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Infection Prevention and Control Practice Handbook

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NSW GOVERNMENT

CLINICAL EXCELLENCE COMMISSION

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Clinical Excellence Commission
Board Chair: Professor Andrew Wilson
Chief Executive: Adjunct Professor Michael C Nicholl

Any enquiries about or comments on this publication should be directed to:
Clinical Excellence Commission
Locked Bag 2030, St Leonards NSW 1590
Phone: (02) 9269 5500
Email: CEC-HAI-IPAC@health.nsw.gov.au
ABN: 79 172 068 820

This handbook has been reviewed and updated by the CEC HAI/IPAC team, who would gratefully like to acknowledge the many infection control practitioners across the local health districts and specialty health networks for their valuable input and feedback.

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Purpose

The purpose of this handbook is to provide practical, day-to-day guidance to support the implementation of the National Safety and Quality Health Service (NSQHS) Standards - Preventing and Controlling Infections Standard (Australian Commission on Safety and Quality in Health Care, 2021c) and the NSW Health Infection prevention and control in Healthcare Settings Policy Directive (NSW Health, PD 2023_025). Both the standards and policy directive establish the Infection prevention and control mandatory standards for NSW Health organisations including affiliated Health Organisations.

This handbook should also be read in conjunction with the most current version of the Australian Guidelines for the Prevention and Control of Infection in Healthcare (National Health and Medical Research Council, 2019b).

The target audience is NSW health workers (HWs), health and care staff working within acute and non-acute healthcare settings and residential care group homes. This includes clinicians, infection prevention and control professionals, managers, and support staff.

Note: any reference to a specific product is to provide an example only. Neither NSW Health nor the CEC endorse or promote any products or equipment identified in this document.

Relevant policies

This handbook complies with and should be read alongside the most current versions of the following NSW Health policy directives and guidelines (refer to table 1).

Table 1 Relevant NSW Health policies and guidelines

NSW Health policy or guideline	PD/GL number
Blood and Body Substances Occupational Exposure Prevention	GL2024_002
Breast Milk: Safe Management	GL2023_021
Clinical and Related Waste Management for Health Services	PD2020_049
Code of Conduct	PD2015_049
Cleaning of the Healthcare Environment	PD2023_018
Early Response to High Consequence Infectious Diseases	PD2024_005
Engineering Services	GL2023_009
Engineering Services Guide	Guide 2023
Enterprise-wide Risk Management	PD2022_023
HIV, Hepatitis B and Hepatitis C - Management of Health Care Workers Potentially Exposed	PD2017_010

Management and Control of Candida auris in NSW Health Facilities	GL2025_006
Management of health care workers with a blood borne virus and those doing exposure prone procedures	PD2019_026
Management of People with HIV Infection Who Risk Infecting Others	PD2019_004
Infection prevention and control in Healthcare Settings	PD2023_025
Influenza Pandemic Plan	PD2016_016
Influenza Pandemic - Providing Critical Care	PD2010_028
Intravascular Access Devices (IVAD) - Infection prevention and control	PD2019_040
NSW Infection prevention and control Response and Escalation Framework	IB2023_019
Occupational Assessment, Screening and Vaccination Against Specified Infectious Diseases	PD2024_015
Principles for the Management of Tuberculosis in New South Wales	PD2022_007
Surveillance and Response to Carbapenemase-Producing Enterobacterales in NSW Health Facilities	GL2025_010
Tuberculosis Contact Investigations	GL2019_003
Tuberculosis Management of People Knowingly Placing Others at Risk of Infection	PD2015_012
Triggers for Escalation Following Detection of Infection Outbreaks or Clusters	GL2024_013
Work Health and Safety - Better Practice Procedures	PD2025_024
Work Health and Safety - Other Workers Engagement	GL2024_012

Definitions and abbreviations

Terms and abbreviations listed in table 2 are defined at the level of detail required for understanding the content of this handbook. Definitions are developed by expert consensus, with references provided where a definition has been obtained from another source.

Table 2 Definitions and abbreviations

Term	Definition
µm	Micrometre, also called a micron. A metric unit of measure for length, equal to 0.001 millimetres.
ABHR	Alcohol-based hand rub. An alcohol-containing preparation designed for reducing the number of viable microorganisms on the hands without the use or aid of running water. The product must meet the EN1500 testing standard for bactericidal effect and be included on the Australian Register of Therapeutic Goods as a medicinal product (National Health and Medical Research Council, 2019b).
ACH	Air Exchange per Hour (ACH) refers to the number of times the volume of air in a space is completely replaced per hour. Volume of Air Flow in cubic ft. per minute (60) / Cubic feet of the area.
ACSQHC	Australian Commission for Safety and Quality in Health Care
Aerosol(s)	Aerosols form part of a continuum of particle sizes generated through a range of respiratory activities in humans, which can carry infective material and facilitate respiratory disease transmission.
AGB	Aerosol generating behaviours that are likely to generate higher volumes of respiratory secretions and thus increase the risk of transmission via aerosols.
AGP	Aerosol generating procedure. Clinical procedures which are known to produce aerosols, such as suctioning, induction of sputum, chest physiotherapy, tracheostomy procedures, nebuliser treatment or bronchoscopy.
Affiliated Health Organisations	Affiliated Health Organisations are not-for-profit religious, charitable, or other non-government organisations which provide health services and are recognised as part of the public health system under the Health Services Act 1997.
Airborne precautions	A type of transmission-based precautions, used to interrupt airborne transmission from patients known or suspected to be infected with agents transmitted person-to-person by the airborne route (National Health and Medical Research Council, 2019b).

Term	Definition
Airborne transmission	Also known as the airborne route. Airborne transmission is a form of indirect transmission that occurs by the dissemination of small, expelled aerosols that can carry microorganisms. The factors affecting airborne transmission include microorganism burden or load in different-sized respiratory particles, the stability of the microorganism in aerosols, and the dose-response relationship for each virus. For airborne transmission to occur, aerosols must be generated, transported through air, inhaled by a susceptible host, and deposited in the respiratory tract to initiate infection (Wang, 2021).
Alert/de-alert (for infection prevention and control)	Enabling of an electronic communication warning 'flag' in a patient's clinical records that indicates a patient's infectious status, for example: multi-drug resistant organism (MRO) colonisation or infection. De-alert is the inactivation of the electronic infection prevention and control Alert (flag).
ANC	Absolute Neutrophil Count
Anteroom	An Anteroom or airlock lobby, when attached to an Isolation room, functions as a controlled area in which the transfer of supplies, equipment and persons can occur without contamination impacting on the surrounding healthcare areas. Also controls the entry or exit of contaminated air when the anteroom door is opened, a controlled area where PPE can don or doff prior to entry/exit of the isolated area.
Antimicrobial	A chemical substance, usually a medicine, that inhibits or destroys bacteria, viruses, fungi, yeasts, moulds or protozoa (Australian Commission on Safety and Quality in Health Care, 2017).
Antimicrobial stewardship	An ongoing effort by a health service organisation to optimise antimicrobial use in order to improve patient outcomes, ensure cost-effective therapy and reduce adverse sequelae of antimicrobial use, including antimicrobial resistance (MacDougall and Polk, 2012).
ARI	Acute Respiratory Infection
ARTG	Australian Register of Therapeutic Goods
Aseptic technique	Aseptic technique consists of a set of specific practices and procedures performed under carefully controlled conditions. Aseptic technique protects patients during clinical procedures by utilising infection prevention measures that minimise the presence of microorganisms. While the principles of aseptic technique remain constant for all procedures, the level of practice will change depending upon a standard risk assessment (National Health and Medical Research Council, 2019b).

Term	Definition
Body substance	Any substance produced by, or otherwise expelled, excreted, or extracted from the body. Body substance is used rather than body fluid to emphasise the need for precautions to prevent contact with solid tissue and faeces as well as blood (including dried blood) and body fluids. This does not include intact skin, hair and sweat.
Candidozyma auris	Previously known as Candida auris
CF	Cystic Fibrosis
CLABSI	Central line associated bloodstream infection
Cleaning	The removal of visible soil (for example, inorganic and organic material) from objects and surfaces and is normally accomplished manually or mechanically using water with detergents or enzymatic products (William A. Rutala, 2008).
Clearance of MRO	MRO Clearance refers to the process of successfully eliminating multi-resistant organisms (MROs) from a person's body or environment, typically through targeted treatment or decontamination.
Clinical areas	A clinical area is a specific physical space within a healthcare setting where direct patient care activities are performed. These areas are typically designated for clinical procedures, examinations, treatments, or consultations, and may include rooms such as operating theatres, treatment rooms, dental operatories, and patient bedsides.
Clinical environment	A clinical environment refers to the broader setting in which healthcare services are delivered. It encompasses the physical infrastructure, equipment, personnel, systems, and organisational culture that support the provision of safe and effective patient care. This includes both direct care areas and supporting spaces such as corridors, administrative offices, waiting rooms, and storage facilities.
Clinical waste	Clinical waste with the potential to cause injury, infection or offence: Unrecognisable human tissue (excluding hair, teeth, nails and anatomical waste), Bulk blood or other body fluids (or body substances), material and equipment visibly stained by blood or body fluids (includes incontinence pads and disposable nappies that come from an infectious patient), lab specimens, cultures or other waste from lab investigations, waste from medical or veterinary research, Genetically Modified Organisms (GMOs) PD2020_049.

Term	Definition
Clostridioides difficile	A gram-positive, spore-forming, toxin-producing bacillus (Carter et al., 2010) typically associated with gastrointestinal disease. *C. difficile* is part of the normal intestinal flora in a small number of healthy patients and hospitalised patients (Cheng et al., 2011). *Clostridioides difficile* infection (CDI). Develops in people taking antibiotics because antibiotics alter the normal enteric flora, either permitting the overgrowth of *C. difficile* or making the patient more susceptible to acquiring *C. difficile*. CDI will occur if *C. difficile* proliferate and produce toxins in the colon (Murray et al., 2002). See Monitoring Clostridioides difficile infection (CDI) in Australia for further information.
Cluster	A disease cluster is an unusually high incidence of a particular microorganism occurring in close proximity in terms of both time and geography. A closely grouped series of events or cases of diseases that fulfils the definition of a case – for example, two or more surgical site infections from the same surveillance period or theatre session of the same type of surgery.
Cohorting	The placement of patients who are infected or colonised with the same microorganism in the same zone [4]. As such, patients placed together under this circumstance may be referred to as a cohort.
Colonisation	Detection of an organism from a site (usually skin, throat, nose, or perineum, and/or chronic ulcers) that shows no sign of invasive infection.
Commensal microorganism	Microorganisms living continuously on or within the body, without causing disease. May become a source of infection in specific circumstances, such as when the microbial population grows to excess or gains access to areas of the body outside its normal habitat.
Consumer	Members of the public who use, or are potential users of, healthcare services (Australian Commission on Safety and Quality in Health Care, 2024). When referring to consumers and/or carers, this term includes patients, residents, clients, consumers, families, carers and other support people.
Construction activity	Any activity relating to the demolition, construction, renovation, remodelling, reconstruction, repair or building maintenance of a Health Organisation.
Contact	1. The state or fact of touching or being in immediate proximity or association (Macquarie Dictionary, 2019). 2. An individual who may have been exposed to an infected person.
Contact precautions	A type of transmission-based precautions used to interrupt the transmission of infectious agents that are spread by direct or indirect contact with the patient or the patient's immediate environment (National Health and Medical Research Council, 2019b).

Term	Definition
COVID-19	Coronavirus disease (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus (a member of a large family of viruses called coronaviruses). ‘CO’ stands for corona, ‘VI’ for virus, and ‘D’ for disease.
CPE (Carbapenem-producing Enterobacterales)	CPE refers to bacteria that are members of the family Enterobacterales that have been identified to carry a carbapenemase gene and are therefore resistant to carbapenems. Note: facilities may use an alternate acronym such as CRE or CRO.
CPO (Carbapenemase producing organism)	An organism with an acquired gene or genes that allow the bacteria to produce one or more carbapenemases, leading to resistance to carbapenems and other beta-lactams. CPE is part of the CPO group.
Critical items	A medical device that comes into contact with blood or normally sterile tissue and that must be sterile at the time of use. Note: a critical medical device confers a high risk of infection if it is contaminated with microorganisms.
Decolonisation	Decolonisation is an evidence-based intervention that can be used to reduce or eliminate colonised microorganisms to prevent healthcare associated infections. Decolonisation can be achieved by treatment of colonised persons with antimicrobials and/or other measures to eradicate the colonising organism.
Decontamination	Use of a physical or chemical means to remove, inactivate or destroy pathogens on a surface or item so that they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use or disposal (National Health and Medical Research Council, 2019b).
Disinfection	A process that eliminates many or all pathogenic microorganisms, except bacterial spores, on inanimate objects. Disinfection reduce the number of viable microorganisms on a product or item to a level previously specified as appropriate for its intended further handling or use (Standards Australia, 2023).
Disinfection 2 Steps	Cleaning procedure consisting of cleaning with neutral detergent followed with a Therapeutic Goods Administration (TGA) registered disinfectant, for example, bleach or hospital grade disinfectant. This process must involve either: a 2-step clean, which involves a physical clean using detergent solution followed by use of a chemical disinfectant; or a 2-in-1 clean in which a combined detergent/disinfectant wipe or solution is used and mechanical/manual cleaning action is involved (Clinical Excellence Commission, 2024).
Double packaging	Double packaging of specimens consists of a leakproof primary receptacle containing the specimen and leakproof secondary packaging with absorbent material to absorb the entire contents of the package (National Pathology Accreditation Advisory Council, 2013).

Term	Definition
Droplet(s)	Respiratory droplets are aqueous droplets containing non-volatile species like organic and inorganic salts, surfactants and proteins, and microbes. Droplets smaller than 5 µm are referred to as droplet nuclei and may remain suspended in the air for significant periods of time and move with air currents (Drossinos et al., 2021).
Droplet transmission	Droplet transmission is a form of direct transmission that occurs by the dissemination of expelled aerosols that can carry microorganisms. Droplets travel directly from the respiratory tract of the infectious individual to the susceptible mucosal surfaces of the recipient, generally over short distances (Siegel et al., 2007).
Droplet precautions	A type of transmission-based precautions used to interrupt droplet transmission occurring from patients known or suspected to be infected with agents transmitted by respiratory droplets (National Health and Medical Research Council, 2019b).
Endemicity	Usual level or incidence of a microorganism in a particular healthcare setting.
EPP	Exposure Prone Procedure (EPP): A type of medical or dental procedure where there is a risk that injury to the health worker could result in their blood to have contact with a patient's open tissues, typically due to the worker's hands being in close proximity to sharp instruments or inside body cavities where visibility is limited.
ESBL	Extended-Spectrum Beta Lactamase
Flagging	Enabling of a communication warning alert that indicates current colonisation or infection in a patient's clinical records (see alert/de-alert).
Fit check	A manual procedure that is used each time a tight-fitting respirator (particulate filter mask or P2/ N95) is used to ensure a seal is achieved.
Fit test	A procedure to evaluate the fit of a tight-fitting respirator (particulate filter mask or P2/ N95) either qualitatively or quantitatively.
FMT	Faecal Microbiota Transplantation
Fomite	An inanimate object or surface that may become contaminated with microorganisms and serve in their transmission.
Functional area	A functional area refers to any area in a healthcare facility that requires cleaning. The functional areas have been grouped under four risk categories: extreme, high, medium, and low. These risk categories reflect the frequency and intensity of cleaning required to meet minimum cleaning standards.
Gowning	The wearing of an impervious or fluid resistant apron or gown for personal protection as a barrier against blood, other body substances, contaminated items and or a contaminated environment.

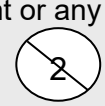
Term	Definition
HAI	Refers to infections acquired in healthcare facilities and infections that occur as a direct or indirect result of healthcare interventions, and which may manifest after people leave the healthcare facility.
Hand hygiene	A general term referring to any action of hand cleansing. Includes washing hands with the use of water, soap or a soap solution, either non-antimicrobial or antimicrobial, or applying a waterless alcohol-based hand rub to the surface of the hands. When performed correctly, hand hygiene results in a reduction of microorganisms on hands (Australian Commission on Safety and Quality in Health Care, 2009).
HBsAg	Hepatitis B surface antigen. A serologic marker on the surface of the hepatitis B virus which can be detected in high levels in serum during acute or chronic hepatitis B.
HBV	Hepatitis B virus
High Consequence Infectious Disease (HCID)	An emerging novel communicable disease of global significance or a HCID is defined as a disease that has potential to cause a high mortality among otherwise healthy people, no routine vaccine exists, risk of airborne spread or unknown mode of transmission, some types of clinical specimens pose generalised risks to laboratory personnel.
Health worker(s) HWs	Refers to all staff delivering or supporting healthcare services in a public Health Organisation. Any person employed or contracted by a NSW Health agency either on a permanent, temporary, casual, volunteer or agency basis.
Healthcare Associated Infection (HAI)	Refers to infections acquired in healthcare facilities and infections that occur as a direct or indirect result of healthcare interventions, and which may manifest after people leave the healthcare facility.
HEPA	High Efficiency Particulate Air
HITH	Hospital in the Home
HIV	Human immunodeficiency virus
HSV	Herpes simplex virus
ICU	Intensive Care Unit
IFU	Instructions for Use
IgM	Immunoglobulin M
Immunocompromised host	An individual who does not have the ability to respond normally to an infection (or other foreign antigen) due to an impaired or weakened immune system. This can be caused by inherited disorders (for example, hypogammaglobulinemia, severe combined immunodeficiency) or acquired disorders (for example, diabetes, HIV infection, malnutrition and drugs).

Term	Definition
Immunosuppression	Inhibition or suppression of the immune response. This can be either deliberate (for example, as part of disease treatment or preparation for transplantation to avoid graft rejection) or as a side effect of therapy (for example, as may occur with corticosteroid therapy or chemotherapy).
Infection	Infection is the invasion of a host organism's bodily tissues by microorganisms and their subsequent multiplication, resulting in disease-causing symptoms and the reaction of host tissues to these organisms and the toxins they produce.
Infection Control professional (ICP) or infection prevention and control professional	An Infection prevention and control (ICP) professional is defined as a healthcare professional such as a medical doctor, nurse, or other health-related practitioner who has completed a certified postgraduate infection prevention and control training program, a nationally or internationally recognised postgraduate course in infection prevention and control, or a related core discipline in which infection prevention and control is a central component of the curriculum, including both practical and clinical infection prevention and control training (World Health Organization, 2020).
Infectious Respiratory Particles (IRPs)	Pathogens expelled from an infected person's "mouth or nose by breathing, talking, singing, spitting, coughing or sneezing" should be described as infectious respiratory particles, or IRPs (WHO 2024).
Invasive device	A device which, in whole or in part, penetrates inside the body, either through a body orifice or through the surface of the body (European Union, 2017).
Invasive procedures	Procedures that require entry into tissues, cavities or organs or repair of traumatic injuries (National Health and Medical Research Council, 2019b).
IV	Intravenous
IR	Interventional Radiology
Key parts	Key parts are the sterile components of equipment used during a procedure, for example, bungs, needle hubs, syringe tips, dressing packs (Australasian College of Infection Control and Prevention, 2015).
Key sites	Key sites include any non-intact skin and insertion or access sites for medical devices connected to the patient, for example, insertion/access sites of intravenous devices, urinary devices, open wounds (Australasian College of Infection Control and Prevention, 2015).

Term	Definition
Maintenance	The process of maintaining plant, equipment and building elements in their original condition (Victorian Goverment Department of Health, 2014).
MBL	Metallo-Beta-Lactamase (one of the recognised carbapenemase)
Medical examination gloves	Non-sterile medical examination gloves that meet the requirements of AS/NZS 4011.1:2014 *Single-use medical examination gloves, Part 1: Specification for gloves made from rubber latex or rubber solution.*
MHDA	Mental Health, Drug and Alcohol
mm^3	Cubic millimetre
Monitor	To check, supervise, observe critically, or record the progress of an activity, action, or system on a regular basis to identify change.
MRO	Multi-drug resistant organism(s). MROs are defined as microorganisms, predominantly bacteria, that are resistant to one or more classes of antimicrobial agents.
MSSA	Methicillin-susceptible *Staphylococcus aureus*
MRSA	Methicillin-resistant *Staphylococcus aureus*. A strain of *S. aureus* that is resistant to beta-lactam antibiotics including penicillins and cephalosporins.
Negative pressure room (Class N)	A Class N isolation room is a negatively pressured single room, with or without an anteroom, with an ensuite that is not shared. It is used for patients who require isolation to reduce airborne transmission of disease (for example., varicella, measles, pulmonary or laryngeal tuberculosis).
Neutropenia	Abnormally low count of neutrophils. Neutropenia in adults is defined as an ANC $<0.5x10^9$/L, or with or less than $1.0x10^9$/L and predicted to fall lower than $0.5x10^9$/L (Tam et al., 2011). Severe, or profound, neutropenia is defined as an ANC $\leq 0.01x10^9$/L (Freifeld et al., 2011).
NHMRC	National Health and Medical Research Council
NICU	Neonatal Intensive Care Unit
Non-critical items	A medical device that only comes into contact with intact skin.
NSW Health Organisation	This term refers to local health districts, statutory health corporations, affiliated Health Organisations and administrative units within the Health Administration Corporation, such as the NSW Ambulance Service, HealthShare NSW and the Ministry of Health, as defined in the Health Services Act 1997.

Term	Definition
NSQHS – Version 2	National Safety and Quality Health Service Standards. A national quality assurance mechanism to assess whether minimum standards of safety and quality are met by healthcare facilities. National Standards 3 is Preventing and Controlling Healthcare-Associated Infection Standard.
Outbreak	Outbreak is the occurrence of disease exceeding the expected level for a given population within a specific timeframe. This includes single cases of some diseases not previously seen or those that have previously been eliminated. Typically, in healthcare this has been defined as two or more cases, which should trigger an outbreak management process.
P2/N95 respirator	A close-fitting respirator worn for airborne precautions, which is capable of filtering 0.3µm particles. A P2 respirator must comply with *AS/NZS 1716:2009 Selection, use and maintenance of respiratory protective equipment.*
Patient Surroundings (Patient Zone)	The space temporarily occupied by an individual patient and the items within it. This will vary between settings and will contain: 1. Surfaces frequently touched by the patient occupying that space (for example, bed, bedside table, chair, personal belongings); and 2. Surfaces frequently touched by the staff member providing patient care (for example, monitors, knobs). Patient surroundings will vary with the patient setting. Patient surroundings do not include curtains, partitions and doors between separate patient areas (Australian Commission on Safety and Quality in Health Care, 2020).
PCR	Polymerase Chain Reaction
PHU	Public Health Unit
PICC	Peripherally Inserted Central Catheter
Plant	Large machinery/equipment in a health facility such as boilers, large sterilising machines, reverse osmosis water systems, robotic-assisted surgical system, air handling equipment, MRI machines.
Point of care	The time and location where an interaction between a patient and clinician occurs for the purpose of delivering care.
PPE	Personal protective equipment. Refers to a variety of protective barriers used alone, or in combination, to protect mucous membranes, skin, and clothing from contact with recognised and unrecognised sources of infectious agents in healthcare settings.
Pre-operative load reduction	Use of topical or systemic antibiotics to reduce *Staphylococcus aureus* colonisation or infection prior to surgical procedures.

Term	Definition
Procedure room	A room designated for the performance of invasive procedures which does not require a restricted environment but may require the use of sterile instruments or supplies. Moderate sedation, minimal sedation and local anaesthesia may be administered in a procedure room (Burlingame et al., 2016).
Protective environment	A specialised patient care area, usually in a hospital, with a positive airflow relative to the corridor (such as, air flows from the room to the outside adjacent space). The combination of HEPA filtration, high numbers of air changes per hour (>12), and minimal leakage of air into the room creates an environment that can safely accommodate patients who are severely immunosuppressed (Sehulster et al., 2003).
Protective eyewear	Refers to goggles, face visors or face shields.
Protective isolation	A range of practices used to protect highly susceptible patients from infection. These practices may include: physical separation from the main hospital or ward population (typically in a standard single room), measures to prevent the exogenous acquisition of microorganisms (for example, hand hygiene), restrictions placed on movement, visitors and diet, antimicrobial prophylaxis and selective decontamination of the digestive system, and supportive care to maintain the integrity of skin and mucous membranes, including skin, oral and dental care (Wigglesworth, 2003).
RACF	Residential Aged Care Facility
Rehabilitation	Rehabilitation care in NSW is defined as the provision of care that aims to: restore functional ability for a person who has experienced an illness or injury; enable regaining function and self-sufficiency to the level prior to that illness or injury within the constraints of the medical prognosis for improvement; and develop functional ability to compensate for deficits that cannot be medically reversed (Agency for Clinical Innovation, 2015).
Risk assessment	The review of a patient or clinical situation to determine risk of adverse consequences.
Risk management	Actions implemented to minimise or control risk.
Reprocessing	All the activities required to ensure that a used, reusable medical device is safe for its intended purpose. This is a multi-step process that includes cleaning, inspection and assembly, functional testing (if applicable), disinfection (if applicable), packaging and labelling and sterilization (if applicable) (Standards Australia, 2023).
RMD	Reusable Medical Device

Term	Definition
RPD	Respiratory protective devices (respirators) worn on the face are designed to reduce the wearers risk of inhaling hazardous airborne particles (including infectious agents, aerosols, gases, or vapours).
SABSI	*Staphylococcus Aureus* Blood Stream Infection
Satellite reprocessing unit	A satellite reprocessing site is a small unit/department/clinic that reprocesses (sterilises or high-level disinfection) a single specific type of reusable medical device, for example, transvaginal transducer, nasendoscope, flexible cystoscope, TOE transducer.
Screening	Microbiological testing, for the purpose of detection of microorganisms within a patient or population. By intent, screening is different to clinical diagnostic testing that is used in the setting of suspected infection.
Semi-critical items	Equipment or devices that come into contact with mucosal membranes or non-intact skin. Such items include but are not limited to respiratory therapy and anaesthesia equipment, gastrointestinal endoscopes, bronchoscopes, laryngoscopes, oesophageal manometry probes, anorectal manometry catheters, endocavitary probes, prostate biopsy probes, infrared coagulation devices, transvaginal probes and diaphragm fitting rings, dental dam, removable dental appliance, dental x-ray holder.
Sentinel event	Events that occur infrequently and may warrant further investigation into whether routine infection prevention and control practices and procedures are in place and working adequately, for example, unexpected deaths or unanticipated serious or psychological harm (or risk thereof) due to infection.
Sharp(s)	Any object capable of inflicting a penetrating injury, which may or may not be contaminated with blood and/or body substances. This includes needles and any other sharp objects or instruments designed to perform penetrating procedures.
Sharps container	A receptacle for the disposal of sharps, designed to meet *AS/NZS 4031:1992 Non-reusable containers for the collection of sharp medical items used in health care areas* and *AS/NZS 4261:1994 Reusable containers for the collection of sharp items used in human and animal medical applications.*
Single patient use equipment	Equipment to be used for one patient only. Single patient use equipment should not be used on more than one patient.
Single use equipment	Equipment to be used on a single occasion for one patient only and then discarded after use. Single use equipment should not be reused on the same patient or any other patient. Single use equipment is labelled with this symbol: 

Term	Definition
Social Contact	Any form of physical contact resulting from non-clinical, everyday interactions with others, for example, handshaking and hugging.
spp.	Species
Standard precautions	Standard Precautions represent the minimum infection prevention measures that apply to all patient care, regardless of suspected or confirmed infection status of the patient, in any setting where healthcare is delivered. These evidence-based practices are designed to both protect and prevent spread of infection among patients and health workers (Centers for Disease Control and Prevention, 2024).
Sterile	Free from all living microorganisms, usually described as a probability (for example, the probability of a surviving microorganism being 1 in 1 million) (William A. Rutala, 2008).
Sterile gloves	Sterile gloves that meet the requirements of *AS/NZS 4179:2014 Single-use sterile rubber surgical gloves – Specification.*
Sterilization	A validated process used to render a product free from viable microorganisms (Standards Australia, 2023).
Stock	Medical consumables.
SSI(s)	Surgical Site Infection(s)
Susceptible	Likely or liable to be influenced or harmed by a particular thing (Oxford Dictionaries, 2025).
TB	Tuberculosis
Teach back	Asking patients to explain in their own words what they need to know or do. It is a chance to check understanding and re-teach information if needed. Teach back is not a test of the patient, but of how well the clinician explained a concept (Yen and Leasure, 2019) .
Terminal clean	Cleaning and disinfection process required after patient(s) with transmission-based precautions has vacated the room, either through room transfer or discharge (Clinical Excellence Commission, 2024).
TGA	Therapeutic Goods Administration
Transmission	Movement of microorganism(s) from a colonised or infected individual, contaminated surface, or vector to a susceptible individual.
Transmission-based precautions	Additional work practices in situations where standard precautions alone may be insufficient to prevent transmission of infection. For example, contact, droplet and airborne precautions or a combination of these precautions.

Term	Definition
Triple packaging	Triple packaging of a specimen consists of a leakproof primary receptacle, leakproof secondary packaging with absorbent material to absorb the entire contents of the package and outer packaging that has secure closure (National Pathology Accreditation Advisory Council, 2013).
VHF(s)	Viral Haemorrhagic Fever(s)
Volunteer	A person who works in an unpaid role for an NSW Health Organisation.
VRE	Vancomycin-resistant enterococcus. A strain of *Enterococcus,* a typical gut bacterium that displays resistance to vancomycin.
VZV	Varicella Zoster Virus
WHO	World Health Organization
Zoning	Zoning, cohorting or ring fencing refers to the grouping of patients with the same condition or same risk in the same area.

Chapter 1 Clinical governance requirements

1.1 Introduction

Infection prevention and control refer to evidence-based practices and procedures that, when applied consistently in healthcare settings, can prevent or reduce the risk of transmission of microorganisms to healthcare providers, clients, patients, residents, visitors and the general community. Infection prevention and control not only involve operational and risk assessments but also requires alignment with a strategic plan. This strategic approach enables executive-level buy-in, supports the identification of gaps within the program, and ensures that infection prevention and control initiatives are integrated, sustainable, and responsive to emerging risks.

Clinical governance refers to a system through which Health Organisations are accountable for continuously improving the quality of their services and safeguarding high standards of care, which includes the prevention of healthcare associated infection (HAIs), by creating an environment in which excellence in clinical care will flourish (Scally and Donaldson, 1998, Halton et al., 2017, Australian Commission on Safety and Quality in Health Care, 2021b). Health Organisations have a legal responsibility to provide a safe work environment, safe systems of work and a safe environment for patients and visitors.

Effective clinical governance is necessary to support and promote improvements in infection prevention and control and to provide safe and sustainable use of infection prevention and control resources. Focusing on strengthening contextual factors at the organisational level that otherwise undermine capacity to implement evidence-based practice is key to sustaining current infection prevention and control successes and promoting further practice improvements (Halton et al., 2017).

Each NSW Health Organisation must ensure that they have an executive sponsor responsible for their infection prevention and control program. The infection prevention and control program must have suitably qualified infection prevention and control professional(s) and a current operational/ risk plan that is in line with the Infection prevention and control Policy Directive.

Clinical governance accountabilities for infection prevention and control include:

- executive engagement and clearly defined leadership
- implementation, reporting and evaluation of a local infection prevention and control program
- increasing consumer participation and education for infection prevention and control
- HAI and antimicrobial stewardship surveillance
- where relevant, inclusion and consultation with non-acute healthcare services in the infection prevention and control program.

The local infection prevention and control program is an integral component of each Health Organisation ’s clinical governance system and should be regularly evaluated. Health Organisation’s infection prevention and control gap analysis and risk management plan or other processes should be used for the ongoing assessment and evaluation of the infection prevention and control program.

The NSW Health Incident Management Policy Directive should be used to report and record incidents. The Health Organisation are also to establish and maintain a risk management framework that is tailored to the needs of the organisation as identified under the risk management category in the Enterprise-wide Risk Management Policy Directive.

The NSW infection prevention and control Response and escalation framework (Framework) supports NSW Health to respond to both outbreaks and pandemics or infections of state or national

significance. The Framework outlines a foundational level for when the NSW Health system remains prepared for infection risks, with structured infection prevention and control escalation strategies for yellow, amber and red transmission risks. For more information refer to the NSW Infection prevention and control Response and Escalation Framework.

1.2 Infection prevention and control program

Infection prevention and control programs are a core element in healthcare patient safety and quality programs. NSW Health Organisations require a comprehensive program to make sure that current and future risks, challenges and threats of HAIs, transmissible multi-drug resistant organisms (MROs) and communicable diseases are identified and managed.

A comprehensive infection prevention and control program should comprise of:

- executive engagement, clearly defined Infection prevention and control leadership and strong relationships between infection prevention and control teams, executive teams, clinical governance, and microbiological/infectious diseases support
- provision of adaptive strategies such as electronic, remote, and/or virtual infection prevention and control program in partnership with public health and epidemiology expertise to ensure safety of health workers and healthcare consumers
- processes to identify and manage risks associated with infections including a governance structure that incorporates risk escalation, reporting, feedback and assigned responsibility for each core component
- policies and procedures for infection prevention and control including antimicrobial stewardship and linkages between national, state, local health district (LHD), speciality health network (SHN) and facility policies/guidelines
- multimodal strategies based on risk assessment to drive improvements in HAI rates, infection prevention practices, and patient infection risks
- built environment, materials, and equipment at both the facility, clinical level and point of care to reduce the risk of HAI and transmission of multi-drug resistant organisms (MROs) including scalability to manage endemic MRO/outbreaks
- a HAI surveillance program that includes national, state and facility clinical and process indicators to monitor, audit, and evaluation of infection prevention and control practices and feedback mechanisms
- a program for the maintenance of standards and practices for reducing or eliminating contamination of environmental and equipment risks
- trained professional(s) to lead and manage the program including education and training programs for all health workers (HWs) that are evaluated for effectiveness and applicability to each of the health professional groups.

An Infection prevention and control professional is defined as a health care professional such as a medical doctor, nurse, or other health-related practitioner who has completed a certified postgraduate infection prevention and control training program, a nationally or internationally recognised postgraduate course in infection prevention and control, or a related core discipline in which infection prevention and control is a central component of the curriculum, including both practical and clinical infection prevention and control training (World Health Organization, 2020).

The effectiveness of infection prevention and control programs is significantly enhanced when led by credentialed professionals. Credentialing ensures that infection prevention and control

clinicians possess the necessary expertise, experience, and commitment to evidence-based practices, thereby improving patient safety and healthcare outcomes. Studies indicate that Health Organisations with credentialed infection prevention and control leaders demonstrate better adherence to infection prevention and control standards and more effective management of HAIs. This professional recognition not only fosters public confidence but also supports compliance with national safety and quality standards (Macbeth et al., 2025).

1.3 Infection prevention and control core components

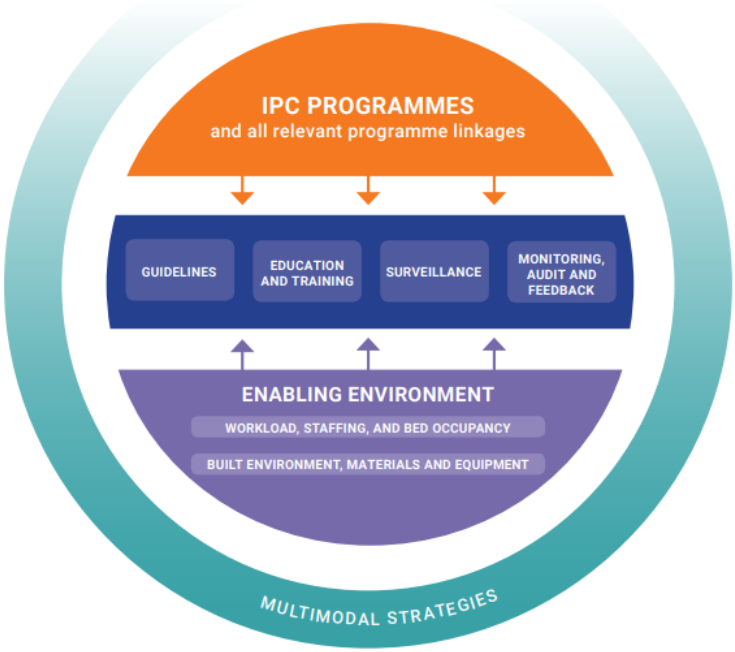
The World Health Organization (WHO) recommends multimodal improvement strategies as a core component of effective Infection prevention and control programs (World Health Organization, 2020). The multimodal strategy consists of five elements: system change, training and education, evaluation and feedback, reminders in the workplace, and institutional safety climate (Figure 1 Infection prevention and control program minimum requirements).

The objectives of the multimodal improvement strategies are to support healthcare facilities to develop or strengthen infection prevention and control programs and strategies through the provision of evidence- and consensus-based guidance that can be adapted to the local context, while taking account of available resources and public health needs (World Health Organization, 2019). There are eight components of infection prevention and control programs that is crucial for the establishment and effective functioning:

1. Infection prevention and control programs and governance: Dedicated, trained team in each healthcare facility for the purpose of preventing Healthcare Associated Infection (HAI) and combating antimicrobial resistance (AMR). The education and training of relevant health workers on the guideline recommendations and the monitoring of adherence with guideline recommendations should be undertaken to achieve successful implementation.
2. Infection prevention and control guidelines: Current evidence-based resources and guidelines developed and utilised for the purpose of reducing HAIs and AMR.
3. Infection prevention and control education: The infection prevention and control program should support the education and training of the health workers along with assessment and outcome measure by monitoring and reflective practice as one of its core functions.
4. Surveillance: HAI surveillance, analysis and quality control monitoring should be in place to guide infection prevention and control interventions and detect outbreaks, including AMR surveillance with timely feedback of results to health workers and stakeholders and through networks.
5. Multimodal strategies: infection prevention and control activities using multimodal strategies should be implemented to improve practices and reduce HAIs and AMR.
6. Monitoring/auditing of infection prevention and control practices and feedback: regular monitoring/ audit and timely feedback of healthcare practices according to infection prevention and control standards should be performed to prevent and control HAI and AMR. Feedback and action taken as a result of monitoring/audits should be provided to all audited persons and relevant health workers.
7. Workload, staffing, patient flow and access: health worker staffing levels including infection prevention and control, support services and clinicians should be adequately assigned according to patient workload.
8. Built environment, materials, equipment, proposed service planning and new development for infection prevention and control at the facility level: Patient care activities should be

undertaken in a clean and hygienic environment that facilitates practices related to the prevention and control of HAI, as well as AMR.

Figure 1 Infection prevention and control program minimum requirements



Source: WHO Minimum requirements for infection prevention and control programmes

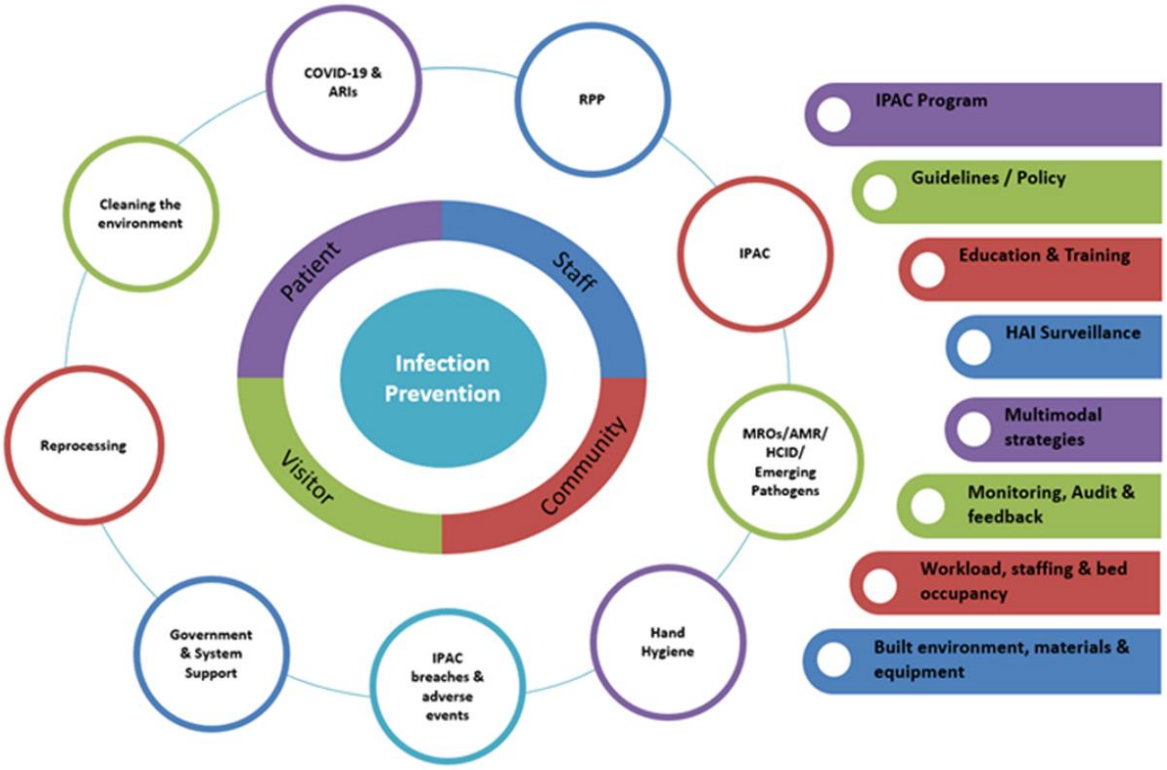
1.4 Clinical Excellence Commission infection prevention and control function

The Infection prevention and control and Healthcare Associated Infections (HAI) program at the Clinical Excellence Commission (CEC) operates as the lead agency for NSW Health infection prevention and control and HAI, providing leadership in safety and quality for healthcare providers, clients, patients, residents, visitors, and the broader community.

The CEC's existing service provision and current infection prevention and control/HAI framework adherence to WHO core components of an infection prevention and control program is outlined in figure 2 NSW infection prevention and control and HAI program framework.

The infection prevention and control/HAI Program assists local health districts and specialty networks in NSW to manage and monitor the prevention and control of HAIs and AMR.

Figure 2 NSW infection prevention and control and HAI program framework

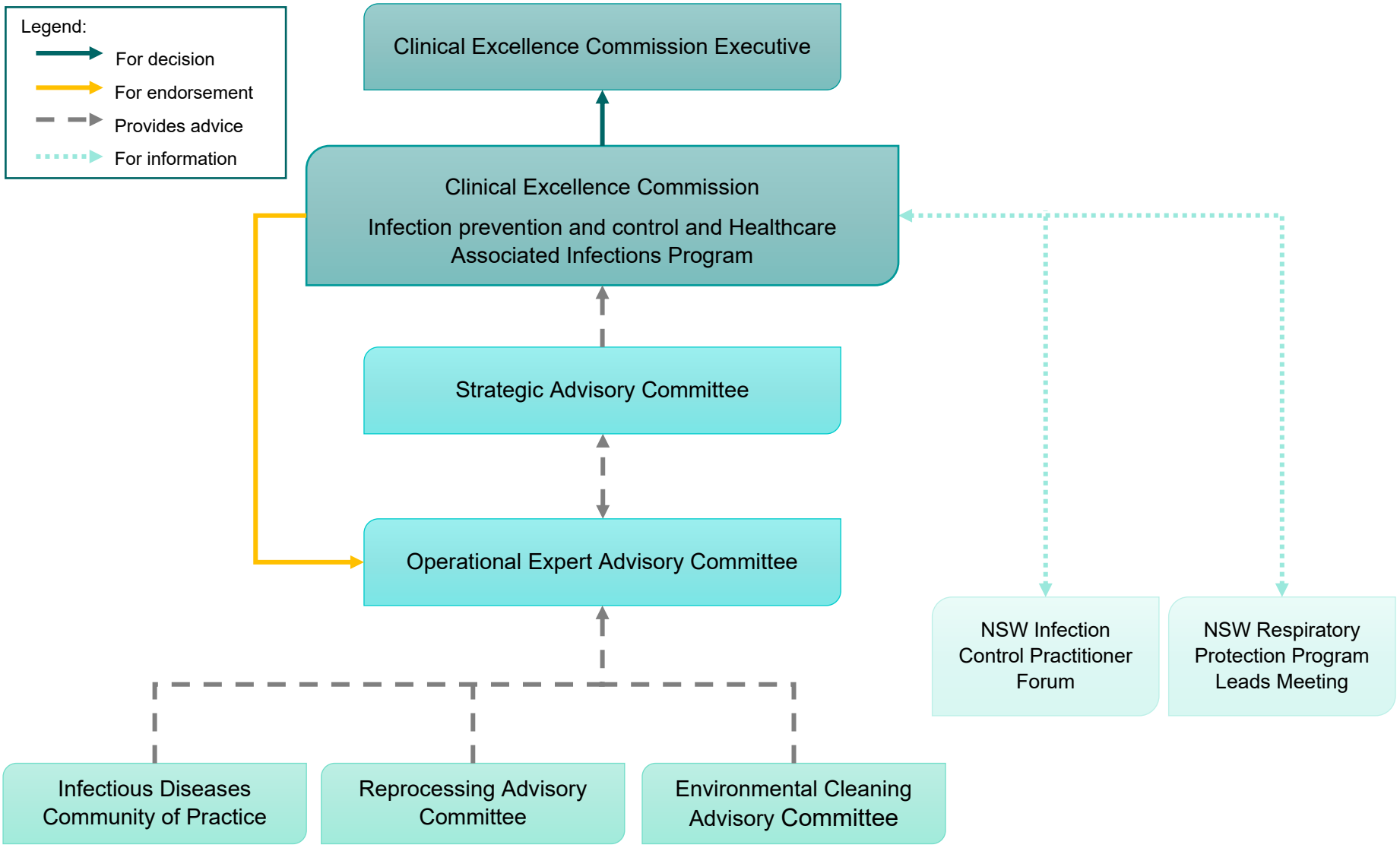


1.4.1 CEC infection prevention and control/HAI program governance structure

The CEC infection prevention and control/HAI team consists of expert clinicians working collaboratively with relevant stakeholders across the system to provide effective leadership, guidance and resources to promote safe and quality healthcare provision to healthcare consumers across the state (Figure 3 CEC infection prevention and control/HAI program governance).

Guidance and resources are developed in consultation with multidisciplinary groups representing relevant clinical specialties to provide independent and impartial strategic advice on system-wide issues (Dempsey et al.). This consultation also seeks to prepare and respond to infection prevention and control requirements and facilitates escalation and dissemination of advice to frontline clinicians.

Figure 3 CEC infection prevention and control/HAI program governance



The role of CEC infection prevention and control/HAI program includes:

- provide advice about the strategic direction for the prevention, control and monitoring of HAI and AMR in NSW public Health Organisations and other healthcare facilities and services
- in collaboration with Local Health Districts (LHDs), Specialty Health Networks (SHNs), Pillar Agencies and HealthShare NSW, provide advice and guidance on implementation and monitoring of HAI and AMR related programs and projects
- provide advice and guidance on the international, national and state evidence regarding HAI and AMR prevention and on emerging issues impacting the NSW population
- consultation and collaboration with relevant stakeholders to provide strategic advice and guidance on implementation and monitoring of the infection prevention and control policies, procedures and guidance across the state
- education, training and mentoring of novice, and existing infection prevention and control professionals and leaders.

1.5 Roles and responsibilities of facility or organisation

Every facility or Health Organisation is to have an infection prevention and control program in place. The success and effectiveness of such a program require the development and involvement of suitably qualified personnel or the development of adequate systems to link in with such expertise.

Everyone working in a Health Organisation both clinical and non-clinical staff has a responsibility to commit to the infection prevention and control principles to do no harm and, therefore, prevent and control infection in the healthcare setting. Infection prevention and control is not only embedded in day-to-day work practices but is also a critical component of strategic planning.

A comprehensive infection prevention and control approach includes:

- Strategic planning to align infection prevention and control goals with organisational priorities and ensure sustainability.
- Operational and risk assessments to identify vulnerabilities and guide targeted interventions.
- Executive-level engagement, which is essential for securing resources, driving accountability, and embedding infection prevention and control into governance structures.
- Infrastructure and design input, including providing expert advice on rebuilds, refurbishments, compliance with the Australian Health Facility Guidelines (AusHFG), and planning for furniture, fittings, and equipment.

This integrated approach supports the identification of program gaps, enhances system resilience, and ensures infection prevention and control is proactively considered across all levels of healthcare delivery.

Each health worker is accountable for the inclusion of infection prevention and control in the work they do. In addition, each health worker is also ethically accountable for communicating or reporting breaches of infection prevention and control in any work they witness which is carried out by other health workers. Refer to NSW Health Core values and NSW Health Code of conduct for more information.

Registered health workers have a legal obligation to comply with infection prevention and control as identified in the Health Practitioner Regulation (NSW) 2016 – Reg 5 Infection Control Standards.

1.6 infection prevention and control program governance and responsibilities

LHD/SHNs are required to have processes in place to comply with the recommendations and requirements for the implementation of the infection prevention and control policy directive (NSW Health, PD 2023_025) and requirements described in this practice handbook. LHD/SHNs are to ensure that there is clear governance for the local infection prevention and control program which includes the responsibilities for:

- Chief Executive
- General managers and service directors
- infection prevention and control Program Steering Committee (Facility/LHD/SHN)
- Supervisors/line managers
- Employees.

Chief Executive

Responsibilities of the Chief Executive include:

- Ensure that a process is in place to enable the infection prevention and control program to be implemented, including establishing an infection prevention and control Steering Committee or equivalent and is included as part of the organisations strategic and operational plans
- Ensure that any high-risk issues related to infection prevention and control are identified and the risks are mitigated in accordance with the Enterprise-wide Risk Management Policy Directive
- Ensure that all required resources are available for the implementation and adherence of the infection prevention and control policy directive and related guidance documents and resources.

General managers and service directors

The General managers and service directors are responsible to:

- Ensure that the infection prevention and control policy directive and related guidance are implemented within their governance areas
- Ensure that HAI and AMR hazards / risks are identified, risk assessments are undertaken, and risk mitigation strategies are implemented and evaluated in consultation with the infection prevention and control team
- Ensure that training and resources are available to enable compliance with infection prevention and control policy directive and related guidance.

Clinical governance or quality and safety units

The Clinical governance or quality and safety unit plays a pivotal role in embedding infection prevention and control into the clinical care, ensuring that systems, practices, and culture across the organisation consistently support safe, high-quality healthcare delivery. These include:

- Regular review of infection prevention and control program effectiveness, including surveillance of HAIs and antimicrobial use
- Identification, assessment, and mitigation of infection risks using structured frameworks (for example, NSW Health Risk Management Framework)

- Partnering with patients and families in infection prevention and control education and program design
- Supporting safe and appropriate use of antimicrobials through collaboration with pharmacy and infectious disease departments
- Ensuring infection prevention and control practices align with national and state guidelines and accreditation standards (for example, NSQHS Standard 3).

Infection prevention and control program committee (facility/LHD/SHN)

The responsibilities of facility infection prevention and control program committee include:

- Ensuring the foundation of the committee to be based on and address the domains of Preventing and Controlling Infections Standard
- Oversees the infection prevention and control policy directive requirements across the LHD/SHN
- Ensuring any high-risk issues identified with the infection prevention and control program that are unable to be resolved are escalated to the Chief Executive (or delegate)
- Receives, reviews, and responds to status reports on infection prevention and control program implementation, progress and evaluation of the program including HAIs, AMR
- Collaboratively resolves issues that have been escalated regarding the infection prevention and control program and implementation of the infection prevention and control policy directive
- Implementation of an infection prevention and control link program (dedicated clinicians to act as a link between their own clinical area and the infection prevention and control team to raise awareness of infection prevention and control) and ensures that the program meets the requirements for the facility and LHD/SHN.

Managers

The managers are to:

- Ensure that the infection prevention and control policy and program core elements are implemented, monitored and evaluated
- Ensures that an escalation pathway is established with a reporting pathway in place
- Ensure that health workers are provided with relevant education and training to apply infection prevention and control strategies and provided with correct tools and guidance.

Infection prevention and control team

The infection prevention and control team play a critical role in safeguarding healthcare environments by providing operational, day-to-day risk assessments to identify, reduce, and manage the risk of infection transmission.

The infection prevention and control team are responsible for:

- Developing and maintaining written policies and procedures, ensuring they are regularly evaluated and updated in line with current evidence and best practice
- Preparing and implementing an infection prevention and control program plan, with endorsement from the infection prevention and control governance committee where appropriate

- Monitoring and evaluating daily patient care practices to ensure they align with infection prevention standards
- Facilitating the hand hygiene auditing program, promoting compliance and continuous improvement
- Identifying and escalating issues in the implementation of infection prevention and control activities that require resolution or support from the infection prevention and control program steering committee
- Providing expert advice on infrastructure projects, including new builds, refurbishments, and compliance with the AusHFG, as well as input into furniture, fittings, and equipment planning
- Oversees surveillance for HAIs/AMR, report and address issues, collaborate with pharmacy and antimicrobial stewardship committees as needed
- Investigate outbreaks and provide data (and expert advice) that should be evaluated to allow for any change in practice or allocation of resources
- Facilitate education of health workers in infection prevention and control policy, practice, and procedures relevant to their own areas
- Provide advice to health workers on all aspects of infection prevention and control on a day-to-day basis
- Lead and develop with educators/managers an annual training plan for health workers and implement infection prevention and control training activities
- Advise and support that only appropriate infection prevention and control supported supplies and equipment are made available by procurement teams
- Have a scientific and technical support role in purchasing and monitoring of equipment and supplies, and in evaluation and checking the efficacy of sterilization and disinfection measures
- Advise and support engineering services to address recommendations for water system testing and ventilation system management
- Advise and support food and environmental services
- Support and participate in research, assessment, quality improvement and change management programs
- Participate in audit activities, report, escalate and act on results/outcomes
- Promote and support a link program to ensure infection prevention and control policies and procedures are implemented, practiced and measured
- Support and promote Occupational Assessment, Screening and Vaccination Against Specified Infectious Diseases program compliance and work health safety risks relating to infection prevention and control (for example, Work Health and Safety - Blood and Body Substances Occupational Exposure Prevention).

Employees

Employees are to:

- Adhere to all components of the infection prevention and control policy directive and related guidance
- Complete all required training and education relevant to their role

- Understand and comply with their individual responsibilities, including all mandatory policies, standards, and guidance related to infection prevention and control.

In line with the core components of an infection prevention and control program (World Health Organization, 2020), the practical aspects are list in the below table.

Table 3 Core components of an infection prevention and control program

Core components	Examples of practical application
A governance structure that incorporates risk escalation, reporting and feedback	• Documented organisational structure including reporting accountabilities • Knowledge of how to collect accurate and verified information, assess risk and document the information for reporting urgently (brief) • Documented reporting line for routine and urgent information • Documented feedback plan for routine reports, incidents, audit results, quality improvement projects, outbreak reports
Clearly defined objectives, functions and annual action plans	• Overview of the program provided for accreditation surveys • Position description and role delineation for infection prevention and control professionals • infection prevention and control risks and operational plan for the facility • Operational and business plans including actions and evaluations
Clear objectives that have scalability to manage any potential risks	• Risk and operational plan for the infection prevention and control program • Identification and management strategies for organisms specific to local epidemiology • Response and escalation plan for clusters and outbreaks
Trained professional(s) to lead and manage the program	• Properly trained infection prevention and control professionals to lead the program; have mentoring for health workers who are relieving or who are untrained • Access to a network of experienced infection prevention and control professionals who can answer questions or provide advice
Linkages between national, state, LHD and facility policies/guidelines	• Reflected in the references in local procedures, reports or plans

Microbiological/infectious diseases support	• Establish linkages with local experts • Develop systems and process to access clinical expertise
Education and training programs for all health workers that are evaluated for effectiveness and applicability to each of the health professional groups	• Competency or clinical assessments, aseptic technique audits, hand hygiene audits, environmental cleaning audits • Review of incidents • HAI surveillance results • Reporting of issues identified in clinical unit reviews
A HAI surveillance program that includes national, state and facility clinical and process indicators	• Documented program that includes clinical/process indicators, who collects the data, where the data is documented, how the data is analysed, how each case is validated, how it is reported and feedback to stakeholders • How trend data is monitored
Multimodal strategies to drive improvements in HAI rates, infection prevention practices, and patient infection risks	• Determine the strategies that are required to drive improvements. For example, hand hygiene, cleaning shared patient care equipment, patient education, standard and transmission-based precautions, surgical asepsis • What other programs are involved in contributing to the strategies. For example, antimicrobial stewardship, environmental cleaning, reprocessing of reusable medical devices, education programs, competency assessment programs • What committees contribute to these strategies, for example, product evaluation, new and emerging technologies (related to cleaning and reprocessing), operating theatre management (reduction of SSIs)
Monitoring/audit/evaluation of infection prevention and control practices and feedback mechanisms	• Development of an annual audit program for infection prevention and control with assigned responsibility • Ongoing risk assessments – use of a standard template and tracking of recommendations to ensure completion • Development of a standard templates for reporting that include communication and feedback • Development of assessments for standard and transmission-based precautions • Development of a monitoring program for critical shared patient care equipment
A program for the maintenance of standards and practices for reducing or eliminating contamination of	• Inclusion in the reporting requirements for environmental cleaning audits to ensure benchmarks are met • Inclusion in assessment of reprocessing areas to ensure compliance with *AS 5369:2023, Reprocessing of reusable*

environmental and equipment risks	*medical devices and other devices in health and non-health related facilities* • Reporting of maintenance processes to peak committees • Maintain risk register of issues, interventions and outcomes
Built environment, materials and equipment at both the facility, clinical level and point of care to reduce the risk and transmission of HAIs	• Inclusion of infection prevention and control staff in: ○ designs, review and commissioning of building works ○ involvement in planned works within clinical space ○ purchase of new equipment ○ compatibility of equipment and cleaning chemicals

1.7 Link program

A link or a liaison program is a strategy to improve engagement and compliance in clinical areas and departments or units. Dedicated clinicians act as a link between their own clinical area and the infection prevention and control team to raise awareness of infection prevention and control within their local area or facility and where appropriate across the local health district/speciality health networks. They are trained to educate colleagues and motivate health workers, patients, visitors and carers to improve infection prevention and control practices to ensure safe care is delivered at all times (Dekker et al., 2023, Ghorbanmovahhed et al., 2023). Implementation of a local link program supports compliance with the requirements of the NSQHCS. The objectives of the link program are to:

- support good communication regarding measures for an optimal infection prevention and control program
- increase the awareness of infection prevention and control in clinical practice
- ensure improved patient outcomes through appropriate education, monitoring and support measures for the control of infections within ward/department
- broaden the base of infection prevention and control expertise and experience in clinical staff
- succession planning and development of infection prevention and control capacity
- improve the dissemination and implementation of infection prevention and control guidelines and tailor the LHD/SHN infection prevention and control program with the specific needs to their clinical setting/speciality.

Strategies to support link program:

- Education, commitment and coordination by the infection prevention and control team
- Support from executive, senior management, ward/unit management and between link personnels
- Provide systems, tools and resources to enable improvement in infection prevention and control practices
- Ongoing review and evaluation of the program
- Encourage reward and recognition.

Refer to Strategies to improve the implementation of infection control link nurse programmes in acute-care hospitals and Evaluation of an infection control link nurse program: an analysis using the RE-AIM framework for more information.

1.8 National accreditation standards

The National Safety and Quality Health Service (NSQHS – Standard 3 Preventing and Controlling Infection Standard) are a quality assurance mechanism aimed at protecting patients from harm and improving the quality of health service provision. The clinical governance and partnering with consumers Standards set the overarching requirements for the effective implementation of all other standards and are to be included in gap analysis, action plans and evidence requirements. Successful infection prevention and control requires a collaborative approach and several strategies across all levels of the healthcare system (Australian Commission on Safety and Quality in Health Care, 2021c). These strategies include:

- Integrating clinical governance
- Applying quality improvement systems
- Partnering with consumers
- Surveillance.

Systems are to be in place to support and promote quality improvement strategies to prevent and control infections and support antimicrobial stewardship and sustainable use of infection prevention and control resources. Specifically, for the preventing and controlling infection Standard, the criteria are:

- Standard and transmission-based precautions
- Hand hygiene
- Aseptic technique
- Invasive medical devices
- Workforce screening and immunisation
- Infections in the workforce
- Reprocessing of reusable medical devices
- Antimicrobial stewardship.

Although all infection prevention and control programs have essential elements that must be considered, programs will need to be tailored to reflect local context and risk.

Resources within the National Standards provide detailed requirements and actions to comply with the preventing and controlling infection standard.

Chapter 2 Risk identification requirements

2.1 Introduction

Risk identification is the process of documenting any risks that could impact on an organisation or program from reaching its objective. NSW Health Organisations are to ensure risks are identified by examining sources of risk, areas of impact, causes and potential consequences of events and scanning the environment (NSW Health, PD2022_023). Effective infection prevention and control is central to providing high quality healthcare for patients, visitors, carers, health workers and contractors, as well as preventing, managing, and controlling healthcare associated infections (HAIs) (NSW Health, PD 2023_025).

All health workers (permanent, temporary or contract) are accountable for managing risk in their day-to-day roles. This includes carrying out their roles in accordance with policies and procedures, identifying risks and inefficient or ineffective controls and reporting these to the appropriate level of management (NSW Health, PD2022_023).

The Work Health and Safety Act requires employers to have systems and processes to identify hazards and assess and control the risks for patients, visitors and members of the workforce, so far as is reasonably practicable. This means doing what is possible in the circumstances to ensure health and safety and continuity of health service delivery.

Risks that are beyond a health worker's capacity or delegation of authority must be escalated to a higher level of management for review, with subsequent mitigations communicated back to the health worker who identified the risk.

A risk management framework will help to prevent and minimise harm from HAIs. It's critical to understand the means of transmission and how and when to use precautions to prevent and control the spread of infectious agents. Successful Infection prevention and control require the use of a range of strategies. It should be an integral part of standard care, rather than an additional measure. Involving patients and their carers is an essential component of infection prevention and control. Patients need to be sufficiently informed to participate in reducing the risk of transmission of infectious agents. For more information on involving patients and their carers, refer to the NSQHS Partnering with Consumers Standard.

2.2 Risk of healthcare associated infection

Healthcare-associated infections (HAIs) are one of the most common adverse events in care delivery impacting morbidity, mortality, quality of life and incurring increased burden for patients, families, and carers. Patients with HAI are more likely to have a longer hospital stay, require second-line or broad-spectrum and more expensive antimicrobials, and place greater demands on the health system. A significant proportion of HAIs are preventable and there is a growing body of evidence to help raise awareness of the global burden of harm caused by these infections, including strategies to reduce their occurrence (World Health Organization, 2016).

Potentially any microorganism may cause HAI. A common misconception is that HAIs are caused only by multi-drug resistant microorganisms (MROs), such as methicillin-resistant *Staphylococcus aureus* (MRSA). HAIs can be caused by any micro-organism that can be transferred between patients, patients and staff and the environment, including medical devices. Examples of microorganisms that can cause HAIs include *Pseudomonas spp*., *Enterobacterales spp*., *Clostridioides difficile*, *Acinetobacter spp*., *Candida spp*., norovirus, scabies, cryptosporidium, SARS-CoV-2, respiratory syncytial virus (RSV) and influenza.

Data from 2022 shows there is an estimate of 170,574 HAIs in adults admitted to public hospitals across Australia, resulting in 7583 deaths. The most common healthcare associated infection is

hospital acquired pneumonia, followed by surgical site, and urinary tract infections (Lydeamore et al., 2022).

HAI remain largely preventable with effective infection prevention and control measures. Under the NSW Health Practitioner Regulation (2025) and the NSW Health Infection Prevention and Control in Healthcare Settings Policy Directive (PD2023_025), all health workers in New South Wales have a legal, ethical, and professional duty to minimise the risk of harm to patients in their care.

Registered health workers are legally required to comply with standardised infection prevention and control practices, including:

- Hand hygiene and skin cleaning
- Use of personal protective equipment (PPE) such as gloves, gowns, masks, and eye protection
- Safe handling and disposal of sharps and clinical waste
- Disinfection and sterilisation of reusable equipment
- Utilise single-use items when appropriate and ensure their proper disposal after use

These requirements are outlined in Schedule 2 of the Health Practitioner Regulation (NSW) Regulation 2025 and must be followed unless superseded by standards from a relevant National Board. Compliance is mandatory for NSW Public Health Organisations and is a condition of subsidy for public health services.

Implementing and consistently adhering to infection prevention and control strategies is essential not only for preventing the transmission of infectious microorganisms but also for fulfilling the broader duty of care that health workers owe to their patients.

2.3 Standard precautions

A comprehensive risk management framework must address both human and system-level factors that contribute to the transmission of infectious agents. This includes the effective identification, control, and prevention of infections whether they are common pathogens such as gastrointestinal viruses or emerging threats like influenza and multi-drug resistant organisms.

Under (NSW Health, PD 2023_025), all NSW Health Organisations are required to implement infection prevention and control strategies that are grounded in clinical governance and supported by legislative frameworks

Standard precautions are the minimum infection prevention measures that apply to all patient care settings, regardless of suspected or confirmed infection status of the patient.

Standard precautions involve adherence to all the following work practices:

- Performing hand hygiene
- Appropriate and correct use of personal protective equipment (PPE)
- Respiratory hygiene and cough etiquette
- Use of aseptic technique
- Safe use and disposal of sharps
- Performing routine environmental cleaning
- Cleaning and disinfection of shared patient equipment
- Reprocessing of reusable medical devices

- Safe handling and disposal of waste used linen and laboratory specimens.

Detailed explanation on the implementation of each of these components refer to Chapter 5 Risk mitigation.

2.4 Modes and route of transmission

Mode of transmission describes how a microorganism moves from one host to another. Infection prevention and control depend on disrupting the transmission of pathogens from their source (the infected animal or human) to new hosts (animal or human) or locations (environment, medical equipment, food or water). Transmission can occur horizontally, between individuals who are not necessarily related or vertically, from mother to child (National Health and Medical Research Council, 2019c).

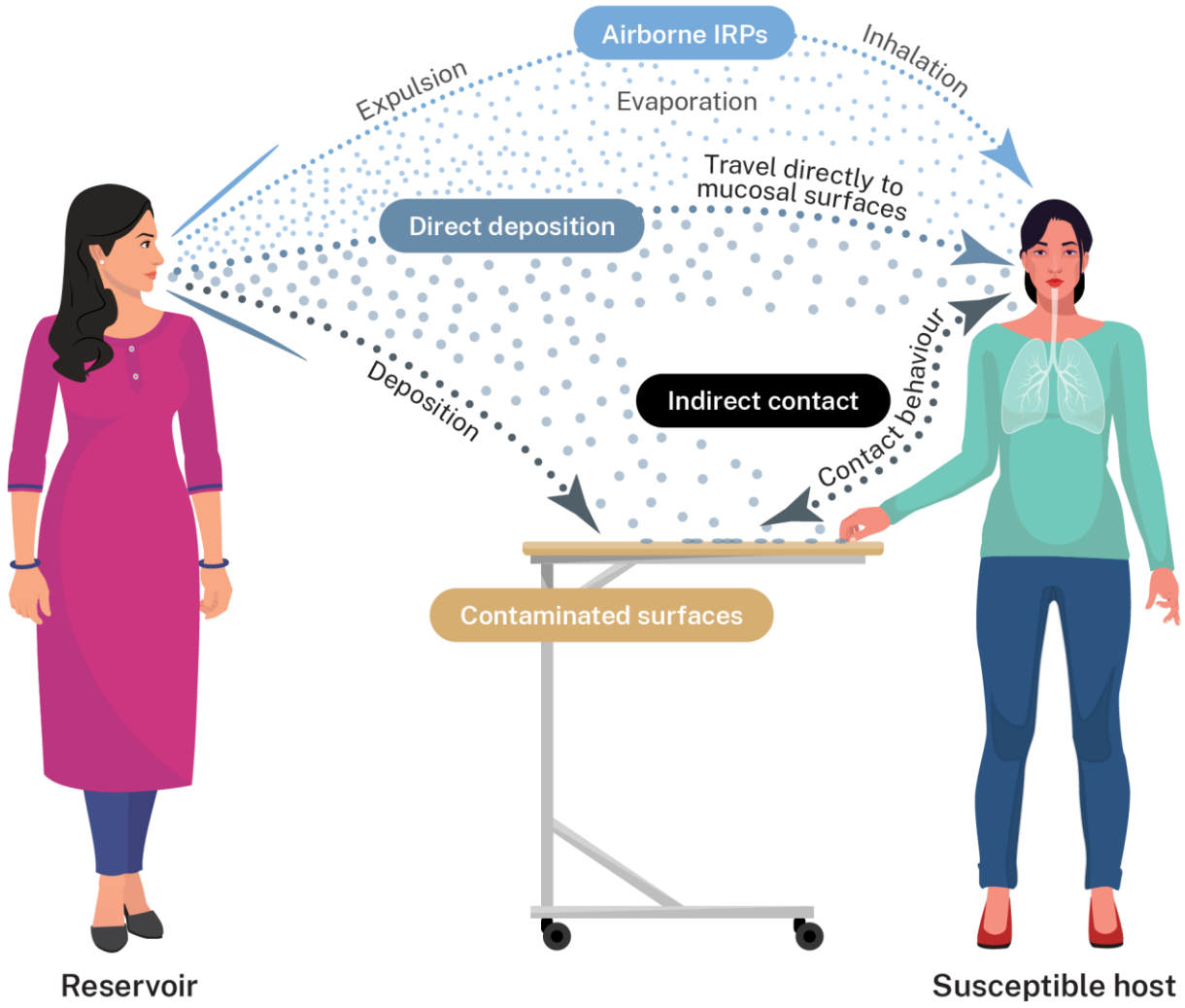
There are certain microorganisms that simultaneously employ multiple transmission routes. For example, norovirus can be spread by direct contact, indirect contact, and common-source transmission through contaminated food.

The transmission of microorganisms can be divided into the following five main routes: airborne transmission/ inhalation, direct deposition, direct or indirect contact, oral (ingestion), and vector borne. Microorganisms can transmit between:

- **Person to person**: a common way for infectious diseases to spread is through the direct transfer of bacteria, viruses or other pathogens from one person to another.
- **Animal to person**: exposure to an infected animal such as bites, scratches or exposure to birthing products/matter.
- **Mother to unborn child**: a pregnant woman may pass pathogens that cause infectious diseases to her unborn baby.
- **Food Contamination**: disease causing pathogens can infect us through contaminated food and/or water.
- **Vector borne:** diseases are human illnesses caused by parasites, viruses and bacteria that are transmitted by vectors. Vectors are mostly arthropods, such as mosquitoes, ticks, flies, fleas and lice.
- **Fomite transmission**: A fomite refers to inanimate objects that can carry and spread disease and infectious agents. Fomites can also be called passive vectors. Fomites can become contaminated with microorganisms by direct contact with body secretions or fluids, contact with soiled hands, or contact with aerosolised microorganisms.

The mode of transmission of infectious respiratory particles (IRPs) involves the creation, release, movement, and biophysical or biochemical alterations as they travel from an infected person to another individual (figure 4). Additionally, IRPs can directly land on the mouth, nose, or eyes of another person, potentially causing infection (World Health Organization, 2024a).

Figure 4 Features of infectious respiratory particles and descriptors for modes of transmission



Developed by Health Education and Training Institute 2025, Source: Global technical consultation report on proposed terminology for pathogens that transmit through the air. Geneva: World Health Organization; 2024. Licence: CC BY-NC-SA 3.0 IGO

2.4.1 Airborne transmission/inhalation

Pathogens expelled from an infected person's mouth or nose through breathing, talking, singing, spitting, coughing, or sneezing should be described as infectious respiratory particles (IRPs). IRPs exist on a continuous spectrum of sizes, and no single cut off points should be applied to distinguish smaller from larger particles.

Airborne transmission or inhalation, for cases when IRPs are expelled into the air and inhaled by another person. Airborne transmission or inhalation can occur at a short or long distance from the infectious person and distance depends on various factors (airflow, humidity, temperature, ventilation). IRPs can theoretically enter the body at any point along the human respiratory tract, but preferred sites of entry may be pathogen specific (World Health Organization, 2024a).

2.4.2 Droplet transmission (direct deposition)

Direct deposition occurs when infectious respiratory particles (IRPs) expelled by an infected person are directly deposited onto the mouth, nose, or eyes of another nearby individual. These particles can then enter the respiratory system of the exposed person, potentially causing infection (World Health Organization, 2024a).

Droplets can contaminate horizontal surfaces close to the source and hands of health workers through direct contact with those surfaces. For example, collection of throat or nasal swabs, suction, chest physiotherapy.

2.4.3 Contact transmission

Contact transmission routes refer to the movement of microorganisms from a colonised or contaminated source to a susceptible host, via either direct or indirect physical contact.

Direct contact transmission occurs when infectious agents are transferred from one person to another without a contaminated intermediate object or person. For example, blood or other body substances from an infectious person may have contact with the skin or mucous membranes of another person. A common scenario would be a health worker with contaminated hands touches a patient without cleaning their hands.

Patients may infect themselves when touching their cannula or uncovered wound sites or mucosal membranes with hands colonised with commensal microorganisms or contaminated by body substances that contain microorganisms (for example, blood, respiratory secretions).

Indirect contact transmission involves the transfer of an infectious agent through a contaminated intermediate object (fomite) or person. Contaminated hands of health workers have been shown to be important contributors to indirect contact transmission. Other examples of indirect contact transmission in the healthcare environment include:

- shared patient equipment which is not cleaned and disinfected between patients
- contaminated environmental surfaces.

Reusable medical devices that are inadequately reprocessed between patients are also implicated in the indirect contact transmission of microorganisms to patients. For example, health worker uses common keyboard to write in patient notes or mobile phone then touches the patient without cleaning their hands. Patient equipment such as trolley, chair or lifter sling is used and not cleaned before it is used on another patient.

2.4.4 Oral (ingestion) transmission

Ingestion of microorganisms can occur from contaminated food or water as well as by licking or chewing on contaminated objects or surfaces. Environmental contamination is most commonly due to secretions, faeces, urine, or saliva. Direct person-to-person transmission is rare.

2.4.5 Vector-borne transmission

Microorganisms are introduced by another organism, such as an arthropod (for example, mosquito, flea or tick) or rodent. Direct person-to-person transmission is not possible.

2.5 Colonisation

Microorganisms are normally found on the skin surface, in the nasopharynx and in the human gut, and cause no harm to their human host when colonised in these usual anatomical locations.

Colonisation is the detection of an organism from a site (usually skin, throat, nose, or perineum, and/ or chronic ulcers) without signs of invasive infection.

The commensal microorganisms of one person may be a pathogen for another person. Patients exposed to health workers and visitors may be at risk of acquiring an infection from these colonised individuals depending on the extent of exposure and their own immune status.

A patient may be visited up to 18 times per hour by health workers or visitors. At least 27% of these visits involve physical contact. Therefore, there are plenty of opportunities for patients to be exposed and infected by microorganisms innocuously carried by health workers and visitors (Cohen et al., 2012).

Colonisation is not harmful to the patient and does not require treatment if they are not considered clinically significant.

2.6 Infection

Infection is the invasion of a host's bodily tissues by microorganisms and their subsequent multiplication, resulting in disease causing symptoms and the reaction of host tissues to these organisms and the toxins they produce.

Infection may be preceded by colonisation. An infection is typically differentiated from colonisation by the presence of clinical signs and symptoms. There may be a systemic response (for example., febrile illness, elevated white cell count) and/or a local response (for example, cough, localised inflammation). Infection may not be easily observable. For example, infected individuals who are elderly and/or immunocompromised may be unable to mount a strong clinical response to infection.

During most infections, an asymptomatic phase precedes the onset of symptomatic clinical illness. Depending on the causative microorganism, an individual may shed infectious material during asymptomatic infection. As an example, the influenza virus is shed prior to the onset of flu symptoms (Morris et al., 2024). If the patient is immunocompromised, pregnant or undergoing certain surgical procedures, having an asymptomatic infection may pose a significant clinical risk (Montgomery et al., 2024).

A number of pathogens demonstrate latency. That is, infection has occurred, which may be asymptomatic, and is controlled by the immune system. Examples include tuberculosis (TB), hepatitis B, measles and varicella-zoster. An individual with a latent infection is usually asymptomatic and does not usually shed infectious material. Infection may reactivate secondary to waning of the immune response or if there is immunosuppression, for example when using immunosuppressive therapy.

Under certain conditions, normal flora may become opportunistic pathogens. An opportunistic pathogen is a microorganism that usually does not harm its host, but can cause infection when:

- the host's resistance is low (such as in the elderly, pregnant women, neonates, or those with weakened immune systems)
- a protective barrier (such as the skin or mucous membranes) is damaged or penetrated.

For example, opportunistic pathogens are a common cause of infections acquired from surgical procedures. *Clostridioides difficile* infection, and infections caused by *Candida spp.* may also be opportunistic, as they may occur due to disruption of the normal flora in the body caused by antimicrobial therapy. People can also be infected by transient flora that briefly colonise the body, or from microorganisms directly acquired from an external source, such as other people, medical devices, equipment, or the environment (Australian Commission on Safety and Quality in Health Care, 2022). For more information refer to the Australian Commission on Safety and Quality in Health Care Infection prevention and control Workbook 2024.

2.7 The chain of infection

The transmission of infectious agents occurs via a series of interlinked events called the Chain of Infection. The six links include: the infectious agent, reservoir, portal of exit, mode of transmission, portal of entry, and susceptible host (refer to Figure 5 The chain of infection).

Infectious agent is the microorganism that causes disease.

Reservoir includes places in the environment where the microorganism lives. This includes people, animals and insects, medical equipment, and soil and water.

Portal of exit is the way the microorganisms leave the reservoir. This can be through open wounds, aerosols, and splatter of body fluids including coughing, sneezing, and saliva.

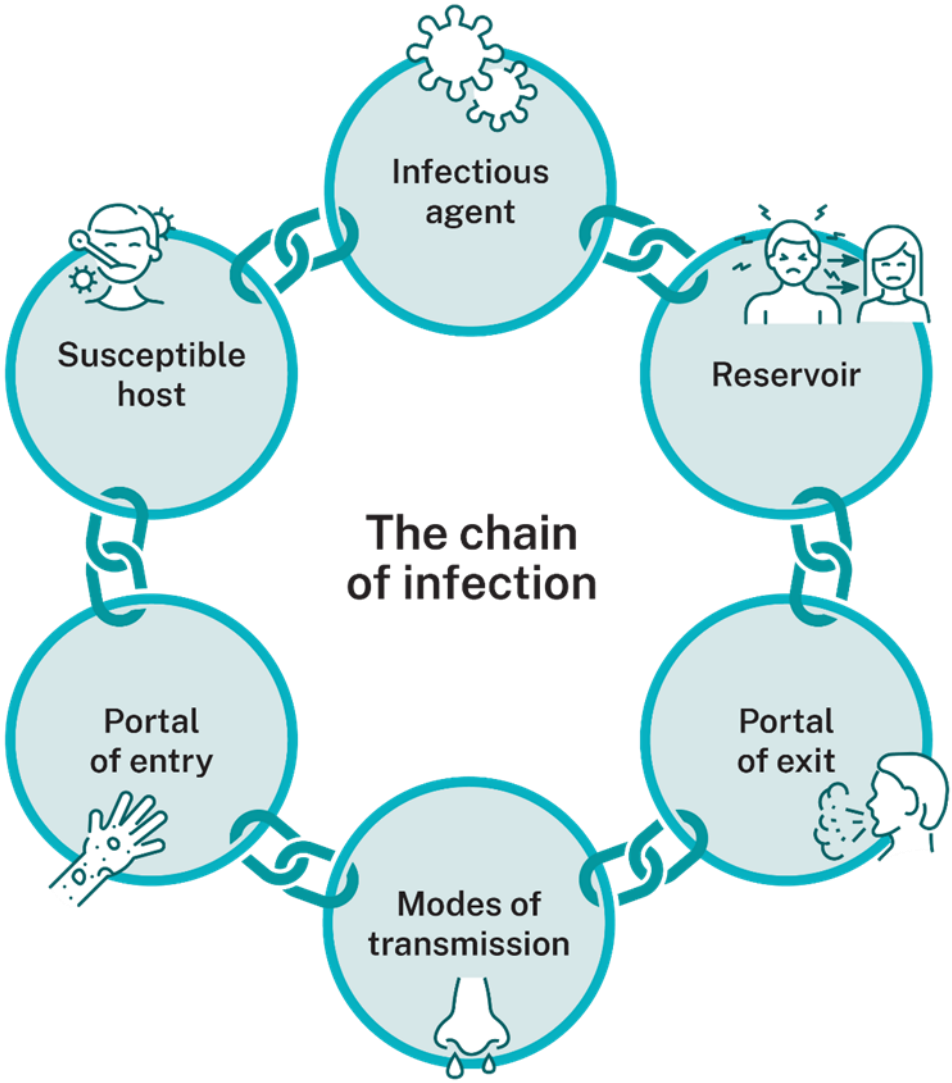
Mode of transmission is the way the microorganisms can be passed on. Modes can be through direct or indirect contact, ingestion, or inhalation.

Portal of entry is the way the microorganisms can enter a new host. Entry can be through broken skin, the respiratory tract, mucous membranes, and catheters and tubes.

Susceptible host can be any person, the most vulnerable of whom are receiving healthcare, are immunocompromised, or have invasive medical devices including lines, devices, and airways.

The objective of infection prevention and control is to interrupt the chain of infection.

Figure 5 The chain of infection



Source: The Australian Commission on Safety and Quality in Health Care

The disruption to the links breaks the chain of infection. The principles of infection prevention and control aim to break the ongoing transmission of microorganisms in the healthcare setting (Australian Commission on Safety and Quality in Health Care, 2022). For more information refer to the Australian Commission on Safety and Quality in Health Care Infection prevention and control Workbook 2024.

Chapter 3 Risk assessment framework

3.1 Risk assessment

Risk assessment involves identifying the types of risk exposure within an organisation, measuring those potential risks and proposing ways to mitigate them. Where possible, Health Organisations should use existing risk identification strategies and adopt the principles outlined in this section.

A Healthcare Associated Infection (HAI) may occur if a susceptible person acquires a sufficient quantity of a microorganism from either (Collins, 2008):

- another person
- the environment; and/or
- from another site on the body.

Firstly, it is important to determine any risks that promote the transfer and spread of microorganisms, any risks that promote the acquisition of an infection by a susceptible person. It is essential to continually review the risk mitigation and quality improvement strategies are still appropriate and effective. As new and emerging evidence identifies infection risks and whether they increase the risk of HAI, reflection and consideration must always be undertaken when assessing the ongoing effectiveness of the control measures. Infection risks may be associated with:

- the individual patient
- the patient's family, carer, visitors or health workers
- non-adherence to standard or transmission-based precautions
- inadequately cleaned shared patient care equipment
- contaminated foods, medications or water sources
- inadequately reprocessed reusable medical device
- implantation of a device. For example, intravascular access device, indwelling catheter, joint replacement, pacemaker
- inadequate cleaning of the functional area
- environmental controls such as ventilation, infrastructure and fixtures.

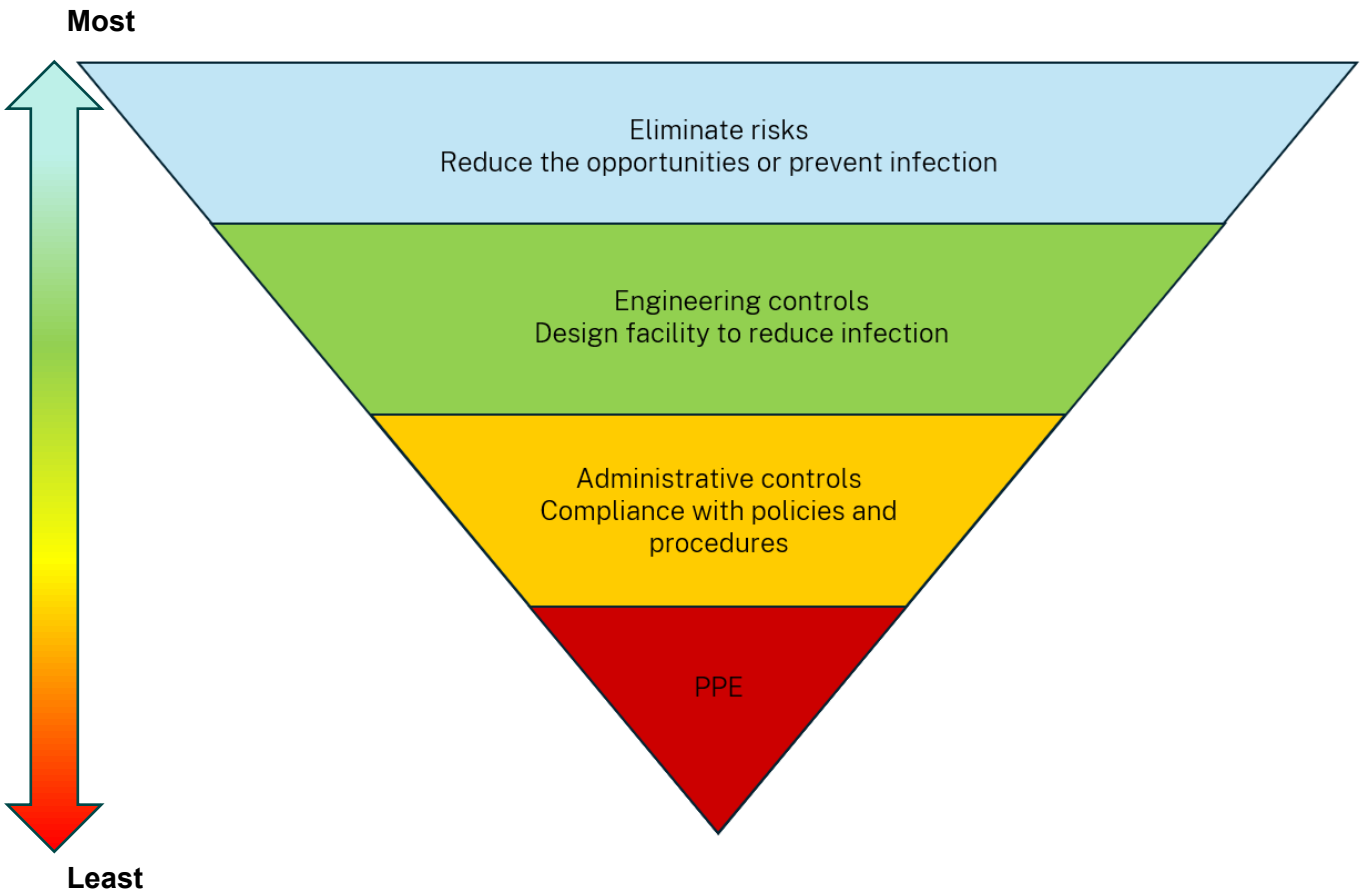
3.2 Risk management framework

Using a risk management approach provides Health Organisations with a framework to assess and address risks and develop mitigation strategies. The hierarchy of controls is a model used in work health and safety management to control hazards which rank controls from most to least reliable. Risk management is the design and implementation of a program and system to identify and avoid, or minimise, risks to patients, employees, volunteers, visitors, and the organisation. If it is not reasonably practical to eliminate risks, then risks must be minimised or mitigated, as far as is reasonably practicable, by using one or a combination of elimination treatments to change the likelihood and consequences of the risk, such as engineering controls, followed by administrative controls and personal protective equipment (PPE).

Infection prevention and control risks and being risk aware are an integral part of organisational infection prevention and control operations and safety, and it must be identified and managed at the appropriate level for an infection prevention and control program to be effective within all Health Organisations (NSW Health, PD 2023_025).

For more information refer to NSW Health Enterprise-wide Risk Management Policy Directive.

Figure 6 An example of the application of hierarchy of controls in the infection prevention and control context



Source: Adapted from NIOSH – CDC

Infection prevention and control hazards should be addressed through a risk management process to maintain and improve patient and health worker safety and provide safer care.

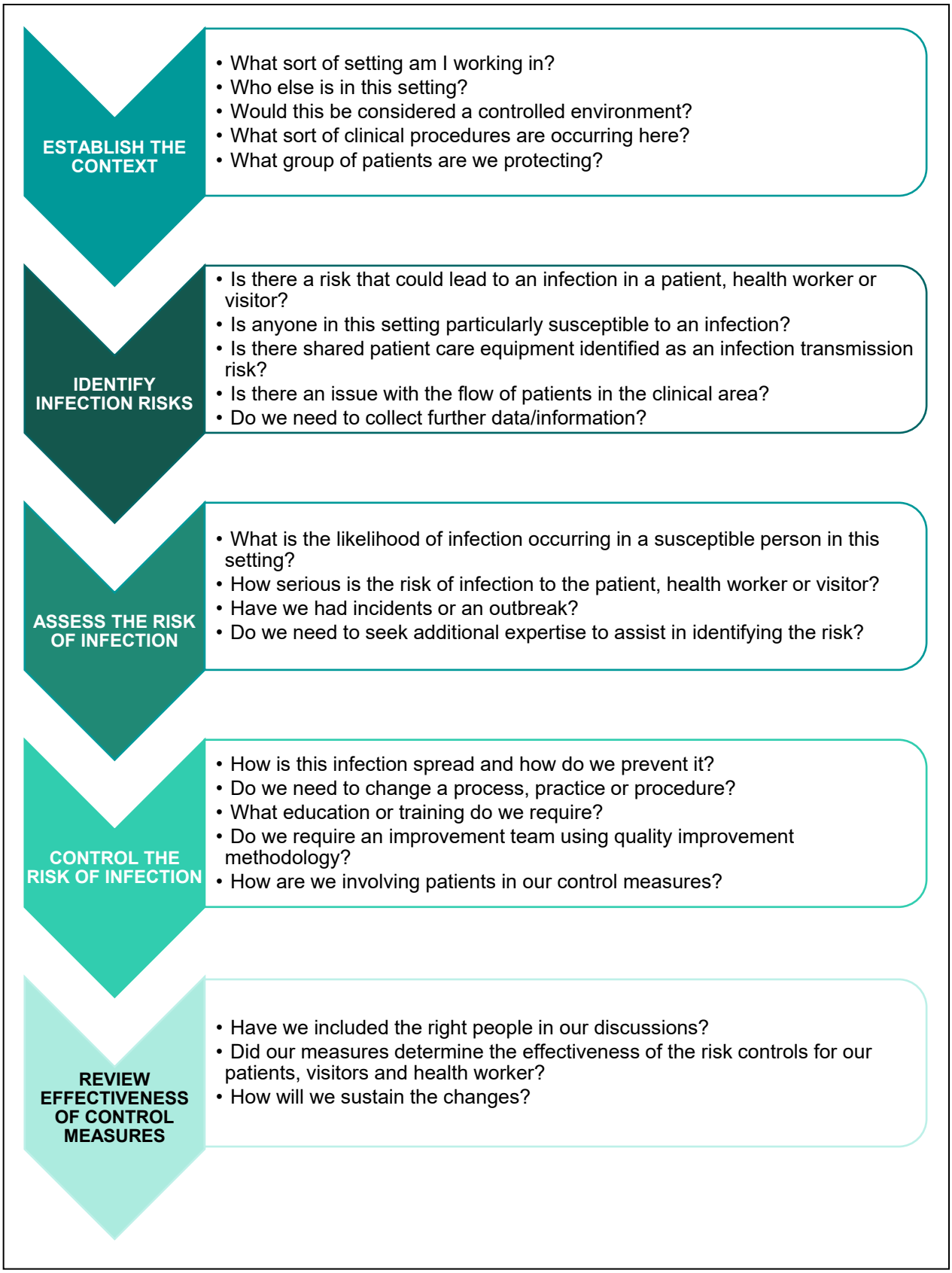
A successful approach to risk management occurs on many levels within a healthcare facility:

- **Organisational/facility/service wide** - for example, providing support for effective risk management through an organisational risk-management policy, health worker training, follow-up of outcomes, monitoring, and reporting.
- **Ward or department based** - for example, embedding risk management into the local procedures, processes or safe work practices.
- **Individual** - for example, considering the risks involved in carrying out a specific procedure and questioning the necessity of the procedure as part of clinical decision-making, attending education sessions (for example, hand hygiene, sharps safety or respirator fit testing).

When implementing infection prevention and control measures all Health Organisations need to consider the risk of transmission of infection according to their specific setting and circumstances.

The local infection prevention and control program and plans should use a risk management framework consistent with NSW Health policy (Safe Work Australia, 2018). For infection prevention and control, the risk management framework for Health Organisations should address five key actions of the NSQHS Standards Risk management approach described in Figure 7 Steps of risk management framework.

Figure 7 Steps of risk management framework



Source: NSQHS Standards Risk management approach

What are the principles of risk management?

The 5 fundamental principles of risk management are to:

1. **Avoid risk**

   Identify appropriate strategies that can be used to avoid the risk whenever possible, if a risk cannot be eliminated then it must be managed.

2. **Identify risk**

   Assess the risk, identify the nature of the risk and who is involved.

3. **Analyse risk**

   Examine how a risk can occur; what the likelihood is; and what are the consequences of this risk occurring.

4. **Evaluate risk**

   Determine how the risk can be reduced or eliminated. Document the process and response or outcomes.

5. **Treat risks**

   Manage the risk by determining who is responsible for taking actions, when and how this will be monitored.

3.3 Risk assessing the healthcare delivery

When health workers are assessing for risks, and deciding how activities can be performed safely, for both the patient and themselves, the below questions should be considered.

Table 4 Questions to consider when risk assessing

Who	Is the patient known to be infected or colonised with a particular microorganism? (for example, multi-drug resistant organism, *Clostridioides difficile*) Are there cognitive or behavioural factors that may increase the risk of the patient transmitting an infection? (for example, shouting, screaming or aggression)
What	What type of activity is being performed? (for example, invasive procedure, wound dressing, personal care) What resources are available for the activity? (for example, appropriate PPE, condition of the equipment)
When	Are other activities happening at the same time in the clinical area? (for example, cleaning, procedures, emergency responses)
Where	Where is the care being delivered? (for example, clinical setting, patients' home)
Why	Consider the actions that can be taken to reduce the risk of infection transmission during the activity? (for example, aseptic technique, patient placement, transmission-based precautions)

3.4 Principles of risk assessment in the context of PPE selection

Identify the risk

Identifying tasks or activities that increase the risk of introducing or spreading infection such as aerosol generating procedures (AGPs), patient symptoms (coughing or heavy breathing), behaviour (confused, agitated, shouting).

Identifying likely transmission route(s)

Type of exposure, for example, parenteral (introduction of body substance into the body through piercing or puncturing), or non-parenteral (contamination of mucus membrane, for example, eyes mouth, non-intact skin) with body substance.

Quantify the impact

To quantify the impact as part of risk assessment, the following should be considered:

- Intensity of exposure, for example, how close you are to the patient
- Duration of exposure, for example, how long will you be with the patient
- Does it need mitigation (yes/no) or can this be reduced or eliminated
- What the mitigation is, for example, single room, negative pressure or negative flow, standard precautions, transmission-based precautions, appropriate PPE
- Patient condition (for example, hearing impaired, confused or agitated) – risk assess the impact when wearing PPE, and how can the risk be mitigated while keeping patient, own and others safe.

3.5 Risk assessing visitation

Visitors (carers, volunteers, participants in care) can also play a role in introducing infection to a patient or may also be at risk of infection from the patient and the healthcare environment. A visitor may be a source or susceptible of infection, particularly given the following factors:

- **Age**: Young children are often reservoirs of infectious material and should have limited access to functional areas where there are highly susceptible patients (such as, those unable to mount an immune response).
- **Symptomatic illness**: For most infectious diseases, the shedding of infectious material is often associated with symptomatic illness. Assess visitors for symptoms of infectious diseases particularly in high-risk areas.
- **Physical contact**: Frequent and prolonged physical contact is likely to mediate the transfer of microorganisms from the visitor to the patient if personal hygiene is not practiced.
- **Exposure to infectious diseases**: Prior exposure or vaccination may protect the visitor from the establishment of infection. In some cases, vaccination may also reduce the severity of illness.
- **Pregnancy**: As compared with nonpregnant women, pregnant women are more severely affected by infections with some organisms, including influenza virus, invasive group A streptococcal disease, varicella zoster.
- **Vaccination status**: Check vaccination status of patients, carers, and volunteers where possible and practical.

The following risk considerations and risk assessment can be considered for patients, visitors, volunteers and carers.

Table 5 An example of visitation risk assessment

Risk considerations	Yes	No
Are there any environmental factors or exposure events that should be considered (such as return from overseas, contact with communicable infection)		
Is information available about current infection risks or infectious diseases?		
Do clinicians provide sufficient information on how to prevent further infection at home and in the community?		
Are restrictions for visiting clinical areas needed to reduce infection risks?		
Are cultural appropriateness and safety needed to be considered? Aboriginal status, religious, refugee communities, linguistically diverse group?		
If carers are involved in direct patient care, are they provided with information, training, and support to deliver care safely?		
Is infection prevention and control related information available in locally used languages other than English?		
Are there any visitor restrictions in place in the organisation?		
Are visitors, volunteers, and carers aware that they should not visit patients when they themselves are unwell?		
Are there facilities and products available to perform hand hygiene?		
Are there alternative ways for visitation available to limit transmission risks such as visiting away from ward if in shared room (such as, outside or virtual)?		

3.6 Risk assessing the patient

Depending on the ward, unit or department layout, availability of single rooms, ventilation, patient mix and speciality, the overall patient-specific risk of transmission of microorganisms or infection may vary. These risks can include:

- Procedure associated risks
- Device associated risks
- Emerging or multi-drug resistant organism presence
- Enteric disease
- Respiratory disease
- Communicable disease.

Consider the following factors when risk assessing a patient.

The patient may be:

- the source of an infection and may facilitate the transfer of infectious material; or

- the target of an infection (for example, a susceptible host) and have risk factors that promote the acquisition of an infection.

Infectious diseases and the risks:

- determine if the patient is suspected, probable or confirmed as having an infectious disease that is communicable.
- review the likely incubation and communicability period and the way the infectious diseases are transmitted to others at risk.
- timeline of the patient movements in the facility and or admission.
- determine the type of room accommodation, for example, single room with ensuites.
- determine the type of transmission precautions required and the duration of these precautions.
- determine patient education requirements to prevent transmission to others.

It is important to determine as early as possible whether a patient is a source of infection and when they may have been infectious from, to prevent the spread of infection to others.

The following questions could be used to establish whether the patient is at risk of transmitting infection to others and the environment.

Table 6 Patient risk assessment

Questions to consider	Yes	No
Is the patient known or suspected of being colonised or infected with an MRO or communicable disease or risk of classical Creutzfeldt Jakob disease (CJD)?	☐	☐
Has the patient recently been screened for an MRO?	☐	☐
Has the patient recently received or is currently taking antimicrobials?	☐	☐
Is the patient immunocompromised?	☐	☐
Is the patient coughing and/or has a fever and/or have a rash?	☐	☐
Is the patient vomiting or has diarrhoea?	☐	☐
Does the patient have any open and/or chronic wounds?	☐	☐
Does the patient have any invasive devices?	☐	☐
Does the patient live in a residential (aged) care facility?	☐	☐
Does the patient have a history of recent overseas travel or received healthcare in an overseas medical facility? **If yes, ask the below questions:** • Do you have a fever or history of fever in the past 24 hours? AND • Have you visited or worked in a VHF-endemic or outbreak area in the previous 21 days? OR	☐	☐

• Have you had contact with a known or highly suspected case of VHF within 21 days of illness onset? Refer to Table 7 for Multi-drug resistant organism (MRO) transmission risks		

There are certain risk factors which promote the transmission of MROs in the healthcare environment. For more information refer to Table 7 Multi-drug resistant organism (MRO) transmission risk assessment. The following strategies should be considered when risk assessing patients:

- Admission screening for extreme risk areas, such as neonatal intensive care unit (NICU), renal dialysis, haematology, oncology, and transplant units should depend on local demonstrated MRO epidemiology of the receiving service and the service where they may have been transferred from as relevant or known.
- Carbapenemase-producing *Enterobacterales* (CPE) screening for patients who have received care/treatment in overseas facilities, for example, In vitro fertilization (IVF) within the last 12 months.
- *Candidozyma auris* screening should be conducted for patients who have received care in overseas facilities within the last 12 months.

Refer to Surveillance and Response to Carbapenemase-Producing Enterobacterales in NSW Health Facilities and Management and Control of Candida auris in NSW Health Facilities guideline for more information on surveillance and management of CPE and *Candidozyma auris* in NSW Health facilities.

Table 7 Multi-drug resistant organism (MRO) transmission risk assessment

MRO transmission risk	Is admission screening needed?			
	MRSA	CPE	VRE	*Candidozyma auris*
Admission to high-risk clinical inpatient areas or received healthcare in an overseas medical facility (past 12 months)	Yes	Yes	Yes	Yes
Admission to high-risk clinical inpatient areas with recent (past 12 months) overnight admission in an overseas hospital or residence in an overseas RACF	No	Yes	No	Yes
Admission to an extreme risk rated clinical inpatient area, such as an adult ICU, burns, renal dialysis, haematology, oncology, and transplant units	Yes	Yes*	Yes*	Yes
Transfers from units in other NSW hospitals or residential care settings	Depends on local infection rate			
Admission to or transfer from a facility (for example, NICU) with known prevalence or MRO outbreak	Depends on local infection rate			

Presence of a chronic wound or invasive device	Depends on local infection rate	
Other MRO Gram negatives	Depends on local infection rate	

*According to local risk assessment and priorities

For further information on MRO admission screening specimens refer to Chapter 7 Management of MROs.

A patient's susceptibility to an infection is affected by several factors. To establish whether a patient is susceptible to infection, clinicians should consider the following risk factors:

- **Age**: In general, immunity is less effective in infants (<2 years) and the elderly (> 65 years). Therefore, these individuals are less likely to mount a strong antibody response to counter an infection.
- **Presence of wounds, ulcers, burns or exfoliative skin conditions**: Skin is a physical defence against infection. Breaches to the skin provide an access portal for infection.
- **Invasive devices**: Invasive devices are an access portal for microorganisms. The longer the dwell time for an invasive device, the greater the risk of infection acquisition.
- **Co-morbidities**: Certain conditions and behaviours, such as immunodeficiency, diabetes, and smoking, impair the immune response and increase the propensity for infection.
- **Medications**: Medications, such as chemotherapy and immunosuppressant medications, preclude normal immune responses.
- **Nutrition and body mass index (BMI)**: Malnourished and nutrient deficient individuals, as well as individuals with a high BMI, have an increased susceptibility to infection.
- **Personal hygiene**: Failure to practise hand hygiene may promote contact transmission. Poor perineal hygiene may promote contamination of the urinary tract.
- **Physical contact**: Behaviours that involve intimate physical contact, can increase the likelihood of contact transmission.
- **Exposure to infectious diseases**: Prior exposure or vaccination may protect the patient from the establishment of infection. In some cases, vaccination may also reduce the severity of illness.
- **Travel and medical tourism**: The treating clinician should consider recent travel to an area where communicable diseases or MROs are endemic, including medical tourism.

3.7 Risk assessing the functional area

A functional area is defined as the classification of an area (department/unit/specialty) based on the activity conducted and associated risks. Functional areas have been grouped under four risk categories: extreme, high, medium, and low. The transfer and spread of microorganisms to a patient in a specific healthcare environment is largely influenced by the clinical procedures that are taking place and susceptibility of the individual.

Functional areas are categorised according to risk.

Extreme

Areas with the greatest risk of transmission of infection, as patients in these areas:

1. are very susceptible to infection (for example, are immunocompromised and/or have significant comorbidities) and/ or
2. are undergoing highly invasive procedures – such as operating theatres, intensive care units, delivery suites, angiography suites, interventional radiology suites.

High

Areas where infection transmission risk is high as:

1. patients are susceptible to infection; and/or
2. invasive procedures are conducted – such as general wards, special clinic treatment areas, mortuaries performing autopsies, emergency transport vehicles.

Medium

Areas where there is medium risk of infection transmission as the patients are not staying long or overnight, and there are no regular invasive procedures performed – such as, outpatient departments, non-emergency transport vehicles, pharmacy.

Low

Areas where the risk of infection is low as there is no patient care performed – such as ambulance stations, offices, nonpatient transport vehicles.

Additional considerations for risk assessment

The risk assessment for one setting may not be applicable in another setting and additional consideration may be required of the impact and suitability when allocating, mixing, or moving patients between different functional areas.

Each Health Organisation is to determine the frequency and intensity of cleaning each functional area that is required to meet the cleaning standards. Review of the regular auditing program of environmental cleaning, cleaning of shared patient care equipment and actioning any identified gaps should be undertaken when risk assessing the functional area.

Each functional area in hospitals should be risk assessed with specific consideration to the following matters:

- **Procedures** – Performing a highly invasive procedure that breaches the skin exposing a normally sterile body site and tissue may increase susceptibility to infection.
- **Patient mix** – Consider whether there are certain patients that may be more susceptible to infection than others. For example, elderly, dementia, cognitively impaired, immunocompromised, patients with complex medical history.
- **Physical environment** – Certain procedures should be carried out in fit-for-purpose settings to minimise the risk of transmission (for example, Cath labs, interventional radiology (IR), operating theatres). Also consider the need for shared equipment cleaning and cleaning of healthcare environment.
- **Patient Movement** – Constant moving of patients through variable functional areas potentially increases the risk of infection and complicates strategies for contain and control. Where possible and practical this should be limited.

Refer to Cleaning of the Healthcare Environment policy directive for more information on functional areas.

3.8 Preventative maintenance and asset management

Each Health Organisation is responsible for developing and carrying out its own maintenance and asset management strategy to meet the needs of the organisation and the population it serves. This strategy must include consideration of the Infection prevention and control implications when purchasing and maintaining plant and equipment and the construction and maintenance of buildings.

Compliance reporting of preventative maintenance and engineering programs should have a process to ensure that compliance or risks are reported to the health services infection prevention and control governance committee as part of quality assurance program and HAI prevention strategies (such as, heating, ventilation and air conditioning (HVAC) systems, temp and humidity in sterile reusable medical devices (RMDs) stock rooms, washer disinfectors, negative pressure room functionality. There should be a program established for *Legionella* surveillance testing of cooling towers.

For more information refer to NSW Health Engineering Services Guide, NSW Health Infrastructure Asset Management and NSW Health Asset Management policy directive.

3.9 Purchasing new equipment

As part of the process for purchasing new patient care devices, consumables or equipment, the Health Organisations, solely or in conjunction with HealthShare NSW, must seek local Infection prevention and control advice prior to purchase. Where new devices or equipment will require later reprocessing, the NSW Health Organisation must also consult with management of local reprocessing units prior to trial or purchase to ensure compliance with relevant policies, procedures and Australian standards.

Local procurement, clinical and biomedical engineering (where relevant) should also be consulted for any reusable medical devices that require testing and maintenance. Advice should be based on an assessment of whether:

- the equipment is available for supply under a current NSW Health contract or is new technology or a product group not covered by an existing NSW Health contract. Exemptions should be obtained directly from NSW Health
- the product is registered with Therapeutic Goods Administration (TGA) or an exemption from TGA is obtained
- the manufacturer can supply instructions for use (IFU) for individual items
- compliance with the IFU meets Australian standards, policies and local guidelines
- the manufacturer has provided well designed studies that show a statistical significance for the safety of the product
- there have been no previous product recalls of the product
- the use of the product will have infection prevention and control implications for other consumables, equipment or plant
- the feasibility of the cleaning and reprocessing requirements for the product will impact on product functionality and safety
- additional infection prevention and control and/or reprocessing training is required for individuals who will be handling the new product
- cleaning instructions are provided, including the cleaning and disinfection products to be used or are safe to use on the medical device
- the criteria for new technologies are met. This will require referral to the LHD/SHN New Technologies and Specialised Services Committee for review
- products and services (for example, electrical appliances and water using appliances) comply with the minimum standards set out in the NSW Government Resource Efficiency Policy.

Also refer to HealthShare NSW Procurement services, NSW Health Procurement (Goods and Services) Policy Directive and NSW Health New Health Technologies and Specialised Services guideline for more information.

3.10 Review and maintenance of existing equipment

Each Health Organisations should undertake regular maintenance and routine review of all patient and non-patient care equipment, furnishings and fixtures according to their manufacturer's instructions, mandatory requirement, or risk assessment. Results of the review that indicate an infection or transmission risk should always be reported back to Infection prevention and control and, where necessary, involve the local infection prevention and control unit in any further investigations. Each Health Organisation is to ensure that:

- an equipment maintenance program for cleaning, servicing, and repair are in place
- patient furnishing and patient care equipment is intact and able to be cleaned. A preventative maintenance and replacement program should be in place
- maintenance schedules for all plant and equipment are up to date
- processes are in place for reusable medical devices reprocessed on site or by an external contractor.
- health workers are trained in reprocessing medical and patient care equipment
- regular equipment audit is undertaken where applicable (reprocessing equipment, cleaning of equipment)
- equipment, stock, and reusable medical devices are stored appropriately.

3.11 Building, demolition, refurbishment and construction

Health Organisations are to ensure that all construction, renovation, installation and maintenance activities on their sites are undertaken in a safe and appropriate manner to reduce the risk of infection to patients, visitors, carers, volunteers and health workers. The local infection prevention and control unit should be involved in the planning and building stages of any new build, demolition, refurbishment or construction activity. Also refer to Australasian Health Facility Guidelines for more information.

During the planning stage, the local infection prevention and control team should be enabled to identify opportunities to prevent the transmission of infectious organisms during construction activity and identify opportunities to implement engineering and environmental controls for better infection prevention and control in any facility that will be built, renovated or repaired.

Environmental controls such as effective ventilation, dust suppression and adequate cleaning is required to minimise any impact on air quality within the construction zones to reduce the risk of potential adverse health effects. For more information refer to NSW Health Engineering Services Guide.

The design, installation and commissioning of ventilation systems for new builds, or upgrades to current infrastructure, requires technical expertise from qualified biomechanical or ventilation engineers who are also responsible for the operation, maintenance and monitoring of these systems.

Health Organisations are to embed sustainability initiatives and deliver value to the community by creating future-focused and sustainable healthcare infrastructure and asset solutions. For more information refer to NSW Health Infrastructure Sustainability Commitment and Strategy.

The infection prevention and control implications of preserving any existing structures during a refurbishment should also be considered and assessed for infection risks as part of the planning process.

Prior to any demolition, refurbishment and construction activity, the Health Organisation should appoint an infection prevention and control and clinical microbiology team that determines and evaluates:

- the risk of airborne dissemination of microorganisms during construction activity
- whether any environmental or air sampling is required and how the required sampling will be undertaken
- the infection prevention and control requirements of the new, renovated, or repaired facility
- whether additional infection prevention and control measures are required for patients, health workers and visitors during construction activity
- what infection prevention and control measures are required by construction workers during construction activity
- how the local infection prevention and control unit should participate in site inspections and commissioning of the new or refurbished facility.

Building contractors, engineers and any other individuals involved in construction activity should comply with infection prevention and control requirements, as determined locally, when on site. A notification and remediation process should be implemented to address any breaches in infection prevention and control that have arisen during construction activity.

At the completion of construction, the infection prevention and control requirements for sign off will require a documented risk assessment. The risk assessment will be scalable depending on the extent of construction. For more information refer to Chapter 13 Building, construction and renovation.

3.11.1 Infection prevention and control considerations on facility design

The design of a healthcare facility can influence the transmission of infections by air, water and contact with the physical environment. Sustainable architecture is the adoption of efficient energy and material resources in buildings, incorporation of the dwellers into micro-climate control and the natural environment. As well as low energy and low carbon emission, the goal of sustainable architecture for hospital design is to integrate design strategies for infectious disease prevention and control (Emmanuel et al., 2020). Aesthetics or sustainable architectural concepts should not overrule infection prevention and control and HAI risks identified as part of facility design.

Key design considerations for minimising transmission of infection include:

- smooth surface finishes that are easy to maintain and clean. This includes floors, walls, benches, fixtures and fittings
- ventilation, air conditioning, cooling towers and water systems that meet Australian standards for the facility they service
- the ability to isolate patients
- appropriate workplace design:
    - separation of procedural and cleaning areas
    - movement of workflow systems

- placement and access to hand hygiene facilities
- adequate storage for all patient-care items
- easily accessible storage for personal protective equipment
- adequate waste management procedures and linen handling.

3.11.2 Control of surface contamination through material selection

Ease of cleaning should be a key consideration in selecting appropriate floor, fixture and furniture coverings. Several design-related factors should be considered to minimise the risk of infection from contaminated surfaces:

- the nature and type of contamination that is likely to occur
- if a suitable cleaning method for that surface can be performed
- if a surface is able to withstand hospital grade disinfectants
- areas that may be in direct contact with blood and body substances (for example, surfaces such as floors and bench tops) are to be made of impervious material that is smooth and easy to clean.

3.11.3 Flooring

When selecting floor covering for a healthcare setting, consideration needs to be given to the following:

- who is at risk of acquiring infection
- what is the risk of exposure to the infectious agents
- what is the nature of the possible infectious agents
- how can the agent be transmitted - for example, airborne; through cleaning techniques; through contact, especially in environments in where there are young children.

Carpeting should be avoided in clinical areas where patient care and treatments are undertaken, including areas where:

- spills are likely to occur (for example, around sinks or in isolation or soiled utility/holding areas)
- patients may have direct contact with contaminated carpets (for example, children/babies crawling on the floor)
- patients that are at greater risk of infections
- extreme to high, high to medium risk functional areas
- clinical areas where high risk procedures may be performed
- areas where sterile equipment and devices are store.

Where the flooring is carpeted the need for a cleaning regime for carpets should be in place to demonstrate regular cleaning of the same.

3.11.4 Furnishings

Fabric-covered furniture can be a source of infection in hospitals and community-based facilities where high risk procedures are undertaken including management of invasive devices and dental

procedures due to the inability to clean, disinfect and dry appropriately. Where appropriate Health Organisations should consider, non-porous material for the ease of cleaning and disinfection (where appropriate).

3.11.5 Water supply system

The water supply system should be designed and maintained with appropriate temperature controls and adequate pressure; stagnation and back-flow should be minimised, and dead-end pipes (dead leg) should be avoided.

Water fixtures such as sinks, faucets, aerators, showers and toilets have been identified as potential reservoirs for microorganisms. Regular cleaning, disinfection and preventative maintenance programs should be provided, especially in areas housing immunocompromised patients.

The use of spray taps and hoses is not supported in clinical or dirty utility environments as they create aerosols. Exemption can be applied based on the availability of risk mitigation strategies such as appropriate PPE, height and depth of sink and possibility of water pressure adjustments. For example, reusable medical device reprocessing departments.

The use of thermostatic mixing valves (TMV) shall be the preferred method of delivering warm water. Remote monitoring of the TMV shall be provided. This provides a more reliable method of controlling legionella and will minimise the affected area in case of any issues arising. For more information refer to the NSW Health Engineering Services Guide. Testing and monitoring of water quality should be conducted as per the local requirements.

3.11.6 Water features

Decorative fountains produce aerosols. Despite the absence of empirical documentation linking properly maintained fountains to healthcare acquired infections, it is suggested that decorative fountains not be installed in enclosed spaces in healthcare facilities especially in areas intended for use by persons at increased risk of Legionnaires' disease. For more information on health facility design, building elements, surfaces and finishes refer to the Australasian Health Facility Guidelines (AusHFG) Part D Infection prevention and control and Australian Guidelines for the Prevention and Control of Infection in Healthcare.

Drinking water dispensers

Any system or equipment containing nonsterile water can grow Legionella particularly when water temperatures are suitable for bacterial growth, and the complex structure of hospital water systems can often lead to stagnation, corrosion, and biofilm formation. A number of water reservoirs have been linked to water-borne disease outbreaks including potable water, sinks, faucet aerators, showers, tub immersion, toilets, dialysis water, ice machines and water baths (Kanamori et al., 2016).

Health Organisations are to conduct a risk assessment that identifies all points of water dispensing that pose potential hazards, followed by a water management program to ensure safety of these dispensers. When placing these systems in the clinical areas, choose a design that do not promote the growth of microorganisms and reduce contamination, easiness of cleaning and disinfection. Also consider the following:

- Eliminate sections of no-or low-water flow or dead legs
- Recognise that low-flow and mechanically complex fixtures (for example, electronic sensor faucets) can increase the risk of Legionella growth
- Identify water system components that speed the decay of disinfectant residuals

- Clean and maintain water system components, such as aerators, filters, dispensing system and storage tanks, regularly
- Consider installing sampling ports in locations to facilitate water parameter monitoring and validation
- Should have a preventative maintenance program and regular cleaning program.

Clinical hand wash basins must not be used for drinking water as colonisation of sinks with Gram negative bacilli occurs (Hopman et al., 2017, Smolders et al., 2019, Tabone, 2022).-Microorganism transmission can be caused by splashing of water droplet from contaminated sinks to hands and water collection devices and has been associated with HAIs.

3.11.7 Fish tanks/aquariums

A number of microorganisms can be acquired from aquarium animals such as fish through spine puncture or open wounds (for example, *Aeromonas hydrophila, Edwardsiella tarda, Erysipelothrix rhusiopathiae, Mycobacterium marinum, Streptococcus iniae*) (Lehane and Rawlin, 2000) resulting from cleaning fish tanks. Furthermore, risks of infection from maintenance of the fish tank due to possibility of aerosolisation of *Legionella spp*., has also been noted. Immunocompromised patients should avoid direct contact with fish tanks and the aerosols that these items produce (Balfour-Lynn, 2021, Cremonesini and Thomson, 2008).

Because fish tanks may harbor the abovementioned pathogens, fish tanks generally should be excluded from healthcare facilities and both clinical and non-clinical areas; however, aquariums may be permitted if maintained by trained personnel, on a regular basis and this task should be performed by non-health workers following standard precautions, who are not responsible for patient care. The tank must use a closed system and water pumps that are designed to prevent aerosolisation (Murthy et al., 2015). An infection prevention and control risk assessment should be conducted to determine whether a fish tank poses a risk for patient or resident safety and health workers before making the decision (Sehulster LM, 2003). Also refer to NSW Health Staying safe around pets and animals fact sheet.

3.12 Staff health and HAI risk

Health workers' noncompliance with Infection prevention and control can contribute to the potential transmission of microorganisms within healthcare settings. Health workers carry their own commensal microflora and at times may become colonised or infected with other microorganisms that are in circulation within a healthcare facility.

Health Organisations have a responsibility to take a proactive position on staff health matters that may place the health of patients, visitors or other health workers at risk of an infection. A health worker diagnosed with an infectious condition is obliged to practice in such a manner that does not put patients, visitors or other health workers at risk of infection. The most effective way for a health worker to prevent the transmission of infection is to refrain from attending the workplace when unwell or experiencing symptoms of a known acute communicable disease.

Any staff health matters should be undertaken in discussion with the organisation workforce and/or human resource (HR) service to ensure HAI risks are aligned with the organisation's governance and operational processes for staff who may be at risk or pose a risk of infection to others in the workplace.

Refer to NSW Health Code of Conduct policy directive for more information.

3.12.1 Risk assessing health workers

There are times when the health worker may be the source of an infection and may promote the transfer of microorganisms to patients or to other health workers. Where a health worker is unwell, ask the questions in Table 8 prior to the delivery of any patient care to establish the presence and severity of this risk.

Table 8 Health worker risk assessment

Risk	Yes	No
Is the health worker known or suspected of being colonised or actively infected and poses a direct risk to others with a multi-drug resistant organism (MRO) or other communicable diseases?	☐	☐
Is the health worker displaying signs of an acute respiratory infection such as coughing or fever? (For example: COVID-19, influenza, pertussis, or tuberculosis)	☐	☐
Is the health worker vomiting or has diarrhoea?	☐	☐
Does the health worker have any open wounds, dermatitis or skin condition that are unable to cover with a waterproof or other dressing? This is particularly important if any such condition inhibits compliance with hand hygiene.	☐	☐
Does the health worker have an injury that prevent their ability to perform hand hygiene, such as cast, splint?		
Is there a history of recent overseas travel or overseas hospitalisation? (Also refer to Table 6 Patient risk assessment).	☐	☐
Has the health worker been exposed to anyone they may be aware of who has had a communicable disease or transmissible infection at home or in the workplace and they were not wearing appropriate PPE?	☐	☐
Does the health worker have relevant vaccination against infectious diseases as specified by the NSW Health Occupational Assessment, Screening and Vaccination Against Specified Infectious Diseases policy directive?	☐	☐
Is performance of an exposure prone procedure (EPP) likely?	☐	☐

At other times, the health worker may be a susceptible host and may be at risk of acquiring an infection. To establish whether the health worker is susceptible to infection, clinicians should consider the following risk factors prior to patient exposure:

- **Procedures that are being performed**. EPPs and aerosol generating procedures (AGPs) may increase the likelihood of microorganisms being transferred from patient to health worker.
- **Presence of wounds (chronic or other), ulcers, burns, contact dermatitis or exfoliative skin conditions**. Skin is a physical defence against infection. Breaches to the skin provide an access portal for infection.

- **Co-morbidities**. Certain conditions or behaviours, for example, smoking, immune disorders that may increase the propensity for infection.
- **Pregnancy**. Acquisition of infections during pregnancy may have severe outcomes for the mother and/or foetus. Immunisation compliance with current Occupational Assessment, Screening and Vaccination Against Specified Infectious Diseases policy directive or documented immunity is important to establish with some infectious diseases risks.
- **Contact and exposure to particles carrying infectious material**. Consider whether the health worker has had exposure to a patient with an infectious illness or exposure to symptoms of an infectious disease (for example, vomit, diarrhoea) without practicing transmission-based precautions.
- **Vaccination or immunity status**. Prior vaccination or identified immune status to specified infectious diseases may protect the health worker from the establishment of an infection. In some cases, vaccination may also reduce the severity of illness.

The Health Organisation must have systems to ensure compliance with the policy directive Occupational Assessment, Screening and Vaccination Against Specified Infectious Diseases. Where an organisation identifies, or is made aware, that a health worker is at risk or poses an infection risk to patients, visitors or other health workers, the level of infection risk should be assessed using the framework set out above. The duty of care required should then be reviewed against the level and consequences of the infection risk. If the level of the risk is deemed unacceptable the health worker must be managed to ensure that the health and welfare of the health worker or patients, visitors or other health workers are not compromised. This may result in exclusion of health worker from the workplace or reassignment of duties in consultation with the relevant stakeholders.

3.12.2 Managing health workers

The best practice for mitigating the risk of transmission to and from health workers involves:

- the use of established lines of communication between health workers and their managers and local staff health or occupational vaccination/screening services; and
- a suitable escalation process to managers.

The implementation of these actions will require continual support and reinforcement at the Health Organisation executive level.

Any staff health matters should be undertaken in discussion with the organisation workforce and/or human resource (HR) service to ensure HAI risks are aligned with the organisation's governance and operational processes for staff who may be at risk or pose a risk of infection to others in the workplaces.

Where a health worker has notified their manager and/or staff health or occupational vaccination/screening services of a suspected or known infection risk posed by their own health, a timely assessment of the health worker's condition should be undertaken and a suitable management response enacted. In some instances, a suitable management response may involve a change in duties, temporary leave or redeployment until such time as the infection risk has been deemed acceptable or eliminated.

At all times, staff health or occupational vaccination/screening services information must be treated in confidence by managers and staff health services. The Health Organisation must investigate and act further if it becomes aware that a health worker has unknowingly posed an infection risk to patients and other health workers in the present and past.

Managers and staff health or occupational vaccination/screening services also have a responsibility to minimise the risk of infection to health workers.

If a health worker is immunocompromised or lacks sufficient protection against a vaccine preventable disease, a suitable management response may be to change the health worker's duties or redeploy the health worker in an area where there is a lower risk of infection. Health workers should be made aware of infection risks prior to any anticipated exposure and be trained to use standard and transmission-based precautions. If an exposure is known to have occurred, depending on the nature and extent of exposure (for example, penetrating needle stick injury), the exposed health worker may require immediate first aid, clinical care and/or treatment. For more information refer to NSW Health policy directive HIV, Hepatitis B and Hepatitis C – Management of Health Care Workers Potentially Exposed.

If a health worker is exposed to an infectious disease during their work, the management response (also refer to Figure 8 PPE breach risk assessment key principles) should address:

- notifying the health worker of the exposure (if they are unaware)
- whether the health worker requires clinical assessment
- incubation period, signs, and symptoms of the infectious disease
- whether post exposure prophylaxis should be discussed, consented, and administered
- precautions to be undertaken by the health worker to prevent further spread of the disease (including time off work and return to work plan)
- whether change of duties or home quarantine is required
- whether the Public Health Unit (PHU) and/or Safe Work NSW needs to be notified
- referral to their general practitioner or relevant specialist consultant
- report/record in Incident Management System (IMS+) or as per the local process.

In the event of a health worker being exposed to or infected with an infectious disease during their work and are required to take leave from work by the Health Organisation, a return-to-work program should be agreed to in consultation with the health worker. Likewise, a consultative process, involving the health worker, should be undertaken regarding any change in duties or temporary or longer-term redeployment.

3.12.3 Management of health workers with an occupational exposure

An occupational exposure is defined as an incident which occurs during a person's employment and involves contact with blood or other body substances or communicable diseases. Such exposures include:

- **Sharps injury**: Needlestick (including hollow bore and suture needles), cut with a sharp object or device. For example, scalpel, glass slide, dental equipment, tooth (including bites) and bone.
- **Mucous membrane exposure**: Mouth, eye, nose.
- **Contact with non-intact skin**: Uncovered open wound/cut, dermatitis, eczema and acne.

Occupational exposure does not include contact of blood or body substances with intact skin.

A risk management should be undertaken to ensure that health workers are protected from exposure to blood and body substances and should be undertaken in consultation with workers who are, or are likely to be, directly affected.

Health worker occupational exposures should form part of an organisation Key Performance Indicator (KPI) for reporting on regarding locations trends, risks and preventative or quality improvement activities undertaken by managers and the services in response to health worker safety as part of the organisation's workforce accountability framework.

For more information refer to NSW Health policy directive HIV, Hepatitis B and Hepatitis C – Management of Health Care Workers Potentially Exposed, Work Health and Safety - Blood and Body Substances Occupational Exposure Prevention, NSW legislation- Work Health and Safety Act 2011 No 10 and NSW Health Chief Health Officer's guidelines for the Mandatory Disease Testing Act 2021.

Where such an exposure occurs, the following principles apply:

- Carry out first aid immediately:
    - Skin - wash the exposed site with soap and water
    - Eyes - rinse thoroughly while eyes are open with water/normal saline
    - Mouth - spit out and rinse with water several times
    - Clothing - remove and shower if necessary.
- Notification of the incident to immediate supervisor or manager and Incident Management System (ims+).

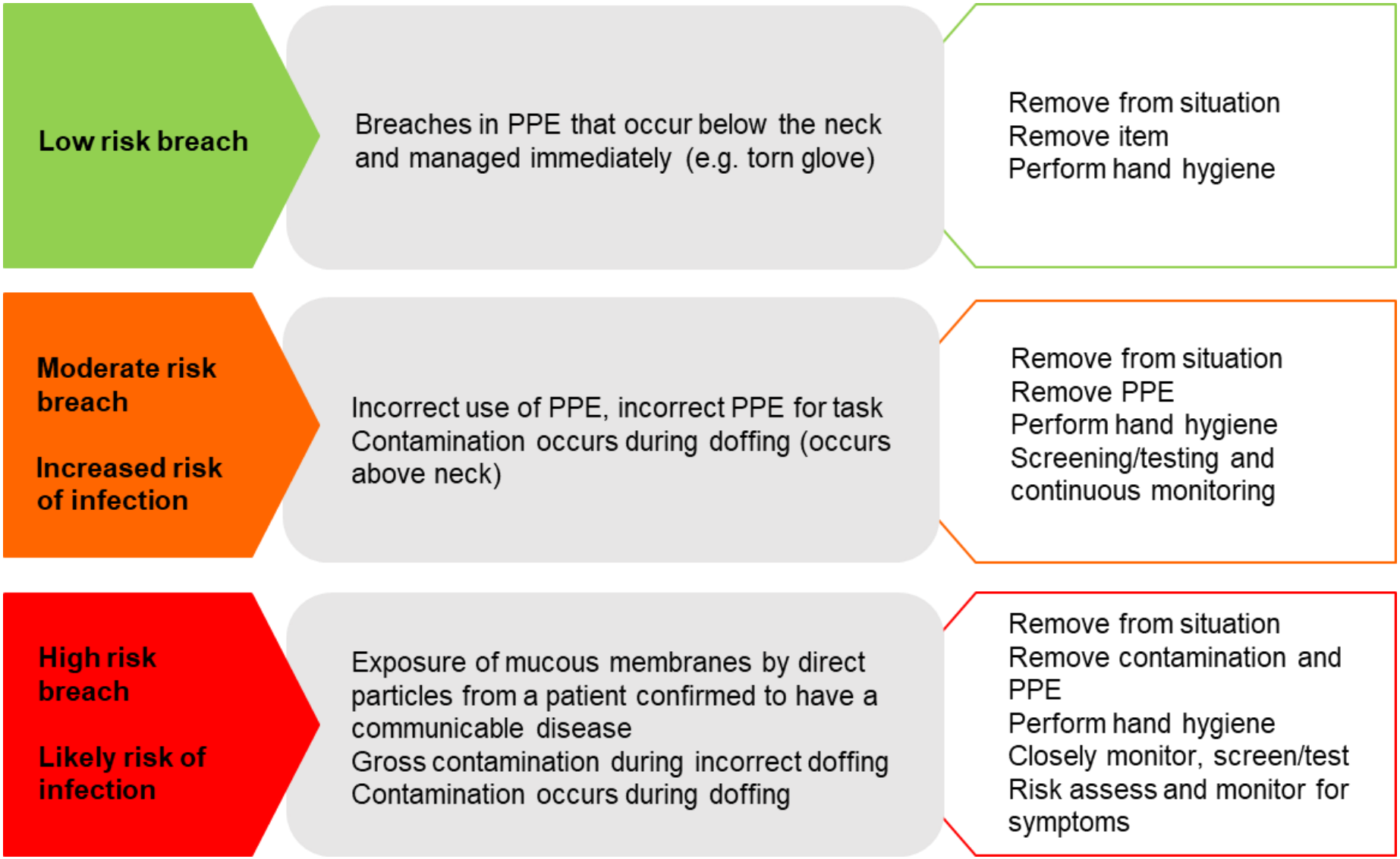
3.12.4 PPE breach risk assessment principles

Perform a risk assessment to determine health workers level of exposure to a communicable disease during their work. Where injury has occurred, perform immediate first aid. Based on the risk assessment, inform health workers of their level of exposure and likely actions required, while maintaining confidentiality.

To help reduce the risk of transmission in the workplace and support health worker wellbeing, the following actions should be implemented when an employee is unwell or may have been exposed to a communicable infection:

- Provide information on the need to monitor for symptoms and importance of consistent adherence to all recommended mitigation strategies
- If required support and encourage working from home or options to telework where possible
- Provide follow up and support as required and plan for return to work.

Figure 8 PPE breach risk assessment principle – examples



3.13 Exposure prone procedures

Exposure prone procedures (EPPs) are procedures where there is a risk of injury to the health worker resulting in exposure of the patient's open tissues to the blood of the health worker. These procedures include those where the health worker's hands (whether gloved or not) may be in contact with sharp instruments, needle tips or sharp tissues (shards of bone or teeth) inside a patient's open body cavity, wound or confined anatomical space where the hands or fingertips may not be completely visible at all times. For more information refer to CDNA National Guidelines for healthcare workers on managing bloodborne viruses.

Key practice points:

- Health workers who perform EPPs must take reasonable steps to know their blood borne virus (BBV) [human immunodeficiency virus (HIV), Hepatitis B virus (HBV) and Hepatitis C virus (HCV)] status and are required to comply with the National Guidelines for BBV testing and annual declaration of compliance to AHPRA.

For more information refer to:

- NSW Health policy directive - HIV, Hepatitis B and Hepatitis C – Management of Health Care Workers Potentially Exposed
- NSW Health policy directive - Management of health care workers with a blood borne virus and those doing exposure prone procedures
- ASHM National Hepatitis B Testing Policy
- ASHM National Hepatitis C Testing Policy

3.14 Health worker screening and vaccination

NSW Health Organisations must establish systems to ensure that all health workers and new recruits are assessed, screened, and vaccinated as required by the risk category of their position.

New recruits and students must undertake any necessary serological tests, vaccinations, and tuberculosis (TB) screening. Refer to Occupational Assessment, Screening and Vaccination Against Specified Infectious Diseases for more information.

3.15 Health workers with cystic fibrosis

Health workers with cystic fibrosis (CF) should consult with their line manager and infection prevention and control professionals on specific requirements for delivery of care.

Health workers with CF should always adhere to the requirements of standard precautions and where necessary, transmission-based precautions.

3.16 Health workers with herpes simplex virus

There is a risk that a health worker with an oral/facial lesion (such as, cold sores) associated with herpes simplex virus (HSV) and herpes zoster virus may transmit infectious material to a patient when providing direct care. The appropriate management response should ensure that these health workers are not providing direct care to, or in close contact with, high risk patients, such as:

- Neonates
- Newborns
- Patients in delivery suites

- Severely immunocompromised
- Burns patients
- Patients with extensive eczema
- Ophthalmic patients (specified by local facility)
- Patients in an operating room if there is an exposed herpetic lesion.

The inclusion of other patient cohorts into high-risk groups should be determined locally and be based on an established risk assessment.

Where this is unavoidable due to appropriate staffing availability and poses a risk to patient safety as above, consult with infection prevention and control/ID for advice.

3.17 Health workers with other infectious diseases

Health workers exposed to other communicable diseases (for example, Pertussis, Measles, Chickenpox, Meningococcal Disease) should seek medical care and timely discussion with their manager should also be considered. Refer to NSW Health Infectious Diseases control guidelines for more information.

Chapter 4 Risk Management

4.1 Introduction

Risk management in healthcare is a complex set of clinical and administrative systems, processes, procedures, and reporting structures designed to detect, monitor, assess, mitigate, and prevent risks to patients (McGowan et al., 2023), visitors and health workers. Health Organisations are responsible for the evaluation of, managing and minimising risks in the healthcare environment (McGowan et al., 2023). Furthermore, Health Organisations are to take a proactive risk management approach by identifying the types of risk exposure within an organisation, measuring those potential risks, and proposing means to mitigate or exploit them. For more information refer to NSW Health policy directive on Enterprise-wide Risk Management (NSW Health, PD2022_023).

4.2 Health worker education

Healthcare organisations need to have an established and on-going risk management plan in place with detailed employee training requirements including new employee orientation, ongoing and in-service training, annual review of risk management plan, competency validation, and event-specific training.

4.2.1 Mandatory education

Completion of mandatory training helps maintain a safe and healthy work environment and must be undertaken by all NSW Health workers to meet the criteria specified in NSW Health policy directive Infection prevention and control in Healthcare Settings (NSW Health, PD 2023_025) and the Australian Commission on Safety and Quality in Healthcare Preventing and Controlling Infections Standard (Australian Commission on Safety and Quality in Health Care, 2021b).

Infection prevention and control training of health workers is the core foundation of an effective infection prevention and control program. The Health Organisation is responsible for ensuring health workers complete this training. In addition, health workers are to undergo onsite practical training and competency assessments, where relevant, on the following: hand hygiene, aseptic technique, sharps use and disposal, waste management, donning, and doffing of personal protective equipment (PPE) including respiratory protective devices, cleaning of shared patient equipment and cleaning of the healthcare environment.

There are a number of mandatory, core infection prevention and control training modules for clinical staff as well as additional modules based on roles and responsibilities within the organisation. Refer to the below list of course names and codes from Health Education and Training (HETI) My Health Learning.

Table 9 Examples of mandatory training course names and codes

Course name	Course code
Donning and fit checking of P2 or N95 respirators in NSW healthcare settings	319438161
Hand hygiene for clinical healthcare workers	526958944
Hand Hygiene for non-clinical Healthcare workers	526960138
Aseptic technique	40027445
Environmental cleaning	45738936

Further training may be directed by a Chief Executive (CE) in response to specific local training requirements and is deemed “CE Directive Training” rather than mandatory training.

4.2.2 Local education and training

Each Health Organisations should recognise that additional local education and training may need to be delivered to address specified local infection prevention and control issues. Such issues may be identified through an education gap analysis. Information for the gap analyses may be determined from:

- new or revised local procedures
- debrief recommendations made following an outbreak
- outcome from surveillance trends
- auditing results
- accreditation recommendations or requirements
- mandatory training requirements
- clinical competency/assessments required for the local facility.

The delivery of local education, training and competency/assessments can take many forms. Consideration of the content being delivered, and the knowledge levels of the target audience should influence what modes are applied with adult learning principles.

Informal education should be considered as an essential part of the continuing development of all health workers. If practical, and without compromising patient dignity or safety, opportunities at the bedside are useful in providing informal one-on-one or small group infection prevention and control education to health workers.

4.3 Consumer education

A healthcare consumer is an individual who uses or is a potential user of health services and includes the family, participants in care, patient's carers, clients, or residents. Health Organisations are to develop a process consistent with the Australian Commission on Safety and Quality in Healthcare Partnering with Consumers Standard when assessing risks and implementing infection prevention and control practices.

Consumer education, including for visitors, is an effective way to raise awareness about infection prevention and control and to reduce the spread of microorganisms in healthcare facilities and in the community. At a minimum patients, visitors and carers must be educated on appropriate hand hygiene and respiratory etiquette, and where required, donning, and doffing of PPE.

Health Organisations should continually provide education to consumers:

1. All patients should receive basic education on hand hygiene and cough etiquette.
2. Patients should receive additional education based on their needs – for example, when to perform hand hygiene, vaccination programs, wound management, caring for indwelling devices, isolation requirements and transmission-based precautions.

The time, content, and context on the provision of infection prevention and control information varies from person to person and not every patient/consumer will require specific infection prevention and control education. In general, individualised education should be provided to a consumer:

- when an infection risk is identified and continued until the risk has subsided. For example, chemotherapy, organ, or tissue transplant
- with a suspected or confirmed infectious disease
- when undergoing surgery

- who has an identified medical condition or immune disorder that increases their risk of acquiring an infection or multi-drug resistant organism (MRO), for example, diabetes, hypogammaglobinemia
- who has permanent indwelling devices such as a tracheostomy, supra-public catheter, intravascular device
- who has been recently hospitalised overseas in countries with known high prevalence of MROs or emerging novel infections
- under transmission-based precautions.

Consumers should also be provided with education at the time of discharge if ongoing infection prevention and control measures are required. In community health settings, infection prevention and control education should be provided when an infection risk is identified and then continually reviewed as part of the patient's, client's or resident's care plan until the risk has abated.

When providing infection prevention and control education to consumers, treating clinicians should provide tailored answers to the following questions:

- Why am I at risk?
- What is the level of risk that I have?
- Am I contagious?
- What symptoms will I experience if I get an infection?
- How does my condition affect me, my family, and my visitors?
- What can I expect is going to happen to me?
- What can I expect from the health workers who are looking after me?
- What are my treatment options?
- What are the risks and benefits associated with the different treatment options?
- Are there any alternatives or other options that I should consider?
- What do I need to do if have signs or symptoms of an infection?
- When and how do I take my medication?
- How can I protect myself, my family, and my friends?
- What do my family and visitors need to do to protect me and themselves?
- What should I do if I am concerned about the transmission and infection risks around me?
- How can I protect myself in my room?
- How can I protect myself and others if I leave the room?
- Who can I contact if I have any further questions or need to check something?

Health workers should first provide verbal education to the consumer and then, if appropriate, provide the consumer with written information that has been approved by the Health Organisation. Any written material should be provided to consumers as reference material rather than as a primary source of education. Written material should always be explained and discussed with the consumer. Any education and/or information provided to the consumer is to be documented in the health record.

Every health worker has a responsibility to provide infection prevention and control education to consumers in their care, their family, participants in care, carer, and visitors. Infection prevention and control education should be based on the scope and context of the consumer/health worker relationship, as illustrated by the following examples:

- A physiotherapist may educate a consumer on why their wound must heal before the patient can use the hydrotherapy pool
- A nurse may educate a carer on how to help a patient take a shower prior to surgery
- A diabetes educator may educate the spouse of a diabetic patient on how to check the patient's feet for signs of a skin breakdown or infection
- An infection prevention and control professional may educate a visitor with a persistent cough not to visit a relative in neonatal intensive care unit (NICU)
- An infectious diseases physician may educate a consumer regarding their new diagnosis of Carbapenemase-producing *Enterobacterales* (CPE) when discussing their treatment options
- A nurse may educate their consumer with an MRO on performing hand hygiene before leaving the room to go to medical imaging.

There may be times when infection prevention and control education may include discussing sensitive information (for example, sexual history, disease status, pregnancy). When providing education to a consumer or their family, participants in care, carer and visitors, clinicians should be aware of the physical environment and seek permission from the consumer to disclose any sensitive information to family, carers or visitors.

Health literacy is the skills, knowledge, motivation, and capacity of a person to access, understand, appraise and apply information to make effective decisions about health and healthcare and take appropriate action.

The health literacy of one person may vary to the health literacy of the next person and is usually very different to that of a health worker. Therefore, clinicians should be mindful to use simple and clear language and avoid using medical jargon, such as medical abbreviations, terms, and phrases when providing information and education to consumers.

There needs to be a clear process for the provision of education and information in languages other than English. This can be done by engaging in the services of a language interpreter or information sheets written in the consumers' preferred language. Consider aboriginal health needs including aboriginal health teams where available.

Many support groups provide information on specific conditions, diseases, surgical procedures, and treatments. These should be explored as an option when providing education and where local information sheets are not available.

Health Organisations need to ensure that the consumer infection prevention and control information is both accessible and understandable. The development of education and information sheets, pamphlets, videos for mass distribution and consumption should include consideration of the most effective modes and mediums, for example, verbal, written, face to face, paper or online. The language of the information materials should be tested by a broad range of consumer advisors to ensure they are suitable for the target consumer group. Clinicians also should seek consumer advice on whether to use signs and symbols, diagrams, images, colours, and other visual tools to simplify and reinforce meaning.

Checking whether a consumer understands the infection prevention and control information provided is just as important as providing the information itself. One way to test if a consumer has clearly understood the information provided is to use the 'teach back' method. A follow up

conversation a few days later is also a good way to reinforce education and check that information is clearly remembered and understood.

4.3.1 Education on acute respiratory infection prevention and control practices

To prevent transmission of respiratory infections Health Organisations should implement infection prevention and control measures including provision of education to consumers, carers, and visitors. Provide instructions when scheduling appointments and display visual alerts at the entrances to the Health Organisations reminding consumers and people who accompany them (for example, family, friends, visitors) to:

- Inform health workers about the symptoms of any respiratory infection when they attend a Health Organisation.
- Defer non-urgent routine visits if symptoms of respiratory infection and consider alternative mechanisms (for example, video-call applications on cell phones or tablets) until they have recovered.
- Wear a surgical mask while in the facility if they have symptoms of respiratory infection (for example, cough) or have recently been in close contact with someone with SARS-CoV-2 infection.
- Clean their hands after having contact with respiratory secretions (respiratory hygiene and cough etiquette).

Instructions and alerts should be provided in appropriate languages and with consideration for individuals with learning disabilities or visual impairment.

Practice respiratory hygiene and cough etiquette

Health Organisations are to:

- Ensure the availability of materials for adhering to respiratory hygiene and cough etiquette at facility entrances, triage areas, and waiting areas for consumers and visitors
- Provide face masks for people with symptoms of respiratory infection (for example, cough) or who have recently had close contact with someone with SARS-CoV-2 infection and advise those older than 12 years of age to wear it while they are in the facility unless there are medical contraindications
- Facilitate hand hygiene, provide conveniently located dispensers of alcohol-based hand sanitiser; where sinks are available, ensure that supplies for hand washing (such as soap, disposable towels) are consistently available
- Provide tissues and no-touch receptacles for used tissue disposal.

4.4 Evaluating the delivery of information to consumers

As part of a Health Organisation ’s commitment to quality and consumer focused care, all infection prevention and control consumer information should be evaluated to ensure that the information provided is clear, relevant, easily understood and meets the needs of the healthcare consumer. Examples of methods on how to evaluate information include:

- Review of information by Health Organisation consumer advisory groups.
- Consumer surveys or focus groups.
- Testing on a small number of consumers.

Additional information and resources on the development and evaluation of information for healthcare consumers is available from:

- Clinical Excellence Commission - Person centred care
- Health Consumers NSW.

4.5 Communication between providers

Processes must be placed to ensure that a patient's precaution status (for example, infectious diseases, behavioural risks, or other clinical risks) is clearly and consistently communicated whenever responsibility for their care is transferred between healthcare providers or organisations. This includes communication with:

- receiving healthcare facilities or services
- health-related transport providers, such as NSW Ambulance or Patient Transport Services (PTS).

This communication is essential to maintaining continuity of care, ensuring patient and health worker safety, and supporting appropriate clinical and infection prevention and control practices.

4.6 Risk management in specific healthcare settings

Risk management in Health Organisations, including specialty settings, improves the quality and safe delivery of healthcare by introducing systems that identify and prevent circumstances that put consumers and health workers at risk of harm. All Health Organisations are required to implement locally based risk management systems, or to enhance their existing process in line with NSW Health policy directive on Enterprise-wide Risk Management (NSW Health, PD2022_023).

4.6.1 Oral health settings

Health Organisations providing oral health services are to comply with state and national policies and standards in accordance with the Dental Board of Australia, National Safety and Quality Health Service (NSQHS) Standards and NSW Health Policy Directive- Infection prevention and control in healthcare settings.

Oral health settings are to ensure that infection prevention and control practices and strategies outlined in the Australian Guidelines for the Prevention and Control of Infection in Healthcare and NSW Health Policy Directive- Infection prevention and control in healthcare settings are to be implemented to reduce or eliminate the risk of transmitting microorganisms such as bacteria, viruses, and fungi between patients/clients, from staff to patients/clients, and from patients/clients to practitioners or other staff members.

For more information refer to Australian Dental Association Guidelines for Infection prevention and control.

4.6.2 Community settings

In the community setting, care may be provided in a clinical environment like community health or in a non-clinical environment like a private home, residential aged care facility, group home or community hall.

To determine whether the environment is likely to promote the establishment or spread of infection, the following risk factors need to be considered:

- **Procedures**: Performing an invasive procedure that breaches the skin and exposes normally sterile body substances and tissue may increase susceptibility to infection.
- **Cleanliness**: Cluttered, unkempt, or unhygienic environments are more likely to be a stimulus for development of reservoirs for organisms and a build-up of bioburden. This increases the risk of microorganism transmission and possible infection.
- **Equipment and stock**:
    - Single-use equipment including sharps must be used once only. Where an incomplete portion or sets are used, remaining parts should be disposed of according to current waste management procedures.
    - Single-patient-use devices and equipment can be used multiple times on the same patient following manufacturer's instructions for cleaning between uses.
    - Reusing single-use or contaminated sterile equipment and stock increases the risk of infection.
    - Sterile products or equipment are to be stored in a manner to maintain their sterility.
    - Event related sterility applies to all sterile stock (event related shelf-life practice) means the product should remain sterile until an event causes the item to become contaminated. For example, tears in packaging, packaging becomes wet, seal is broken. Event-related factors that contribute to the contamination of a product include bioburden (such as, the amount of contamination in the environment), air movement, traffic, location, humidity, insects, vermin, flooding, storage area space, open/closed shelving, temperature, and the properties of the wrap material).
    - During transport and storage, sterile stock should be stored in an environment that maintains the integrity of sterile stock.
    - When storing sterile stock there should be a process for stock rotation to ensure the oldest manufactured date is at the front/top so that it is used first.
    - Do not over stock. Keep storage containers clean, dry and in good condition.
- **Reprocessing of reusable clinical and non-clinical equipment**: Failure to clean and/or reprocess reusable medical devices prior to use on a patient and after use will increase the risk of subsequent microorganism transmission.
- **Waste management**: Inappropriate clinical waste disposal may promote the spread of infection.
- **Contacts**: The type of contact between patients or their family and health workers may increase the possibility of microorganism transmission. This is particularly the case if there is poor personal and environmental hygiene.
- **Individual**: Consider whether there are certain individuals that may be more susceptible to infection than others.

This assessment should be done initially before the delivery of any care and then reviewed routinely if ongoing care needs to be provided in the setting.

Home visits

Home visits from healthcare and non-government organisation (NGO) providers enable personalised and individualised care for patients/clients. While planning and providing care to patients with a communicable disease or an infection, the providers are continuing to ensure that there is minimal impact on patient/client care activities.

The impact of communicable disease recognition and prevention must not impede routine and necessary patient/client models of care, safety, and quality of care. It is expected that home care providers will maintain adequate supplies of appropriate PPE, cleaning materials and alcohol-based hand rub to protect themselves if caring for a patient/client with suspected or confirmed communicable disease, in preventing exposure and cross transmission.

4.6.3 Ambulance and paramedic settings

Infection prevention and control principles equally apply to paramedics and ambulance settings. Paramedic and ambulance care is provided in a variety of settings, and with varying degrees of urgency. The environment within an ambulance vehicle may be considered more controlled than that outside the vehicle. It may be difficult to control the transmission risks present outside the ambulance vehicle; however, identification of the transmission risk factors should form part of scene safety and patient assessment processes.

To determine whether the environment is likely to promote the establishment or spread of microorganisms that potentially cause infection, the following risk factors need to be considered:

- **Procedures**: Performing an invasive procedure that breaches the skin and exposes normally sterile body substances and tissue may increase susceptibility to infection.
- **Cleanliness and hygiene of the environment**: Poor environmental cleanliness and hygiene may impact on the application of aseptic technique in this setting.
- **Equipment and stock**: Certain equipment and stock must be used only if sterile. Maintaining stock sterility in a crowded, mobile and temperature labile environment is difficult, and this may increase the risk of infection if it is not managed adequately.
- **Reprocessing of reusable clinical and non-clinical equipment**: Failure to clean and/or reprocess reusable equipment after its use will increase the risk of subsequent transmission.

4.6.4 Patient transport service settings

Patient transport service vehicles and fixed wing aircraft should be considered as similar to an ambulance setting and risk assessed in the same way as an ambulance setting.

For transport of patients with specific MRO should refer to Chapter 7 Management of MROs.

Communal patient transport vehicles (such as transporting more than one patient at a time) should also be considered as a community setting for the purposes of this Handbook. Communal patient transport vehicles are like outpatient clinic waiting rooms, as a varied mix of patients may be present at any given time. Infection risks in these settings should be identified in line with guidance provided for community settings.

4.7 Risk management in patient care settings

All NSW Health Organisations must assess the risk at different levels, across many functions and activities as appropriate for the size and complexity of the organisation.

4.7.1 Food

All Health Organisations are regulated by the NSW Food Act 2003 and are to be licensed by the NSW Food Authority. Health Organisations are to comply with the Food Standards Australia New Zealand Standard Code 3.3.1 Food Safety Programs for Food Service to Vulnerable People, NSW Food Authority - Vulnerable persons and National Safety and Quality Health Service Standards(Australian Commission on Safety and Quality in Health Care, 2024).

It is important that the principles of food hygiene are followed by all those who are involved in the preparation, handling and serving of food.

High risk patient groups

High risk patients in Health Organisations may be at risk of acquiring a foodborne illness if food safety standards are not maintained. Even if food safety is not compromised, certain patients are more vulnerable to serious infection from certain foods. These patients include pregnant women, young children, the elderly and the immunocompromised (for example, diabetes, immunosuppressive treatments, or leukemia). Seek dietary advice from local dietetics services prior to providing food to these individuals. For more information refer to Agency for Clinical Innovation (ACI) Nutrition Network and Nutrition Network resources.

4.7.2 Food provided by the hospital (or other HOs)

Food Standards Australia New Zealand Standard Code 3.3.1 outlines the local governance structures and processes required for:

- Food storage requirements and temperature control.
- Food sanitation.
- Stock rotation and food expiry.
- Cleaning of food preparation areas and equipment.
- Documentation.

At the ward level, the following practices are advised for implementation:

- Serve hospital-provided food immediately after its preparation.
- Storage of uneaten or partially uneaten meals is not recommended. Uneaten meals are to be disposed of after the meal service.
- Use enteric feeds immediately after opening. Dispose of any feed that has been exposed to the environment (for example, left sitting open on benchtops).
- The ward-based kitchen and beverage preparation areas (including designated patient food storage refrigerators) should not be considered or treated as a main access thoroughfare for clinicians, patients, or visitors. Before implementing any access restrictions, Health Organisations should consider the need for patient and/or visitor access. For example:
    - Settings where patients access to the kitchen is imperative for their health and recovery (for example, mental health settings, occupational therapy, rehabilitation)
    - Settings and/or occasions where patients, particularly those hospitalised for a long period, may communally gather in the kitchen (for example, celebrations).
- Good hand hygiene practice should always be employed when preparing and handling food. Hand hygiene products are to be available.
- Safe and appropriate handling practices should be used when preparing eggs, raw meat, poultry, noodles, cheeses and fruit and vegetables (NSW Food Authority - Special care foods).
- Dedicated refrigerators should be available to separate stores:
    - Patient food and beverages
    - Staff food

- Medication and vaccines (refrigerator should be outside of food preparation areas)
- If required, medical equipment (the refrigerator should be outside of food preparation areas)
- Regular monitoring, documentation and preventative maintenance should be provided for these refrigerators.

Refer to the NSW Health Breastmilk: Safe Management guideline for advice on the storage of breast milk.

4.7.3 Food not provided by the hospital (or other HOs)

Food brought into hospitals by patients and their families and carers is outside the scope of this handbook. This includes foods brought from commercial food outlets on the hospital campus (for example, takeaway shops and convenience stores). However, health workers should inform patients, families, and carers that wards do not have the capacity to store food that has not been provided by the hospital and cannot guarantee the integrity and preservation of externally bought foods. Health workers should seek dietetic advice regarding the risks associated with consuming externally brought food.

Note: Health workers should not purchase, reheat, prepare, or serve any externally brought food on behalf of patients.

Accumulation of food products inadequately stored, whether from internal or external sources potentially increases the risk to patients due to poor preservation. There is also an increased risk of attracting insects and vermin if not managed.

4.7.4 Oral nutritional supplements

To prevent contamination, portion controlled nutritional supplements should be dispensed in a clean environment. The full portion should be consumed when given. If the full portion is not consumed within 2 hours, it is to be discarded.

Open supplement containers or cans must be labelled with the date and time opened, covered, and stored in a patient food storage refrigerator. Use the contents or discard within 24 hours of opening.

Items delivered and not consumed, both opened or unopened should be discarded due to potential cross contamination risks.

4.7.6 Ice for human consumption

Heat generated by a water chiller or ice machine's compressor may create optimal growth temperatures for Legionella in the water supplying the ice machine, chilled water dispenser or ice. Immunocompromised patients are particularly susceptible to this risk if exposed to ice or chilled water contaminated with Legionella.

It is recommended that activated carbon filtration is not used in ice machines and water coolers in health and aged care facilities because of the increased opportunity for Legionella to colonise the device downstream of the carbon filter. When purchasing new ice machines, the facility is to comply with their product/equipment evaluation processes. There is a preference for non-touch dispensing ice machines.

The following should be considered when purchasing ice machines:

- Advice must be sought from the infection prevention and control team, facilities maintenance, and the local procurement as appropriate

- Machines that dispense ice directly into portable containers at the touch of a control or "hands free" should be purchased to reduce potential for contamination
- Recycling excess water onto a reservoir or ice compartment is not recommended. Machines must be plumbed into the main water supply
- Machines must be installed in accordance with the manufacturer's guidance and instructions
- A U-bend and break in the drain is required to prevent reflux
- There should be adequate separation of air inlets and air outlet in the heat exchange mechanism to permit efficient cooling. The placement of the machine should be such that these areas are not obstructed
- The ability to implement necessary maintenance schedules should be addressed during the purchasing process
- Machines must be on a regular cleaning schedule as recommended by the manufacturer. Health Organisations should develop a process of regular cleaning and monitoring of the machines
- Adequate maintenance schedules should be developed, to ensure the machine can be maintained as per the manufacturer's instructions and records are audited at least annually.

Health workers obtaining ice must:

- Perform hand hygiene prior to accessing the ice
- Not to handle ice with hands
- Once the ice is removed, it must not be returned to the machine.

4.8 Flowers and plants

For most patients in hospitals and other healthcare facilities, fresh flowers or potted plants do not represent a risk of infection.

Cut flowers left standing in water and soil from plants and dried arrangements can be heavily contaminated with microorganisms that are pathogenic to immunocompromised patients, such as Aspergillus species. While there is limited evidence that links the presence of these organisms to infection in these patients, it is strongly recommended that plants and dried or fresh flowers are not allowed in the hospital rooms of haematopoietic stem cell transplant recipients given the potential for severe infection in these patients (Sal Moslehian et al., 2023).

Poorly maintained flowers or potted plants can increase the risk of attracting insects. Plants are not recommended in clinical and laboratory areas (Sal Moslehian et al., 2023).

4.9 Staff attire

Health workers are to wear clean garments for each shift. Health workers are also to ensure that:

- Clinical procedures require a bare below the elbow approach to comply with asepsis and NSW Health policy directive Infection prevention and control in Healthcare Settings (NSW Health, PD 2023_025).
- If they are wearing long sleeved clothing, the long sleeves should be rolled up or removed during clinical procedures and they must be able to perform adequate hand hygiene.

- Requests from clinical staff to wear long-sleeved items (for example, compression bandages) for medical reasons should be assessed by the Health Organisation on a case-by-case basis in consultation with local infection prevention and control.

Hair

Health workers are to ensure that:

- Hair should be always clean and in the clinical environment should be contained.
- Hair below collar length should always be tied back in a manner which does not allow contact with the patient.
- Head/ hair protection is mandatory in certain areas including kitchens and operating theatres.
- Facial hair is best kept tidy, neat and trimmed and should be covered with a hood when undertaking aseptic procedures.

Health workers are to wear fluid repellent, fully enclosed shoes in the clinical environment.

The wearing of ties and lanyards in the clinical area is not recommended. Evidence suggests that ties and lanyards can be contaminated during patient care, and in turn can carry infectious material between patients (Pepper et al., 2014, Murphy et al., 2017, Kotsanas et al., 2008).

4.10 Uniforms and scrubs

Uniform 'scrubs' are supplied by NSW Health to meet uniform requirements and are referred to as 'uniform' in this guidance.

Surgical scrubs are theatre attire worn by health workers in theatre or other specialities. They are supplied by NSW linen service and are referred to as 'surgical scrubs'.

NSW Health stipulates when scrubs and uniforms should be worn, as outlined in the NSW Health policy directive Uniforms Policy. Employees who are required to wear a uniform are required to comply with the policy, LHD/SHN Uniform and Dress Code requirements and the NSW Health Code of Conduct.

Perioperative attire (surgical scrubs) should not be worn outside of the perioperative area as per local procedures, except for emergency attendance of patients within the hospital building. If scrubs are worn outside of the perioperative setting, surgical attire is to be changed before re-entry into theatre.

At any time, if a health workers clothing becomes contaminated with blood or body substance, the clothing should be removed as soon as practical and before the health worker attends to other patients.

If skin is contaminated with blood or body substance, the health worker must remove contaminated clothing/uniform or PPE and wash any affected skin, including hand hygiene.

PPE must not be worn outside the hospital setting unless it is specific for clinical service such as during a home visit, resuscitation/first aid on campus grounds.

The choice to change out of a uniform before leaving work is a personal one. Surgical scrubs are not to be worn outside the hospital setting.

4.11 Perioperative attire

Health workers are to replace all outer garments with prescribed perioperative attire in the designated changing facilities before entering the semi-restricted and restricted areas.

Theatre attire worn during surgical or invasive procedures must provide the wearer with an appropriate level of fluid-resistant protection to prevent contamination and ensure safety. This includes gowns that serve as a barrier to blood, body substance, and other potentially infectious materials.

Where reusable gowns are used as a sustainability initiative, it is essential to ensure that their protective qualities meet or exceed those of disposable alternatives. However, reusable gowns may pose a risk of strike-through, where fluids penetrate the fabric over time or under pressure. To mitigate this risk, additional protective measures are recommended, such as:

- Wearing a fluid- resistant apron underneath gown during high-risk procedures
- Ensuring that reusable gowns meet AAMI Level 3 or 4 standards (or equivalent), depending on the procedure's fluid exposure risk
- Adhering to strict laundering and inspection protocols to maintain the gown's integrity over repeated uses
- Training health workers to recognise when additional protection is needed and how to don/doff layers safely.

Perioperative attires are not worn outside of the perioperative environment (Hafiani et al., 2022, Mohammed Al-Aamri et al., 2024), unless emergency attendance of a patient is required within the facility or transport of patients from theatre to ward within the same facility. If scrubs are worn outside of the perioperative setting, surgical attire is to be changed before re-entry into theatre.

Use of outer gowns to protect surgical attire is not recommended, due to the limited benefit in reducing the contamination of surgical attire (Mohammed Al-Aamri et al., 2024, Hafiani et al., 2022).

Health workers are to consider the following while working within the perioperative environment:

- Change into clean perioperative attire daily, or when wet or soiled
- Visibly soiled scrubs are to be changed before leaving the theatre
- Ensure hair on the back or at the neckline is covered
- Prevent perioperative attire have contact with the floor when changing
- Lanyards, pouches or other hand or wrist accessories are potential vectors for infection and are not recommended
- Apply a head cover that encloses all hair, including sideburns and facial hair, and covers the nape of the neck
- Change head covers daily and when wet (perspiration) or soiled.

There is limited evidence for the use of shoe covers to reduce microbial load in the theatre environment (Rashid et al., 2016). Fluid resistant shoe covers may provide protection against the risk of body substance contamination of the shoes. Where the use of shoe covers is indicated, health workers are to perform hand hygiene after putting on and removing shoe covers.

Shoes used for the perioperative environment should be dedicated for that use and routinely cleaned.

4.12 Use of portable fans

In healthcare settings, the use of portable or ceiling fans can promote the spread of dust, debris and microorganisms through the air and can pose a risk to patients, health workers, and consumers. Organisms dispersed through the air can have the potential to contaminate open wounds, open

areas, and environmental surfaces. Fans can disturb the normal air flow within a room or patient clinical area, altering the expected air flow pattern (for example, disturbance in negative pressure room air changes).

The use of ceiling or portable fans in high-risk clinical settings can alter the indoor air flow and can be an important vehicle for a variety of human pathogens and the bioaerosol deposition resulting in potential source of hospital-associated infections.

Bladeless fans, while they may be considered easier to clean, may promote environmental contamination through their operating mechanisms. The blades are hidden inside the pedestal stand and air flows through the channel in the pedestal through the curved path, the surrounding air becomes drawn into the fan from multiple areas around the fan. Given that the internal component of bladeless fans may not be able to be cleaned thoroughly, clinically significant microorganisms can harbour inside the cowl.

While the use of portable fans has not been proven to transmit infection, lack of appropriate cleaning procedures for portable fans is an infection control concern. Portable fans can be considered in waiting areas and non-clinical settings providing regular cleaning, maintenance and appropriate regulation of the speed is maintained.

Infection prevention and control recommendations for use of fans in patient care areas

Health workers are to perform a risk assessment before using fans in patient rooms on a case-by-case basis. Health workers are to ensure that:

- Portable fans should be used within a single patient room, or if used in a multi-patient room, within the patient's bed space with the curtains drawn
- Consult infection prevention and control team for use of fans for patients on additional isolation precautions other than airborne isolation precautions (for example, contact or droplet precautions)
- Consult infection prevention and control for use of fans in food preparation and food service areas
- Fans with blades should be accessible for cleaning
- Bladeless fans may need to have internal components cleaned between uses
- Fans should be used only as a temporary measure
- Fans should only be used at the lowest speed for less disruption of dust and debris and with least disruption to airflow such as non-oscillating.

Fans should be turned off in the room for the following, including, but not limited to:

- When a sterile field is required
- When a sterile/aseptic procedure is being performed (such as, a wound dressing, dental procedure)
- When a procedure is performed that might generate a splashing of body fluids such as fluid aspiration, emptying urinary catheter, dental procedure.

Fans are considered non-critical devices and must be regularly cleaned:

- Weekly cleaning according to manufacturer's instructions for use (IFU) and local procedure or as required
- Health Organisations are to develop a written schedule that documents when the device is cleaned and by whom

- Portable fans when not in use must be stored and covered post cleaning.

Fans must not be used in:

- Rooms/areas with directed airflow
- Rooms with patients on droplet or airborne precautions or when an aerosol generating medical procedure might be performed
- Reusable Medical Device (RMD) reprocessing departments, any area outside RMD reprocessing area that performs reprocessing and areas where sterile supplies are stored
- Adult Intensive Care Unit (ICU)
- High Acuity Units
- Neonatal Intensive Care Unit (NICU)
- Operating Room (OR)
- Dialysis Unit
- Endoscopy Suite
- Laboratory
- Oncology Unit
- Haematology Units
- Transplant units.

4.13 Biofilms in healthcare

Biofilms are complex, surface-associated communities of microorganisms (for example, bacteria, protozoa, algae, fungi), that play a crucial role in microbial survival and adaptability across diverse environments (Omwenga and Awuor, 2024). A biofilm is where microorganisms are attached to surfaces and each other by an extracellular matrix they produce. This biofilm matrix consists of various carbohydrates, proteins, lipids and extracellular DNA. The species of organism present, the surrounding environment and the availability of nutrients all influence the composition of this matrix (Chowdhury et al., 2018).

The formation of biofilms on medical devices and/or equipment enhances the survival of bacteria, rendering them resistant to antibiotics, disinfectants, and physical friction and these biofilms are associated with HAIs (Maillard and Centeleghe, 2023). The most common biofilm associated infections are ventilator-associated pneumonia, central-line-associated blood stream infection, catheter-associated urinary tract infections (UTIs), *C. difficile*, MROs and surgical site infection (Suleman et al., 2014). Furthermore, biofilms are routinely seen on medical implants and devices which include catheters and prosthetic joints, increasing the risk of persistent and difficult-to-treat infections. Bacterial biofilms contribute considerably to antibiotic resistance by building a protective environment that protects organisms from the effects of antibiotics (Mendhe et al., 2023)

Biofilms can be classified as hydrated biofilms, formed on living and non-living surfaces, for example, in drains and parts of some medical devices and equipment, and environmental dry biofilms (DSB) possibly on medical devices and surfaces in the indoor environment, including floors, walls, fittings, fixtures, furniture and equipment (Maillard and Centeleghe, 2023).

Prevention of biofilm related infections include, not limited to (Shineh, 2023, Dancer, 2022):

- Hand hygiene to reduce dry biofilm transfer from health worker hands to patients and equipment

- Aseptic non-touch technique during device implantation and handling, protecting key site, key part and scrub the hub
- Reducing the duration of device use (for example, catheters) can limit the time available for biofilm development
- Antimicrobial and antiseptic stewardship
- Routine cleaning and disinfection with appropriate product and process ‘one wipe; one site; one direction’
- Appropriate reprocessing of reusable medical devices.

Chapter 5 Risk mitigation

5.1 Introduction

Infection prevention and control utilise a risk mitigation approach to reduce or prevent the transmission of infections. The two-tiered approach of standard and transmission-based precautions provides a high level of protection to patients, health workers, consumers, and other people in Health Organisations. In this chapter healthcare consumers include patients, clients and residents.

5.2 Standard precautions

Standard precautions represent the minimum infection prevention measures that apply to all patient care, regardless of suspected or confirmed infection status of the patient in any setting where healthcare is delivered. These evidence-based practices are designed to minimise, and where possible, eliminate the risk of transmission of infection among patients, consumers, and health workers.

Standard precautions are in place to reduce the risk of transmission of blood borne and other pathogens from both recognised and unrecognised sources.

Standard precautions must be used in the handling of:

- blood (including dried blood)
- all other body fluids or substances (except sweat), regardless of whether they contain visible blood
- non-intact skin
- mucous membranes.

Standard precautions comprise of the following practices:

- Performing hand hygiene
- Appropriate and correct use of personal protective equipment (PPE)
- Respiratory hygiene and cough etiquette
- Use of aseptic technique
- Safe use and disposal of sharps
- Performing routine environmental cleaning
- Cleaning and disinfection of shared patient equipment
- Reprocessing of reusable medical devices
- Safe handling and disposal of waste used linen and laboratory specimens.

Each of these measures will be described in further detail in this section. Appropriate patient placement further supports standard precautions. For more information refer to 6.5 Supporting bed allocation and patient flow.

5.3 Hand hygiene

Human skin is a dynamic ecosystem home to millions of bacteria, fungi and viruses. These microbes are referred to as skin microbiota. Similar to those in the gastrointestinal (GI) system, skin microorganisms have essential roles in the protection against invading pathogens, the education of our immune system and the breakdown of natural products (Byrd et al., 2018).

The microorganisms present on hands could be divided into two categories, namely resident or transient.

The resident flora (resident microbiota) consists of microorganisms residing under the superficial cells of the stratum corneum and can also be found on the surface of the skin (for example, *Staphylococcus epidermidis, S. hominis,* propionibacteria, corynebacteria). Resident flora has two main protective functions: microbial antagonism and the competition for nutrients in the ecosystem. In general, resident flora is less likely to be associated with infections, but may cause infections in sterile body cavities, the eyes, or on non-intact skin (World Health Organization, 2009).

Transient flora which colonises the superficial layers of the skin, are microorganisms that may be present in or on the body under certain conditions and for certain lengths of time; they are easier to remove by mechanical friction than resident flora (World Health Organization, 2009) . Transient microorganisms do not usually multiply on the skin, but they survive and sporadically multiply on the skin surface. They are often acquired by health workers during direct contact with patients or contaminated environmental surfaces adjacent to the patient and are the organisms most frequently associated with HAIs.

Hand hygiene is a major component of standard precautions and is recognised as the cornerstone of infection prevention and control, also one of the most effective methods to prevent transmission of microorganisms in healthcare. Hand hygiene is the act of cleaning hands with either alcohol-based hand rub (ABHR) in liquid, foam, or gel form; antiseptic liquid hand wash with running water; or (plain) liquid soap and running water and drying with single use towels.

Routine hand hygiene

For most hand hygiene activities, ABHR is to be used. Visibly soiled hands must be washed with liquid soap and running water.

Use of alcohol-based hand rub:

- Apply the amount of ABHR recommended by the manufacturer onto dry hands
- Rub hands thoroughly, ensuring the hand hygiene solution covers all areas, especially the fingertips, thumbs, and space between the fingers to achieve effective disinfection
- Continue rubbing until the solution has evaporated and the hands are dry (approximately 20-30 seconds).

Using soap (including antimicrobial soap) and water:

- Wet hands under running water and apply the recommended amount of liquid soap
- Rub hands thoroughly for at least 15 seconds, ensuring the hand hygiene solution reaches all areas especially the fingertips, thumbs, and spaces between the fingers for effective coverage and disinfection
- Rinse hands thoroughly under running water, pat dry with single use towels (approximately 40-60 seconds).

Surgical hand hygiene

Routine hand hygiene reduces the transient flora on health workers hands and surgical hand preparation should eliminate the transient and reduce the resident flora. Refer to Table 10 hand hygiene procedures, for more information.

In addition to hand hygiene, the use of PPE should be guided by risk assessment and the extent of contact anticipated with body substances or microorganisms. Wearing gloves must not be considered a substitute for hand hygiene.

5.3.1 Hand hygiene principles

Health workers are required to perform hand hygiene as per the World Health Organization's 5 moments for hand hygiene (refer to Figure 9 Five moments for hand hygiene):

- Before and after patient contact
- Before and after a procedure
- After a body substance exposure risk
- Immediately before and after glove use
- Between individual patients
- Between dirty and clean sites on the same patient (in the continuum of care for the patient, the health workers are to attend to clean sites before dirty sites)
- Before handling sterile products/packs
- After touching patient surroundings.

In addition, it is recommended that health workers perform hand hygiene:

- Upon entering and leaving a ward or a unit (for example, at start of shift or going on a break)
- Before and after eating
- Before handling patient food
- After coughing or sneezing or blowing nose
- After going to the toilet
- After cleaning shared patient care equipment
- After contact with animals (for example, companion therapy)
- Before and after smoking, including e-cigarettes/vapes.

Figure 9 Five moments for hand hygiene



Source: National Hand Hygiene Initiative – NHHI

Effective hand hygiene relies on appropriate techniques and selection of the correct product. Incorrect hand hygiene technique can result in the failure to effectively remove or kill microorganisms on the hands.

Effective hand hygiene relies on the following mechanisms of action:

- The rubbing action, or friction, enables the mechanical removal of microorganisms
- The antimicrobial properties of the hand cleansing product (for example, ABHR, soap) killing remaining microorganisms
- The volume of applied ABHR needs to be adapted to hand size to sufficiently cover palm and dorsum. The entire surface of the hands should be covered with hand hygiene products when performing hand hygiene
- The drying of hands after hand cleaning and before putting gloves. Residual moisture left on the hands may harbour microorganisms
- Use ABHR on dry, non-soiled hands and rub hands vigorously until the ABHR has evaporated (follow manufacturers recommendation on amount)
- Use a liquid antiseptic hand wash or plain liquid soap with running water, and dry with single use towels (paper or cloth)

Hands should be washed with soap and water:

- When hands are visibly soiled, which includes body substances
- After contact with known or suspected bacterial spores, such as *C. difficile*
- After contact with known or suspected non-enveloped viruses, such as norovirus, rotavirus, or hepatitis A.

When hands are visibly soiled:

- Use liquid soap and running water. This helps to dissolve and lift soiling (fats and proteins) from the skin
- If soap and water are not available, ABHR should be used.

Surgical scrub using soap and water requires a sterile towel for hand drying; or surgical scrub using waterless method requires use of alcohol based surgical hand rub (ABSHR) in accordance with specific manufacturer's instructions.

ABHR has some reported limitations in spore penetration and may be less effective against removing and killing bacterial spores, for example, *C. difficile* and non-enveloped viruses, for example, rotavirus, norovirus. Hand hygiene with soap and water would be the most effective method in these situations, especially after care with symptomatic patients where hands may be potentially soiled. In situations where soap and water are not available ABHR should be utilised.

For more information refer to World Health Organization-Five Moments for Hand Hygiene, National Hand Hygiene Initiative, Australian Guidelines for the Prevention and Control of Infection in Healthcare and Preventing and Controlling Infections Standard.

5.3.2 Hand hygiene product accessibility

Appropriately placed ABHR dispensers, sinks and basins can facilitate health worker compliance with hand hygiene requirements, generally within arm's reach of where patient care or treatment is taking place. Hand hygiene compliance may increase if ABHR dispensers, are placed in appropriate locations (where clinical care is provided/point of care, for example, bedside, within the patient zone or where direct care is performed. For more information refer to National Hand Hygiene Initiative Implementation Guide and Australasian Health Facility Guidelines Part D – Infection prevention and control.

Where possible, ABHR should be placed:

- at the foot of every bed or within each patient zone using either a fixed or removable bracket
- attached to mobile work trolleys, for example, workstation on wheels, pharmacy on wheels, intravenous, drug and dressing trolleys,
- high traffic areas such as a nurses' station, pan room, medication room and patient room entrance
- all other clinical and patient care areas, such as examination rooms and outpatient consultation rooms
- entrances to each ward, outpatient clinic or department
- public areas such as waiting rooms, reception areas, hospital foyers, near elevator doors in high-traffic areas. Consider tamper proof ABHR dispensers for in these areas.

ABHR dispensers need to be suitably located out of the reach of children, or in supervised locations. Placement of dispensers must be carefully considered in mental health facilities and alcohol withdrawal units.

ABHR dispensers should not be placed at sinks or next to sinks, as this can cause confusion for health workers about which hand hygiene product to use except for mental health and any other supervised locations.

Signage about the appropriate use of ABHR should be prominently displayed in all clinical areas in all health service facilities.

Use of ABHRs in high-risk clinical environments

Alcohol-based hand rubs (ABHRs) are recommended by the ACSQHC and the WHO as the first-line choice for hand hygiene, due to their proven efficacy in reducing HAIs.

However, in high-risk environments such as psychiatric units and alcohol withdrawal settings, the use of ABHRs may pose safety concerns. In these contexts:

- ABHRs should only be used where safe and appropriate, based on a local risk assessment.
- Non-alcohol-based alternatives may be considered where the risk of misuse or harm outweighs the benefits.
- Product selection and dispenser placement must be guided by clinical safety, patient risk profiles, and environmental supervision.
- Local assessments should involve infection prevention teams, clinical staff, and facilities management to determine the safest product and placement strategy.

For more information refer to NHS hand hygiene product literature review Jan 2024, the Australian Commission on Safety and Quality in Health Care and World Health Organization.

Hand washing basins

Hand washing basins are required in all patient care areas and in areas where careful attention to hygiene is essential such as kitchens, laundry, pharmacies, laboratories and amenities for patients, visitors, or staff. Reticulated, free-flowing warm and cold water will be provided. Plugs and wastewater diffusers should not be provided other than hand wash basins in patient ensuites (for example, vanity basins). Hand wash basins must comply with the requirements in the Australasian Health Facility Guidelines Part D – Infection prevention and control.

Clinical hand wash basins within clinical areas:

- Should be dedicated for their intended purpose. Non-hand hygiene activities such as disposing of used medication, emptying leftover fluids or nasogastric aspirate, sugary drinks, tea, or coffee for example, may promote microbial growth in drains and cross contamination of taps, pipes and hands
- Are identified by a signage for the purpose of hand hygiene only, not as a disposal route
- Should not be used for drinking water, washing any patient equipment, storing any equipment such as toothbrushes or dentures, additional paper towel or PPE
- Splash backs are required behind all basins. The splash back should be large enough to contain splashes and prevent moisture seepage. The surface should be water resistant and easy to clean
- Water present around hand wash basins or sinks encourages the growth of mould and bacteria in any substrate material. Regular cleaning and scheduled maintenance are needed to reduce the bioburden.

The installation and use of hot air hand dryers is not appropriate for clinical areas in Health facilities as there are risks that these dryers will spread microorganisms in the clinical setting and therefore increase the risk of cross transmission of organisms. Hot air hand dryers may be considered in non-clinical areas, such as public toilets if evidence supports their instillation. Careful consideration for combined water and dryer systems given possible increase to aerosolisation of water particles.

For more information refer to Australasian Health Facility Guidelines Part D - Infection prevention and control D.0002 - Building Elements.

5.3.3 Hand hygiene product selection

All selected products should be registered with the Therapeutic Goods Administration (TGA) and have an Australian Register of Therapeutic Goods (ARTG) number.

When purchasing hand hygiene products, the following selection strategy is recommended:

- The Health Organisation product selection committee (or delegate committee) should determine the preferred product from the NSW Health contract; and
- The Health Organisations product selection committee (or delegate committee) should include representation/advice from infection prevention and control when making purchasing decisions for hand hygiene products.

Each Health Organisation should consider the following factors when purchasing hand hygiene products:

- A chemical composition of alcohol with a range between 60% to 80% (volume by volume) is recommended
- Aesthetic preferences such as fragrance, colour, texture, and ease of use
- Practical considerations such as availability, convenience and functioning of dispenser and ability to prevent contamination
- Compatibility with other hand hygiene products
- Dermal tolerance
- Manufacturers or supplier support for instillation, ongoing maintenance, resources provided and education programs.

For more information refer to TGA - Meeting requirements for manufacturers, supply or advertise hand sanitisers.

The clinical activity to be performed should dictate the product and technique used. Table 10 provides advice on the hand hygiene product to use and the duration for common clinical activity sets. For more information refer to WHO Hand Hygiene Technical Reference Manual and NSW Health policy directive Intravascular Access Devices (IVAD) - Infection Prevention & Control.

Table 10 Hand hygiene procedures

Activity		Skin cleansing product*	Action	Duration of hand wash or hand rub*
Routine/social hand hygiene		Plain liquid soap and running water	Wet hands using running water, apply recommended dose of liquid directly onto hands and work up lather on all areas of the fingers, hands and wrists. Rinse. Dry hands with single use towels.	40-60 seconds (includes wetting, lather and scrub hands for at least 20 seconds and drying) (WHO 2009)
	For example, taking pulse/BP,	ABHR	Dispense manufacturer's recommended amount of	Until dry

Standard patient care activities	assembly of needle and syringe, prior to collecting and opening sterile consumables or preparing an aseptic field, and after touching patient surroundings		solution into cupped dry hands. Rub vigorously over all areas of the fingers, hands and wrists until the solution has evaporated and hands are dry.	(Usually 20-30 seconds) (WHO 2009)
		Plain liquid soap and running water	Wet hands using running water, apply recommended dose of liquid directly onto hands and work up lather on all areas of the fingers, hands and wrists. Rinse. Dry hands with single use towels.	40-60 seconds (includes wetting, lather and scrub hands for at least 20 seconds and drying) (WHO 2009)
		Antiseptic hand wash and running water	Wet hands using running water, apply recommended dose of liquid directly onto hands and work up lather on all areas of the fingers, hands and wrists. Rinse. Dry hands with single use towels.	40-60 seconds (includes wetting, lather and scrub hands for at least 20 seconds and drying)
	For example, following care of patients (Including contact with their surroundings) where C. difficile or non-enveloped viruses are suspected AND gloves were not worn	Plain liquid soap and running water	Wet hands using running water, apply recommended dose of liquid directly onto hands and work up lather on all areas of the fingers, hands and wrists. Rinse. Dry hands with single use towels.	40-60 seconds (includes wetting, lather and scrub hands for at least 20 seconds and drying)
Aseptic procedures	For example, wound dressing, invasive device maintenance or insertion of IDC, PIVC, epidural and other procedures where maximum	ABHR	Dispense manufacturer's recommended amount of solution into cupped dry hands. Rub vigorously over all areas of the fingers, hands, wrists and forearms until the solution has evaporated and hands are dry.	30-60 seconds

	barrier precautions are not required	Antiseptic hand wash and running water	Wet hands using running water, apply recommended dose of liquid directly onto hands and work up lather on all areas of the fingers, hands, wrists and forearms. Rinse. Dry hands with single use towels.	40-60 seconds (includes wetting, lather and scrub hands for at least 20 seconds and drying)
	Insertion of CVAD and other procedures where maximum barrier precautions (mask, cap, eyewear, sterile gown, sterile gloves) are required.	ABSHR	Use alcohol based surgical hand rub (ABSHR) for surgical hand scrub strictly in accordance with the product manufacturer's instructions for amount, technique and duration. Note: The first surgical scrub of the day, wash hands, forearms and nails using a non-medicated soap and running water, followed by ABSHR. It is important to ensure all surfaces to elbow are covered.	In accordance with specific manufacturer's instructions 2 minutes
		Antiseptic hand wash with running water	Wet hands using running water, apply recommended dose of liquid directly onto hands and work up lather on all areas of the fingers, hands and wrists, paying attention to the fingernails.	2 minutes
Surgical procedures	**i) Surgical prewash** (Conducted before the first surgical hand scrub or surgical ABSHR of the list, to ensure the hands are free of soil and debris, and fingernails are clean)	Plain liquid soap and running water	Wet hands using running water, apply recommended dose of liquid directly onto hands and work up lather on all areas of the fingers, hands and wrists, paying attention to fingernails. Rinse. Dry hands with single use towels.	1 minute
	ii) Surgical hand scrub	Antiseptic hand wash	Wet hands using running water, apply recommended dose of liquid directly onto	5 minutes for first operative

		and running water	hands and work up lather on all areas of the fingers, hands, wrists and forearms for 2 minutes then rinse and repeat for a further 2 minutes for the first scrub and 1 minute for subsequent scrubs of the list. Rinse. Dry hands with a sterile towel.	procedure of the day 3 minutes for subsequent operative procedures
	iii) Surgical hand rub	ABSHR	Use alcohol based surgical hand rub (ABSHR) for surgical hand scrub strictly in accordance with the product manufacturer's instructions for amount, technique, and duration	In accordance with specific manufacturer's instructions

*Manufacturer's recommendations should be followed for the dosage and duration. According to the WHO hand hygiene guidelines, the duration of the entire hand washing procedure is 40-60 seconds while that of the entire hand rub procedure (with hand sanitizer) is 20-30 seconds.

Alcohol free hand rub is not as effective as ABHR (Australian Commission on Safety and Quality in Health Care, 2020, Pittet and Boyce, 2001) and use of alcohol-free hand rub should be limited to non-clinical areas and places where alcohol-based products are prohibited, such as Justice Health and Forensic Mental Health settings. Refer to Section 5.3.9 Hand hygiene in specialty settings.

5.3.4 Jewellery and access to forearms

To ensure the safe care provision to every patient, all health workers engaged in direct patient care must comply with hand hygiene requirements as outlined in the NSW Health Infection Prevention and Control Policy and the National Hand Hygiene Initiative. An agreement must be established between the Health Organisation and all health workers, outlining the mandatory requirements for hand hygiene, including the "Bare Below the Elbows" (BBE).

Several studies have shown that skin underneath rings are more heavily colonised than comparable areas of skin on fingers without rings (World Health Organization, 2009). Health workers working clinically are to ensure that:

- Hand, wrist or forearm jewellery (for example, piercings, rings, watches, bracelets, bands, movement trackers, embedded jewellery) must not be worn in the clinical environment when providing direct patient care, unless required for patient care (for example, wristwatch) or if medically essential (for example, medical alert bracelet). These must be removable, able to be cleaned and not be able to cause injury to patients during direct clinical care
- Wearing of rings in clinical areas must be limited to a plain band on the finger and this should be moved about on the finger while hand hygiene is being performed
- To allow for adequate antiseptic scrubbing of hands and forearms prior to an aseptic clinical procedure or surgical procedure all hand, wrist and forearm jewellery must be removed
- Long sleeved clothing, for example cardigans and long sleeve undergarments, should not be worn in clinical areas. If worn, sleeves must be rolled/pushed above the elbow during clinical/direct patient care

- The only forearm attire permitted while providing clinical care within the clinical area is PPE (impervious gowns, sterile gowns, gloves).

The ability to perform effective hand hygiene for clinical care required must not be impeded by the wearing of long-sleeved garments or forearm jewellery (for example, religious dress or bangles, bandages or slings). Health Organisations are to perform a case-by-case risk assessment in consideration of the risk to patients versus the health worker.

Religious attire considerations: NSW Health recognise and respects the religious practices of its health worker. However, religious attire must not impede effective hand hygiene. In line with NSW Health guidance:

- Long sleeves worn for religious reasons must be rolled above the elbows during direct patient care
- Staff may re-cover their forearms outside of clinical duties
- Hand hygiene must be able to be performed as required.

Risk assessment and support: Where concerns arise regarding religious attire and hand hygiene compliance, a risk assessment may be conducted in consultation with their manager, work health and safety and infection prevention and control to ensure compliance with safe patient care.

All outcomes and agreed-upon measures must be documented as part of local procedures, ensuring consistency and accountability.

A risk-based approach is supported by clinical handbooks and infection control policies. While patient safety is paramount, flexibility should be applied to enable continued learning and contribution through non-contact roles where appropriate.

Risk assessment for health workers with physical limitations

Participation in clinical activities by individuals with a physical limitation (for example cast, braces or arm support devices) must be guided by a risk assessment focused on infection prevention. Key considerations include the ability to perform hand hygiene, comply with BBE, and the contamination risk posed by the cast.

If hand hygiene or BBE cannot be maintained, the individual must not engage in direct patient care or enter high-risk areas (for example, theatres, ICU).

Permitted activities may include observing ward rounds (no direct patient contact), using a computer on wheels (if hand hygiene is possible), documentation, audits, and education sessions.

A flexible, risk-based approach is encouraged, but patient safety remains the priority.

Risk assessment for clinical placement involving students with physical limitations

The checklist below is to be used as a guide in assessing whether a student with a cast or arm support devices can safely participate in clinical activities, with a focus on infection prevention and control principles.

Table 11 Clinical placements involving students with physical limitations

Assessment area	Yes/No	Notes/actions
Can the student perform hand hygiene effectively?		
Is the student compliant with bare below the elbow?		
Is the student required to have direct patient contact?		
Is the student able to use shared equipment safely? For example, computers on wheels		
Is the student excluded from high-risk areas? For example, theatres		
Is the student aware of infection prevention and control expectations and limitations?		
Has a supervisor reviewed and approved the placement plan?		

Note: A record of 'no' for any of the above indicates noncompliance with the infection prevention and control requirements. Where this occurs, a risk assessment must be caried out in relation to what tasks the student is able to carry out as part of clinical placement that does not result in direct patient care. If this cannot be achieved alternative arrangements or deferment of placement should be considered.

5.3.5 Fingernails

Health workers with artificial nails are more likely than those with natural nails to harbour gram-negative pathogens on their fingertips. Nail art and artificial nails are a potential reservoir of microorganisms which may prevent effective hand hygiene and promote microorganism transmission (Pittet and Boyce, 2001, Hedderwick et al., 2000). Chipped nail varnish supports the growth of larger numbers of organisms on the fingernails (Gupta et al., 2004, Parry et al., 2001).

Recent evidence supports that shorter nail length minimises risk of potential microorganism transmission (McNeil et al., 2001). Shorter nail length does not impede effective hand hygiene and is less likely to puncture gloves. An easy guide to appropriate fingernail length is to keep the nail shorter than the end of the finger (<2mm long) (Fargernes and Lingaas, 2011). For more information refer to WHO Guidelines on Hand Hygiene in Health Care: First Global Patient Safety Challenge Clean Care Is Safer Care.

Health workers are to ensure that:

- Artificial nails, extenders, nail varnish, nail art and technology must not to be worn when providing direct patient care
- They have short fingernails.

5.3.6 Hand care and skin integrity

Selected ABHRs, antiseptic hand washes, surgical hand scrubs and moisturising lotions should be chemically compatible and pH neutral (pH 5.5 to 7) to minimise skin reactions and to ensure that the decontaminating properties of the hand hygiene products are not deactivated (Girou et al., 2002). The following should be considered when performing hand hygiene:

- ABHR should be dispensed onto dry hands while liquid and antiseptics soaps/preparations should be applied to hands already wet with water (see Table 10)
- Good skin integrity is aided by good hand hygiene technique and regular moisturising
- Health workers should check their hands and forearms regularly to ensure they have good skin integrity. ABHR is a good marker of skin integrity as a sting from ABHR application indicates broken skin. Any broken skin should be covered with impervious dressing
- Health workers with compromised skin integrity (eczema and dermatitis) involved in direct patient care or in the direct patient environment, should have a risk assessment to determine whether they can undertake clinical duties without compromising patient safety and their own safety or may need to consider redeployment from clinical area until the issue is resolved
- Given the potential for contamination and microorganism transmission, it may be inappropriate for a health worker to work clinically if they require multiple impervious dressings, have hand splints or are unable to wear impervious dressing for certain medical conditions and cannot perform adequate hand hygiene
- Hand care issues such as dryness, dermatitis, eczema and/or sensitivity should be reported to the manager/supervisor for action or referral to address appropriate hand care products.

5.3.7 Hand hygiene in oral health settings

Oral Health settings must comply with hand hygiene during the delivery of patient care as described above.

If providing oral health care within an operating theatre (for example, complex oral surgery), health workers should comply with the hand hygiene principles expected for surgical environments (see Table 10).

5.3.8 Hand hygiene in community and home settings

Health workers must comply with hand hygiene during the delivery of patient care in community and home settings as per table 10.

Health Organisations must supply health workers with adequate products to undertake appropriate hand hygiene.

Hand hygiene products, cloths, and towels (paper or otherwise) supplied by patients can potentially be compromised. Health workers are recommended to use products supplied by the Health Organisation or in the case where no other option is available a risk assessment should be undertaken to determine risk versus benefit.

5.3.9 Hand hygiene in specialty settings

NSW legislation prohibits the supply and use of alcohol-containing products in Mental Health Facilities, alcohol withdrawal units, Justice Health and Forensic Mental Health Network settings and Corrective Services NSW facilities. According to legislation:

- ABHR products must not be used in any Health Organisation that operate within these facilities; and
- Health Organisations operating within these facilities must provide an alternative hand hygiene product that is alcohol-free, non-intoxicating and non-flammable for health workers, inmates, and visitors to use.

For more information refer to Custodial Operations Policy and Procedures 6.5 Infections and communicable diseases.

5.3.10 Patient and visitor hand hygiene

Patients and visitors are encouraged to perform hand hygiene on entry to a healthcare facility, a ward or a community health outpatient setting and prior to visiting patients.

Health Organisations are to ensure that consumer education and educational resources should be made available to promote the practice and hand hygiene technique.

The consumer/visitor should be reminded of the following hand hygiene opportunities:

- entering a health facility
- after touching shared items
- entering and exiting patient/client room and/or zone
- on exit of the health facility
- before and after involvement in any direct care.

The following should be considered to promote hand hygiene for patients and visitors:

- Placement of signs and posters in key locations, such as entry and exit points, to act as visual triggers for patients and visitors
- Hand hygiene products should be readily available and accessible, for patients, visitors, and health workers
- The Health Organisation should ensure that resources and means are available to patients to perform hand hygiene (such as providing ABHR or hand cleaning wipe for a bed-bound patient).

Health workers should also offer and encourage patients to perform hand hygiene prior to eating, after eating, after going to the bathroom, on entry and before leaving their room/zone.

5.4 Respiratory hygiene and cough etiquette

To minimise the risk of transmission of infection to others, everyone entering, visiting or working within a Health Organisation presenting with signs and symptoms of respiratory infection should practice respiratory hygiene and cough etiquette (Australian Commission on Safety and Quality in Health Care, 2024). A Health Organisation should encourage and enable patients, visitors and health workers to perform respiratory hygiene and cough etiquette safely and provide appropriate resources to support these behaviours. Specific responsibilities for the Health Organisation and individuals visiting or working within a Health Organisation are detailed in Table 12 and the NSW Health poster on the NSW Health website.

Table 12 Individual and Health Organisations responsibilities for respiratory hygiene and cough etiquette

Responsibilities of the individual	Responsibilities of the Health Organisation
• Health workers with a persistent cough or signs and symptoms of a respiratory infection should: ○ stay home if symptomatic ○ absent themselves from work as necessary (refer to Section 3.12 Staff health and HAI risk) ○ seek medical advice ○ practice respiratory hygiene and cough etiquette • Cover the mouth and nose with a tissue when coughing or sneezing. If a tissue is not available, cough or sneeze into the elbow. • Use the nearest bin to dispose of the tissue after use. • Perform hand hygiene, for example, hand washing with soap and water or use ABHR after coughing or sneezing or if contaminated objects, materials, or equipment are touched. • If a patient is coughing or sneezing during transportation or in common waiting areas, a surgical mask should be worn if able. • If coughing, sit ≥ 1.5m from others in common areas. • Inform clinicians about any respiratory signs or symptoms.	• Reinforce the importance of hand hygiene and provide access to hand hygiene amenities, surgical masks, tissues and no-touch receptacles for used tissue disposal. • Conveniently located dispensers of ABHR, where sinks are available, ensure that supplies for hand washing (such as soap, disposable towels) are always available. • Display signage that instructs health workers, patients and visitors on respiratory hygiene and cough etiquette. • To reduce the risk of transmission to vulnerable patients, a Health Organisation may restrict access to certain areas for visitors who are coughing or sneezing. • Provide surgical masks to people who are coughing in waiting areas. • Ensure that health workers have access to appropriate PPE and are provided training in the use of PPE. • Employ a risk assessment process for the management of symptomatic health workers, visitors, or consumers, particularly those working or visiting areas with vulnerable patients, such as neonatal intensive care units (NICUs), paediatric transplant and haematology units.

5.5 Personal protective equipment

Using appropriate personal protective equipment (PPE) is important for health workers and patient safety. This means selecting appropriate PPE at the right time, in the right setting, for the right patient and then applying (donning) and removing (doffing) PPE in line with evidence-based practice is utmost important (National Health and Medical Research Council, 2019a).

General principles when using PPE include:

- Health workers should be trained in the correct use of PPE including donning and doffing. Training should include when hand hygiene and glove changes are required during different procedures or tasks on the same patient/client
- PPE labelled ‘reusable’ should be cleaned, disinfected, and reused according to the manufacturer’s instructions IFUs; all other PPE must be disposed of after use

- Isolation aprons/gowns which are impervious, or fluid resistant are suitable for standard, and transmission-based precautions
- Sterile surgical gowns should only be used in surgical environments and for sterile procedures
- Eye protection is to be worn for standard precautions when there is a risk of body substance exposure, for example removal of a drain
- When caring for patients in droplet and airborne precautions, eye protection is required along with a surgical mask or P2/N95 respirator
- Fluid resistant surgical masks are suitable for standard and droplet precautions
- Fluid resistant P2/N95 respirators are used when providing care to patients in airborne precautions, with suspected or confirmed acute respiratory infections
- P2/N95 respirators should be fit checked at every use
- Incorrect removal of PPE is associated with an increased risk of self-contamination.

5.5.1 PPE training

Training on the appropriate selection, use and disposal of PPE is required to ensure safe use of PPE. Some of the potential issues to consider are:

- How to minimise unnecessary contact with a mask and eye protection while wearing/in use
- Importance of adherence to hand hygiene before donning PPE and during the PPE doffing process
- When and how to change gloves between different procedures or tasks
- Correct removal (doffing) of PPE
- Cleaning and disinfection of reusable items
- How to ensure adherence to correct PPE donning and doffing technique/sequence to reduce self-contamination.

Refer to My Health Learning training modules for further information.

5.5.2 PPE selection

Appropriate PPE should be selected to prevent contamination of skin, mucous membranes and/or clothing. Selection should be guided by patient status:

- Wet patient - conditions that potentially increase the risk of organism dispersal include diarrhoea, incontinence or uncontained wounds, or symptoms of acute respiratory infection (ARI). For example, cough, sneezing
- Dry patients –are those who present with symptoms that pose a low risk of organism dispersal for example, patients who are continent, have contained wounds, and are not coughing or sneezing
- The anticipated type and amount of exposure to blood and body substances and the likely transmission route of microorganisms.

When you are selecting PPE, consider three key things:

1. **The anticipated type of exposure**. This is determined by the type of anticipated exposure, such as touch, splashes or sprays, or large volumes of blood or body substance that might penetrate the clothing.

   Circumstances where there is an increased risk of transmission include:

   - Enclosed spaces - an infectious person exposes people at the same time or people were exposed shortly after the infectious person had left the space
   - Increased exposure to respiratory particles - often generated with expiratory exertion (for example, coughing, shouting, singing, exercising) that increase the concentration of suspended respiratory particles in the air space
   - Inadequate ventilation or air handling - suspended small respiratory particles and particles from the air that were not adequately removed.

   PPE selection, in particular the combination of PPE, also is determined by the category of transmission-based precautions a patient is on.

2. **The appropriateness of the PPE for the task being undertaken**. If there is likely splash/spray, then a fluid resistant gown is required.
3. **PPE fit**. PPE must fit the individual user. Health Organisations are to ensure that PPE is available in various sizes to protect the workforce.

5.5.3 Standard and transmission-based precautions

Health workers are to perform a risk assessment for PPE requirements based on the type of patient contact (contact with blood or a body substance), if a multi-drug resistant organism (MRO) is present, communicable disease (how and where it is transmitted from the patient), patients' status (wet or dry, cognitive status).

Risk assessment for PPE should be based on:

1. Standard precautions – use PPE when there is an anticipated or likely risk of contamination with splashes of blood or body substances and based on the nature of care or the task being undertaken
2. Transmission-based precautions – consider the need for contact, droplet and airborne precautions based on the mode of transmission when caring for patients with epidemiologically important or transmissible pathogens with high-risk consequences that can transmit or cause infection.

The selection of PPE should be based on type of precautions and patient status.

Table 13 PPE selection based on type pf precaution

Type of precautions	Patient status	PPE selection	Patient placement
Respiratory	Airborne	Respirator + eye protection	Single room
	Droplet	Surgical mask + eye protection	Single room or cohort
Contact	Wet	Impervious apron/gown + gloves	Single room
	Dry	Standard precautions	Single room or cohort

Standard	Wet	Risk assess based on the task performed
	Dry	Risk assess based on the task performed
Patients and visitors are to wear surgical masks as appropriate		

Based on risk assessment individual components of the PPE or a combined approach (level 1 PPE) may be needed to protect health workers. Patients suspected or confirmed to have a high consequence infectious disease level 2 PPE is recommended.

Table 14 PPE level

PPE level 1 Combined standard and transmission-based precautions	PPE level 2 High consequence infectious diseases (combined)
Long sleeved fluid-resistant gown where the wrist is covered by gloves	Long sleeved fluid-resistant gown where the wrist is covered by gloves
Fitted fluid-resistant disposable surgical mask or P25/N95 respirator	Fitted fluid-resistant disposable P2/N95 respirator or PAPR (if available)
Eye protection	Surgical hood
Non-sterile gloves	Non-sterile gloves – two pairs (long cuff if available
Closed in shoes	Eye protection (face shield recommended)
	Closed-in shoes and below knee booties to cover shoes
Health workers in NBC are required to follow NBC specific PPE procedures when providing care to patients with an HCID	

Based on risk assessment (patient status and the level of care anticipated):

- **Before entering patients' room**
  - Perform hand hygiene
  - Select PPE based on risk assessment (refer to Table 15 PPE selection based on risk assessment).
- **After entering patients' room**
  - Perform a risk assessment on the need for gloves based on what you will be in contact with when providing care, the task you are performing, assistance, or a procedure on the patient
  - Change or remove gloves (if worn) and perform hand hygiene in between different procedures on the patient and between dirty and clean tasks. For example, changing a dressing then changing an incontinence pad
  - Remove gown and gloves (below neck PPE) if worn and perform hand hygiene before leaving the room or at the exit. In certain situations, such as emptying bed pans or urinals, health worker may continue to wear the PPE outside the patient zone and dispose at the end of the episode of care (For example, health workers may doff

gown and gloves in the dirty utility room after placing urinal, pans, and jugs in the pan sanitiser) and perform hand hygiene
- Remove eye protection, surgical mask/respirator (above neck PPE) if worn after leaving the room
- Clean and disinfect reusable items (if used)
- Perform hand hygiene.

Table 15 PPE selection based on risk assessment

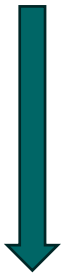
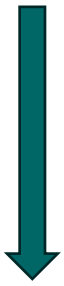
Type of precautions	Patient status	PPE selection	Risk assessment
Standard	All patients	Risk assessment based on the task performed	
Respiratory-Airborne	Known or suspected to be infected with pathogens transmitted by the airborne route (for example, tuberculosis, measles, chickenpox, disseminated herpes zoster, COVID-19)	Respirator + eye protection	Signs and symptoms Infectivity period Proximity of care Intensity of exposure Ventilation
Droplet	Known or suspected to be infected with pathogens transmitted by respiratory droplets that are generated by a patient who is coughing, sneezing, or talking (for example, Influenza, Pertussis)	Surgical mask + eye protection	Signs and symptoms Infectivity period Proximity of care Intensity of exposure Ventilation (Air exchange)
Contact	Known or suspected infections that represent an increased risk for contact transmission (for example, CPE, Candia auris, symptomatic *Clostridioides difficile*)	Impervious apron/gown + gloves	Signs and symptoms, task performing, assistance, or a procedure on the patient.
	Care of patients colonised with MRO (MRSA, VRE)	PPE based on risk assessment	Signs and symptoms, task performing, assistance, or a procedure on the patient.
Combined precautions	Organisms with multiple mode of transmission, for example, disseminated shingles	Impervious gown, surgical mask or P2 respirator, eye protection and gloves	Risk assessment based on the task performed.

PPE donning and doffing (level 1)

The following sequences are recommended practice for donning and doffing PPE for all clinical settings outside the operating room (refer to Table 16). Always perform hand hygiene immediately

before commencing donning sequence and donning gloves. Keep hands away from face after donning PPE, limit surfaces touched with gloved hands, change gloves when torn or visibly soiled and perform hand hygiene between episodes of care and tasks performed.

Table 16 Sequence for donning and doffing PPE

Donning sequence		Doffing sequence	
START  END	1. Hand hygiene 2. Gown or apron 3. Surgical mask or respirator 4. Eye protection 5. Hand hygiene 6. Gloves (immediately before touching the patient)	START  END	1. Gloves (if worn) 2. Hand hygiene 3. Gown or apron 4. Hand hygiene 5. Eye protection* 6. Mask or respirator 7. Hand hygiene

*Perform hand hygiene after cleaning reusable eye protection if used and before removing mask or respirator

Doffing PPE

Perform hand hygiene immediately after glove removal, before removing face protection and after removal of any visibly soiled item/s.

In certain circumstances, where there may be a heightened risk for health workers and patients (for example, during high consequence infectious disease alert), additional PPE requirements may apply (Poller et al., 2018).

At any time, if a health worker's clothing becomes visibly soiled with body substance, the clothing should be changed as soon as possible and before the health worker attends to other patients:

- If skin is contaminated with body substances, the health worker must remove contaminated clothing/uniform or PPE and wash any affected skin, then perform hand hygiene
- If broken skin has been contaminated by a body substance, this is an occupational exposure and must be reported to the Health Organisation using local procedures.

HWs working inside operating room or in a sterile environment should refer to local procedures that detail the correct donning and doffing sequences for this particular setting.

For more information on level 1 PPE donning and doffing refer to CEC Education, training, and videos.

5.5.4 Suspected high consequence infectious diseases – local facility (level 2 PPE)

Refer to High consequence infectious diseases - Infection prevention and control Principles and for level 2 PPE donning and doffing refer to CEC High Consequence Infectious Diseases.

5.5.5 NSW Specialist service for high consequence infectious diseases

Contact NSW Biocontainment Centre (NBC) on 1800 HCID 00 (1800 424 300) for guidance.

The type of PPE used will vary based on the level of precautions required, such as standard, contact, droplet, airborne or combined precautions. The type of PPE selection is consistent with

level 2 with the possible addition of enhanced products and processes specific to NBC. The procedure for putting on and removing PPE should be tailored to the specific type of PPE.

Appropriate PPE should be selected to prevent contamination of skin, mucous membranes and/or clothing. Selection should be guided by the anticipated type and amount of exposure to blood and body substances and the likely transmission route of microorganisms.

5.6 Gloves

Gloves are worn as a barrier to protect the wearer's hands from contamination or to prevent the transfer of organisms already on the hands. Gloves must be used in situations where the health worker is potentially exposed to body substances (NSW Health, PD 2023_025). When gloves are determined to be necessary, they must be worn on both hands (World Health Organization, 2009).

Intact gloves must be used in situations where the health worker is potentially exposed to body substance; in particular:

- During any procedure where direct contact is anticipated with a patient's body substance, mucous membrane or non-intact skin
- When handling items or surfaces that have been in contact with bodily substances
- While performing an invasive procedure, venepuncture or a finger or heel prick.

Gloves are not to be worn in non-patient zones unless directly handling blood or body substance such as pathology specimens or cleaning up a blood or body substance spill or when in contact with cleaning chemicals when cleaning the healthcare environment.

Sterile gloves must be worn when it is necessary or unavoidable to touch key sites and key parts. The wearing of sterile gloves for any specific aseptic technique or sterile procedure may be at the discretion or mandate of the NSW Health Organisation.

Gloves must be changed and discarded, and hand hygiene performed:

- As soon as they are torn or punctured
- Immediately after patient contact and task are completed and before care is provided to another patient
- When performing separate procedures/tasks on the same patient
- After handling blood and body substances
- Before handling or opening sterile consumables and devices
- Before touching environmental items and surfaces
- Before or on leaving a patient's room/zone. This may be risk assessed if required to remove contaminated or soiled equipment from the patient zone
- Before writing in the healthcare record, answering telephones, pagers, mobile phones, using computers and other social environmental actions.

When risk assessing the need for glove use, consider the following:

- Gloves should always be put on both hands immediately before the procedure or contact with body substance
- Gloves should fit the user's hands comfortably – they should not be too loose or too tight. They also should not tear or damage easily
- Hand hygiene must be immediately and always performed before and after use of gloves

- Glove use is not recommended as a protective measure against microorganism acquisition due to the increased incidence of dermatologic side effects including irritant dermatitis and eczema, excessive skin soakage with sweat and skin chapping
- Double gloving is only recommended in operating theatre to allow a seamless transition during a procedure from 'dirty' to 'clean(er)' steps or to reduce the impact of sharps injuries for the surgeon
- Limit opportunities for 'touch contamination', such as, surfaces such as light switches, door handles and cabinet knobs can become contaminated if touched by used or soiled gloves
- No part of the glove is to be tampered with or altered at any time before during or after use, such as fingertip cut off to feel a vein when undertaking cannulation or venepuncture
- Gloves are not to be worn as a personal safety strategy as contaminated gloves may be a significant cause of cross-contamination of pathogens in healthcare environment. Inappropriate gloves use can influence the risk of disease transmission in the healthcare setting
- Prolonged glove use can lead to lack of hand hygiene, risk of contact dermatitis and increased risk of contamination of health worker hands
- ABHR must not be used on gloves as the effects of hand sanitisers are tested on the skin and application on gloved hands may affect gloves' integrity and mechanical properties. In addition, alcohol is inactivated in the presence of organic matter, which can easily remain on used gloves, thus potentially driving microorganism transmission. Use of ABHR on the outside of gloves can affect the porosity of gloves, causing them to become more porous, create pinholes or cause the gloves to rupture after a short period of time (exception may apply during high consequence infectious diseases removal of PPE)
- Unless exposure to blood is anticipated, health workers do not need to wear gloves when performing subcutaneous, intramuscular, intravenous, or intradermal injections
- Gloves should be handled and stored to avoid contamination before use
- Gloves should always be put on immediately before:
    - a procedure
    - cleaning shared patient care equipment
    - contact with blood or body substance
    - when cleaning the healthcare environment
- Gloves should not be worn in non-patient zones unless directly handling blood or body substance such as pathology specimens or cleaning up a blood or body substance spill or when in contact with cleaning chemicals.

Wearing gloves does not negate the need for hand hygiene. Hand hygiene must be performed immediately:

- Before putting on gloves to avoid contamination of the outer surface of the gloves
- After removing gloves to avoid transfer of microorganisms to another person, patient's environment, clinical equipment and to protect the health worker.

Inappropriate glove use can result in transmission of pathogenic organisms:

- between different surfaces

- between the wearer and their face (eyes, nose, mouth)
- from the patient to biomedical or other equipment and furnishings.

The type of glove selected should be appropriate to the type and risk of the procedure/task (refer to table 17) and of a suitable size for the user. The Health Organisation should refer to the listed gloves on the NSW Health Procurement. Within sterilization services/areas, only disposable single use gloves that have been approved should be worn, for example, gauntlet gloves that have a longer cuff. Medical examination gloves or other disposable, single use gloves are not to be reused.

Polyvinyl chloride (PVC) gloves provide poor barrier protection, are the weakest film for strength and durability, they have very limited elasticity, and poorer fit and comfort. The molecular structure of vinyl gloves is rigid and more susceptible to tearing when stressed, also vinyl gloves are highly permeable to microorganisms and their use in high-risk tasks over long durations, will potentially increase the risk of cross contamination. Some vinyl gloves do not provide a snug fit on the hand, especially around the wrist, and therefore should not be used if patient contact is likely (Herkins and Cornish, 2023).

5.6.1 Sustainable glove use in healthcare

Environmental and financial sustainability are key reform areas in the NSW Health Future Health Strategy (2022-32). Health Organisation should reduce unnecessary PPE use especially non-sterile glove use and improving hand hygiene practices in clinical areas. Gloves are one of the most common single-use plastic items in health care. Glove use contributes to climate change through carbon emissions from manufacturing and transport, more plastic waste in landfill, also pollutes water systems (Cubas et al., 2023, Jain et al., 2017, Jain et al., 2018).

Health Organisations are to consider strategies to ensure sustainable and safe glove use for clinicians when caring for patients under standard and transmission-based precautions.

Innovation in glove material selection, manufacturing, appropriate use, and disposal is needed to reduce material and energy consumption, reduce waste, and protect health and the environment.

Table 17 Glove selection guide for infection prevention and control

Glove type (non-sterile)	Suggested use
Gauntlets – examination, powder free, textured	Longer cuff – midwives, health workers reprocessing RMDs and other devices, HCID
Gloves – latex, examination, powder free, textured	All clinical and non-clinical staff
Gloves – non-latex (including polychloroprene and nitrile), examination	All clinical and non-clinical staff with an allergy/ sensitivity to latex
Gloves – cytotoxic medication handling	Handling of cytotoxic medications Note: these gloves come in a range of colours
Glove type (sterile)	**Suggested use**
Gloves – surgical, under glove, powder free	Surgical staff who require double gloving
Gloves – non-latex (including polychloroprene, nitrile and natural rubber latex free), surgeons, pairs	Surgical and other clinical staff who perform procedures that require sterile gloves or an allergy/sensitivity to latex

Gloves – latex, surgeons, pairs	Surgical and other clinical staff who perform procedures that require sterile gloves. Touching tissue which would be sterile under normal circumstances
Glove, patient examining & treatment, powder free, standard cuff	Clinical staff who perform aseptic procedures or examinations that require sterile gloves

For more information refer to:

- NSW Health Procurement (Goods and Services) policy directive
- NSW Health Cleaning of the Healthcare Environment policy directive
- NSW Health Infection prevention and control in Healthcare Settings policy directive
- AS/NZS 4179:2014 Single-use sterile rubber surgical gloves - Specification
- AS/NZS 4011.1:2014 Single-use medical examination gloves Specification for gloves made from rubber latex or rubber solution
- AS/NZS 4011.2:2014 Single-use medical examination gloves Specification for gloves made from poly (vinyl chloride).

5.7 Facial protection

Facial protection is used to protect the mucous membranes of the face (eyes, nose, and mouth) from exposure to body substance splash or spray. The level of protection required should be determined by the volume and distribution of body substance likely to be encountered during patient care (AS 4381:2015 Single use face mask for use in healthcare).

For standard precautions, the types of facial protection include:

- Face shield/visor
- Protective eyewear
- Fluid-resistant surgical mask.

5.7.1 Eye protection

Eye protection (face shield/visor or goggles) must be worn when there is risk of body substances splashing or spraying into the conjunctiva (Roberge, 2016). Personal eyeglasses, prescription glasses and contact lenses are not considered adequate eye protection and are not a substitute for eye protection unless they are specified as safety glasses (Coia et al., 2013).

Goggles with a manufacturer's anti-fog coating provide reliable, eye protection from splashes, sprays, and respiratory particles from multiple angles (Siegel et al., 2007).

Visors are transparent personal protective devices intended to shield the face and eyes of a health worker and are suitable for use with prescription glasses and masks. Use a mask visor or a face shield if there is potential exposure to an excessive amount of blood or body substance splash or spray.

If reusable eye protection is used, it should be cleaned and disinfected in accordance with the manufacturer's instructions for use (National Health and Medical Research Council, 2019a).

Prescription eyewear is considered to provide appropriate eye protection for blood or body substance splash or droplet exposure if:

- the eyewear is close fitting, particularly at the corners of the eye and across the brow

- includes side protection that is indirectly vented
- can be cleaned and disinfected between use.

Additional protective eyewear does not need to be worn with prescription eyewear that has these features. For more information refer to AS/NZS 1337.6.2012 – Personal eye protection prescription eye protectors against low and medium impact.

Health workers are to wear eye protection for:

- all invasive procedures where the risk of exposure has been identified, including, but not limited to, surgery, intravascular access devices (IVAD), endoscopies and haemodialysis line management
- the disposal of liquid body substances
- when changing and emptying urinary catheter drainage devices; and other drains
- when cleaning reusable medical devices contaminated with body substance using running water
- during cleaning of areas such as toilets/urinals/shower, where body substance splash may occur
- during procedures that induce the patient to cough, for example, chest physiotherapy
- when performing aerosolising generating procedures and when providing care to patients with aerosol generating behaviours (for example, shouting, screaming or yelling)
- single use eye protection can be worn for an extended period unless moist, wet or contaminated, and disposed of at the end of the session
- reusable facial protection is to be worn, fitted and cleaned in accordance with the manufacturer's instructions and should be stored clean and dry
- there must be a clear described procedure in place for the cleaning, disinfection, drying and storage of reusable eye protection to reduce the risk of a HW donning an item that has not been effectively reprocessed since its last use
- any facial protection that is labelled 'single use' must not be cleaned and reused
- disposable single use facial protection must be discarded after use.

5.8 Respiratory and facial protective equipment

Respiratory and facial protection is required for those organisms that are usually transmitted via the droplet or airborne route, including when particles have been artificially created, such as during AGPs. Respiratory protective devices (RPDs) are designed to protect the wearer from inhalation hazards such as airborne infectious agents and in some cases, dust, and other particles.

Respiratory protection is one aspect of both infection prevention and control as well as work health and safety (WHS) strategies for ensuring health worker safety at work. Health Organisations are required to implement a comprehensive respiratory protection program (RPP) and depending on the RPD design, guidance should be developed on the selection, facepiece fit testing and use of RPDs. For more information refer to the Respiratory protection manual.

5.8.1 Surgical mask

A well-fitted surgical mask provide a barrier to splashes and can help block particles from reaching the nose and mouth of the wearer (wearer protection) and, if someone is ill, help block particles

coming out of their nose and mouth from reaching others (source control) (Arora and Majumdar, 2022).

They do not provide protection against airborne particles and are not classed as an RPD. Some surgical masks have an integrated eye protection shield (mask visor). Surgical face masks used by health workers for protection against microorganisms must be fluid resistant and disposable.

Surgical masks are for use in clinical care, dental settings, and surgery as per standard precautions. Surgical masks should be worn for the duration of the relevant exposure, task, or procedure.

Masks have different properties and colours depending on the manufacturer. Each mask barrier level will provide varying levels of fluid penetration resistance and protection against respiratory particles and body fluid splashes or spray.

A fluid resistant surgical mask is to be worn:

- within the operating room during surgery, or for invasive or dental procedures and whenever sterile supplies are open to protect health workers and the patient
- to prevent body substance exposure to health workers and to protect the patient against respiratory microorganisms which may be expelled by the health worker.

The level of surgical mask should match the procedure performed or the level of protection required (refer to Table 18).

A fluid resistant surgical mask is to be worn by health workers:

- and fitted in accordance with the manufacturer's instructions
- must not be touched by hands or gloves while worn
- are to cover both the mouth and nose while worn
- are not worn loosely or folded down around the neck; and
- are to be removed and discarded immediately after leaving the patient-zone/room
- and perform hand hygiene after removing
- and report any pressure injuries to the supervisor or manager, following local reporting processes and usual WHS processes.

When the mask becomes moist or damp/wet, it is no longer effective and should be discarded. The mask is to be removed by touching the strings/ties or loops only.

When wearing a mask, it is important to remember the following:

Do not:

- touch the mask or face as this may contaminate the wearer
- pull the mask below the nose or chin
- hang the mask around the neck, ear or top of the head.

Do:

- change the mask if it becomes moist or damp
- change the mask if it is sprayed or splashed on
- change the mask if contaminated with blood or body substances
- immediately perform hand hygiene if the mask is accidentally touched

- perform hand hygiene after removing a mask
- place the mask into a general waste bin, perform hand hygiene and replace with a new mask
- report mask pressure injuries to the supervisor or manager, following local reporting processes and usual WHS processes
- remove a mask outside of patient care areas or patients requiring other precautions (for example, between rooms or patient zones, break room, reception area) and before proceeding to care for patients that are not isolated for ARI.

Table 18 Type of face protection and recommended use

Type of care	Examples	Face protection required
Routine	General examinations (for example, medical, physiotherapy, nursing) Routine observations	Not required unless caring for a patient with respiratory symptoms
Procedures that generate splashes or sprays	Dental procedures Nasopharyngeal aspiration Emptying wound or catheter bag	Protective eyewear/full-length face shield Surgical mask
Procedures involving the respiratory tract (including the mouth)	Intubation Chest physiotherapy Nasopharyngeal of tracheostomy suction	Protective eyewear Surgical mask or P2/N95 respirator, based on risk assessment

As per the Therapeutic Goods Administration (TGA) when assessing the suitability of surgical masks, the manufacturers are expected to provide test evidence of conformity for fluid resistance, bacterial filtration efficiency and breathability. Refer to Guidance on medical/surgical face masks and respirator standards - key performance aspects for more information.

The Australian Standards (AS 4381:2015) for single-use face masks for use in healthcare sets out standards for surgical masks used in healthcare and is divided into three levels of performance for materials used in surgical masks to protect against fluid strike-through. Fluid resistance rates the performance of the material to contain blood and bodily fluid splashes before filtering through the mask. Therefore, its level of limitations determines the healthcare setting it is most suited to depending on the risk factors of the procedures. Refer to Table 19 for more information.

Level 1: Fluid Resistance: 80mm Hg, low fluid exposure - low barrier protection.

Level 2: Fluid Resistance:120mm Hg, moderate fluid exposure - moderate barrier protection.

Level 3: Fluid Resistance:160mm Hg, high fluid exposure - maximum barrier protection.

Table 19 AS 4381:2015 Single-use surgical face mask standard

Characteristics	Level 1	Level 2	Level 3
Application	For general purpose medical procedures, where the wearer is not at risk of blood or body fluid splash or to protect staff and/or the patient from droplet exposure to microorganisms (for example, patient with ARI visits GP)	For use in emergency departments, dentistry, changing dressings on small or healing wounds where minimal blood droplet exposure may possibly occur (for example, endoscopy procedures)	For all surgical procedures, major trauma first aid or in any area where the health worker is at risk of blood or bodily fluid splash (for example, orthopaedic, cardiovascular procedures)
Barrier	Mask materials are evaluated for resistance to penetration by synthetic blood at the minimum velocity specified in bacterial filtration efficiency and differential pressure.	Mask materials are evaluated for resistance to penetration by synthetic blood at the middle velocity specified in bacterial filtration efficiency and differential pressure.	Mask materials are evaluated for resistance to penetration by synthetic blood at the maximum velocity specified in bacterial filtration efficiency and differential pressure
Bacterial Filtration Efficiency (BFE) %	≥ 95%	≥ 98%	≥ 98%
Particulate Filtration Efficiency (PFE) % (0.1µm)	< 4.0	< 5.0	< 5.0
Resistance to penetration by synthetic blood (fluid resistance) min pressure in mm Hg for pass result	80mm Hg	120mm Hg	160mm Hg

Extracted from AS 4381: 2015 Single use surgical face mask standard.

5.8.2 Respirators

Respirators intended for use in a healthcare environment, are medical devices and are regulated by the TGA under the Therapeutic Goods Act 1989. Unless exempt, medical devices must be included in the ARTG before being imported into or supplied in Australia, exported from Australia, or advertised in Australia. For more information refer to the Face masks and respirators that are regulated by the TGA.

There are many types of respirators available which include:

- Air-purifying respirators which protect the wearer by filtering inhaled air. These types of respirators can be disposable or reusable and are either:
    - non-powered – uses inhalation to draw air through a filter
    - powered – uses a fan to draw air through a filter
- Supplied-air respirators which protect the wearer by supplying clean breathing air from an independent source such as an air compressor or compressed air cylinder.

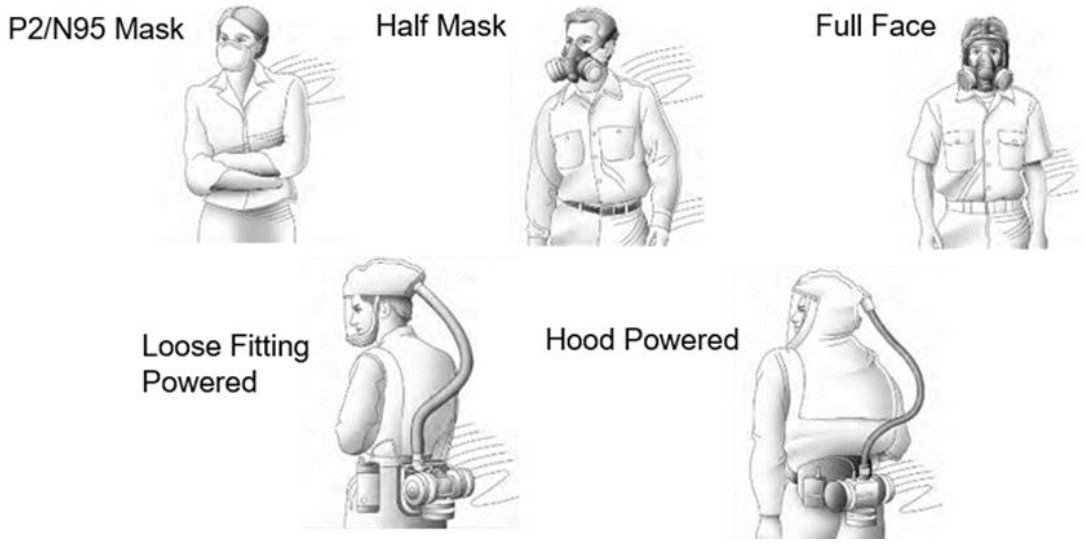
The category of particulate filtering respirators can be further divided into:

- **Disposable particulate filtering respirators**, where the entire respirator is discarded at the end of a session of care, or when it becomes unsuitable for further use due to excessive resistance, sorbent exhaustion, or physical damage
- **Reusable particulate filtering respirators**, also called elastomeric respirators, may take the form of a reusable full-face or half-face respirator and harness fitted with particulate P2 or P3 filters that are activated passively by inhalation
- **Powered Air Purifying Respirators (PAPRs)** full-face or half-face PAPRS actively supply filtered air to the wearer and deliver positive air pressure via a battery-operated blower unit.

Reusable respirator facepieces are cleaned and reused but the filter cartridges are discarded and replaced when they become unsuitable for further use. All reusable items must be cleaned and disinfected in accordance with the manufacturer's recommendations and AS 5369:2023 *Reprocessing of reusable medical devices and other devices in health and non-health related facilities*. For more information respirator use, fit checking, fit testing, education and training refer to the CEC Respiratory protection program.

In the healthcare setting, an air-purifying respirator (or particulate filtering respirator) most commonly relates to the disposable filtering half face respirator also known as a P2 or N95 mask. There are a variety of respirators available, and these may differ between healthcare facilities (refer to figure 10 as an example).

Figure 10 Major types of respirators (adapted from OSHA)



Disposable (single use) particulate filter respirators (also known as a P2 or N95 mask) are devices that are discarded on completion of an episode of care, or when they become unsuitable for further use due to excessive resistance, physical damage, or contamination. Reusable respirators are designed to be used multiple times after appropriate reprocessing in between use as per manufacturer's instructions for use (IFU).

Disposable respirators are the most common devices used in healthcare settings for respiratory protection. Each time these items are used, they must be checked for defects, for example, elastic head pieces unevenly attached, marks on the respirators and tears. Disposable respirators found to be defective are to be discarded and replaced.

Filter efficiency

Disposable P2/N95 face masks or respirators can filter out very fine particles (less than 0.5 micron) from the air when worn correctly.

AS/NZS 1716:2012 Respiratory protective devices use a classification system to identify the different types of particulate filters which are P1, P2 and P3. The 'P' refers to the particle size of the particulate matter that the respirator is designed to protect against.

Particulate filters are classified and marked as P1, P2 or P3, with P3 providing the highest level of protection. However, P3 protection can only be achieved if the P3 filter is used in a full-face respirator. P3 filters are currently not part of the Standards or readily available for use in Australian healthcare. The filtration efficiency of different particulate filters is:

- P1 = 80% Filter efficiency
- P2 = 94% Filter efficiency
- P3 = 99% Filter efficiency.

Assigned protection factor

A respiratory protective device is considered adequate if it has the capacity to reduce the wearer's exposure to a hazardous substance to acceptable levels. Assigned protection factor (APF) refers to the level of respiratory protection that a respirator or class of respirators is expected to provide to users. The APF is the ratio of the airborne concentration of the substance outside the device to that inside the device (Table 20).

Table 20 Filter types and assigned protection factors

Conformité Européen marked particle filter type	Assigned protection factor (what is likely to be attained in practice)
P1	4
P2	10
P3	20

Elastomeric and PAPRs are regarded as having high levels of APF, particularly when used with full-face protection. The typical APF for a disposable N95 respirator and a half facepiece elastomeric is 10 and full facepiece elastomeric is 50. An APF of 10 means that the respirator (if used properly) can be safely used in an atmosphere that has a hazardous concentration of up to 10 times the Permissible Exposure Limit (PEL) or other exposure limit for that hazard.

N95 respirators and P2 respirators are similar and applied interchangeably to the same conditions. There are, however, differences in testing and certification practices between Australia and the USA (Table 21).

Table 21 Difference between testing of P2 and N95 respirators

	P2 respirator (Australia & New Zealand Standard)	N95 respirator (USA NIOSH Standard)
Filter efficiency	at least 94%	at least 95%
Testing substance	Sodium Chloride Aerosol	Sodium Chloride Aerosol
Aerosol flow rate	95 litres per minute	85 litres per minute
Aerosol particle size	0.3 to 0.6 microns	0.3 microns

Surgical and standard P2/N95 respirators

There are two types of P2/N95 respirators:

- Surgical P2/N95 respirators that are fluid resistant
- Standard or non-surgical P2/N95 respirators are not tested against fluid resistant specifications and therefore not considered as fluid resistant.

Use a surgical P2/N95 respirator when:

- Performing tasks such as surgery, that may expose health workers to high pressure streams that produce particles of blood or body substance
- Providing care for suspected or confirmed COVID-19 patients.

Standard P2/N95 respirators can be used for dry airborne situations where minimal exposure to wet particles is expected such as caring for patients with suspected or confirmed tuberculosis, measles or chickenpox. Standard P2/N95 respirators can be used together with a face shield, surgical mask or a visor (these additions must be approved by the product manufacturer) if fluid resistance is required.

Considerations before selecting respiratory protection devices

Before selecting RPD, the following should be considered:

- Identify hazards (for example, the respiratory hazards to which HWs will be potentially exposed during routine and emergency situations)
- Appropriate donning, doffing and use of respirators
- Fit check (user seal check) at point of use every time a respirator is applied. Refer to the donning and fit checking of P2/N95 respirators in NSW healthcare settings video series available through HETI My Health Learning (Course code 319438161) for more information
- Fit testing of respirators (risk assessed)
- HWs are to ensure that they have the physiological ability to wear a respirator.

A respiratory protection program (RPP) should be in place including fit testing after fit (seal) checking is fully implemented. Fit testing provides additional information to determine the suitable type(s) of P2/N95 respirators for an individual. In situations where fit testing has not yet been carried out, and a P2/N95 respirator is recommended for use, a fit-checked P2/N95 respirator is preferred over a surgical mask. Refer to the Respiratory protection manual for more information.

Alternatives to disposable P2/N95 respirators

There are a variety of respirators used by health workers when caring for patients with a respiratory infection. In situations where there is a risk of airborne spread the recommended RPD is a particulate filter respirator. For some HWs and in some conditions, the available disposable P2N/95 respirators may not provide optimal fit.

A reusable respirator should be considered for HWs who are unable to achieve a facial seal (fit check) with available disposable P2/N95 respirators and/or have not passed a fit test and cannot be re-deployed to a lower risk clinical area due to their specialist skills. In this situation, alternatives to consider include reusable elastomeric respirators and PAPR.

Considering the complexities and challenges surrounding the use of reusable respirators in healthcare, the decisions on the selection and purchase of elastomeric respirators or PAPRs for use in healthcare facilities must involve specialists in infection prevention and control, work health and safety, biomedical engineering, reprocessing and the procurement or product evaluation committee.

Elastomeric respirators

Elastomeric respirators have historically had limited use in healthcare and their design may not comply with requirements of the healthcare environment, and they are not recommended for routine use in healthcare. The illustrations in figure 11 is not an endorsement but as an illustration of different types for consideration. Decisions on the selection and purchase of these respirators for use in healthcare should follow the process for procurement including certification where required on ARTG.

For more information refer to CEC Respiratory protection program manual.

Powered air-purifying respirators

A PAPR is a battery-powered device that provides filtered air under positive pressure into either a loose-fitting hood or helmet or a tight-fitting facepiece. Because the filtered air is delivered under positive pressure, the device can compensate for an imperfect seal. For this reason, a PAPR is regarded as potentially providing a higher level of protection than other RPD but is more complex to use and maintain.

For more information refer to CEC Respiratory Protection Program resources.

Difference between disposable P2/N95 respirators, reusable elastomeric respirators and PAPRs

The most significant difference between disposable respirators, reusable elastomeric respirators and PAPRs is that reusable respirators must be maintained and inspected after each use, including cleaning and disinfection of the reusable components such as facepiece valves, valve covers and straps.

Figure 11 Examples of different types of respirators



Table 22 Properties of P2 and N95 respirators

Properties	P2 respirator	N95 respirator
Other names	N95 masks, respiratory protection device, particulate respirator	P2 respirator, respiratory protection device, particulate respirator
Characteristics	P2 particulate filtering respirators/masks must have a filter efficiency of at least 94% when tested with sodium chloride aerosol at a flow rate of 95 litres/minute Under the European Norms system, aerosol testing is similar to Standard AS/ NZS 1716: 2012 but has additional filter efficiency testing with paraffin oil aerosol that must also meet the minimum 94% filter efficiency to be classified as P2. The particle size of this aerosol has a median diameter of 0.3 to 0.6 microns with a range of particles in the 0.02 to 2-micron size range	NIOSH classified N95 particulate filtering respirators/masks must have a filter efficiency of at least 95% when tested with sodium chloride aerosol at a flow rate of 85 litres/minute
	• Raised dome or duckbill • 4–5 layers (outer polypropylene, central layers electret [charged polypropylene]) • Filtration through mechanical impaction and electrostatic capture • Designed to provide a good facial fit to minimise aerosol contamination of the mucous membranes of the nose and mouth	
Sealing	• Ties or straps at crown and bottom of head, pliable metal nose bridge • Recommend fit checking all respirators, fit testing based on risk category	
Australian Standards	Standard AS/NZS 1715:2009 Standard AS/NZS 1716:2012	Set by the US NIOSH classification (NIOSH Guidelines – Procedure No. TEB-APR-STP-0059)
Intended use	• Routine care of patients on airborne precautions • High-risk procedures (or AGPs) such as bronchoscopy when the patient's infectious status is unknown, or the patient has suspected or confirmed COVID-19 • Procedures that involve aerosolisation of particles that may contain specific known pathogens (AGPs)	

Source: Australian Guidelines for the Prevention and Control of Infection in Healthcare, 2019

5.9 Aprons and gowns

Disposable fluid resistant aprons or gowns are designed to protect uniforms or clothing from moisture or soiling from blood, body substances and/or transmissible microorganisms during direct patient care. They also protect the patient during direct contact.

There are two main types of gowns available: isolation gowns and surgical gowns.

Isolation gowns offer varying resistance to blood and body substances depending on the type of the material, permeability and wear and tear. Isolation gowns may be classified as 'disposable/single use' or 'reusable/multi-use'.

Single use surgical gowns are sterile, fluid-resistant, disposable garments made of natural and/or synthetic materials worn over uniform 'scrubs' and operating theatre attire during surgical and aseptic procedures. Surgical gowns help protect the patient, health workers performing the procedure and operating room personnel from the transfer of microorganisms, body substances and particulate material (Kilinc, 2015).

The Association for the Advancement of Medical Instrumentation (AAMI) is a recognised and collaborative organisation that develops international standards, information and guidance to achieve safe use of medical devices (Chan, 2011). According to AAMI classification a surgical gown with a level 1 classification provides the lowest level of protection and level 4 provides the highest level of protection. For more information refer to Table 24 AAMI level standards for gowns.

Risk assessment and gown selection in procedural areas and operating suites

Risk assessment considers the anticipated risk of exposure to blood, body fluids/substances and irrigation fluid, the procedure itself, and the patient. Regardless of gown level, once fluid has penetrated the gown, the integrity of the protective barrier and sterility is compromised. It is recommended the gown is then changed (National Health and Medical Research Council, 2019a). Some common procedures are provided as examples in the tables below, to guide sterile gown selection based on the AAMI standard.

Table 23 Aprons/gowns recommended use and characteristics

Type	Recommended use	Characteristics
	Disposable aprons are worn to protect uniforms and clothing from moisture, body fluids or soiling during direct patient care or contact with the patient's environment or their equipment. An apron is usually applied when risk assessment of contact or exposure is minimal.	• Fluid impervious • Single use, for one procedure or episode of patient care • Disposable
	Disposable gowns are worn to protect arms, shoulders, uniforms and clothing from moisture, body fluids or soiling during direct patient care or contact with the patient's environment/equipment. A gown is usually applied when risk assessment of contact or exposure is greater in time and/or volume.	

A risk assessment approach must be used to choose between an apron or a gown for standard and/or transmission-based precautions.

The following points should be considered when conducting the risk assessment:

- level of direct contact with the patient
- tasks or procedures the health worker will undertake
- anticipated exposure to body substances
- if transmission-based precautions are required
- patient factors such as their ability to practise respiratory hygiene and hand hygiene
- the patient's ability to wear a disposable mask (source control)
- procedural requirements.

If the health worker anticipates exposure to blood or body substances on an uncovered part of their skin or uniform, then the risk assessment will direct them to an apron or gown for standard and/or transmission-based precautions.

When an apron or a gown is worn, it should be changed between patients. Extended use of a gown or apron is not routinely recommended. It may only be acceptable in exceptional circumstances and where minimal contact is anticipated, for example, COVID-19 testing centres.

Cloth (patient) gowns do not provide any level of protection for health workers undertaking procedures and they are not to be worn in clinical areas, including oral health, maternity units and medical imaging, and during patient care. In the operating room health workers should wear an impervious plastic apron or gown underneath the sterile cloth gown to provide protection from strike through. This section does not address the sterile apparel worn during operative procedure (refer to ACORN standards for further information).

Defining the best level of protection for the American National Standards Institute (ANSI) /Advancement of Medical Instrumentation (AAMI) standards PB70:2022 involves an understanding of the critical zones of a gown and what each level of barrier performance entails.

The critical zones of a gown comprise of the front of the gown and the sleeves, which are both primary areas with the greatest risk of exposure to fluids and blood-borne pathogens. As the level increases, so does the need for greater barrier protection for the entire critical zone. See table 25 for level of protection needed for intended task.

Table 24 AAMI level standards for gowns

Barrier performance	Barrier protection	Resistance measure	Description
Level 1	Minimal	Liquid penetration	Used for MINIMAL risk situations. Provides a slight barrier to small amounts of fluid penetration. Single test of water impacting the surface of the gown material is conducted to assess barrier protection performance.
Level 2	Low	Liquid penetration	Used in LOW-risk situations. Provides a barrier to larger amounts of fluid penetration through splatter and some fluid exposure through soaking. Two tests are conducted to assess barrier protection performance: • Water impacting the surface of the gown material. • Pressurising the material.
Level 3	Moderate	Liquid penetration	Used in MODERATE risk situations. Provides a barrier to larger amounts of fluid penetration through splatter and more fluid exposure through soaking than Level 2 Two tests are conducted to test barrier protection performance: • Water impacting the surface of the gown material. • Pressurising the material.
Level 4	High	Liquid and viral penetration	Used in HIGH risk situations. Prevents all fluid penetration for up to 1 hour. May prevent VIRUS penetration for up to 1 hour. In addition to the other tests conducted under levels 1-3, barrier level performance is tested with simulated blood containing a virus. If no virus is found at the end of the test, the gown passes.

Extracted from Standard ASTM F1670 / F1670M

Aprons and gowns are to be removed in a manner that prevents contamination of clothing, skin or the environment. The outer 'contaminated', side of the apron or gown is turned inward and rolled into a bundle and then discarded into a designated receptacle for waste or linen to contain contamination.

Table 25 Sterile surgical gown selection for routine surgery

Examples of procedures drawn from industry supplier *(this list is not exhaustive)*	**Barrier performance**	**Risk of exposure**	**Description**
• Regional anaesthesia (epidural/spinal) • Biopsies, excision of superficial lesions • Minor gynaecological procedures (for example, dilatation and curettage) • Minor orthopaedic surgery (for example, carpal tunnel, wedge resection toenails)	Level 1 Use sterile Level 2 gowns if Level 1 gowns are not available	Minimal fluid	Used for situations where risk of exposure to blood, body fluids or irrigation fluids is MINIMAL Provides a barrier to small volumes of fluid Single test of water impacting the surface of the gown material is conducted to assess barrier protection performance
• Minimally invasive surgery (for example, laparoscopic, endoscopic) • Hernia repair • Breast reduction, plastic/cosmetic surgery • Orthopaedic arthroscopy (ankle) • Open reduction internal fixation • Dental surgery • Chest drain insertion	Level 2	Low fluid	Used for situations where risk of exposure to blood, body substances or irrigation fluids is LOW Provides a barrier to larger amounts of fluid penetration Two tests are conducted to assess barrier protection performance: • Water impacting the surface of the gown material • Pressurising the material
• Mastectomy • Urological procedures and hysteroscopy • Laparoscopic assisted hysterectomy/bowel resection • Joint replacement surgery • Neurosurgery & vascular surgery • Orthopaedic arthroscopy (shoulder/knees) • Burns	Level 3	Moderate fluid	Used for situations where risk of exposure to blood, body substances or irrigation fluids is MODERATE Provides a barrier to larger amounts of fluid penetration Two tests are conducted to test barrier protection performance: • Water impacting the surface of the gown material • Pressurising the material

Examples of procedures drawn from industry supplier *(this list is not exhaustive)*	Barrier performance	Risk of exposure	Description
• Major trauma • Knee/shoulder reconstruction • Lower segment caesarean section • Cardiac/thoracic – open procedures where the surgeon's hands/arms are in a body cavity throughout the procedure	Level 4	Highest fluid and microbial barrier	Used for situations where risk of exposure to blood, body substances or irrigation fluids is HIGH Provides a barrier to large volumes of fluid penetration and greater resistance to fluid soaking than level 3

(ASTM International 2017). Note reusable surgical gowns used to support sustainability should be assessed for fluid resistance properties. Where protection against strike through is not provided an impervious apron/gown should be worn underneath to provide the required level of protection and prevent exposure to health workers.

5.10 Aseptic technique

Aseptic technique is a set of practices aimed at minimising contamination and is used to protect the patient from infection during procedures (National Health and Medical Research Council, 2019a). Components of standard precautions are required for aseptic technique, however, adherence to these practices alone does not constitute aseptic technique.

Aseptic technique protects patients during invasive clinical procedures by employing infection prevention and control measures that minimise, as far as practicably possible, the presence of pathogenic microorganisms.

Aseptic technique reduces the risk of infection. It is required for all invasive procedures.

Correct aseptic technique prevents contamination and transfer of pathogens from hands, surfaces, and equipment to the patient during procedures. This is achieved by:

- Identifying key parts and key sites and always protecting them
- Key parts must only contact with other key parts and/or key sites.

Asepsis can be explained in different levels:

Aseptic technique and Medical Asepsis

Reducing microorganisms by using non-touch technique (clean technique)

Aseptic fields that promote asepsis are used when:

- key parts are easily protected by critical micro aseptic fields and non-touch technique
- the main aseptic field does not have to be managed as a key part.

Management of the general aseptic field requires key parts be protected by critical micro aseptic field (critical micro aseptic fields are those key parts protected by syringe caps, sheathed needles, covers or packaging). Asepsis of the immediate procedure environment is therefore promoted by general aseptic field management.

Critical aseptic fields are used when:

- key parts/sites are large or numerous and can't be easily protected by covers or caps or can't be handled with a non-touch technique
- invasive procedures require a large aseptic working area.

Management of the critical aseptic field requires only sterilized equipment to be placed in the aseptic field; sterile gloves are required to maintain asepsis.

Key sites include any non-intact skin and insertion or access sites for medical devices connected to the patient (for example, insertion/access sites of intravenous devices, urinary devices, open wounds).

Key parts are the sterile components of equipment used during the procedure (for example, bungs, needle hubs, syringe tips, dressing packs).

Sterile single-use equipment or instruments must be used according to manufacturer's instructions and in such a way that the sterility of the item is maintained.

Non-touch technique is a technique where key parts and key sites are not touched and therefore not contaminated by clinician's hands. The most effective way to protect a key part is not to touch it even if sterile gloves are used.

Each Health Organisation is to undertake a local risk assessment to identify medium and high-risk procedures that require the use of aseptic technique or maximum barrier protection. Maximum sterile barrier (MSB) precautions are defined as wearing a sterile gown, sterile gloves, and cap and using a full body drape (similar to the drapes used in the operating room) during a procedure (for example, insertion of a central line).

The Health Organisation is to regularly audit the use of aseptic technique and evaluate audit data locally to identify opportunities for compliance improvement.

Each Health Organisation should provide its clinical workforce with, or access to, aseptic technique education. Health workers that perform procedures that require aseptic technique are to be trained in aseptic technique and are responsible for maintaining aseptic technique competencies. The Health Organisation is to maintain a central record describing the aseptic technique education and competencies of its clinical workforce.

Aseptic technique, when performed correctly will:

- Minimise contamination of key sites
- Protect patients from their own pathogenic microorganisms that may cause infection
- Reduce the transmission of microorganisms
- Maintain the sterility of equipment and key parts used for aseptic procedures.

As per the NSQHS Standards Implementation guide for Action, the Health Organisations must have processes to:

a. Identify the procedures where aseptic technique applies
b. Assess the competence of the workforce in performing aseptic technique
c. Provide training to address gaps in competency
d. Monitor compliance with the organisation's policies on aseptic technique.

When performing a procedure step must be sequenced to ensure an efficient, logical, and safe order of procedure and clinicians should be familiar with the sequence of the procedure to ensure asepsis is maintained. For more information on steps for sequencing refer to ACSQHC Principles of aseptic technique: Information for healthcare workers.

The five essential principles of aseptic technique are:

1. Sequencing
    - Performing a risk assessment
    - Pre-procedure preparation
    - Performing the procedure
    - Post procedure practices, handover, and documentation.
2. Environmental control:
    - Prior to aseptic procedures, health workers must ensure the environment is free of obstacles that could potentially pose a risk, such as bed making, patients using commodes, use of fans, cleaning of the nearby environment or patient privacy curtains across work area
    - A sterile field should be set up on an adequate surface that has already been cleaned

- If a sterile item is dropped on the floor, the package integrity is compromised, and it MUST be either thrown away (single use) or re-processed (if reusable). It is never appropriate to reuse this item
- To prevent accidental contamination, health worker's hair should be tied back, bare below the elbow and lanyards (if worn) removed or tucked in prior to commencing the procedure.

3. Hand hygiene:
    - Effective hand hygiene is an essential component of aseptic technique. Dependant on the procedure about to be performed either routine or surgical hand hygiene is required
    - Routine hand hygiene refers to the use of neutral pH soap/solution and running water or an alcohol-based hand rub (ABHR)
    - Surgical hand scrub requires the use of an approved antimicrobial skin cleanser or waterless hand rub formulation
    - Perform hand hygiene immediately before and after a procedure or after body substance exposure, in compliance with the National Hand Hygiene Initiative (NNHI) hand hygiene requirements.
4. Maintenance of aseptic fields:
    - Prior to commencing a procedure, it is imperative the clinician determines the aseptic field required and how that field will need to be managed
    - Cleaning and/or disinfection of key site(s) and key part(s) prior to procedure(s)
    - Establishing an aseptic field
    - Use of sterile equipment
    - Maintenance of the aseptic field, including protecting the key sites and key parts
    - Use of a non-touch technique
    - Gloves must not touch any item or surface outside of the aseptic field.
5. PPE:
    - Correct selection and use of sterile and non-sterile PPE
    - Sterile gloves should be worn if key sites or key parts need to be touched.
    - If key sites or key parts are not touched, then non-sterile gloves may need to be worn to protect the clinician from body substance exposure
    - Other PPE should be worn in line with standard precautions to reduce the risk of body substance exposure to the HW such as mask and eye protection.

For more information refer to My Health Learning Aseptic Technique.

Surgical Asepsis

Preventing or minimising microorganisms entering sterile body areas (for example, through surgical incisions).

Surgical aseptic technique is required when procedures are technically complex, involve extended periods of time, large open key sites or large or numerous key parts. To counter these risks, a main

critical aseptic field and sterile gloves are required and often maximum barrier precautions. Critical micro aseptic fields and non-touch technique should also be practiced and maintained.

Surgical aseptic technique involves:

- Establishment of a sterile operating field - a clearly defined area within which all surfaces, instruments, and materials are sterile. This field must be maintained throughout the procedure.
- Hand hygiene - performed using a surgical alcohol-based hand rub or a surgical cleanser registered by the TGA for surgical hand preparation.
- Skin antisepsis - application of a TGA-approved antiseptic agent to the patient's skin around the surgical site to reduce the microbial load and minimise the risk of infection.
- Use of sterilized equipment - only sterilized instruments and materials may enter or be used within the sterile field. Any breach in sterility must be immediately addressed to maintain aseptic integrity.

5.10.1 Aseptic technique in oral health

The five essential principles for aseptic technique (refer to section 5.10 Aseptic technique) are to be used for chair-side procedures in oral health. The patient's submucosal oral tissues are the key sites - that is, they are the susceptible body sites that should be protected from microorganisms on hands, gloves, surfaces, and equipment.

Most of the instruments and equipment used routinely in oral health, such as probes and scalers, are classified as invasive devices, and therefore should be handled aseptically. The key parts of those instruments are, for example, the tip of a probe or the tip of a scaler. The key parts of a local anaesthetic set-up using an aspirating syringe are both ends of the sterile needle and the sterile bung of the anaesthetic cartridge that will be pierced by the needle. These key parts - and others identified for other instruments and devices - should also be protected from microorganisms on hands, gloves, surfaces, and equipment.

The aseptic field for a routine dental procedure can be prepared by either using the instrument cassette in which the instruments were sterilised or placing a clean single-use cloth on the clean bracket table. The cap of the local anaesthetic needle is used as a critical micro-aseptic field to protect the needle from contamination.

For more information refer to the Australian Dental Association Guidelines for Infection prevention and control.

5.11 Management of invasive devices

Under the NSW Health Infection prevention and control in Healthcare Settings policy directive, each Health Organisation must maintain written policies and/or procedures for safe management of all types of invasive devices, including intravascular devices. These documents must provide clear guidance on insertion, maintenance, and removal practices to minimise the risk of healthcare-associated infections (HAIs).

Health workers are expected to follow device-specific protocols and consult relevant clinical resources, including:

- NSQHS Preventing and Controlling Infections Standard – for overarching principles on invasive device safety and infection prevention and control.

- NSW Health Guideline GL2021_015 – Insertion and Management of Urethral Catheters for Adult Patients, which outlines best practice to reduce catheter-associated urinary tract infections (CAUTIs).
- NSW Health Policy Directive PD2019_040 – Intravascular Access Devices - Infection prevention and control, detailing mandatory standards for IVAD insertion, care, and documentation.
- ACI Clinical Practice Guide (2021) – Central venous access device: Clinical practice guide, offering detailed procedures for CVAD insertion, maintenance, and removal.
- ACSQHC Clinical Care Standard (2021) – Management of Peripheral Intravenous Catheters Clinical Care Standard (2021), which sets national benchmarks for safe PIVC use, including daily review, documentation, and removal protocols.

All procedures involving aseptic technique must be documented. This includes:

- Indications for the procedure
- Any clinical misadventures or complications
- Required follow-up or review actions

This documentation supports clinical accountability and aligns with the (Australian Commission on Safety and Quality in Health Care, 2021a)) standards for safe invasive device management.

5.12 Skin antisepsis

Skin antisepsis is a critical component of preparing for any procedure requiring aseptic technique. This includes, but is not limited to, central line insertions, peripheral intravenous cannulations, lumbar punctures, drain insertions, and surgical procedures.

To ensure safety and efficacy:

- A single-use antiseptic skin preparation product must be used.
- After application, any remaining product and packaging must be discarded to prevent contamination and ensure compliance with infection prevention and control standards (Bednarek et al., 2025).
- For procedures involving surgical sites, clinicians should refer to Chapter 12 of the NSW Health Infection Prevention and Control Practice Handbook, which outlines detailed protocols for surgical site infection (SSI) prevention.

Selecting the Appropriate Antiseptic Agent

Effective skin preparation requires choosing the correct antiseptic agent at the appropriate concentration. Clinicians should refer to antiseptic summary table 26 Antiseptic agents for skin preparation to support evidence-based decision-making and ensure compliance with NSW Health and national infection prevention and control standards.

Table 26 Antiseptic agents for skin preparation

Antiseptic agent	Typical concentration	Activity against bacteria	Activity against viruses	Activity against fungi	Residual effect	Notes
Chlorhexidine Gluconate (CHG)	0.5%–4% in alcohol or aqueous base	Gram-positive & Gram-negative	Yes	Yes	Persistent (binds to skin)	Not inactivated by organic matter; persistent antimicrobial activity

Povidone-Iodine (PVP-I)	7.5%–10% aqueous or alcohol-based	Gram-positive & Gram-negative	Yes	Yes	No	Inactivated by organic matter; apply to clean skin only
Alcohol (Isopropyl or Ethanol)	60%–90%	Broad-spectrum	Many enveloped viruses	Many fungi	No	Rapid action; no residual effect; flammable
CHG + Alcohol	2% CHG in 70% isopropyl alcohol	Excellent immediate & persistent	Yes	Yes	Yes	Combines rapid kill with long-lasting effect
PVP-I + Alcohol	0.5%–1% iodine in 70% alcohol	Excellent immediate & moderate persistence	Yes	Yes	Moderate	Combines fast action with iodine's broad-spectrum activity

Adapted from Department of Queensland Health: Surgical skin disinfection guideline.

Best practice for skin antisepsis

When skin antisepsis is required for aseptic procedures (for example, central line insertion, IV cannulation, lumbar puncture, surgical procedures), a single-use antiseptic skin preparation should be used. After use, both the applicator and any remaining contents must be discarded to prevent contamination.

The following should be taken into consideration when applying skin antiseptics:

- The skin should be physically cleaned with soap and water (if necessary) prior to applying the antiseptic solution before inserting the device
- The same antimicrobial agent must be used for all phases of the patient's skin preparation, to ensure full residual benefit and consistent action
- All solutions must be allowed to dry before beginning insertion, do not wipe, pat, blot or fan prior to commencement of procedure
- Sterile saline or water solutions alone are not acceptable antiseptic solutions and should only be used to clean the skin of gross contaminants prior to applying any antiseptic solution
- Take care when applying liquid solutions to minimise the risk of eye injury to the patient due to splashes.

5.12.1 Skin disinfection before injection

In some circumstance skin preparation is needed before injection. Alcohol should be used to disinfect the skin prior to injections to prevent introduction of microorganisms into the skin being injected within tissue (Dulong et al., 2020). Alcohol has been shown to be a good disinfectant, reducing the number of bacteria on skin by 47-91%.

Health Organisations deciding to disinfect skin prior injections are to ensure that:

At a minimum swabbing the injection site with a saturated 70% alcohol swab for 30 seconds and allowing the skin to dry for 30 seconds is essential to reduce the number of microorganisms.

Administration of vaccines

As per the Australian Immunisation Handbook, before the administration of vaccines:

- If the skin is visibly clean, there is no need to wipe it with an antiseptic (such as an alcohol wipe)
- Alcohol wipes may increase injection site reactions as alcohol may track in with the vaccine.
- If you use alcohol or other disinfecting agents to clean skin that is visibly dirty, the skin must be allowed to dry before injecting the vaccine. This prevents inactivation of live vaccines and reduces the likelihood of irritation at the injection site.

5.12.2 Use of alcohol-based skin preparations in operating theatres

Alcohol based skin preparations have been shown to significantly reduce the incidence of surgical site infection. Where alcohol-based skin preparations are used, procedures must be in place to minimise associated risks to the patient (Jones et al., 2017). The following information is to remind operating theatre staff of the potential flammability of alcohol-based skin preparations:

- Use skin preparation with coloured dye to assist in identifying any pooling and what part of the body has been prepped
- The quantity of the flammable skin preparation used to prepare the skin should be kept to a minimum to avoid overspill and pooling either on or around the patient
- The size of the sponge/gauze applicator used for painting the skin should be assessed. Applicators which soak up large volumes of the skin preparation fluid should be avoided to minimise the risk of pooling
- Any overspill that occurs should be removed before the drapes are applied
- Time should be allowed for the alcohol to evaporate and disperse prior to applying the drapes.

5.13 Needle stick and sharps injury prevention

Breaches in safe injection, infusion and medication vial handling practices has resulted in transmission of human immunodeficiency virus (HIV) and viral hepatitis and in some cases caused outbreaks of disease (Fischer et al., 2010, Guh et al., 2012). Standard precautions, particularly aseptic technique, form the basis of safe injection practices (Kottapalli et al., 2023). This section focuses on the safe injection practices, required to ensure patient and health worker safety.

The following practices are recommended in the context of injecting devices and safe injection practices:

- Open the sterile needle, cannula, syringe, or Epi-pen from packaging immediately prior to use
- Use safety engineered sharps devices whenever possible
- Discard syringes, needles, and cannula at the point of care in an approved sharps container
- Perform hand hygiene prior to accessing supplies, handling vials and intravenous (IV) solutions, and preparing or administering medications
- Sharps must not be passed by hand between a relevant health practitioner and any other person (Part 3 Infection Control Standards-Health Practitioner Regulation (New South

Wales) Regulation 2010. If a sharp is to be carried, it must be carried in a puncture proof container

- Each health worker is responsible for the management and safe disposal of any sharp that they use
- Ensure that reusable shared equipment used for aseptic technique procedures are cleaned in between use
- Use aseptic technique in all aspects of parenteral medication administration, medication vial uses and injections
- Store and prepare medications and supply in a clean area on a clean surface
- Never store needles and syringes unwrapped as sterility cannot be assured
- Discard all opened vials (including multi-dose vials), IV solutions and prepared or opened syringes that were involved in an emergency.

For more information refer to Part 3 Infection Control Standards-Health Practitioner Regulation (New South Wales) Regulation 2010, NSW Health Preparation of pharmaceutical and advanced therapeutic products policy directive, NSW Health Blood and Body Substances Occupational Exposure Prevention guidelines and Blood or Body Fluid Exposure Self-Assessment Tool.

Safe use and disposal of sharps

The potential for exposure to blood borne viruses is greatest when medical devices, such as needles, scalpels and other sharp instruments, are used (King and Strony, 2025, National Health and Medical Research Council, 2019a). The use of sharps should be minimised wherever possible and be disposed of immediately after use at the point of use.

In accordance with the NSW Health Infection Prevention and Control in Healthcare Settings Policy Directive, each Health Organisation must have a written procedure in place for the safe handling, transportation and reprocessing and disposal of sharps. A Health Organisation must also provide training to health workers on sharps handling, disposal, cleaning, reprocessing and safe storage (NSW Health, PD 2023_025).

Where possible, a Health Organisation should purchase and ensure the use of safety equipment for sharps handling, particularly in areas where high sharps use occurs and/or in areas where there have been occupational exposures relating to sharps handling. As per the Health Practitioner Regulation (New South Wales) Regulation 2010, each health worker is responsible for the management and safe disposal of any sharp that they use and they must comply with the following:

(1) Sharps must not be passed by hand between a relevant health practitioner and another person.

(2) The requirement in subsection (1) does not apply if, in a case involving an invasive procedure, the proper conduct of the procedure would be adversely affected.

(3) A puncture resistant tray must be used to transfer sharps.

(4) A needle must not be removed from a disposable syringe for disposal, or be purposely broken or otherwise manipulated by hand, unless-

(a) it is necessary to remove the needle for technical reasons, or

(b) the relevant health practitioner is performing a procedure in which the needle must be bent.

(5) A needle must not be bent after it is contaminated with blood or body substances.

(6) If re-sheathing of a needle is required-

(a) the needle must be properly recapped, and

(b) the sheath must not be held in the fingers, and

(c) a single-handed technique or forceps, or a suitable protective guard designed for the purpose, must be used.

(7) Immediately after being used, sharps must-

(a) if they are reusable - be placed in a puncture resistant container specially kept for that purpose and labelled for that purpose or

(b) if they are non-reusable sharps - be disposed of in a puncture resistant container.

Re-sheathing a needle in dental practice

Needles must not be re-sheathed, most health services use a single use syringe with a needle that can be discarded as one unit after administering the injection, except where no other alternative process is available such as dental practice (King and Strony, 2025).

The rationale is that most dental practices, when administering a local anaesthetic, do not use a single-use syringe with needle that can be discarded as one unit after administering the injection.

The Australian Dental association (ADA) Guidelines for Infection prevention and control do not recommend the recapping of local anaesthetic needles as a regular work practice. As per the management of sharps section 'Needles and medical sharps must not be recapped unless (1) there is a requirement to control a risk identified based on an assessment under jurisdictional Work Health and Safety regulations, AND (2) the risk of injury cannot be controlled by other means (for example, the absence of a needle recapping device or self-sheathing needle system).'

Where possible alternative processes that remove the requirement to re-sheath should be explored.

Dental practices that use a re-usable dental aspirating syringe, with a single-use needle attached, should remove the needle from the reusable syringe after administering the local anaesthetic.

If re-sheathing is required in these special circumstances:

- the needle must be properly recapped
- the sheath must not be held in the fingers
- either a single-handed technique, forceps, or a suitable protective guard designed for re-sheathing must be used.

For more information refer to the NSQHS Standards on Reprocessing of reusable equipment and devices, Australian Guidelines for the Prevention and Control of Infection in Healthcare and NSW Health Clinical and Related Waste Management for Health Services policy directive.

Sharp containers

All sharp containers should be positioned out of the reach of children at a height that enables safe disposal by all health workers. Relevant Australian and New Zealand Standards include:

- AS/NZS 3816:2018 Management of Clinical and Related Wastes
- AS 23907:2023, Sharps injury protection - Requirements and test methods - Sharps containers.

Sharp containers must have clear, standardised colour coding and labelling to ensure correct identification and segregation of different hazardous waste streams.

Containers must meet higher standards for penetration resistance to prevent sharps from piercing the walls of the container.

Materials and design should consider the environmental impact during the manufacturing, use, and disposal phases.

5.13.1 Sharps in community and home settings

In both clinical and non-clinical community settings, the handling and disposal of sharps must adhere to strict safety precautions to prevent injury and infection. In clinical environments such as community health centres and multi-purpose services, sharps should be managed in accordance with standard precautions, including immediate disposal into puncture-resistant, sealable containers clearly marked with biohazard warnings.

In non-clinical environments such as a patient's home or during Hospital in the Home (HITH) programs, the safe management of sharps is essential to protect patients, carers, and the community from injury and infection.

According to Safe Work Australia and the NSW Health Community Sharps Guidance, any sharps generated during care must be:

- Immediately placed into an approved sharps container at the point of use. These containers must be:
    - Rigid, puncture-resistant, and leak-proof
    - Clearly labelled with a biohazard symbol
    - Compliant with AS 23907:2023, the Australian Standard for sharps injury protection
- Securely closed and stored to prevent accidental exposure or tampering.
- Transported in a separate compartment from the driver's area of the vehicle, in accordance with Work Health and Safety (WHS) regulations.
- Disposed of at a designated facility, such as:
    - Public hospitals
    - Community health centres
    - Multi-purpose services
    - Participating pharmacies or sharps disposal bins provided by local councils

These practices are outlined in:

NSW Health Community Sharps Guidance

Safe work Australia – Code of Practice

Sharps disposal and management in Australia: a comprehensive guide

These guidelines ensure consistent, safe, and legally compliant sharps management across all care settings, including home-based healthcare.

5.14 Blood glucose monitoring devices

The following practices are recommended (Krleza et al., 2015) when using blood glucose monitoring devices:

- When performing glucose monitoring procedures, health worker must use aseptic technique
- The glucometer and its protective casing are to be cleaned and disinfected after use and between patients, regardless of visible soiling

- Restrict use of finger-stick capillary blood sampling devices to individual patients
- Use single-use lancets that permanently retract upon puncture. Never reuse finger-stick devices and lancets
- Dispose of finger-stick devices and lancets at the point-of-use in an approved sharps container
- Where feasible patients should be encouraged and supported to undertake their own skin prick and blood glucose monitoring.

5.15 Intravenous solutions

The following practices are recommended (Dolan et al., 2016) in the context of intravenous solutions:

- Protective packaging should not be removed until immediately prior to use
- Intravenous solution containers (for example, bags or bottles, syringes) for flushing lines are not to be used for multiple patients. Single patients use only
- Replace the entire IV tubing (line) if disconnected except for transient controlled disconnections such as changing IV infusions, removing a sling or sleeve, or access in Operating Theatres, Medical Imaging or Radiology Departments
- Additions to intravenous fluids should be made under controlled conditions where possible (pharmacy laminar flow unit) or else prepare immediately prior to administration using aseptic technique
- Begin/initiate administration of spiked IV solutions (IV bag entered by the tubing spike) within one hour of preparation. If administration has not begun within one hour of spiking, the IV bag and tubing shall be promptly discarded
- All spikes must be attached to a fluid bag
- Check the expiry date on IV solution; do not use if it is expired
- All intravenous access ports should be meticulously cleaned with a large wipe (scrub the hub) for at least 15 seconds generating friction by scrubbing in a twisting motion with a single-use 70% (v/v) alcohol-impregnated swab or 2% chlorhexidine in 70% alcohol. If allergic, 10% povidone-iodine should be used and allowed to air dry prior to accessing the system. The drying time may vary (20 second or more) depending on the product (Slater et al., 2018)
- Use needle free systems for all aspects of parenteral medication administration and transfer of solutions between containers.

For more information refer to the NSQHS Standards Medication Safety, NSW Health Medication Handling policy directive, and NSW Health Intravascular Access Devices (IVAD) - Infection Prevention & Control policy directive.

5.15.1 Flushing

If an intravascular access device is accessed intermittently for the administration of medications or fluids, the device should be flushed prior to infusion or at least once a shift (8 hours).

Flushing is recommended to promote and maintain patency and prevent the mixing of incompatible medical solutions (Goossens, 2015). Sterile 0.9% sodium chloride for injection must be used by clinicians unless the manufacturer recommends flushing with an alternate solution.

Single dose syringes should be used for flush solutions. If a multi-dose vial must be used, use it for only one patient and then discard it. Use a new, unused sterile needle and new, unused sterile syringe for each entry into the vial. Syringes should not be attached directly to a normal saline ampule or bag. A drawing up needle/device should be used to protect key sites and key parts.

Clinicians managing intravascular access devices are to ensure that:

- The catheters must be flushed immediately,
    - After placement
    - Before and after each fluid infusion or injection
    - Prior to and after drawing blood
- Flush in a pulsatile (push-pause) motion
- Peripheral intravenous catheters (PIVCs) must be flushed at least every 8hrs, for hospital patients or every 24 hours for patients in the community if not on a continuous infusion
- Central venous access devices (CVADs) not being accessed must be flushed and locked every 7 days. CVAD lumens that are used intermittently should be flushed no more frequently than 8 hours
- Implantable venous port (Ports/IVP) not being accessed must be flushed and locked every 4 to 12 weeks, in line with manufacturer's IFU and local policy/procedure.

Use aseptic techniques including cleaning the access port (scrub the hub) with a disinfectant agent (for example, alcohol and/or chlorhexidine) for at least 15 seconds and allow to dry prior to accessing the system (Moureau and Flynn, 2015).

Use aseptic technique when preparing and administering intravenous medications (IV), flush solutions or other parenteral solutions (Buetti et al., 2022).

Aseptic technique includes hand hygiene before and after preparation and administration of medications or solutions; disinfection of the medication access diaphragm on a vial, IV access port, needleless connector, and use of appropriate PPE.

Protect the key site and key part during procedure. If a drawing up needle is used to drawing up a normal saline flush-do not attach the syringe directly to the normal saline ampule or bag.

For more information refer to the ACSQHC Management of Peripheral Intravenous Catheters Clinical Care Standard and NSW Health Intravascular Access Devices (IVAD) - Infection Prevention & Control policy directive.

5.16 Medication vials and ampoules

The following practices are recommended (Dolan et al., 2016) in the context of medication vials and ampoules:

- Follow the manufacturer's instructions for storage and use
- Disinfect the rubber septum on all vials prior to each entry, even after initially removing the cap of a new, unused vial
- Disinfect the rubber stopper/bung of the vial using friction and 70% (v/v) alcohol and allow to air dry before inserting a device into the vial
- Use single-use ampoules or single-dose vials. Always use a sterile syringe and needle when entering a vial or sterile access device

- Never enter a vial with a syringe or needle that has been used on a patient
- Never leave a needle in the septum of a medication vial for multiple medication draws. This provides a direct route for microorganisms to enter the vial and contaminate the fluid
- Discard single dose vials after use. Do not use them again for another patient
- Unwanted portions of ampoules must be discarded at the time the dose is prepared. Dispose unused medication into pharmaceutical bins, not in sinks or clinical hand wash basins
- Never store medication vials in clothing or pockets
- Inspect vials and discard if sterility has been compromised or is thought to be compromised
- Use needleless transfer devices when reconstituting drugs. Discard transfer device with the vial at the end of the transfer
- Use a filter needle or filtered transfer device to draw medications from an ampul into a syringe to prevent glass shard and/or potential microbial contamination (Chiannilkulchai and Kejkornkaew, 2021)
- When handling medication vials and ampoules, glove use should be based on a risk assessment. Gloves are not required when handling ampoules unless specifically advised by the manufacturer.

Examine the vial for any particulate matter, discoloration, or turbidity. If present, do not use and discard immediately (Dolan et al., 2016). All vials used during an emergency should be discarded as sterility cannot be guaranteed.

5.16.1 Multi-dose vials

A multi-dose vial is a vial of liquid medication intended for parenteral administration (injection or infusion) that contains more than one dose of medication (Ernstmeyer and Christman, 2021).

There are some delivery systems within the Australian healthcare market that provide multi-dosing administration where a drug, fluid, radiation treatment or contrast medium is given from a primary vial to multiple patients. Delivery using such systems (not routinely recommended) must ensure that there is no cross contamination with any device/ consumable/ solution/ medications between patients. These products and devices must be registered with the Therapeutic Goods Administration (TGA), and NSW Health Organisations must identify them and develop clear local protocols for their management.

Multi-dose vials must only be used between multiple patients where there is no other alternative product available on the Australian market. Where multi-dose vial use is unavoidable (such as, only manufactured as a multi-dose vial) it must be used for a single patient whenever possible and discarded immediately after use. Health workers are to be provided with appropriate education and training prior to the utilisation of multi-dose vials.

Multi-dose vials are labelled as such by the manufacturer and typically contain an antimicrobial preservative to help prevent the growth of bacteria. The preservative has no effect on viruses and does not protect against contamination when health workers fail to follow aseptic technique. Examples of multi-dose vials include, insulin, Botox, tuberculin skin test vials and allergy testing vials.

The following practices are required in the context of multi-dose vials and safe injection practices, in accordance with the NSW Health Infection prevention and control in Healthcare Settings policy directive and NSW Health Medication Handling policy directive:

- If a multi-dose vial must be used, it should be used for a single patient whenever possible and discarded immediately after use
- Each entry into the multi-dose vial must be with a new unused sterile needle and syringe, even if the vial is dedicated to a single patient
- If multi-dose vials must be used for more than one patient, they should only be kept and accessed in a dedicated medication preparation area away from immediate patient treatment areas. This is to prevent inadvertent contamination of the vial through direct or indirect contact with potentially contaminated surfaces or equipment that could then lead to infections in subsequent patients
- If a multi-dose vial enters an immediate patient treatment area, it should be dedicated for single patient use only (examples of immediate patient treatment areas include operating and procedure rooms, anaesthesia and procedure carts, and patient rooms or bays)
- Keep multi-dose vials away from the immediate patient environment (Ernstmeyer and Christman, 2021)
- Dispose of opened multi-dose medication vials 28 days after opening, unless specified otherwise by the manufacturer, or sooner if sterility is questioned or compromised (Dolan et al., 2016)
- Date opened multi-dose vials to reflect date opened and/or date of expiration
- An organisation may choose to establish a system wide opened multi-dose discard schedule, such as, one date a month established to discard all opened multi-dose vials no matter when the vial was opened during the month.

5.17 Cleaning and disinfection of reusable shared equipment

Any reusable devices or equipment that have contact with intact skin (non-critical item) must be cleaned before it is used.

Use of shared devices and equipment in patient care has been implicated in the transmission of infection between individuals (Lee et al., 2018, Ssekitoleko et al., 2020).

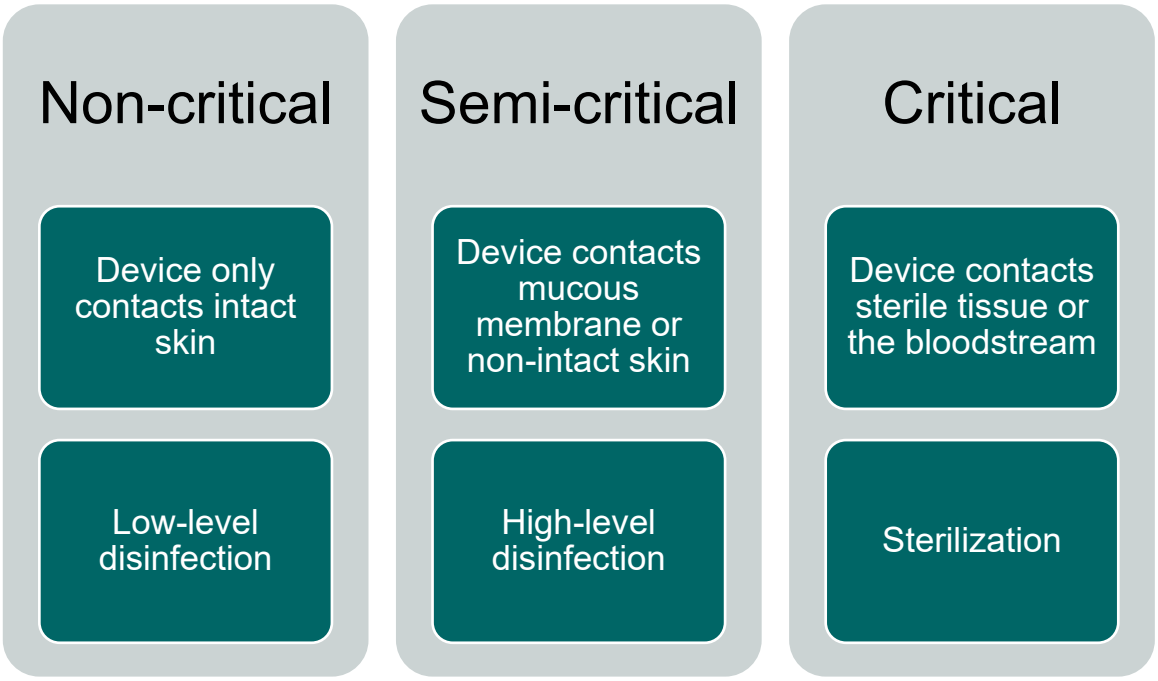
Cleaning is the removal of visible soil (such as inorganic and organic material) from objects and surfaces and is normally accomplished manually or mechanically using water with detergents or enzymatic products.

Disinfection is a process that eliminates many or all pathogenic microorganisms, except bacterial spores, on inanimate objects.

Sterilization is the complete elimination or destruction of all forms of microbial life and is accomplished in health care facilities by either physical or chemical processes.

As per the Spaulding classification (Figure 12) devices and equipment for patient care were categorised as critical, semi critical, and noncritical according to the degree of risk for infection involved in use of these items.

Figure 12 Spaulding classification



Principles of cleaning and disinfection

Reusable non-critical equipment used in the assessment and delivery of patient care should be reprocessed before use. Health workers are to pay special attention to the cleaning of shared reusable clinical devices and equipment between patients, their carers, between health workers and between episodes of patient care. They must be cleaned according to manufacturer's instructions for use and local procedures. The following principles apply to their use and reprocessing:

- Any reusable equipment and accessories that have contact with a patient must be reprocessed in between use. The level of process is dependent on the intended use
- Any single use items must be discarded following use
- Single patient items may need to be cleaned before reuse (Instruction for Use [IFU] to be followed) on the same patient
- Health workers that use or transfer the item between patients should be responsible for reprocessing
- All reusable equipment must be cleaned immediately if it becomes visibly soiled
- Product selection should include assessment on ease of cleaning such as smooth impervious surfaces, material, and product compatibility
- Adhesive tape should not be applied to patient care equipment as it harbours microorganisms and serves as a vehicle for cross-transmission and inhibits ability to clean
- Appropriate risk assessments, including a review of available manufacturer's IFU and local procedures must be carried out prior to the disinfection of equipment with the correct detergent/disinfectant regardless of the use of cover or sheath to protect the item
- Where there are no manufacturer's IFUs available, for example, reusable tape measures, consult with local infection prevention and control team or delegate to risk assess, determine required product cleaning method and frequency of cleaning.

Non-critical items such as a commode chair, temperature probe, should be cleaned with a neutral detergent and if disinfection is required a Therapeutic Goods Administration (TGA) approved hospital grade disinfectant, preferably with label claims against specific organisms should be used in accordance with manufacturers' recommendations.

Some items or parts, particularly electronic equipment such as monitors and keyboards may be damaged using certain chemical disinfectants, and the manufacturer's IFU should always be consulted prior to selecting a disinfectant for these items.

Where possible and available the use of cleanable keyboard or fully washable type keyboards should be considered.

One the most important aspects regarding the effectiveness of a disinfectant is the contact time. Contact time refers to the amount of time necessary for the disinfectant to be in contact with the surface to inactivate micro-organisms. HWs should always adhere to the manufacturer's IFU regarding contact time to ensure maximal disinfection effectiveness.

The following table provides an example of frequency and type of cleaning required for shared patient care equipment. The facilities should develop their own list and based on local risk assessment.

Table 27 Example of frequency and type of cleaning required for shared patient care equipment

Item	Frequency	Cleaning product	Responsibility	Comments
Dressing or Procedure trolley	Before and after use	Neutral detergent solution or wipe **OR** 2-in-1 detergent/disinfectant*	User	Disinfection based on risk assessment
Workstation on wheels	Before and after use, before moving to another patient's bedspace or room		User	
Patient call bells	Daily		Environmental services	
Bed rails/bed side table	Daily		Environmental services	
PE trolley	After use		User	
Glucometer	Before and after use		User	
Stethoscope	Before and after use		User	
IV Infusion pump	Before and after use		User	

Bladder scanner	Before and after use		User	
Vital signs equipment	Before and after use		User	

*Use an ARTG listed 2-in-1 detergent/disinfectant, which has efficacy claims against the pathogen of interest.

5.17.1 Information communication technology

Health information communication technology (ICT) hardware (such as workstations on wheels, mobile phones, tablets, laptops, digital pens, wall mounted fixatures that support ICT equipment) in some circumstance can pose patient safety risks due to inability to clean these items effectively and efficiently in between use. ICT equipment in both clinical and non-clinical areas become contaminated with microorganisms, which are transmitted via contaminated gloves or hands. Cleaning and disinfection of these items are an important strategy to reduce microbial burden on these items and hand contamination of health workers.

The design, development, trial, purchase, and implementation of any ICT must be in consultation with local infection prevention and control service, work health and safety and local procurement to ensure relevant Australian Standards and processes are considered and followed.

Recommendations for ICT equipment reprocessing

The way each ICT equipment is used and the locations in which it is used should determine the frequency and level of cleaning and disinfection. For example, reprocessing of devices that are used in between patients should be much more frequent than items fixed on the wall or in non-clinical areas. The following practices should be followed to ensure equipment remains clean and safe for use:

- When purchasing equipment, choose items that are easy to clean and disinfect before and after use
- Do not take ICT equipment into patients' rooms if it cannot be cleaned and disinfected
- Any mobile equipment (for example, computer on wheels, mobile phones, tablets, or laptops) taken into a patients' room should be kept at least two metres away from the patient to prevent possible contamination
- Hand hygiene is the most important factor in keeping the ICT equipment clean and preventing microorganism transmission. Always access ICT equipment with clean hands, health workers should not wear gloves when using ICT equipment, alcohol-based hand rubs should be conveniently placed to improve hand hygiene
- Clean and disinfect ICT equipment regularly and if it becomes contaminated. The frequency for cleaning and disinfection is determined by the risk of cross contamination, the proximity of the equipment to the point of care and the amount of soiling or contamination
- Portable ICT equipment taken into the patient's room, but not directly in the point of care, for activities, such as charting in an electronic medical record, order entry, or data collection (for example, computer or workstation on wheels, tablets, wireless laptops) must be always handled with clean hands. When multiple health workers are present during patient review, one team member should be designated to interact with the patient while another operates the ICT equipment to minimise cross-contamination. If gloves are worn during patient contact, they must be removed and hand hygiene performed prior to touching any ICT

device. In the event of suspected or confirmed contamination, the equipment must be cleaned and disinfected immediately following use, in accordance with infection prevention protocols

- Fixed ICT equipment used at point of care should be cleaned at least daily and at transfer or discharge
- All other fixed ICT equipment located in clinical areas should be cleaned daily
- Personal ICT equipment (for example, pager, mobile phone, or device) and hard plastic casings should be cleaned daily
- Follow manufacturer's instructions for use (IFU) for specific equipment cleaning and disinfection. Establish a cleaning and disinfection process for all ICT equipment
    - Use a soft, non-abrasive, lint free cloth. Avoid abrasive cloths, towels, paper towels, and similar items that may cause damage to the equipment
    - Do not use cloths saturated with liquid
    - Never spray or pour disinfectant directly onto ICT equipment
    - Clean ICT equipment prior to disinfection
    - Allow surfaces to dry before reusing
    - Do not use compressed air to clean ICT equipment, for example, keyboards. Keyboards are cleaned and disinfected in the same manner as other ICT equipment. Replace keyboards with visible soil that cannot be removed by cleaning.

5.18 Single use or single patient use equipment

Single use equipment is either indicated on its packaging by the text 'Single use' or by the international symbol for single use:

Single patient use equipment is indicated on its packaging by text stating 'Single patient use' and a symbol 

A singe use device is designed to be used once and then discarded (*ISO 13485:2016 Medical devices - Quality management systems-Requirements for regulatory purposes, Therapeutic Goods Administration*).

For more information refer to the Australian Regulatory Guidelines for Medical Devices (ARGMD).

Equipment which is labelled by the manufacturer for single patient use, including insulin pens and asthma spacers, must not be used for more than one patient or individual user. 'Single patient use' devices and equipment can be used multiple times on the same patient following manufacturer's instructions for cleaning and/ or reprocessing between use.

Single patient use equipment should be cleaned and stored as per the manufacturer's instructions between periods of use in a manner that prevents contamination between uses.

Any sterile single use or single patient use equipment is to be used according to the manufacturer's instructions and in such a way that the sterility of the item is maintained before patient use. Subsequent use of the same item on same patient may not guarantee sterility.

If single use equipment and single patient use equipment is soiled, it should be immediately discarded.

The Therapeutic Goods (Medical Devices) Regulations 2002 (Commonwealth) requires a Health Organisation that reprocesses single use devices to be licensed as a manufacturer under Section

41BG (2) of the Therapeutic Good Act 1989 (Commonwealth). Where the Health Organisation is a manufacturer by the Therapeutic Goods Administration (TGA) it is subject to audit conformance.

Health Organisations are required to consider environmental sustainability with a balanced approach to decisions related to the implementation of single use or single patient use items versus reusable items.

When considering single use vs reusable there are several factors to consider such as cost of consumables, preparation time, processing time, electricity, water, human resources, manufacturers recommendations, transport, infrastructure, policies and standards on healthcare associated infection prevention, health worker safety and consumer expectations.

Routine replacement of single use items with reusable items can be a complex process which requires rigorous risk assessment to ensure quality and safe provision of care is maintained.

5.19 Storage of sterile, clean and reprocessed stock and equipment

Sterile items are to be stored and handled in a manner that is in accordance with manufacturers' IFU and that maintains the integrity of the packaging material and prevents contamination of the contents. To maintain the integrity and sterility of the stock, the following storage and handling practices must be adhered to:

- Packaging of sterile items should not be disfigured, left opened or be held together with tape, elastic, or paper clips. Sterile stock which may have opened and not used must be discarded if single use or if reusable is to be reprocessed before use
- Sterile stock is to be stored out of direct sunlight, in dedicated sterile stock storage areas that are cleaned to a routine schedule and are free from dust, insects and vermin
- New or reprocessed stock is to be stored in a designated clean and dry room/area and stored in such a way that prevents contamination and maintains the sterility
- Storage of stock should be in receptacles that reduce the risk of dust entrapment and fall through of items. In the absence of these receptacles processes should be in place for their routine cleaning
- Do not use cardboard boxes (transport or outer packing) including corrugated cardboard carton as routine storage. Items should be removed from outer packaging material but not to be removed from inner primary packaging even if it is in cardboard box to reduce direct handling of consumables. Bulk storage area should be located on the periphery of the unit so that deliveries of commercially prepared sterile stock is de-boxed from outer store/transportation packaging before being brought into the sterile stock storage area. Space is needed to unpack cartons. Where consumables may only have a primary packaging layer, the storage of these items should be managed based on risk assessment. The method of transport should also be assessed to ensure delivery occurs in a safe and clean manner
- If the packaging of a sterile item becomes compromised by moisture or damage, the stock must be considered unsterile
- If unsterile stock cannot be reprocessed, stock should be disposed of immediately. If unsterile stock can be reprocessed, the stock should be repackaged and reprocessed again before use
- Decision to use or dispose the items after a potential contamination event should be based on risk rating and the potential level of contamination

- The Health Organisation is responsible for ensuring that a stock rotation procedure and policy is in place. Stock levels should be maintained to meet the needs of the clinical area while not compromising stock sterility or wastage.

Semi-critical items should be stored appropriately to prevent environmental contamination. All endoscopic instruments (except those in sterile packaging) should be stored in an appropriate cabinet or reprocessed within set timeframes prior to use.

Non-critical items must be cleaned and or disinfected as per their IFU and local procedure in between use and stored in a clean, dry place to prevent environmental contamination. For more information refer to Table 28.

Table 28 Examples of items to be stored in designated areas

Clean room or area	Dirty utility or clean up rooms	Sterile storage areas
• Medical equipment (for example, infusion pumps, blood pressure machines, computer on wheels) • Medical and administrative supplies • Wheelchairs • Walking aids • Plastic bed sheets or 'blueys' (disposable waterproof sheets) • Indwelling urinary or suprapubic catheter holders • Spare beds • Incontinence pads • Bed slings (if not stored with clean linen) • Patient personal hygiene products • Unused sharps containers • Emesis bags	• Bedpans & Urinals • Patient wash bowls • Urine testing equipment • Linen skips and waste bins • Access to PPE for the purpose of the tasks performed in the dirty utility (this area is not for storage of PPE) • Pan covers • Vases • Rubbish bags	• Clear segregation from sterile and other items • Prevents contamination from any source (dust, vermin, sunlight, water, condensation, and so forth) • All surfaces must be cleanable • Surfaces including shelving and storage containers should be able to be cleaned • Do not use cardboard boxes as routine storage. Decant stock from outer transport cardboard boxes • Store supplies off the floor

For more information refer to the Australasian Health Facility Guidelines. Part D: Infection prevention and control and AS 5369:2023 Reprocessing of reusable medical devices and other devices in health and non-health related facilities.

5.20 Clean linen

Sort, package, transport, and store clean linen in a manner that prevents risk of contamination by dust, debris and vermin. Clean linen should be separated from used linen, or other soiled items. Each floor/ward should have a designated room for sorting and storing clean linen. Transport clean linen to patient care areas on designated carts or within designated containers that are regularly (for example, at least once daily) cleaned with a neutral detergent and warm water solution or premade wipes.

Clean linen is to be stored:

- in a clean, dry place that prevents inadvertent handling, contamination by aerosols, dust, moisture, or vermin and other soiled or contaminated items during sorting, packaging, transport, and storage
- on clean, washable shelves and, if necessary, wrapped in a clean protective covering whilst on linen trolley
- in a separate area, away from used linen
- in a manner that will allow for stock rotation.

Linen should **not** be overstocked, and health workers are to handle linen with clean hands.

Clean linen should **not** be stored in patient bathrooms or places where there is a potential for moisture contamination.

Clean linen trolleys are to be covered while in transit and in storage.

If clean linen is decanted from the linen trolley for bed making rounds, this linen should be discarded and not returned to the linen cupboard or clean linen trolley.

During transport externally to the hospital clean linen should be protected from the elements or potential environmental contamination (for example, covered trolleys).

Clean linen and used linen are **not** transported together unless separated by a suitable barrier. For more information refer to the AS/NZS 4146:2024 Laundry practice.

5.20.1 Handling, disposal and transport of used linen

All used linen should be handled with care to avoid dispersal of microorganisms into the environment and to avoid contact with health workers clothing. Each Health Organisation is to have a written procedures on the collection, transport, and storage of linen. Furthermore, a Health Organisation that processes or launders linen in-house will also have documented procedures consistent with AS/NZS 4146:2024 Laundry practice.

The following principles apply when handling linen used for all patients (such as, whether transmission-based precautions are in place or not):

- Standard precautions are to be followed when handling used linen
- Handle soiled linen with minimum agitation to avoid contamination of the air, surfaces, and persons (for example, roll up)
- Never carry soiled linen against the body. Always place it in the designated container
- Used, soiled, or wet linen should be placed into appropriate laundry receptacle at the point of generation; water-soluble bags and double bagging are not necessary and are not recommended

- Clear leak-proof bags are to be used to contain linen that is heavily soiled with blood, other body substances or other fluids (including wet with water)
- Linen bags should be tied securely and not be filled completely as this will increase the risk of rupture in transit and injury to health workers handling the bags
- Reusable linen bags must be laundered before re-use
- Hand hygiene must be performed following the handling of used linen.

Used or soiled linen is **not** to be rinsed or sorted in patient care areas or washed in domestic washing machines.

Domestic type washing machines are only to be used to launder patient's personal items and only one patient's personal items can be washed per cycle.

All patient care and cleaning items, and facility linen is to be washed using non-domestic (commercial) washing machines. Washing machines are to be housed in suitably designed rooms with a clean and dirty workflow. Clothes dryers should be used for drying. Appropriate handling, storage, and transport of soiled linen are essential to minimise the risk of contamination, and the following points are to be considered when managing soiled linen:

- Laundry carts, skips or hampers used to collect or transport soiled linen need not be covered
- Containers (including carts, bags, and plastic bins) for collecting, storing, or transporting soiled linen should be waterproof, leak-proof, nonporous, and in good repair, and should be decontaminated after use
- Vehicles that transport linen to and from the laundry should be clean. Soiled and clean textiles should not be transported in the same vehicle, unless they are separated by a suitable barrier, for example, containers with suitable closures, moisture impermeable bags that would prevent contact and contamination between the soiled and clean linen. If a compartment has carried soiled laundry, that compartment should be thoroughly cleaned before it is used to carry clean linen
- Special handling of linen for clients/patients/residents on additional precautions is not routinely required. Standard precautions for handling and laundering are sufficient, regardless of the source of the linen
- Linen bags should be held away from the body to avoid potential risks of contamination and injuries due to possible sharps. Do not drag filled linen bags across the floor
- Disposable linen is the first-choice preference for patients with a high consequence infectious disease. Reusable linen should be discarded as clinical waste
- Used linen areas should be separated from the clean linen storage areas
- Regular monitoring and feedback of environmental cleaning and handling, transporting and storage of linen.

5.21 Environmental cleaning

Health Organisations are complex environments where the provision of care to large numbers of patients results in increased microbial burden and contamination of surfaces and equipment with microorganisms. Contaminated surfaces and equipment may potentially contribute to the transmission of microorganisms and healthcare associated infections.

Each Health Organisation must use a risk management framework when considering cleaning of the healthcare environment. The aim of determining risk is to ensure appropriate controls are implemented due to the variety of problems that inadequate cleaning can cause.

Health Organisations must have a multi-modal approach to environmental cleaning including a defined standard principle for cleaning and disinfection and compliance should be ensured by measures such as standard operating procedures, adequate training, and suitable audit and monitoring systems (Assadian et al., 2021).

The accountability for all aspects of cleaning lies with the Health Organisations management. Where an environmental services department does not exist, and an external contractor has not been deployed, a suitable worker should be designated this role. For more information refer to NSW Health Cleaning of the Healthcare Environment policy directive, NSQHS Preventing and Controlling Infections Standard and Australian Guidelines for the Prevention and Control of Infection in Healthcare.

Health Organisations require a continuous comprehensive approach to monitoring the cleanliness of the healthcare environment. Internal audits of a Health Organisations cleanliness must be performed in all functional areas across all risk categories. This systematic program of internal auditing (including results achieved) must be clearly documented. Feedback must be provided to the individual areas along with a plan to rectify any highlighted issues.

At a minimum, routine environmental management in each Health Organisation should include:

- Cleaning and disinfection using products listed on the Australian Register of Therapeutic Goods (ARTG), consistent with manufacturers' instructions for use and recommended frequencies
- Provide access to training on cleaning processes for routine and outbreak situations, and novel infections
- Ensure floors and baseboards are visibly clean*
- Ensure walls, ceilings and doors are visibly clean*
- All horizontal surfaces are visibly clean* (includes furniture, window ledges, overhead lights, phones, and so forth)
- Bathroom fixtures including toilets, sinks, tubs, and showers are visibly clean
- Mirrors and windows are visibly clean*
- Dispensers are visibly clean*
- Appliances are visibly clean*
- Waste is disposed of appropriately
- Items that are broken, torn, cracked or malfunctioning are replaced
- Prompt disposal of used single use items
- Prompt cleaning and disinfection of all blood and body substance spills
- Minimal clutter in shared administrative and clinical areas, such as workstations, storerooms, and utility rooms
- Audit the effectiveness of cleaning practice and compliance with its environmental cleaning policy and use the results of audits to improve environmental cleaning processes and compliance with policy. The frequency may vary depending on the functional risk rating of the area.

- Cleaning practices must be periodically monitored and audited with feedback and education.

** Visibly clean means free from dust, soil, mould, stains, smudges, cobwebs, soap/mineral build-up.*

5.21.1 Principles of environmental cleaning and product selection

Cleaning of healthcare environment is a key component of standard precautions; the first line in infection prevention and control in the healthcare environment. The level of cleaning and disinfection should be based on risk assessment (Assadian et al., 2021) consisting of the following:

- patient risk profile (vulnerability of patients to infections or colonisation)
- surface risk profile (probability of contamination with pathogens and potential for exposure and/or indirect transmission, and frequency of hand contacts)
- pathogen risk profile (persistence, antibiotic resistance and primary mode of transmission).

In the context of assessing the risks for patients, health workers and pathogen transmission, the following factors must be considered to distinguish the level of cleaning and disinfection:

- High touch surfaces - usually close to the patient, are frequently touched by the patient or health workers (bedrails, door handles, bedside tables, computer tables and keyboards, medical equipment, call bells and light switches)
- Low-touch surfaces usually not handled by the patient or health workers (floors, walls or environmental surfaces out of reach or outside the patient zone).

Consideration should be given to increased frequency of routine cleaning and disinfection of environmental surfaces and frequently touched surfaces in clinical areas.

- Clean using an S-shaped motion from clean to dirty (figure 13)
- Clean general surfaces and fittings straight away when visibly dirty and after spills
- Clean often touched surfaces with detergent solution or ARTG listed disinfectants in either a two-step process where a detergent is used, followed by a disinfectant or 2-in-1 cleaner/disinfectant, which has efficacy claims against the pathogen of interest.

Figure 13 The five principles of cleaning (Image from GAMA Healthcare)



Source: GAMA Healthcare Clinell®

Refer to Figure 14 Processes for routine cleaning of healthcare environments for more information.

Disinfection

Disinfection is a process that eliminates many or all pathogenic microorganisms, except bacterial spores, on inanimate objects. A disinfectant is a chemical agent that rapidly kills or inactivates most infectious agents. Disinfectants are not to be used as general cleaning agents, unless combined with a detergent as a joint cleaning agent (detergent and disinfectant). ARTG listed disinfectants

may be used in either a two-step process where a detergent is used, followed by a disinfectant or 2-in-1 cleaner/disinfectant, which has efficacy claims against the pathogen of interest.

2-step clean:

Physical cleaning with detergent followed by disinfection with a TGA listed hospital-grade disinfectant with activity against pathogen of concern (according to label/product information) or a chlorine-based product such as sodium hypochlorite.

2-in-1 clean:

A physical clean using a combined detergent and TGA listed hospital-grade disinfectant with activity against pathogen of concern (according to label/product information) or a chlorine-based product such as sodium hypochlorite, where indicated for use, such as a 2-in-1 cleaner/disinfectant wipe or solution.

Only hospital-grade disinfectants with specific claims listed on the ARTG should be used for equipment and hard surface cleaning in Health Organisations.

The use of disinfectants for routine cleaning is only recommended for:

- extreme risk areas*
- as part of management of an outbreak or cluster of infections
- terminal cleaning following an MRO/ infectious disease
- toilets.

*For more information refer to NSW Health Cleaning of the Healthcare Environment policy directive.

When selecting a disinfectant or 2-in-1 cleaner/disinfectant for a cleaning and disinfection task, the purchasing team/ committee is to ensure that:

- The product is listed on the ARTG
- The product is effective against the targeted organism(s) including microbiological activity and contact time to kill microorganisms
- The intended purpose of the product is as per the manufacturer's instructions
- The product is suitable for the surface or setting.

Questions to ask when selecting disinfectants for Health Organisations:

- Does it keep surfaces wet for enough contact time to kill pathogens? How long before the disinfectant evaporates? Is the product inactivated by organic material?
- Is it compatible with the surfaces within facility? Is it compatible with other products in use? Is it compatible with medical equipment?
- What is the toxicity rating? (consider exposure of staff, visitors, and patients) Is it approved by a relevant regulatory body? What personal protective equipment will be required?
- Does it need dilution or is it a ready-made solution?
- Is training required and who will provide this training?
- Is it the most cost-effective option? Is it sustainable?

For more information refer to the NSW Health Cleaning of the Healthcare Environment policy directive and Australian Guidelines for the Prevention and Control of Infection in Healthcare.

NSW Health Organisations must have documented procedures for effective use, maintenance, and storage of cleaning equipment, such as, mops, cloths, and solutions.

Reusable cleaning equipment must be maintained, used, cleaned, laundered, and stored (in a clean space and off the floor) in accordance with their manufacturer's instructions and national and international standards.

After use, single-use cleaning equipment is to be disposed of in accordance with their manufacturer's instructions.

Enhanced cleaning

Enhanced cleaning refers to a targeted and intensified cleaning process aimed at reducing the risk of HAIs, particularly in high-risk areas or during outbreaks. It goes beyond routine cleaning by increasing the frequency, thoroughness, and scope of cleaning activities.

Enhanced cleaning consists of:

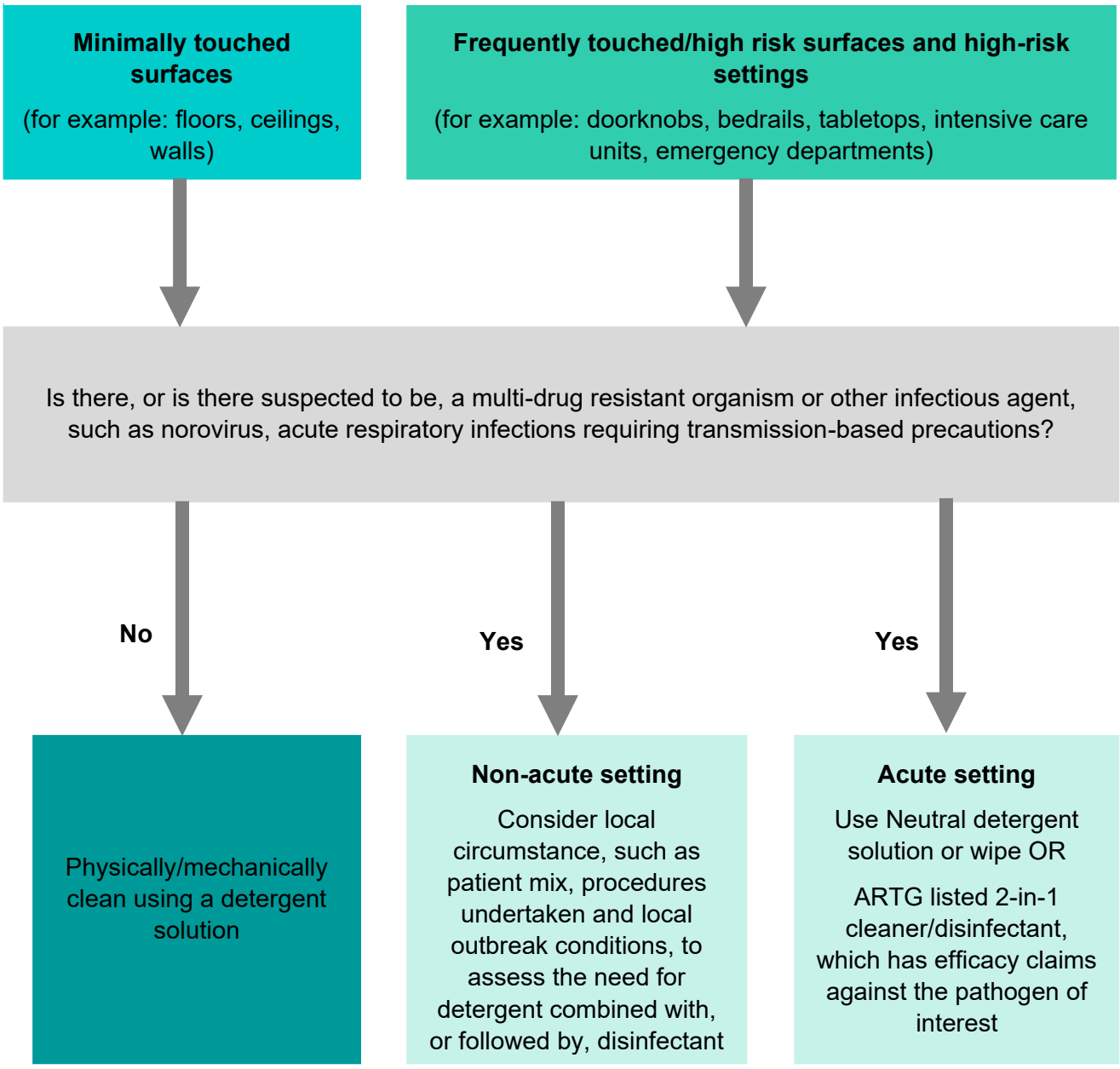
- Higher frequency of cleaning, especially for high-touch surfaces. For example, bed rails, doorknobs, light switches
- Use of ARTG listed disinfectants proven to be effective against pathogens of concern
- Documented cleaning protocols and audits to ensure compliance and effectiveness
- Trained staff following infection prevention and control procedures and PPE requirements.

Terminal cleaning

Terminal cleaning refers to cleaning and disinfection process required after patient(s) with transmission-based precautions has vacated the room, either through room transfer or discharge. This process also includes cleaning and disinfection of the patient zone, the wider patient care area and all shared patient care equipment to minimises the risk of microbial contamination from fomites. Methods can vary, but terminal cleaning often involves cleaning of all surfaces with a neural detergent followed a TGA approved disinfectant or a dual-purpose product.

For more information refer to the CEC Environmental cleaning Standard Operating Procedure (SOP) and ACSQHC Environmental cleaning and infection prevention and control resources.

Figure 14 Processes for routine cleaning of healthcare environments



Adapted from ACSQHC Australian Guidelines for the Prevention and Control of Infection in Healthcare.

Preparation and use of cleaning products

The correct preparation and use of cleaning solutions is essential to the effectiveness of the product. Health workers undertaking environmental cleaning should:

- Mix and store cleaning products as per the manufacturer's instructions for use
- Ensure the correct contact time, such as the amount of time necessary for the disinfectant to be in contact with the surface to inactivate micro-organisms
- Allow surfaces to completely air-dry
- Ensure that hand hygiene, appropriate use of personal protective equipment (PPE) and correct waste disposal processes are used when handling a disinfectant to prevent contamination and promote environmental sustainability
- Replace solutions regularly when cleaning heavily contaminated areas; when solutions appear visibly dirty; and immediately after cleaning blood and body fluid spills.

High-level disinfectants or liquid chemical sterilant are not appropriate for general cleaning; such use is counter to manufacturers' instructions for these hazardous chemicals. Alcohol should not be used to disinfect large environmental surfaces, given the risk of additional hazards such as flammability.

Health organisations must consider the respiratory risks associated with spray disinfectants, including mucous membrane irritation and asthma in health workers. Evidence suggests that both spraying and general disinfection tasks may increase respiratory exposure to pathogens or chemicals, highlighting the need for safer alternatives, improved ventilation, appropriate PPE, and strict adherence to safety protocols (Casey et al., 2017, Clausen et al., 2020, Fontana et al., 2025).

Auditing of cleaning can be performed through a variety of different methods. For more information refer to the NSW Health Cleaning of the Healthcare Environment policy directive and the Clinical Excellence Commission Environmental Cleaning.

5.21.2 Emerging disinfection technologies

As healthcare environments continue to evolve in response to emerging pathogens and increasing antimicrobial resistance, innovative disinfection technologies are gaining attention as potential adjuncts to traditional cleaning protocols. Among these, ultraviolet (UV) light disinfection has emerged as a promising option due to its ability to inactivate a broad spectrum of microorganisms. However, its effectiveness as a routine adjunct to terminal cleaning in Healthcare Organisations remains under investigation. While not yet established for routine use, UV light disinfection may be considered in high-risk settings or during outbreaks when conventional methods have been exhausted (Jain et al., 2025).

The following principles should be followed when exploring new technologies such as hydrogen peroxide aerosols and UV lights to enhance routine cleaning:

- If emerging disinfectants are used in healthcare facilities, this should always be used in addition to standard cleaning practices
- Cleaning robots or touchless technologies offer an alternative to overcome some challenges faced by traditional manual cleaning. However, the available evidence is modest and inconclusive, and the expectation of a dramatic clinical benefit is currently not supported by available data (Doll et al., 2018)
- The touchless devices are not a substitute to manual cleaning
- The touchless devices require the removal of most of the bioburden and soil from the surfaces before its use to optimise its function
- The room or patient space should be empty anywhere between 15 minutes to a couple of hours depending upon the device and technology
- The financial cost should be considered before local decision making.

There is also an emerging trend towards using steam and microfiber clothes for environmental cleaning as an alternative to other disinfection methods. The evidence on the use of steam and microfiber cloths on patient-centred outcomes including patient colonisation and healthcare associated infection were not supported by evidence therefore, Health Organisations are to consult the local infection prevention and control and infectious diseases specialists for advice.

Antimicrobial surfaces

Several disinfectant modalities have emerged or undergone further development for use in healthcare facilities. The effectiveness of surfaces, fittings or furnishing containing materials with antimicrobial properties in healthcare facilities is yet to be established. As per the Australian

Guidelines for the Prevention and Control of Infection in Healthcare currently, there is only minimal or insufficient evidence examining the effectiveness of copper-based surfaces compared to standard surfaces and hospital acquired infections. As a result, copper-coated surfaces are currently not recommended for use, nor are other antimicrobial surfaces or fittings (National Health and Medical Research Council, 2019a).

Electrolysed water

Electrolysed water (eW) is generated by electrolysis of dilute salt solutions, typically sodium chloride (NaCl), in an electrolytic chamber that contains positively, and negatively inert charged electrodes divided by a bipolar membrane. In this process, water molecules are electrolysed to form hydrogen ions (H+) and hydroxide (OH−), while salt (in the case of NaCl) dissolves into sodium ions (Na+) and chloride ions (Cl−)(Wang and Salvi, 2023).

Classification of Electrolysed Water

EW has three main physical properties—the available chlorine concentration (ACC), the pH value and the oxidation-reduction potential (ORP)—and the difference in these properties will categorise the effectiveness and efficacy of eW.

Acidic Electrolysed Water

The acidic eW has a pH of about 2.2 to 2.7, the ORP is greater than 1100 mV, and the ACC is 20–60 ppm, and the main component is hypochlorous acid.

Weak Acidic Electrolysed Water

Weak acidic eW is also known as slightly acidic hypochlorous acid water and slightly acidic oxidizing potential water. The pH value is 5.0~6.5, the ORP is about 850 mV, and the ACC is 10–30 ppm.

Basic Electrolysed Water

Basic electrolysed water is generated from the cathode. The alkaline solution has a pH of 10 to 13, an ORP of −800 to −900 mV, and an ACC is 80–100 ppm.

Neutral Electrolysed Water

Neutral eW is partially mixed hydroxide ions enter the cathode side, resulting in a near neutral pH of about 7.0–8.0, while the ORP is 700–900 mV and the ACC is 30–200 ppm (Chen and Wang, 2022).

Implications for practice

The evidence presented does not demonstrate that the product has a contribution to make to improvements in infection prevention and control interventions to reduce HAIs (Jain et al., 2025, Chen and Wang, 2022) and the evidence of the effects of these emerging disinfection methods on clinical outcomes remains sparse (Australian Guidelines for the Prevention and Control of Infection in Healthcare). For more information on emerging technologies refer to ACSQHC Fact sheet - Environmental cleaning: emerging cleaning technologies.

5.22 Utility room

Workflows are to be separated in rooms where both clean and dirty functions occur (for example, dirty utility and clean-up rooms). Work should flow from clean to contaminated areas, with care taken to avoid contaminated equipment re-entering clean work areas.

A clean utility/supply room for storing sterile supplies and equipment should:

- Be separate from and have no direct connection with dirty utility or soiled holding areas

- Be able to keep supplies free from dust and moisture and stored off the floor with the lowest shelf at least 250 mm above the floor to avoid mechanical damage during cleaning and 440 mm from the ceiling
- Be adjacent to usage areas and easily available to health workers
- Be equipped with a work counter and dedicated hand washing basin if used for preparing patient care items.

Dirty utility room

The dirty utility room, provides a space for the decontamination and storage of bedpans, urinals, and bowls, testing and disposal of patient specimens, disposal of clinical and other waste, cleaning and holding of used equipment for collection, and holding of soiled linen for collection. Due to the availability of washers that do not require pre-handling of items, a spray hose and flushing rim sink are no longer included in the dirty utility room. For more information on the configuration refer to the Australasian Health Facility Guidelines (AusHFG).

Designated dirty utility (pan) rooms are to have clear separation of clean and dirty workflows to avoid contamination of cleaned equipment and to prevent contaminated equipment from being placed in the clean work area. Dirty utility rooms must be designed and maintained to support safe handling of soiled materials and equipment. The following requirements apply to ensure infection prevention and effective workflow:

- The dirty utility room should be physically separate from other areas, including clean supply/storage areas
- Be adequately sized within the unit and located near the point-of-care
- Spray hoses are not recommended due to risk of aerosolisation
- Have a dedicated hand washing basin with both hot and cold running water
- A separate utility sink is also required if the soiled utility room will be used for rinsing or removal of gross soiling of medical instruments or equipment
- Have adequate space to permit the use of equipment required for the disposal of waste
- Have PPE available to protect health workers during disposal/cleaning and disinfecting procedures
- The ideal dirty utility (pan) room will have purpose-built storage spaces to store clean stock and equipment to avoid any contamination (refer to Table 28 Examples of items to be stored in designated areas)
- Dirty utility (pan) rooms are to be maintained in a clean dry state with uncluttered work surfaces and with all items stored off the floor. Towels, bluey or sheets are not to be used as covers for the benchtops
- A program for the routine cleaning of shelves and storage compartments is to be established, and records maintained. Health workers should be made aware of the local routine cleaning program, including correct use of general cleaning products (for example, neutral detergent impregnated wipes) and an awareness of who is responsible for ordering stock when they are low
- Unauthorised people should not have access to the dirty utility room
- Dirty utility room/s should not be used to store unused medical equipment or sterile stock (refer to Table 28 Examples of items to be stored in designated areas).

5.23 Patient zone privacy curtains

A Health Organisation may use privacy curtains to separate individual patients, provide an easily identifiable perimeter and this plays an important role in defining the patient zone. Curtains should be installed to ensure that there is total coverage when the curtains are drawn closed (for example, no open gaps are present). Patient curtains should be disposable or able to be laundered, and easy to remove and to hang. When pulled/closed around the bed, ensure there is room for health workers to carry out procedures (Nelson et al., 2023). Privacy curtains are frequently contaminated with microorganisms and considered outside the patient zone. The following principles apply to their use and management to reduce the risk of cross-contamination:

- Touching the curtains after caring for a patient is equivalent to leaving the patient zone
- Hand hygiene must be performed between touching the curtains and touching the patient and vice versa
- Curtains are to be either made of a washable or disposable material. Curtains to be laundered should be changed and washed according to the CEC Environmental Cleaning Standard Operating Procedure
- The frequency of changing or washing is to be determined by applying the functional risk rating of the clinical area, as outlined in the NSW Health Cleaning of the Healthcare Environment policy directive. Refer to table 29 for recommended changeover/cleaning frequency for patient privacy curtains
- If the curtain (washable or disposable) is visibly soiled, it should be changed as soon as practical. If disposable curtains are soiled, particularly with body substances they should be replaced irrespective of the curtain expiry date
- In high-risk areas washable curtains should be changed upon discharge, increase frequency of cleaning or change during outbreak situations, when managing patients with new and emerging pathogen (for example, Candia auris)
- Non-disposable privacy curtains are to be changed as part of terminal cleaning.

Disposable curtains are marked with an expiry date and should be disposed of in accordance with manufacturer's IFU, local procedure and NSW waste management guidelines.

Consider environmental sustainability when deciding on reusable versus disposable curtains such as life expectancy of reusable curtains, washing cost including energy, water, human resources, transportation charge. The relative efficiency of each curtain type depends largely on the functional area, infrastructure such as laundering, and storage facility and the ability of disposable curtains to be recycled.

The complex role of fabrics or textiles play in retention of pathogens, cross contamination and transmission of microorganisms is further complicated by limited evidence on the determination of optimal washing frequency. As the level of contamination increases over time, the washable curtains should be changed on a regular basis (for example, monthly to three monthly) depending on the risk of contamination, number of beds and patient risk factors (White et al., 2007, Ohl et al., 2012).

The frequency of curtain replacement will depend on "the risk of contamination" and it will vary depending on the type of patient care being provided. For example, curtains in operating rooms and emergency departments may require more frequent replacement than those in a general ward. In addition, Health Organisations should consider factors such as the prevalence of infections in the community and the specific needs of their patient population when determining their curtain replacement schedule.

Health workers are to:

- Monitor recorded dates on privacy curtains and ensure that curtains are changed in accordance with local procedure
- Should notify environmental cleaning staff if a curtain is visibly soiled and requires changing
- Environmental cleaning staff are responsible to undertake regular compliance audits as described in this procedure the CEC Environmental Cleaning Standard Operating Procedure
- Perform hand hygiene before hanging the curtain
- Record the date on the curtain on the label at the top of the curtain prior to hanging
- During the hang ensure the curtain does not touch the floor.

The Health Organisation should have a process/ program in place for regular review of disposable curtains for soiling and replacement.

Table 29 Recommended changeover/cleaning frequency for patient privacy curtains

Area	Disposable curtains	Washable curtains
Very High Risk Outbreaks of infectious disease or gastroenteritis Patients with active *Clostridioides difficile* New and emerging pathogens (*Candidozyma auris*) High consequence infectious diseases (HCID)	Change when visibly soiled or torn Follow manufacturer's instructions for use (IFU) Change immediately on patient discharge Refer to local procedure	Depending on the risk of contamination, number of beds and patient risk factors Change when visibly soiled or torn Change upon patient discharge or terminal clean Refer to local procedure
High Risk Intensive Care (ICU) High Dependency Unit (HDU) Burns Unit, Renal Unit Operating suites Day surgery Emergency Departments Wards with patients requiring transmission-based precautions	Change when visibly soiled or torn Follow manufacturer's instructions for use (IFU)	Change when visibly soiled or torn Follow manufacturer's instructions for use (IFU)
Moderate risk General wards	Change when visibly soiled or torn Follow manufacturer's IFU	Change when visibly soiled or torn Change three monthly to bi-annually based on risk assessment

Low risk Rehabilitation Long term care/Nursing Homes Office based practice, medical centre	Change when visibly soiled or torn Follow manufacturer's IFU	Change when visibly soiled or torn Change three monthly to bi-annually based on risk assessment

5.23.1 Dedicated window curtains and blinds in clinical areas

Fixtures and fittings such as window curtains should be designed to allow easy cleaning and to discourage the accumulation of dust.

As per part AusHFG Part-D Fixtures and Fittings should be designed to allow easy cleaning and to discourage the accumulation of dust. Blinds contained in double glazing (preferred), curtains and roller-type blinds made of fabric that can be removed and laundered are preferable to louvered and vertical blinds that are extremely difficult to clean.

Before purchasing and installing window curtains (with or without additional backing) and blinds in clinical areas, the Health Organisation to consider the cleaning requirements for these furnishings in accordance with the NSW Health Cleaning of Healthcare Environment policy directive.

5.24 Waste disposal

Health Organisations generate a large amount of waste, about 85% is general, non-hazardous waste and 5% is considered hazardous material that may be infectious, toxic or radioactive (World Health Organization, 2024b). Healthcare waste may contain potentially harmful microorganisms that can infect patients, health workers and other health consumers. Waste generated in healthcare is landfilled or incinerated and can result in air pollutant emissions and water pollution due to landfill leaching, constantly raising concerns over environmental protection issues. The management of waste requires increased attention and diligence to avoid adverse health outcomes associated with poor practice and

Proper containment of waste can minimise the transmission of infection(National Health and Medical Research Council, 2019a). See NSW Health Clinical and Related Waste Management for Health Services policy directive. Health workers are to follow standard precautions at minimum when handling waste including:

- Waste must be placed in appropriate containers at the point-of-care/use and stored in a designated enclosed room with access limited to authorised health workers
- Anatomical waste must be refrigerated at or below 4°C of if stored for more than four days
- Biomedical waste storage areas are to be locked, except where authorized health workers are on hand
- Segregated waste should be removed to central holding areas at frequent intervals and be stored in rigid, secondary leak-proof bins that are cleaned and disinfected prior to re-use
- Waste bags should never be stored directly on the floor
- A dedicated hand washing basin must be available to waste handlers
- Health Organisations are to provide, and waste handlers should wear, PPE appropriate for the risk of the tasks when handling waste

- Waste should be transported in leak-proof and covered carts which are cleaned on a regular basis
- Waste should not be transported in the same lift at the same time as clients/patients/residents or clean/sterile instruments /supplies/linen.

To create a sustainable environment through the reduction in and management of healthcare generated waste, an appropriate organisational culture must be developed, encouraging the participation of all stakeholders who partake in waste generation, management and disposal (Lee and Lee, 2022).

5.24.1 Clinical waste disposal in the community

Clinical waste should be handled in a manner consistent with standard precautions. Health workers providing care in the community should consider the following:

- In a client's home, clinical waste generated should be disposed of at the point of use
- Sharps are to be disposed of in sharps containers and returned to suitable collection point.

Used aprons, gowns and gloves in both clinical and non-clinical community health settings are classified as general waste. Any bulk fluids should be emptied into domestic sewerage systems. Other clinical waste, such as closed system surgical drains, wound exudate collection canisters from vacuum-sealed systems and self-contained chest drainage collection systems that cannot be emptied into domestic sewerage systems, is to be double-bagged and disposed of at point of use into a bin.

Where it is not feasible to discard closed systems into domestic waste and local processes require transport back to the centre/hospital for disposal, the item needs to be transported safely in a rigid secure container.

For more information refer to the NSW Health Clinical and Related Waste Management for Health Services policy directive.

5.25 Safe handling and transport of patient specimens

Health workers are to ensure that standard precautions are always applied when obtaining specimens. PPE must be selected based on symptoms, type of precautions patients is under and specimen type.

When transporting and handling pathology specimens, health workers are to ensure that the specimens are packaged and transported in such a way to ensure the safety of anyone required to handle the package and/or specimen and that the specimen is maintained under suitable conditions.

Infectious substances or specimens means substances that are known to contain, or are reasonably expected to contain, pathogens. Infectious substances are divided into categories A, B and C/Exempt, and are governed by various UN 2814 and UN 2900 requirements. Pathology specimens and associated materials must be classified and packaged according to their level of risk, in line with the Requirements for the packaging and transport of pathology specimens and associated materials (Fifth Edition). The classifications include:

- Category A substance is an infectious substance in a form that, when exposure to it occurs, is capable of causing permanent disability, life threatening or fatal disease in otherwise healthy humans
- Category B substances an infectious substance which does not meet the criteria for inclusion in Category A. This includes Category B infectious substances transported for diagnostic purposes

- An exempt/category C substance is a patient specimen for which there is minimal likelihood that pathogens are present.

For more information refer to the NSW Health Transport of Pathology Specimens to Laboratories policy directive.

As a minimum, the following infection prevention and control principles are to be observed during the transportation of specimens:

- transport specimens to the pathology laboratory as soon as possible
- if transporting specimens by foot or trolley, double packaging of the specimen is required, for example, the primary receptacle placed in a secondary packaging of appropriate shape, leak-proof and of sufficient volume to contain a spill
- contain specimens in a canister/capsule prior to sending via a pneumatic tube specimen delivery system
- do not use pneumatic tube specimen delivery systems when transporting highly pathogenic or novel infectious specimens.

In the event of a novel infectious disease, Health Organisations to refer to specific pathology specimen handling and transporting advice provided by NSW Health or other delegate agencies and High consequence infectious diseases - Infection prevention and control Principles.

Also refer to:

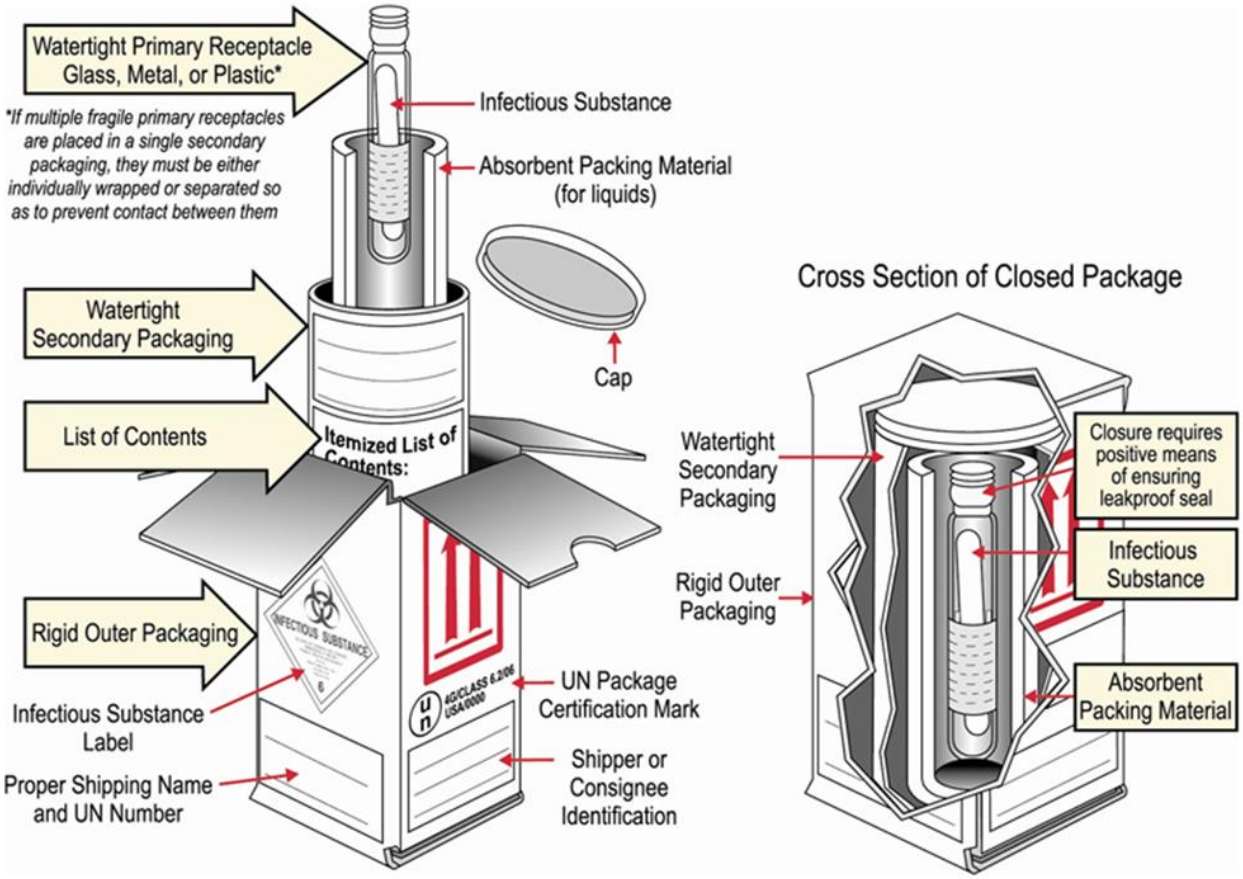
- NSW Health Early Response to High Consequence Infectious Diseases policy directive
- The Australian Dangerous Goods Code Edition 7.9
- Requirements for the Packaging and Transport of Pathology Specimens and Associated Materials (Fourth Edition 2013)
- WHO Guidance on regulations for the transport of infectious substances 2021-2022
- CDC VHF Clinical Specimen Packaging and Shipping.

5.25.1 Specimen transport between locations

Where a Health Organisation is required to transport specimens to a pathology laboratory by road, rail or air transport, triple packaging is to be used. For example:

1. Leakproof primary receptacle (contains the sample, for example, screwcap tubes and needs to be sealable and leakproof)
2. Leakproof secondary receptacle (can be rigid or flexible and is capable of withstanding, without leakage, an internal pressure of 95 kPa). For liquid specimens, absorbent material must be in a quantity sufficient to absorb the contents of the primary receptacle
3. Rigid outer packaging (A rigid cardboard box or other designated transport container).

Figure 15 Packing and shipping category A specimen diagram



Source: CDC VHF Clinical Specimen Packaging and Shipping

Specimen packaging is to comply with the relevant standards and requirements for the mode of transport being used. For more information refer to the NSW Health Transport of Pathology Specimens to Laboratories policy directive, AS 4834-2007 Packaging for surface transport of biological material that may cause disease in humans, animals and plants, and Part 92 of CASR Consignment and carriage of dangerous goods by air.

5.26 Advice for Visitors

Health Organisations should adopt a risk-based approach when promoting visitation to acute care settings. Visitation processes may need to be adjusted in response to current risks, including seasonal outbreaks or emerging infectious diseases.

To safeguard patients, staff, and other visitors, the following minimum infection prevention and control measures are to be observed by all visitors:

Symptom Screening

Visitors must not enter the facility if they are experiencing symptoms of acute respiratory infection, such as cough, sore throat, fever, runny nose, diarrhoea, vomiting

Visitors should only return once symptoms have fully resolved.

Hand Hygiene

Visitors are required to sanitise hands thoroughly upon entry and exit.

Hand hygiene must also be performed before and after contact with any surfaces or individuals.

Alcohol-based hand rubs are to be used and are available at facility entrances and patient rooms.

Personal Protective Equipment (PPE)

Visitors must comply with facility-specific PPE requirements.

PPE use may vary depending on the clinical area, patient condition, or current infection risks.

Masks may be required in high-risk zones or during respiratory illness outbreaks.

Compliance with Local Protocols

Infection prevention and control requirements may differ between facilities and clinical contexts.

Visitors must always follow all posted guidelines and staff instructions.

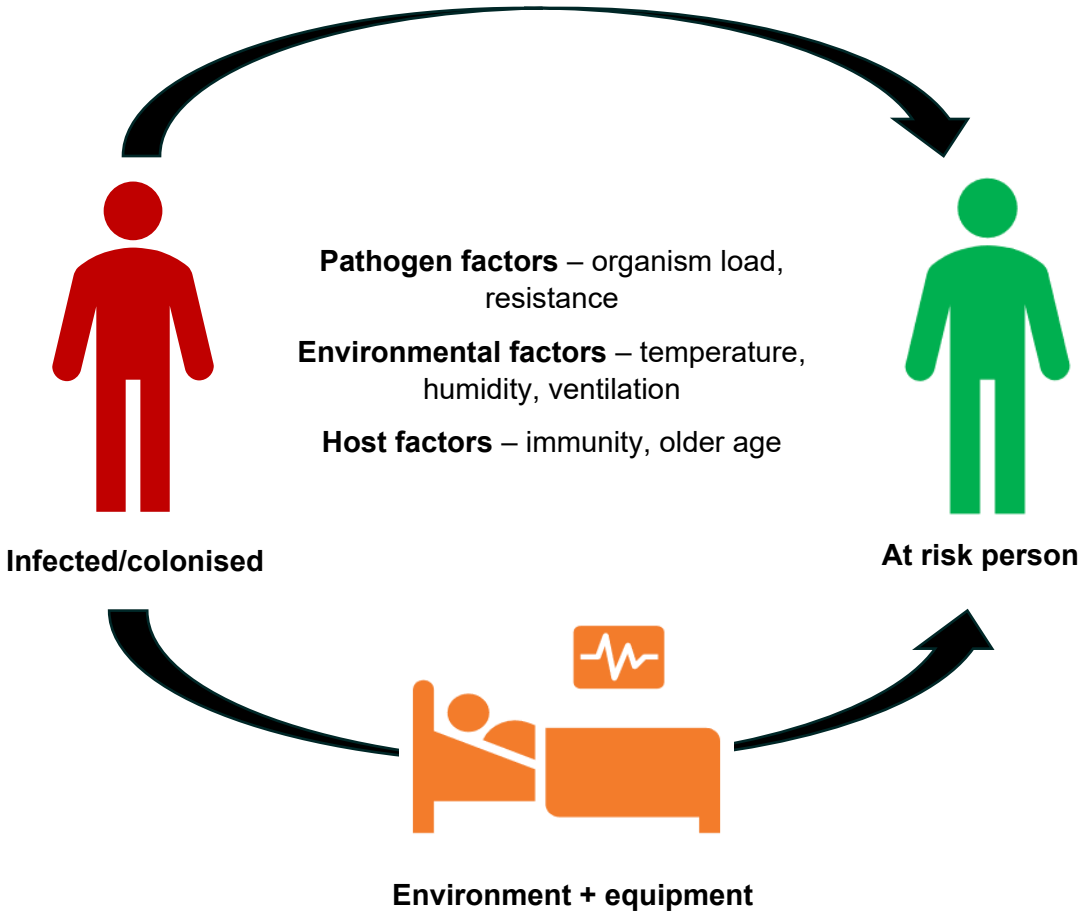
Chapter 6 Transmission-based precautions

6.1 Introduction

Transmission-based precautions are used when standard precautions alone are insufficient to prevent microorganism transmission. Standard precautions are required in all situations as the minimum requirement. These principles aim to reduce the risk of healthcare associated infection (HAI) and protect patients and health workers. The mode of transmission depends on both microorganism factors and patient risk factors. Therefore, understanding the mode of transmission is an important factor in deciding the type of precaution required for each situation and episode of care (National Health and Medical Research Council, 2019a). Whether a transmission occurs is determined by microorganism, environmental and host factors at the time of the event (Figure 16 Microorganism transmission).

Transmission-based precautions are applied based on risk assessment when a patient is confirmed or suspected of having transmissible and/or epidemiologically significant microorganisms. Risk assessment involves identifying the types of risk exposure within an organisation, measuring those potential risks and proposing means to mitigate them. To support the requirements of standard and transmission-based precautions, a Health Organisation is responsible for providing health workers, patients, participants in care and visitors with recommended resources including personal protective equipment (PPE), hand hygiene products, tissues and waste receptacles (Australian Commission on Safety and Quality in Health Care, 2021c). The Health Organisation should also provide suitable accommodation /bed placement, dedicated patient care equipment where possible and ensure that health workers are trained in the application of standard and transmission-based precautions.

Figure 16 Microorganism transmission



When assessing the need for transmission-based precautions there are several factors to consider: the patient, the environment, and the health worker.

The patient factors include:

- the type of microorganism
- mode or route of transmission
- factors that increase the risk of transmission such as respiratory symptoms, or other “wet” symptoms, for example, diarrhoea and/or vomiting,
- susceptibility, such as, the presence of wounds, indwelling device(s), or whether they are immunodeficient/ compromised
- age of patient (paediatric, children, young persons with autism spectrum disorder - and the potential for increase AGBs, mobility.

Environmental factors include:

- patient placement location such as extreme or high-risk unit, dialysis, or outpatients
- available infrastructure such as single room availability, shared bathrooms
- what patient care equipment needed
- shared equipment or amenities.

Health worker factors include:

- the type, frequency, duration, and intensity of contact or interaction with the patient.

The primary reason to implement transmission-based precaution is to reduce the risk of transmission of the microorganism or pathogen to other patient and less commonly to health workers and visitors/participants in care.

Transmission-based precautions require the use of PPE, cleaning and disinfection of shared equipment, additional cleaning and disinfection of patient care area, hand hygiene and appropriate patient placement. The type and components of PPE required will depend on risk of transmission and interaction required.

If a transmissible infection or microorganism is suspected, health workers should apply appropriate transmission-based precautions as soon as possible. Precautions are to remain until a definitive diagnosis (including pathology results) has ruled out the possibility of an infectious disease or symptoms have resolved (for example, no diarrhoea for last 48 hours, ARI symptoms started more than 5 days ago) or until effective treatment has been commenced and continued for the appropriate period. Health workers should be aware that it may not be possible to identify all patients for whom contact, droplet and/or airborne precautions are required (Figure 17 Transmission pathway).

For example, the risk of transmission may be present before symptomatic illness is observed or a definitive diagnosis made (National Health and Medical Research Council, 2019a).

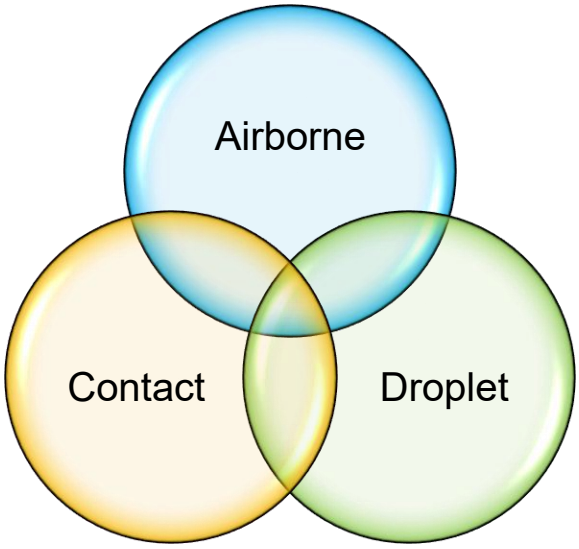
Transmission-based precautions are tailored to the different forms of transmission:

- contact precautions
- respiratory precautions
    - droplet precautions
    - airborne precautions.

Some microorganisms can be transmitted by more than one transmission route, and more than one type of transmission-based precaution may be employed.

Implementation of transmission-based precautions are to include an education program on how to risk assess for type of precautions, patient placement and selection of PPE.

Figure 17 Transmission pathway



Transmission-based precautions key principles

Triaging of patients suspected or confirmed to have transmissible microorganisms or infections should occur in a manner that prevents contamination of the environment and transmission in waiting rooms.

Patients suspected of having an infectious disease should be moved from shared waiting area to a single patient area or cohort area while awaiting further assessment and management. Where this may not be physically possible at the time all strategies to minimise the risk of transmission to other patients, health workers and visitors must be considered whilst keeping the patient safe. As per the local process infection prevention and control professionals, as subject matter experts, should be consulted to assist managers and health workers with workable operational strategies as reasonable.

If transfer or transport of the patient is required, the transferring/transport agency should be informed of the required transmission-based precautions on booking and as part of patient handover communication (communicating for safety) patient condition/diagnosis information remains confidential unless directly relevant to their clinical management.

Transmission based precautions:

- are used when the route(s) of transmission are not completely interrupted by using standard precautions alone
- apply precautions based on routes of transmission. A microorganism may have several routes of transmission
- may change as understanding of transmission and immunity to infection evolve over time
- use multiple layers of interventions (screening, PPE, single room, ventilation).

As per local process Public Health Unit (PHU) may need to be notified during an outbreaks or significant cases of notifiable conditions.

Patient isolation may also impact patients with anxiety, falls risk and reduced health worker visits and therefore education and communication are needed to ensure patients are well informed of the rationale and any requirements of transmission-based precautions.

The environment must be physically cleaned with a neutral detergent followed by a disinfectant, either a 2-step process where a detergent is used, followed by a disinfectant, or as a 2-1step process, where a TGA approved detergent and disinfectant is used. Patient movements (bed and/or ward) and transfers during transmission-based precautions should be minimised based on a risk assessment and needs approach to reduce cross contamination and transmission risks.

Visitors, carers, and participants in care

Prior to entering the patient's room, the health worker caring for the patient is to explain any transmission risk and educate the visitor, carers, and participants in care on ways to prevent transmission of microorganisms, for example, wearing a mask for respiratory precautions when entering the room. At a minimum:

- visitors are encouraged to practise hand hygiene
- visitors usually do not need PPE such as gloves and gowns, unless exposure to body substance is anticipated. Surgical mask should be worn when vising patients under droplet or airborne precautions
- any visitors attending a patient in transmission-based precautions need to understand that they should not subsequently visit any other patient in the hospital during the same visit
- parents should be advised to refrain from taking infants in to visit patients who are being cared for under transmission-based precautions. However, an exemption should be granted for situations such as an infant's mother is in hospital and visitation may be required.

If variations to the above are requested, consult the local infection prevention and control unit prior to the visit.

Visitors to patients with high consequence infectious diseases (HCID) should be limited and each Health Organisation should address the need for visitor restrictions on a case-by-case basis.

Signage - when specific environment cleaning is required keep signage displayed after the patient leaves the room (discharged or transferred out) so that environmental services know what precautions are required for cleaning/disinfection.

Specialist areas

Specialist areas such as mental health (both community and inpatient) settings, dementia and cognitive impaired units, a risk assessment-based approach to appropriate infection prevention and control strategies should be implemented to reduce the risk of cross transmission. These areas should have a documented process on how to manage communicable or infectious cases (sporadic or an outbreak situation) including process to minimise transmission risks when consumers therapeutically socialising with one another.

Maternity and Neonatology Units

Neonates, especially premature neonates, are extremely vulnerable to infection. Health workers need to be aware of appropriate interventions to minimise the possibility of cross transmission and infections. The process detailed throughout this document applies to these settings. Neonatal units should comply with restrictions and exclusions based on the disease and cross transmission/communicability risk. The care provision of newborns and mums and participant in care who stay in with them should be based on a risk assessment and clinical need.

Refer to the infectious disease table in Chapter 8 Outbreak and cluster management.

6.2 Contact precautions

Contact precautions are used when there is a known or suspected risk of direct or indirect contact transmission of infectious agents that are not effectively contained by standard precautions alone.

Direct transmission occurs when microorganisms are transferred from one person to another person without a contaminated intermediate object or person. For example, blood or other body substances from an infectious person may have contact with a mucous membrane or breaks in the skin of another person.

Indirect transmission involves the transfer of an infectious agent through a contaminated intermediate object (fomite) or person. Contaminated hands of health workers have been shown to be important contributors to indirect contact transmission. Hand hygiene, and cleaning and disinfection of shared patient care equipment are acknowledged as some of the strategies to reduce indirect transmission of microorganisms.

Where there is significant patient and/or environmental contact, health workers are to implement contact precautions for patients with known or suspected infections with either an increased risk for contact transmission or significant consequences (for example, high risk of organism dispersal with MROs, *Clostridioides difficile*, acute gastroenteritis or herpes zoster).

Contact precautions consist of:

- appropriate patient placement based on risk assessment. If the patient has “wet” signs or symptoms (include vomiting, diarrhoea, bleeding, coughing with sputum production, uncontained wounds) single room is preferred*
- hand hygiene
- appropriate PPE selection and use, based on risk assessment:
    - below neck PPE if patient has “wet’ signs or symptoms
    - gloves as per standard precautions, don immediately before patient contact and change between different tasks on same patient and must be changed between patients
- where practical, single use/ disposable, or dedicated patient care equipment based on local epidemiology and procedure or if shared equipment is used, it must be cleaned appropriately in line with manufacturers instruction between patient use each time
- enhanced cleaning of patient care areas
- communication - inform the patient and relevant family/caregivers. Ensure relevant agencies are notified, for example, ward or hospital transfer, transport providers. Risk assessed transport and movement of patients.

Risk assessment – patient factor

Perform a risk assessment based on patients' communicability or risk of organism dispersal. Conditions that potentially increase the risk of organism dispersal include diarrhoea, incontinence, or uncontained wounds (wet patients). These patients may need contact precautions in a single room with a dedicated toilet. Where single rooms are not available, appropriate PPE based on the type of care being provided.

Conditions with a low risk of organism dispersal include continent, contained wounds (dry patients) where standard precautions may be appropriate.

Risk assessment – patient placement

Patient placement should be determined based on risk assessment, single room patient placement priority guide, availability and local bed management priority matrix (if available). Preferably patients with wet symptoms such as symptoms of acute infective diarrhoea should be placed in a single room with ensuite bathroom. If this is not possible, patients can be cohorted with patients infected or colonised with the same microorganism with access to a designated bathroom. Any decision to cohort patients should be in conjunction with the local infection prevention and control team.

Risk assessment – PPE

Health workers are to conduct a risk assessment if (below neck or above neck) PPE is required based on the episode of care, anticipated exposure to blood or body substance and level of contact with the patient and patient zone. The following are to be considered as part of the risk assessment:

- If the care involves body substance contact, below neck PPE (a gown/apron and gloves) should be donned to protect health workers' uniform/personal clothing and hands
- Facial and eye protection (above neck PPE) should be selected according to standard precautions (risk of splash or spray or aerosolisation of body substance).

Health workers must perform hand hygiene prior to donning an impervious gown/apron on entering the patient zone based on anticipated contact with a body substance. When implementing contact precautions, the following practices should be followed to ensure effective infection prevention and control:

- Gloves are always the last PPE item to apply. They are put on inside the room directly before patient contact where exposure to body substances is anticipated and after hand hygiene is performed
- Compliance with hand hygiene inside the patient care zone must continue regardless of glove use. It may be necessary to remove gloves and perform hand hygiene between procedures (especially moving from dirty to clean site) while attending to a patient on contact precautions
- The duration of contact precautions will vary and ceasing contact precautions should be based on either guidelines or advice from local infection prevention and control
- Depending on the microorganism, terminal cleaning with a TGA approved disinfectant may be required
- Use contact precautions signage at entrance of patient's care zone to alert/inform health workers such as environmental services on patient status, (refer to figure 18 Example of contact precautions signage)
- Reusable shared patient equipment must be cleaned and disinfected in between use regardless of patient's status
- Computers on Wheels and Workstations on Wheels must only be used by individuals with clean hands. These devices are to be thoroughly cleaned and disinfected between each use. When taken into isolation rooms, a defined work process must be in place to manage their use and reduce the risk of contamination. If such a process cannot be implemented, these items should not be brought into isolation environments. However, any decision to restrict their use must be carefully weighed to ensure that patient care is not adversely affected.

Hand hygiene

Hand hygiene is an important aspect of contact precautions. Hand hygiene must be performed before donning and between each step of doffing PPE, in between any glove changes and before

donning clean gloves. If a patient is suspected or known to have *Clostridioides difficile* or a non-enveloped virus (for example, norovirus), hand hygiene using soap and water should be performed on exit or after care finished. ABHR can be used for hand hygiene when in the room attending to patient and between tasks on the same patient.

Equipment

Single use or dedicated equipment should be used where possible and practical. If shared equipment is used, it must be cleaned between use as per the manufacturer's instructions.

Environmental cleaning

Enhanced cleaning should be employed to ensure patient and healthcare zones are free of contamination.

Use ARTG-listed disinfectants

Clean and disinfect surfaces and equipment using disinfectants listed on the Australian Register of Therapeutic Goods (ARTG) with specific claims.

Apply appropriate cleaning methods

Use either:

- A two-step process: first clean with a detergent, then disinfect
- A 2-in-1 cleaner/disinfectant: ensure it has efficacy claims against the pathogen of interest.

Target high-risk areas

Focus cleaning efforts on surfaces that may be contaminated with microorganisms, especially those:

- In close proximity to the patient. For example, bed rails, over-bed tables
- Frequently touched in the patient care environment. For example, doorknobs, toilet surfaces in patient rooms.

Adjust cleaning frequency

Adjust cleaning frequency based on surface type and frequency of access:

- Clean high-touch surfaces more frequently
- Clean minimal-touch surfaces on a less frequent schedule. For example, horizontal surfaces in waiting rooms.

Appropriate PPE should be used when conducting the cleaning, and hand hygiene performed after doffing PPE.

Signage

Signage is an important reminder that improves adherence to precaution requirements for health workers and visitors. Signage needs to provide clear instructions on the specified transmission-based precautions, requirements for entering and exiting the room, required PPE and advice for visitors on the importance of checking with health workers on any specific requirement before entry to patient zone (refer to figure 18 Example of contact precautions signage).

Patient movement or transfer

If a patient on contact precautions needs to be moved, cover or contain the infected areas of the patient's body (for example, open wound or lesion) or clean patient if they are soiled or have body substance leakages if relevant. Remove and dispose of contaminated PPE and perform hand hygiene prior to transporting patients. Don clean PPE to handle the patient at the transport location.

Patient transport

A risk assessment should be performed on the decision to transport patients on their own with a specific infectious disease. If not possible, cohort with patients suspected or infected with the same microorganism. If that is not possible either, ensure that physical separation of patients can be achieved in the transport vehicle. Physical separation is ensured when patients can neither touch each other nor are there common environmental surfaces. Educate patients on the importance of hand hygiene (Jain et al., 2019). Where there may be uncertainty on risks, contact local infection prevention and control for advice.

Figure 18 Example of contact precautions signage

Contact Precautions
Before entering room: • perform hand hygiene. • perform a risk assessment on the need for apron or gown, for example, type of patient contact or contact with body substance, type of MRO (new or emerging), patient status (wet or dry).
After entering room: • perform hand hygiene. • perform a risk assessment on the need for gloves, for example, contact with body substances. • change or remove gloves (if worn) and perform hand hygiene in between dirty and clean tasks.
On leaving room: • remove and dispose of gloves (if worn). • perform hand hygiene. • dispose of apron or gown (if worn). • perform hand hygiene. • clean reusable shared equipment (if used) and perform hand hygiene.
Remember: • When transporting patient outside of the room remove PPE and perform hand hygiene, as above, after placing patient on trolley/stretcher/wheelchair. • Use patient-dedicated or single-use non-critical patient-care equipment where reusable equipment is not available. • Use a single-patient room or, if unavailable, cohort patients with the same strain of MRO in designated patient-care areas (upon approval from the healthcare facility's infection prevention and control team). • Ensure consistent cleaning and disinfection of frequently touched surfaces near the patient and those likely to be touched by the patient and health workers.

Discontinuation of contact precautions

Duration of contact precautions will vary depending on the organism and patient factors such as the presence of wounds or indwelling devices. For patients who are colonised or have infection with an MRO, local processes should be followed on decolonisation protocols and clearance or removal of alerts. Decisions on ceasing contact precautions for some viral infections are to follow local guidelines or be discussed with infection prevention and control.

For most MRO colonisation, it may be appropriate to assume lifelong colonisation and manage accordingly. However, it might be possible after a prolonged interval free of hospitalisations, antimicrobial therapy and invasive devices (for example, 6 or 12 months) to re-culture patients for clearance (Werner and Shaban, 2018). For more information refer to Chapter 7 Management of MROs.

6.2.1 Contact precautions in specific settings

Community-based settings

Contact precautions in the community should be directed according to the individual patient condition, risk assessment and any ongoing sequence of care.

Lower-risk settings

Conduct a risk assessment

In lower risk areas such as rehabilitation units, long term care settings, outpatient day treatment settings or patient transport services, a risk assessment should be undertaken in collaboration with Infection Prevention and Control to determine:

- The level of risk to patients and health workers
- The potential benefit or impact on patient treatment if contact precautions are implemented.

Hand hygiene

All health workers must perform hand hygiene after contact with the patient or their immediate environment by using:

- Soap and water for patients with norovirus or CDI
- Health workers are to encourage patients/clients to perform hand hygiene when attending outpatient clinics to reduce environmental contamination.

Cleaning of equipment and surfaces

Reusable or shared clinical equipment must be cleaned between patients/clients using a neutral detergent.

Frequently touched surfaces should also be cleaned between patient/client interactions to prevent cross-contamination.

Medium and high-risk community settings

In medium and high-risk community settings, reusable or shared clinical equipment and frequently touched surfaces that have contact with patients/clients known to carry MROs must be:

Cleaned with a neutral detergent and disinfected

Use either:

A two-step process: first clean with a detergent, then disinfect.

A 2-in-1 cleaner/disinfectant: ensure it has efficacy claims against the pathogen of interest.

6.3 Respiratory precautions (droplet and airborne)

Respiratory particles can transmit via droplet or airborne route, over short or long distances, through direct deposition or spray or via inhalation. Aerosols are suspension of particles or droplets in the air, ranging from larger particles (droplets) to very small particles (aerosols) which would be considered airborne. The definition of droplets continues to be debated and defining the size is problematic. For more information refer to WHO 2024 Global technical consultation report on proposed terminology for pathogens that transmit through the air.

Respiratory precautions are required for organisms that are usually transmitted via the droplet or airborne route, or when particles have been artificially created, such as, from aerosol generating behaviour (AGB) or an aerosol generating procedure (AGP).

Patients with cystic fibrosis (CF) are at risk of both acquiring and transmitting respiratory infections. Respiratory infection in patients with CF can be more significant than for other individuals and is associated with deterioration of lung function. It is important that units that care for patients with CF (respiratory wards, non-CF respiratory wards and hospitals without CF clinics) partner with local infection prevention and control units to implement the additional measures described in Chapter 10 infection prevention and control in specialised settings for more information.

6.3.1 Droplet precautions

Droplet transmission is the spread of an infectious agent caused by the dissemination of droplets. Droplets are primarily generated from an infected (source) person during coughing, sneezing and/or talking. Transmission occurs when microorganism containing droplets are propelled through the air and deposited on the conjunctivae, mouth, nasal, throat or pharynx of another person. Most of the volume of expired air or a cough or sneeze comprises of large droplets that travel short distances and do not remain suspended in the air. Thus, special air handling and ventilation are not routinely required to prevent droplet transmission. Certain procedures or interactions however may increase the volume of expelled droplets where additional controls will be warranted such as optimising ventilation and ensuring that air conditioning systems are maintained to minimise the risk of microorganism transmission between individuals.

For more information refer to Engineering Services Guide and 6.12 Recirculating air filtration device use.

Droplet precautions are to be employed in addition to standard precautions when caring for any patient known or suspected of being infected with a microorganism that can be transmitted by the respiratory droplet transmission route.

Droplet precautions consist of:

- appropriate patient placement (single room or cohorting)
- hand hygiene
- appropriate PPE selection (above neck - surgical mask and eye protection) and below neck-based on risk assessment, for example, gown/apron if “wet” signs or symptoms
- where practical, use disposable or dedicated patient care equipment
- clean and disinfect reusable shared equipment in between use
- enhanced cleaning of patient care areas
- Communication - inform the patient and relevant family/caregivers. Ensure relevant agencies are notified, for example, ward or hospital transfer, transport providers

- risk assessed transport and movement of patients.

Patient placement

Place patients who require droplet precautions in a single-patient room when available. Prioritising single rooms should use the following principles:

- prioritise patients who have excessive cough and sputum production for single-patient room placement
- cohort patients who are infected with the same pathogen and are suitable roommates, with access to a designated bathroom
- In shared or cohorted rooms where the space cannot be contained, such as, open bays or poor ventilation, consider source control for the patient when moving around the room if patients' physical health allows
- Avoid aerosol generating procedure (AGPs) and risk assess patient for aerosol generating behaviours (AGBs) when cohorting in a shared room
- Maintain a spatial separation of greater than 2.4m between beds in cohorted areas or draw privacy curtains between patients (if possible, based on risk assessment) to impede the direct spread of droplets and space beds at least 2.4m apart. For more information refer to Australasian Health Facility Guidelines Part B Health Facility Briefing and Planning 0340 - Inpatient Accommodation Unit
- Use droplet precautions signage at entrance of patient's zone.

Avoid placing patients in droplet precautions in the same room with patients who have conditions that may increase the risk of an adverse outcome from infection or that may facilitate transmission (for example, those who are immunocompromised, have or have anticipated prolonged lengths of stay).

Hand hygiene

Hand hygiene is an important aspect of droplet precautions. Hand hygiene must be performed before donning and after doffing PPE, between glove changes and before donning clean gloves.

Personal protective equipment

Health workers are to wear a disposable fluid repellent level 1 or level 2 surgical mask (see Table 30 AS 4381:2015 Single use facemask standard).

In transmission-based precautions the surgical mask is used to:

- protect the wearer against transmission of microorganisms
- protect others (source control) in the environment from infection. The patient under droplet or airborne precautions should wear a surgical mask outside of their patient zone, if able
- If oxygen therapy is required (if the medical condition allows), nasal prongs should be used, and a surgical mask should be worn over the top of the nasal prongs during any patient transport.

Protective eyewear (goggles or face shield) is to be worn as part of droplet precautions if working within 1.5 metres of the patient and as part of standard precautions if there is an anticipated risk to exposure to blood or body substance (National Health and Medical Research Council, 2019a).

Below neck PPE (gown/apron and gloves) to be used as per standard precautions and risk assessment.

After the care provision:

- Health workers wearing above neck PPE (masks and eye protection) should remove and dispose PPE outside patient zone (for example, at the door, curtain, or the anteroom) and perform hand hygiene
- Change PPE and perform hand hygiene between contact with patients in the same room, regardless of whether one patient or both patients are on droplet precautions
- In an outbreak situation, or when alert level has been raised from foundational, based on risk assessment, keep above neck PPE (mask and eye protection) until completion of an episode of care in the same bay/room.

Patient transfer

A patient should be transferred or transported on their own or with patients infected or colonised with same microorganism.

If clinically able, patient should wear surgical mask when outside of the usual patient zone (including outpatient and emergency settings).

Signage

Signage is an important reminder that improves adherence to precaution requirements for health workers and visitors. The signage needs to provide clear instructions on the specified transmission-based precautions, requirements for entering and exiting the room, required PPE and advice for visitors on the importance of checking with health workers on any specific requirement before entry to patient zone.

Other considerations

Health workers are to consider the following points when providing care to patients under droplet precautions:

- Depending on the microorganism, disinfection is required in addition to cleaning of patient care areas
- Visitors are recommended to practice hand hygiene and wear a surgical mask if within 1.5m of patient
- Droplets generally do not remain suspended in the air; baseline ventilation should optimise air exchange however special air handling and ventilation is not routinely required under droplet precautions
- If a patient who is being cared for under droplet precautions requires an aerosol generating procedure (AGP), the level of precautions should be increased to airborne for the duration of the procedure. If a negative pressure room is not available, this procedure should be undertaken in a dedicated single or clinic room away from other patients. If AGPs are anticipated, a P2/N95 respirator should be worn by attending health workers. Eye protection should be worn as part of standard precautions.

Table 30 AS 4381:2015 Single use facemask standard

Characteristics	Level 1	Level 2	Level 3
Application	For general purpose medical procedures, where the wearer is not at risk of blood or fluid splash or to protect staff and/or the patient from droplet exposure to microorganisms (for example, patient with upper respiratory tract infection visits GP).	For use in emergency departments, dentistry, changing dressings on small or healing wounds where minimal blood droplet exposure may possibly occur (for example, endoscopy procedures).	For all surgical procedures, major trauma first aid or in any area where the health worker is at risk of blood or bodily fluid splash (for example, orthopaedic, cardiovascular procedures).
	Evaluated for resistance to penetration by synthetic blood at the minimum velocity specified below in bacterial filtration efficiency and differential pressure.	Evaluated for resistance to penetration by synthetic blood at the middle velocity specified below in bacterial filtration efficiency and differential pressure.	Evaluated for resistance to penetration by synthetic blood at the maximum velocity specified below in bacterial filtration efficiency and differential pressure.
Bacterial Filtration Efficiency (BFE) %	≥ 95%	≥ 98%	≥ 98%
Particulate Filtration Efficiency (PFE) % (0.1µm)	< 4.0	< 5.0	< 5.0
Resistance to penetration by synthetic blood (fluid resistance) min pressure in mm Hg for pass result	80mm Hg	120mm Hg	160mm Hg

Source: AS 4381:2015 Single use surgical face mask standard.

6.3.2 Airborne precautions

Airborne transmission or inhalation can occur when infectious respiratory particles (IRPs) are expelled into the air and inhaled by another person. Airborne transmission or inhalation can occur at a short or long distance from the infectious person and distance depends on various factors (for example, airflow, humidity, temperature, and ventilation). IRPs can theoretically enter the body at any point along the human respiratory tract, but preferred sites of entry may be pathogen specific. Direct deposition can also occur when IRPs are expelled into the air from an infectious person, and are then directly deposited on the exposed mouth, nose or eyes of another person nearby, then

entering the human respiratory system and potentially causing infection (World Health Organization, 2024a).

Airborne precautions are implemented in addition to standard precautions for patients known or suspected to be infected with infectious agents transmitted person-to-person by the airborne route.

Airborne precautions consist of:

- use of single rooms with ensuite preferred and specific ventilation requirements
- hand hygiene
- use of above neck PPE (P2/N95 respirator and eye protection) and below neck- based on risk assessment for example, gown/apron if “wet” signs or symptoms
- enhanced cleaning of patient care areas and shared equipment
- communication- inform the patient and relevant family/caregivers. Ensure relevant agencies are notified, for example, ward or hospital transfer, transport providers
- risk assessed transport and movement of patients (internal or between facilities).

Patient placement

Place patients who require airborne precautions in a negative pressure room (class N room) with anteroom (preferable) and ensuite bathroom that has been constructed in accordance with the Australasian Health Facility Guidelines. For more information refer to AusHFG Isolation Rooms - Engineering and Design Requirements and AusHFG Pandemic Preparedness - Health Infrastructure Planning & Design Guidance.

The class N room should provide at least 12 air changes per hour with direct exhaust of air to the outside. If it is not possible to exhaust air from a negative pressure room directly to the outside, the air may be returned to the air-handling system or adjacent spaces if all air is directed through HEPA filters. The following measures should be implemented to ensure appropriate use and management of negative pressure (Class N) rooms and to maintain airborne precautions:

- Keep the negative pressure room door closed when not required for entry and exit
- Negatively pressured rooms should have a pressure gauge and alarm system to advise when pressurisation has not been achieved. Display monitors with audible alarms connected to the building management system should be outside the room.
- If a class N room is not available, place the patient in a single room with the door always closed. In this instance, the patient should have access to an ensuite or designated bathroom
- Signage should be placed outside the room that advises airborne precautions are in place. Notify environmental services staff on the required environmental cleaning requirements.

Class N rooms

A Class N (negative pressure) isolation room is a single-occupancy room with an ensuite that is not shared, designed to prevent the spread of airborne infectious agents.

The room maintains a negative pressure gradient, ensuring that air flows into the room from adjacent areas, such as corridors.

This airflow design prevents contaminated air from escaping the room, thereby minimising the risk of transmission to others.

The patient room is strongly negatively pressured relative to the corridor. When the door is opened, air from the corridor is drawn into the room, ensuring that no airborne organisms escape into surrounding areas.

Use and operation of Class N (negative pressure) isolation rooms

Class N isolation rooms are used for patients who require airborne infection isolation, such as those with varicella (chickenpox), measles, or pulmonary/laryngeal tuberculosis.

These rooms operate with a negative pressure air handling system, meaning the air pressure inside the room is lower than in adjacent areas (for example, anterooms and corridors). This ensures that air flows into the room, preventing the escape of airborne pathogens.

For new facilities, Class N rooms should be designed with a single-pass ventilation system, where air is not recirculated through other parts of the building.

Exhaust air should be discharged to the outside, away from air intakes and areas occupied by people.

In existing facilities where external exhaust is not feasible, recirculated air must pass through high-efficiency particulate air (HEPA) filters to remove airborne contaminants.

To maintain the integrity of the negative pressure environment, the door to the isolation room must always remain closed.

Procedural areas such as bronchoscopy rooms and sputum induction rooms may require similar negative pressure air handling systems.

Table 31 Reference guide - Air changes per hour (ACH) and time required for removal efficiencies of 99.9% of airborne contaminants

Air changes per hour (ACH)	Minutes required for removal 99% efficiency	Minutes required for removal 99.9% efficiency
2	138	207
4	69	104
6	46	69
8	35	52
10	28	41
12	23	35
15	18	28
20	14	21
50	6	8

Source: CDC Guidelines for Environmental Infection Control in Health-Care Facilities (2003).

Hand hygiene

Hand hygiene is an important aspect of airborne precautions. Hand hygiene must be performed before donning PPE, after doffing PPE, between glove changes and before donning clean gloves.

Personal protective equipment (PPE)

The recommended respirator for routine care of patients requiring airborne precautions is a particulate filter respirator (also known as a P2 or N95 mask). In the healthcare setting, this most commonly relates to the disposable filtering half-face respirator. Disposable P2/N95 respirators can filter out very fine particles (less than 0.5 microns) from the air when worn correctly. The P2 respirator must have a filter efficiency of at least 94% when tested for particles at 0.2 to 2 microns. Eye protection is also recommended for patients on airborne precautions. The need for below neck PPE (apron/gown and gloves) should be risk assessed by Health workers, for example, a health workers' potential for exposure to blood or body substances, contamination of clothing or level of contact with the patient.

Particulate filters are classified and marked as P1, P2 or P3, with P3 providing the highest level of protection. However, P3 protection can only be achieved if the P3 filter is used in a full-face respirator. The filtration efficiency is calculated as follows:

- P1 = 80% filter efficiency
- P2 = 94% filter efficiency
- P3 = 99% filter efficiency.

Surgical and standard P2/N95 respirators

There are two types of P2/N95 respirators, surgical and standard:

- Surgical P2/N95 respirators are fluid resistant (check manufacturer instructions on fluid resistance on the package)
- Standard or non-surgical P2/N95 respirators are not fluid resistant.

Use a surgical P2/N95 respirator when:

- Performing tasks such as surgery where health workers may be exposed to high pressure streams that produce particles of blood or body fluid
- Providing care for patients in airborne precautions.

Standard P2/N95 respirators can be used for dry airborne situations such as caring for patients with suspected or confirmed tuberculosis, measles, or chickenpox. Standard P2/N95 respirators can be used together with a face shield, surgical mask, or a visor (these additions must be approved by the product manufacturer) if fluid resistance is required. For more information refer to the TGA Guidance on Personal Protective Equipment for Health Professionals.

Reusable respirators (respirators that can be used multiple times after appropriate reprocessing in-between use) are an alternative to disposable respirators for some clinicians who require respiratory protection in select situations. For more information refer to the Respiratory Protection Program Manual.

When providing care for patients requiring airborne precautions health workers are to wear a P2/N95 respirator and eye protection on entering the patient's zone. P2/N95 respirator requires a proper face seal, and all health workers are to be instructed on how to fit check a P2/N95 respirator. Health workers are to fit check (user seal check) at point of use every time a respirator is used. Refer to the donning and fit checking of P2/N95 respirators in NSW healthcare settings video series available through HETI My Health Learning (course code: 319438161) for more information.

Fit testing is a validated process of determining the type and size of a respirator that achieves an adequate seal on an individual's face. Health Organisations are required to implement respirator fit testing in their facilities for health workers routinely providing clinical care to patients in airborne

precautions (for example, for pulmonary or laryngeal tuberculosis) or patients with respiratory communicable diseases including COVID-19. For more information refer to the CEC Respiratory protection program.

Application of PPE

Heath workers are to conduct a risk assessment:

- Before entering a room or patient zone where a patient is in airborne precautions - perform hand hygiene and a risk assessment on the need for below neck PPE (apron/gown and gloves). For example, duration and type of patient contact or contact with blood or body substance (as per standard precautions)
- The choice of wearing a fluid resistant apron or gown is based on a risk assessment around the level of contact to blood and body substance exposure
- Whether an apron or gown is worn, it should be changed between contact with patients or their environment
- Select appropriate P2/N95 respirator based on your fit test and fit check prior to entering the patient zone
- Apply eye protection prior to entering the patient zone
- After entering room or patient zone, perform hand hygiene and risk assess the need for gloves, for example, contact with blood or body substance. Change or remove gloves (if worn) and perform hand hygiene in-between dirty and clean tasks
- The use of gloves is recommended as part of standard precautions to reduce the risk of contamination of health workers hands when exposure to blood and body substance is expected
- Below neck PPE (apron/gown and gloves if worn) to be removed prior to exiting the room or at the exit
- Above neck PPE (P2/N95 respirator and eye protection) are to be removed and disposed of in the anteroom or outside the patient's room with door closed and perform hand hygiene
- P2/N95 respirator is not recommended for patient use. Place a surgical mask on the patient (if tolerated) when outside of the isolation. P2/N95 respirators are not recommended for patients due to:
    - Fit and seal requirements: P2/N95 respirators are only effective when properly fitted, which is not feasible for most patients
    - Comfort and tolerance: These respirators are less comfortable and harder to tolerate, especially for patients with respiratory distress or cognitive impairment.
    - Clinical prioritisation: P2/N95 respirators are prioritised for healthcare workers performing aerosol-generating procedures or working in high-risk environments

Patient transfer

When transferring patients under airborne precautions:

- Transport patients on their own when transferred in patient transport vehicles
- If the patient can tolerate wearing a surgical mask, this should be worn when outside of the isolation zone (including transport, outpatient and emergency settings) (117-120)

- If patients require oxygen therapy and the medical condition allows this, change to nasal oxygen for the transport or transfer period with a surgical mask over the nasal prongs.

Signage

Signage is an important reminder that improves adherence to precaution requirements for patients, health workers and visitors. The signage needs to provide clear instructions on the specified transmission-based precaution, requirements for entering and exiting the room, required PPE and advice for visitors on the importance of checking with health workers on any specific requirement before entry to patient zone.

Visitation

Prior to entering the patient's room, the health worker caring for the patient is to explain the transmission risk and educate the visitor, carers, and participants in care on ways to prevent transmission of microorganisms, for example, wearing a mask or respirator for respiratory precautions when entering the room.

When vising patients under airborne precautions:

- Visitors are recommended to wear a surgical mask
- P2/N95 respirators may be an alternative but must be accompanied with training and fit checking with the assistance of a health worker. P2/N95 respirators require a proper seal to the face and instruction should be given on how to perform a fit check. This should include a demonstration of donning, removing, and disposing of PPE in addition to hand hygiene
- Visitors with chronic respiratory, cardiac, or other medical conditions that make breathing difficult should check with their healthcare provider before using P2/N95 respirator because the P2/N95 respirator can make it more difficult for the wearer to breathe
- Consideration should be given to limit visitation by providing alternatives such as virtual visits where possible and practical for those visitors requiring high levels of protection (also immunocompromised).

Other considerations

Depending on the microorganism, disinfection may be required in addition to cleaning of patient care areas. There is a required time for removal efficiencies of 99.9% of airborne contaminants between room occupancy depending on the air exchange within the room (refer table 31, the standard minimum air changes per hour for a negative pressure room ≥12). P2/N95 respirator should be worn by all health workers entering these rooms until terminal cleaning is completed and until the time period has elapsed (Ijaz et al., 2016).

Use of split system air-conditioning units should be avoided in patient care areas. If use of such units is unavoidable, the effects on air flow into or within common spaces (for example, shared rooms or corridors) should be considered, and a schedule for maintenance and filter changes should be in place. For more information optimising ventilation and ensuring that air conditioning systems are maintained to minimise the risk of microorganism transmission refer to Engineering Services Guide and Safety Information 009/21 Recirculating air filtration device use in NSW hospitals.

6.3.3 Combined transmission-based precautions

In some instances, patients may require a combination of precautions in addition to standard precautions when individual precautions are not enough to reduce the risk of transmission of some communicable diseases such as high consequence infectious diseases (HCID) viral gastroenteritis or chickenpox. For more information refer to NSW Health Infectious Diseases.

Refer to My Health Learning (course code: 294450660) for PPE donning and doffing videos.

Table 32 PPE selection guide

Precautions	Hand hygiene	Surgical mask	P2/95 respirator	Eye protection	Gown/apron	Gloves
Standard	✓	Risk assessment				
Contact	✓	Risk assessment				
Droplet	✓	✓		✓	Risk assessment	
Airborne	✓		✓	✓	Risk assessment	
Combined D+C	✓	✓		✓	Risk assessment	
Combined A+C	✓		✓	✓		
For HCID refer to High Consequence Infectious Diseases – Infection Prevention and Control Principles Guideline.						

6.3.4 Airborne precautions during sputum-inducing procedure

Sputum induction is a procedure used for patients who have trouble producing sputum spontaneously. The patient inhales nebulised hypertonic saline solution, which liquifies airway secretions, promotes coughing, and allows expectoration of respiratory secretions.

If a sputum-inducing procedure is being performed, such as sputum induction, chest physiotherapy or bronchoscopy on a patient suspected or confirmed to have pulmonary tuberculosis, then all health workers in the room should don a P2/N95 respirator and eye protection, including standard precautions.

Sputum inducing procedures should be performed in a Class N (negative pressure) room (or sputum induction booth). The patient should remain in the Class N room or booth until coughing subsides. Other patients and health workers not wearing P2/N95 respirators should not enter the Class N room or booth until enough time has passed for a sufficient number of air exchanges to occur for adequate removal of contaminated air (refer to table 31 for ACH). Consult with facility engineers to determine the air changes per hour for each room/booth. For more information on refer to the Thoracic Society of Australia and New Zealand position statement: The safe clinical use of

sputum induction for bio-sampling of the lower airways in children and adults and AusHFG Isolation Rooms - Engineering and Design Requirements.

6.4 Transmission-based precautions in community and oral health settings

Patients presenting with an acute transmissible infection to community or oral health clinics can place health workers and other visitors at risk. As the ability to isolate the patient may be challenging, perform a risk assessment to determine alternative measures to mitigate the risk such as risk assessment of patient presenting for non-urgent treatment with acute respiratory infection, rescheduling of non-acute patients or visiting the patient in their home.

If patients are to attend oral health settings as an emergency, ensure health workers are competent in donning and doffing PPE and transmission-based precautions for the suspected/ confirmed infectious diseases.

Compliance with standard and transmission-based precautions, including hand hygiene, cleaning of shared equipment and the patient zone after each patient, and disposal or reprocessing of instruments after each procedure, will reduce the transmission of infections and multi-drug resistant organisms. The Health Organisation should ensure that patients and carers have access to hand hygiene resources and are enabled to clean their hands before and after appointments. For more information refer to NSQHS Standards Guide for Private Dental Practices.

6.5 Supporting bed allocation and patient flow

Bed allocation or patient flow for patients with a known or suspected communicable disease or a multi-drug resistant organism (for example, COVID-19, influenza, tuberculosis, varicella zoster or carbapenemase-producing *Enterobacterales*) can be complex, requiring careful planning to ensure the most suitable ward and bed placement. To ensure the safe and timely placement of a patient, decisions should be made in conjunction with the patient flow team and local Infection prevention and control service wherever possible in business hours, with local procedures for after hours.

Reducing unnecessary movement of patients within a hospital can help to reduce:

- the number of high-risk contacts if a patient has a communicable disease or infection.
- the risk of patient disorientation and adverse outcomes.

6.5.1 Risk assessment and risk mitigation process

Patient placement needs to consider the principles of infection prevention and control hierarchy of controls as part of any risk mitigation process. Prioritisation of single rooms for isolation or for other important uses beyond the management of infectious diseases, such as providing end-of-life care, falls risk, patient vulnerability to communicable diseases (for example, immunocompromised) or ensuring appropriate patient security and safety should be embedded in the decision-making process. Where possible, patient rooms including isolation rooms need to be allocated to minimise any additional unnecessary movement of patients during their admission.

Patients must be promptly assessed for infection risk on arrival at the care area (if possible, prior to accepting a patient from another care area) and this should be continuously reviewed throughout their stay. Patient placement decisions should be based on risk assessment which should consider the route of transmission of the organism or infection, alongside patient factors and symptoms that increase the risk of transmission. These principles should be applied in the emergency department (ED) and ward areas, including outpatient areas. Assessment should include the potential infection,

route of infection transmission and potential spread of infection, risk factors associated with exposure to blood and body substances, and spatial considerations.

On arrival, patients must be promptly assessed for infection risk at the care area (if possible, prior to accepting a patient from another care area) and this should be continuously reviewed throughout their stay. Refer to Table 33.

Any 'yes' responses should warrant patient placement consideration for isolation/single room or appropriate cohorting.

Table 33 Risk assessment guide for patient placement (example)

Risk	Yes	No	Comment
Are there new symptoms of cough, unexplained fever, rash and/or diarrhoea?	☐	☐	
Has there been any travel in the past 21 days outside their usual environment? If yes, review risks of infection.	☐	☐	
Has there been overseas hospitalisation (including day procedures such as dialysis) in the past 12 months	☐	☐	
Are there additional precautions (droplet, contact, airborne) in place?	☐	☐	
Is there known colonisation or infection with an MRO with wet symptoms?	☐	☐	
Is there known contact with someone with CPE or *Candidozyma auris*?	☐	☐	
Is there known contact with ARI or COVID-19 in the past 10 days.	☐	☐	
Is the patient mobile/ambulatory and are they capable and willing to perform hand hygiene and practice respiratory etiquette?	☐	☐	
Does the patient present as vulnerable?	☐	☐	

6.5.2 Prioritisation of single rooms or isolation rooms

Patients with an acute respiratory infection (ARI) should be managed with transmission-based precautions (either airborne or droplet) and standard precautions. The absence of results should not delay the implementation of transmission-based precautions or bed movement. Risk assessment and local procedure should determine the bed allocation.

Appropriate infection prevention and control strategies can be implemented in ward areas, including the emergency department. Test results are primarily used for patient management, such as commencing or ceasing antimicrobial therapy, but may also inform the most appropriate infection prevention and control strategies.

A single-bed room with ensuite should be considered as a minimum for patients on airborne precautions and is preferred for patients on droplet and contact precautions. The ongoing need for isolation should be reassessed based on transmission or infectious period and patients' clinical signs and symptoms.

Local risk assessment should determine the appropriate room placement considering any other patient safety risks (for example, falls risk, other co-morbidities or mental health).

When single-bed rooms are limited, prioritisation should be for patients who have conditions that increase the risk of infection transmission to other patients (for example, draining wounds, stool incontinence or uncontained secretions) and those who are at increased risk of acquisition and adverse outcomes resulting from a healthcare associated infection (HAI) (for example, immunosuppression, open wounds, invasive devices, anticipated prolonged length of stay, total dependence on health workers for activities of daily living and new or emerging organism of significance).

Placing a patient in isolation may increase the risk of stress, depression, or anxiety. Where isolation is required, the reason for isolation should be clearly explained to the patient and their carers to minimise these risks.

A decision to isolate the patient should be made carefully after consultation with treating clinicians and the infection prevention and control service and/or an infectious diseases (ID) team and be regularly reviewed. The reason for isolation must be documented in the patient's healthcare records and reviewed by the infection prevention and control service.

Where a patient's presentation involves acute gastrointestinal symptoms/infection (vomiting, diarrhoea); acute respiratory infection, acute skin infection or infestation, a single room with own bathroom is the preferred room allocation for these patients, if available.

The following order of prioritisation should be considered with all patient allocations:

1. airborne precautions – priority access to negative pressure room with or without anteroom, followed by isolation rooms that may be 100% exhaust or negative airflow. Where these category of isolation rooms are not available use a single room with door closed and dedicated bathroom facilities
2. droplet precautions – single room where available (for example, acute respiratory infections)
3. contact precautions – transmission risk assessment to be conducted (for example, wet contact – diarrhoea, vomiting, open wound).

Table 34 Patient placement priority guide

Priority	Disease or presentation	Precautions including standard precautions	Isolation management
FIRST	High consequence infectious disease (HCID)*	Airborne + Contact	Negative pressure room
	Respiratory viruses of concern, for example, Middle East respiratory syndrome coronavirus (MERS-CoV)	Airborne + Contact	
	Measles	Airborne	
	Pulmonary/ laryngeal tuberculosis	Airborne	

	Chickenpox/disseminated varicella zoster virus	Airborne + Contact	
	Disseminated herpes zoster	Airborne	
	Candidozyma auris	Contact	Single room with own bathroom
	Respiratory AGPs on patients with ARIs	Airborne	Single room with doors closed (negative pressure if available). Own bathroom
	COVID-19 suspected or confirmed	Airborne	
	Neutropenia and transplant recipients	Protective precautions and isolation	Place in single room with own bathroom** Note: neutropenic patients usually placed in Class P (positive pressure) rooms: assess infectious status
SECOND	Influenza	Droplet	Single room
	Pertussis	Droplet	
	Meningococcal disease (first 24 hours of antibiotics)	Droplet	
	Mumps	Droplet	
	Norovirus	Droplet + Contact	
	ARIs including human metapneumovirus, parainfluenza, RSV	Droplet	Single room where available
THIRD	Clostridioides difficile infection (with active diarrhoea)	Contact	Single room with own bathroom where available or dedicated bathroom facility
	Infectious diarrhoea†, vomiting including norovirus	Contact + Droplet	
	Carbapenem-resistant organisms (for example, carbapenem-resistant Enterobacterales)	Contact	
FOURTH	Other multi-resistant organisms as designated by your facility (for example, MRSA, VRE)	Contact	Single room where available with own bathroom. For cohorting: dedicated bathroom or designated commode. Cohorting can occur in this category (VRE, MRSA).
	Scabies	Contact	

	Herpes Zoster (localised & uncovered)	Contact	Single room where available with own bathroom

*For more information, refer to NSW Health Guidelines for management of specific high consequence infectious diseases.
**May consider cohorting with same transplant patients based on local risk assessment
† Some types of infectious diarrhoea only require contact precautions.
Note: protective precautions may apply to vulnerable patients.

6.5.3 Patient placement in a cohort or mixed inpatient area

Where single rooms are not available or where the demand for single rooms for management of patients with same communicable or infectious microorganisms is unable to be met, cohorting patients with the same confirmed microorganism may need to occur. This includes settings such as ED.

A cohort area is a bay, 2-4 bedded room or a ward in which a group of patients (cohort) with the same infection are placed together. Cohorting areas are created based on clinical diagnosis, microbiological confirmation when available, epidemiology, and mode of transmission of the infectious microorganism.

A decision to cohort patients should be made based on infection prevention and control principles and where possible in consultation with treating clinicians and the infection prevention and control service and/or an ID physician. If placement in mixed gender accommodation is being considered, refer to the NSW Health Same Gender Accommodation policy directive.

In lower risk areas such as rehabilitation units, long term care settings, outpatient day treatment settings or patient transport services, a risk assessment should be undertaken to establish the level of risk and benefit to patient treatment.

Where awaiting pathology results, patients should be cohorted based on the symptomatology and risk assessment. However, patients not yet confirmed (suspected) should not be cohorted together with confirmed infections.

Patients screened for respiratory viruses, viral/infective gastroenteritis, or airborne diseases (based on symptomatology and period of infectivity for the causative organism) need to be isolated immediately until negative test results are available. When allocating beds the following are to be considered:

- Patients who are identified as close contacts of positive COVID-19/ acute respiratory infection (ARI) should not be cohorted with unexposed patients
- Patients who are identified as close contacts of positive COVID-19/ARI should be risk assessed for differing exposure times/dates before being cohorted together as their infection risk period may vary.

Patients screened for multi-resistant organisms (except *C. auris*) can remain in their allocated bed with appropriate precautions applied at the patient bedspace until results are available.

When single rooms with dedicated toilets are not available, a dedicated commode (where practical and feasible) should be assigned. Cleaning and disinfection of patient care items and surfaces is essential where shared equipment or environments are used.

Key considerations when allocating a bed space or moving a patient with suspected or confirmed communicable or infectious microorganisms:

- Refer to local guidelines or procedure when allocating beds

- Isolation should not compromise care provision including any clinical or diagnostic procedures. Consider the patient acuity and care needs including wandering, cognitive impairment, or other risk factors (falls risk) for patients requiring isolation
- Risk assessments should consider patient factors and bed availability and done in consultation with the patient flow team and local infection prevention and control/ID
- Does the patient move create additional bed capacity or reduce capacity temporarily "closing" beds
- The decision needs to consider other important uses beyond the management of infectious diseases, such as falls risk, providing end-of-life care, or ensuring appropriate patient security and safety
- Conversations with patients, families and carers about the risks and benefits of the bed move should be ongoing. Placement into an isolation or cohorting area should occur early and documented in the clinical record.

6.5.4 Patient placement during an outbreak

During an ARI (including COVID-19) or any other communicable/infectious microorganism outbreak or pandemic, designated areas or zones may be considered and are divided into different patient zones. Refer to Table 35 as an example of what you may include when managing an ARI outbreak in a health facility.

Table 35 Example of patient zoning

Zone	Description
Red	For patients with a confirmed diagnosis, for example, COVID-19, MRO
Amber	For patients with a suspected ARI/MRO or high-risk contacts
Green	For patients who are cleared of relevant ARI/MRO nor are a contact
Blue	For staff only

The organisation of zones depends on factors such as:

- Physical building space
- Availability of single or shared rooms in a specific area
- Ability of patients to be relocated
- Staffing capacity
- Number of suspected or confirmed ARI or other infectious cases
- Acuity of positive cases
- Number of contacts
- Clinical condition and vulnerability of patients
- Access to bathrooms, toilets, and utility rooms.

6.6 Staffing

Risk assessment should consider the appropriate allocation of health workers. This may involve dedicating health workers to specific patients or cohort groups.

Where this is not possible, adherence to hand hygiene, standard and transmission-based precautions is essential to reduce the risk of transmission of infection.

All health workers need to be vigilant for symptoms suggestive of ARI including COVID-19 or other transmissible infections. If symptoms occur, staff need to notify their manager as soon as practicable and follow local procedures.

Health workers are to be provided with necessary resources, time to practice correct precautions and donning and doffing of PPE to enable adherence to transmission-based precautions.

6.7 Discontinuing isolation

Individual patient risk factors should be considered (for example, there may be prolonged shedding of certain microorganisms in immunocompromised patients) along with clinical judgement before discontinuing isolation. Clinical and molecular tests to show the clearance of microorganisms may also be considered in consultation with health workers involved in the patient care and infection prevention and control team before making the decision regarding isolation discontinuation.

6.8 Vulnerable patients, protective precautions and isolation

Vulnerable patients requiring protective precautions are a priority for isolation.

There are specific patient groups for whom isolation may provide protection from infection. The following groups of patients would be considered as vulnerable and may require protective isolation:

- Any patient whose blood neutrophil count falls below or is expected to fall below 0.5 x109/L as a result of chemotherapy
- Patients receiving haematopoietic stem cell transplant, particularly allogeneic transplants
- Patients with extensive skin loss due to burns or trauma
- Patients within 6 months of a solid organ transplant
- Preterm babies.

Also refer to Infection prevention and control Guidelines for Management and Assessment of Acute Respiratory Infection (Flow chart) for further information.

6.9 Novel respiratory viruses

Ongoing surveillance in non-human species for novel respiratory viruses such as highly pathogenic avian influenza will provide an early warning of a potential threat to humans. If there are cases of highly pathogenic avian influenza (HPAI) in humans, these patients should be managed under airborne precautions until the risks of transmission are further detailed.

6.10 Health worker education

Health workers are to be provided with regular and ongoing education, based on local needs, on transmission-based precautions risk assessment, implementation, and explanation on the importance of why specific processes are followed. Providing justification on the risk associated with transmission of infection will improve compliance, retain information on infection prevention strategies including PPE donning and doffing, thus reduces any potential errors. Additionally,

education on HAIs will better inform health workers on appropriate precautions to adopt, enable them to provide accurate information to patients, and further reduce their own anxiety around self-protection. Education resources are available via the My Health Learning platform.

6.11 Transmission-based precautions and patient experience

Transmission-based precautions may potentially negatively impact on the patient's journey. As part of transmission-based precautions patients may be isolated in a single room, this may be an uncomfortable experience for some patients. Single room accommodation has been linked to adverse events such as patient falls, medication errors, batching of care and reduction in the frequency from health workers attendance (Uchmanowicz et al., 2024, Purssell et al., 2020). In some cases, patients may have experienced stigmatisation, increased negative feelings and anxiety (Fregonese et al., 2023).

When providing care to patients on transmission-based precautions health workers are to:

- discuss with patients the need for isolation in preparation and ideally prior to moving and be available to answer their concerns
- reconsider the need for isolation on a regular basis
- provide written information (fact sheet) on their infectious disease
- regularly check on patients' clinical condition
- treat patients with a positive and supportive attitude
- ensure the food and beverage needs are met
- refer to support services such as chaplaincy, cultural or religious leaders as required
- ensure the physical environment supports the mental health needs of the patient
- educate family and visitors about appropriate behaviour and what is expected of them when visiting, such as, do not visit if they are unwell, not to visit other patients and if using shared amenities ensure to perform hand hygiene before and after.

6.12 Recirculating air filtration device use

Portable air filtration devices, also known as air cleaners and often equipped with HEPA filters, are increasingly promoted for enhancing indoor air quality in hospitals and reducing the spread of airborne respiratory infections, including COVID-19. These units do not provide fresh air; instead, they recirculate existing indoor air while removing particulate matter. The responsibility for supplying fresh air continues to lie with mechanical or natural ventilation systems (ACSQHC Optimising ventilation for infection prevention and control in healthcare settings).

Evidence Summary

Current research on the routine use of portable air filtration devices remains inconclusive. While laboratory and environmental studies have demonstrated that these devices can reduce airborne particle concentrations, including aerosols, there is no direct evidence from randomized controlled trials (RCTs) showing a reduction in human-to-human transmission of COVID-19 or other respiratory viruses (Landry et al., 2021, Alvarenga et al., 2023, Kek et al., 2023).

A recent scoping review of their use in healthcare settings found that, although portable air cleaners can lower aerosol levels, there is limited evidence linking this to decreased transmission of infectious diseases. The review highlights the need for more rigorous studies to establish a definitive

connection between environmental virus removal and clinical infection prevention (Alvarenga et al., 2023).

Filtration is an effective technology for reducing airborne pathogens within room air, however this reflects an absence of environmental contamination and not necessarily a clinical benefit in preventing infection (Thottiyil Sultanmuhammed Abdul Khadar et al., 2023, Obitková et al., 2024).

Most existing studies are observational in nature, depend on surrogate outcomes such as air quality or particle counts, and often lack rigorous control conditions. Due to these limitations, the evidence does not currently support recommending the widespread use of portable air cleaners in well-ventilated clinical settings (Alvarenga et al., 2023).

The (World Health Organization, 2021) recommends the use of these devices only in settings where mechanical ventilation is inadequate and not as a supplement to environments with effective ventilation.

Guidance from international bodies

The World Health Organization (WHO) recommends portable air filtration only when:

- A minimum of six air changes per hour (ACH) cannot be met, and
- Other ventilation improvements are not possible or optimal.

The U.S. Environmental Protection Agency (EPA) emphasises that:

Air cleaning may be useful when used along with source control and ventilation, but it is not a substitute for either method.

Context in modern healthcare facilities

Most contemporary hospital environments meet or exceed six ACH (NSW Health GL2023_009 Engineering Services), aligning with WHO guidance.

Many older facilities may rely on natural ventilation and may require assessment for adequacy.

Recommendations

1. **Evidence-informed use**

Portable filtration devices should only be considered if expert assessment of ventilation performance shows it does not meet current standards.

2. **Technical specification and implementation**

Devices should be equipped with both a dust filter and a HEPA filter and must not emit ozone or other chemical pollutants. Ideally, they should also include a pre-filter to help extend the lifespan of the main filters. Selected models should feature filters with a minimum lifespan of 12 months and be fitted with alarms for both the pre-filter and HEPA filter, indicating when replacement or maintenance is needed.

Other considerations include:

- Where the device is to be placed for optimal air circulation
- Consumables and maintenance with device verification and service level agreement at installation and at each filter change
- Noise levels (devices should operate at a sound level of < 50 dB at 3m)
- Availability of spare parts
- Electrical safety.

While portable air filtration devices may offer supplemental benefits, they are not a substitute for adequate ventilation. Their use should be strategically justified, technically assessed, and embedded within a broader infection prevention strategy.

Multidisciplinary consultation

Prior to purchasing or deploying air filtration devices, consultation is strongly recommended with:

- Facility engineers/ maintenance team
- Work Health and Safety (WHS) advisors
- Infection prevention and control team

This collaborative approach ensures that all considerations are outlined are fully addressed.

Operational considerations

When introducing recirculating air filtration devices, Health Organisations are to address practical and safety-related operational issues, including:

- Ensuring that filter changes are not performed in clinical areas
- Implementing a ‘safe change’ procedure, in line with existing protocols for routine filter replacement, to prevent contamination risks during maintenance and cleaning.

There is no current high-level evidence that recirculating air filtration devices reduce transmission of respiratory infections including COVID-19 in healthcare settings. Their use should be limited to environments with inadequate ventilation, and decisions to deploy them must be supported by technical assessments, operational planning, and interdisciplinary consultation.

Chapter 7 Management of multi-drug resistant organisms

7.1 Introduction

Multi-drug resistant organisms (MROs) and antimicrobial resistance (AMR) are major and urgent global public health threats. In 2019, AMR was associated with an estimated 4.95 million deaths, disproportionately in low and middle-income countries and an evolving threat that challenges the effectiveness of existing treatments (World Health Organization, 2024c). Patients infected with an MRO often require increased length of stay in hospital and additional diagnostic testing and treatment. Healthcare associated infections (HAIs) with an MRO are an additional cost for the patient and the healthcare system (National Health and Medical Research Council, 2019a).

MROs are defined as microorganisms, predominantly bacteria, that are resistant to one or more classes of antimicrobial agents. Some of the important pathogens for infection prevention and control include but are not limited to:

- Methicillin-resistant *Staphylococcus aureus* (MRSA)
- Vancomycin-resistant *Enterococci* (VRE)
- Carbapenemase-producing Organisms (CPO)
- Carbapenemase-producing *Enterobacterales* (CPE)
- *Candidozyma auris (C. auris)*
- Ceftriaxone resistant enteric gram-negative bacilli.

For more information refer to Australian Commission on Safety and Quality in Healthcare National Alert System for Critical Antimicrobial Resistances (CARAlert).

Antimicrobial resistance occurs when bacteria, viruses, fungi, and parasites no longer respond to antimicrobials. As a result, infections become difficult or impossible to treat which increases the risk of disease spread, severe illness, disability, and death. Resistance occurs over time and is accelerated by human activity, mainly the misuse and overuse of antimicrobials to treat, prevent or control infections in humans, animals and plants (World Health Organization, 2023). For information on refer to Australian Government Antimicrobial Resistance – Surveillance of antimicrobial use and resistance in human health.

Tackling AMR in human health necessitates global efforts (World Health Organization, 2024c) focused on several key areas:

- robust infection prevention and control measures
- ensuring equitable access to diagnostics and treatment
- vigilant surveillance to detect emerging trends in AMR
- substantial investment in research and development for the creation of new medicines, diagnostics, and prevention tools.

Infection prevention and control and antimicrobial stewardship (AMS) are important elements in the fight against AMR. AMS is a systematic approach to educate and support healthcare professionals to follow evidence-based guidelines for prescribing and administering antimicrobials (World Health Organization, 2023). Health Organisations are to develop and implement AMS (one of the most cost-effective interventions) to optimise the use of antimicrobials, improve patient outcomes and reduce AMR and HAIs. In addition, application of infection prevention and control principles based on the modes of transmission of microorganisms and knowing how and when to apply is critical. To minimise MRO transmission and infection, health workers are to ensure that infection prevention and control principles, including standard and transmission-based precautions and AMS are

applied. Local risk assessments should be conducted to assess the specific infection prevention measures required for the management of patients that are colonised or have an infection with an MRO.

7.1.1 Summary of MRO prevention strategies

The level of risk and specific type of MROs will differ between facilities, but all health services need to consider the risks of transmission of MROs and implement infection prevention and control strategies according to their specific circumstances. Each local health district/specialty networks should conduct its own risk assessment, identify and manage patients colonised or infected with MROs (Department of Health Victoria).

An MRO prevention strategy has the following components:

- Surveillance and reporting of MRO acquisition across a facility/network
- Strategies to identify, screen and risk manage potentially infected/colonised patients
- Strategies to reduce the burden of the disease (decolonisation and/or chemoprophylaxis; public health interventions in communities)
- Strategies to reduce person-to-person transmission, including infection prevention and control measures such as standard precautions (hand hygiene, personal protective equipment, cleaning, disinfection) and enhanced infection prevention and control measures (transmission-based precautions, cohort formation, isolation, screening, environmental sampling).

7.2 Risk factors for MRO acquisition

The following are risk factors for MRO acquisition:

- Overseas travel and accessing healthcare outside Australia
- Previous and/or prolonged hospitalisation, including in Australia
- Antimicrobial treatment, particularly prolonged and/or broad-spectrum exposure
- Comorbidities (for example, acquisition of other MROs, chronic wounds, chronic liver disease, immunocompromise including hematopoietic cell transplant, cerebrovascular disease)
- Invasive procedures (exposure to medical devices, ICU admission, mechanical ventilation, dialysis, or endoscopy within the last three months)
- Transfers between healthcare facilities with known outbreaks within Australia.

7.3 Strategies to prevent MRO transmission

Strategies should include implementation of quality improvement strategies, infection prevention and control measures, surveillance, monitoring, auditing and reporting to the appropriate clinical governance body within the organisation. The presence of a quality improvement system is essential to an infection prevention and control program and can effect change and drive continuous improvement in the prevention of infection. For more information refer to NSQHS Preventing and Controlling Infections Standard and NSW Aboriginal Health Plan 2024-2034.

7.3.1 Standard precautions

Standard precautions are to be applied to the management of all patients and the healthcare environment. For more information on standard precautions refer to Chapter 5 Risk mitigation.

As per the National Safety and Quality Health Service Standards, Health Organisations are to have a process in place to apply standard and transmission-based precautions that are consistent with the Australian Guidelines for the Prevention and Control of Infection in Healthcare.

7.3.2 Transmission-based precautions

Transmission-based precautions are applied in addition to standard precautions. The aim of transmission-based precautions is to reduce further transmission opportunities that may arise due to the specific route of transmission of a particular microorganism (National Health and Medical Research Council, 2019a). A decision to implement transmission-based precautions should be based on the type of microorganism, mode of transmission and patient risk factors including symptoms (wet or dry symptoms), vulnerability and other cognitive or behavioural factors.

Based on patient risk factors, type of MRO and level of contact, the following components of transmission-based precautions are recommended:

- Communication
  - alerts (infection prevention and control flag) in the patient record and other patient information systems
  - communication and education to patients, visitors, family and carers or participants in care
  - signage on the door/entry to patient zone consistent with the alert
  - communication of patient MRO status when care is transferred within or between service providers or facilities.
- Patient management
  - appropriate patient accommodation (single rooms with ensuite where available, or cohorting patients with the same MRO if required (refer to Chapter 6 Transmission-based precautions for more information)
  - minimising patient movement and transfer within and between facilities where practical
  - dedicated patient care equipment where practical
  - use PPE based on risk assessment
  - provision of hand hygiene and personal hygiene opportunities to patients.
- Environment
  - enhanced cleaning and disinfection of the environment and shared equipment (for example, increased cleaning of high-touch areas, use TGA approved with claims against pathogen of concern, 2-step, or 2-in-1 step cleaning and disinfection process).
- Other
  - apply precautions until the patient is discharged or clearance for the target organism has been achieved
  - process for monitoring compliance of components, feedback and any actions required (for example, audits).

7.3.3 Risk assessment on patient placement

Health Organisations should consider patient specific risk factors that may increase the dispersion of microorganisms when deciding on patient placement. The management of MROs in an acute setting may differ from settings where low acuity care is provided, or settings that may be equivalent to home based accommodation (for example, residential aged care facility).

The following patients may require transmission-based precautions:

- inability to maintain personal hygiene
- the presence of discharging wound(s) that cannot be adequately covered
- the presence of diarrhoea or faecal incontinence
- the presence of enterostomies (particularly for enteric organisms such as VRE, CPE/CPO)
- colonisation with MRSA and acute respiratory infection
- catheterised or incontinent patients with MRO colonisation of the urinary tract

- high skin shedding conditions.

Additional considerations should include the cognitive and behavioural status of patients. For example, the presence of delirium, confusion, encephalopathy and/or behaviours that may increase risk of transmission or inability to comply with directions.

Based on the risk assessment patients can:

- be cohorted with other patients with the same MRO or managed with standard precautions in consultation with infection prevention and control team and documented. Patients with different MROs are not to be cohorted
- visit hospital courtyards and public areas within hospital grounds
- use gym and therapy areas, ensuring hand hygiene before and after contact with gym equipment. Reusable equipment to be cleaned after every patient use. For specific advice on some MROs, such as CPE/CPO or *C. auris*, contact infection prevention control for advice
- MRSA colonised patients with risk factors for transmission (above) can be considered for MRSA load reduction.

In non-acute care settings, MRO patients without any risk factors for cross transmission may participate in group activities as required. Hand hygiene with alcohol-based hand rub prior to group activities or upon leaving their room location is recommended for all residents/patients whether they are known to have MRO colonisation or not. All equipment must be cleaned and disinfected before and after use.

Refer to figure 19 Patient placement guide for MRSA and figure 20 Patient placement guide for VRE below for more information (adapted from Bed Management Toolkit for infectious diseases and multi-resistant organisms, 2022, Government of South Australia).

Figure 19 Patient placement guide for MRSA

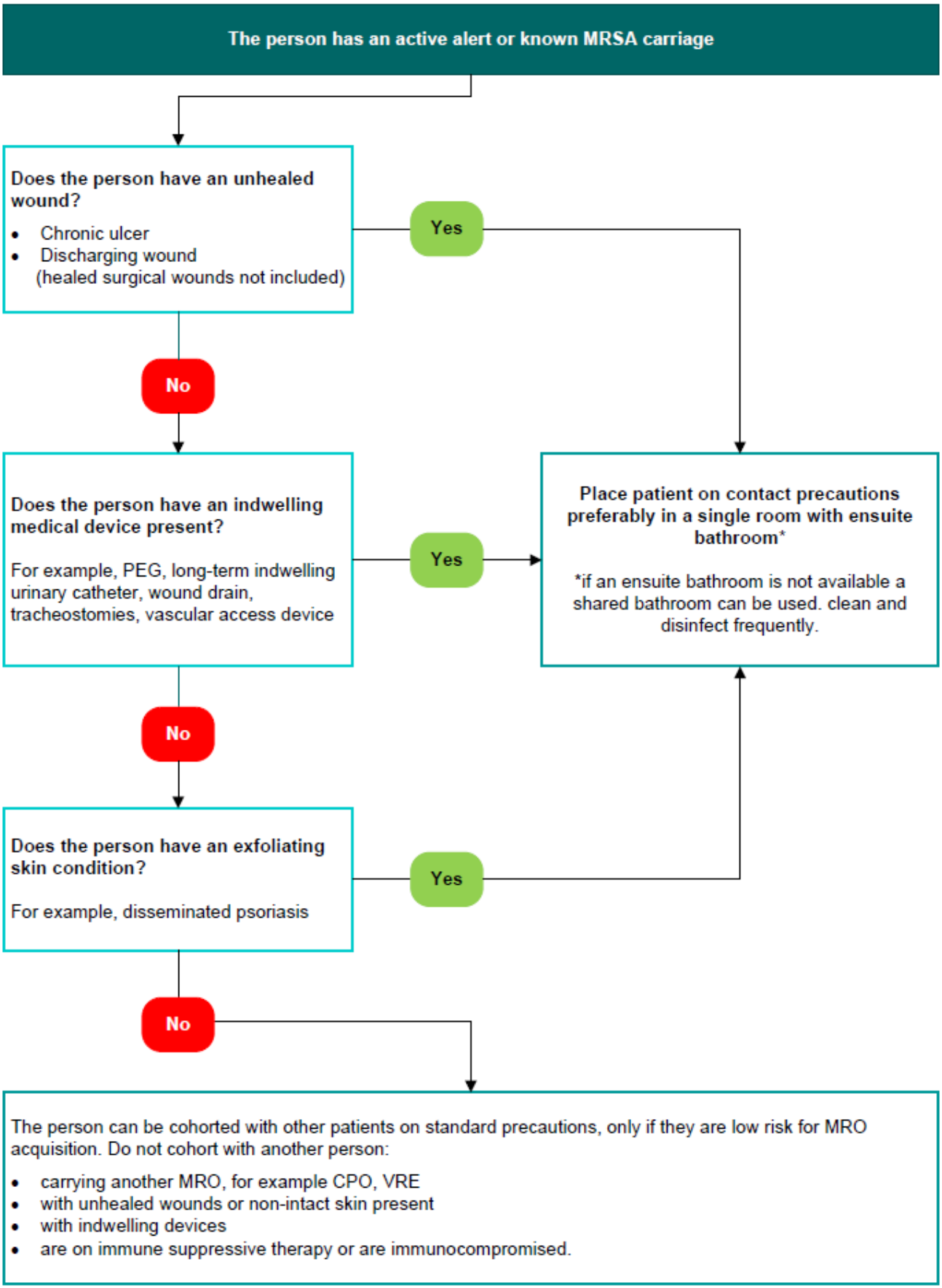
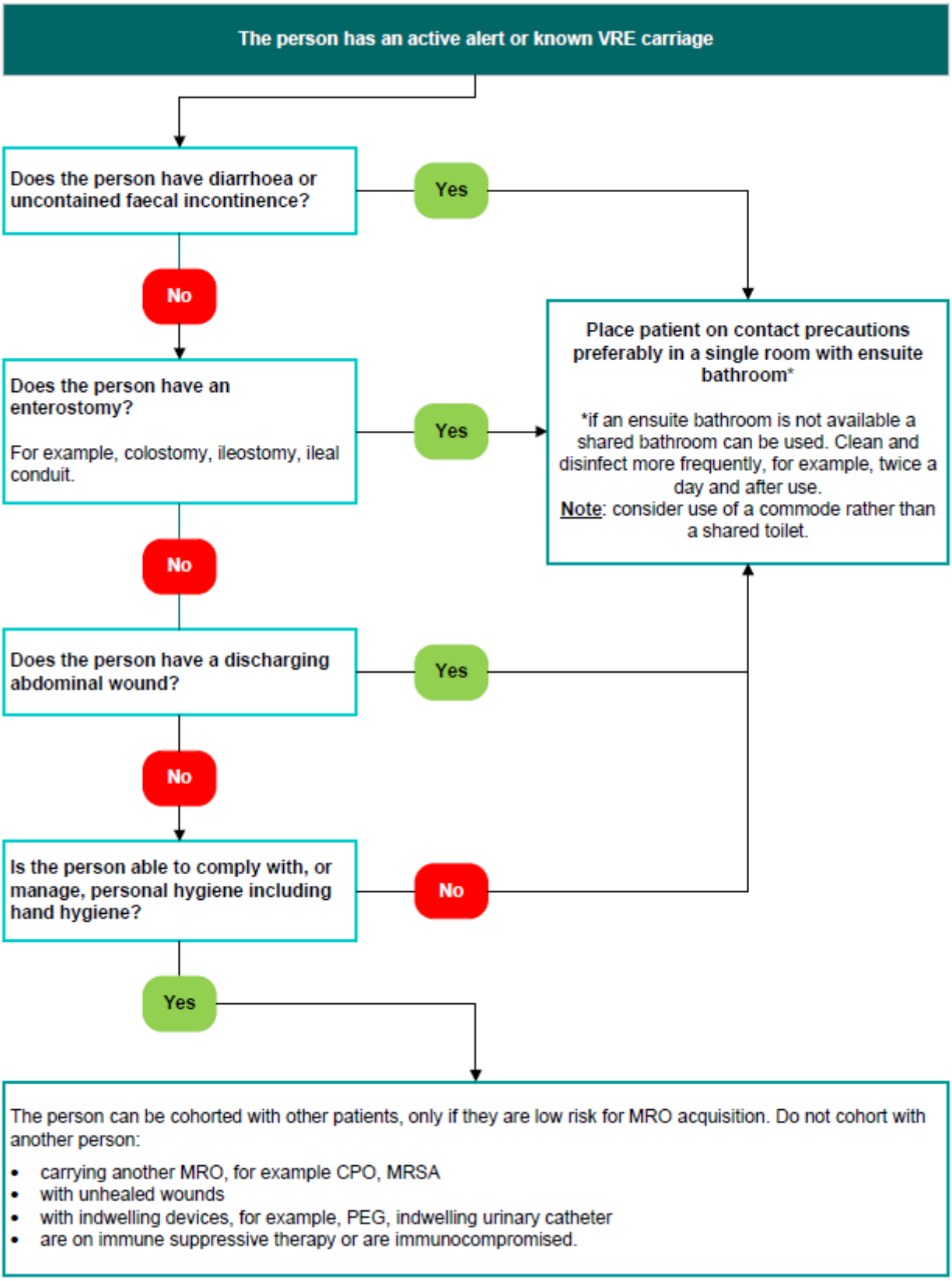


Figure 20 Patient placement guide for VRE



7.3.4 Visitors

Visitors should comply with hand hygiene requirements. Visitors to patients with an MRO should be discouraged from visiting any other patient on the same day.

Visitation should be strictly monitored until the risk is clarified. Local procedures in consultation with infection prevention and control and infectious diseases should be developed for where a parent or a carer needs to remain with the patient (due to age, cultural reasons, end of life, dementia, mental health reasons).

Visitors are not routinely required to use PPE, unless exposure to body substances is anticipated. If visitors are required to wear PPE, education must be provided on hand hygiene as well as donning, doffing and disposal of PPE.

Depending on the age of the visitor and patient's condition, a visitation risk assessment should be made in consultation with local infection prevention and control team along with open communication with stakeholders involved. The risk assessment should consider the following:

- **Infants** – Babies aged less than one year do not have fully developed immune systems. Visitation should be based on a risk assessment and discussion with relevant healthcare professionals
- **Toddlers** – If visiting should be accompanied by an adult to ensure that both the patient and the child are kept safe
- **Children aged 3 to 6 years** – Children in this age group should always visit with an adult and be always supervised.

7.4 Antimicrobial stewardship

Effective antimicrobial stewardship (AMS) promotes the appropriate use of antimicrobials, improves patient outcomes, and reduces the risk of developing antimicrobial resistance (AMR). Along with infection prevention and control, hand hygiene and surveillance, AMS is a key strategy in preventing AMR and decreasing preventable infections (ACSQH Antimicrobial Stewardship). AMS governance involves establishing systems within Healthcare Organisations to ensure the safe and appropriate use of antimicrobials. This is a crucial aspect of clinical governance and is guided by national / clinical standards. Key elements include leadership, accountability, policies, and resources. Effective AMS governance is essential for improving patient outcomes, reducing harm, and preventing antimicrobial resistance. Senior management, pharmacy and medical staff must provide leadership and support for AMS programs.

NSW Health Organisations are required to have an AMS program, policy and antimicrobial formulary restrictions that support a continuous improvement strategy to reduce inappropriate antimicrobial use and the emergence of AMR. These requirements are outlined in the National Safety and Quality Health Service (NSQHS) Standard for National Standards Preventing and Controlling Infections.

The use of antimicrobial agents to prevent and treat infections must be considered judiciously, using the six essential strategies for effective antimicrobial stewardship:

1. Providing access to and implementation of clinical guidelines consistent with current evidence and Therapeutic Guidelines. Selection of antimicrobials based on local antibiograms which reflect susceptibility patterns.
2. Ensure a formal referral service is in place for antimicrobial advice when clinically indicated or if required for use of restricted antimicrobials.
3. Review of antimicrobial prescribing with intervention and direct feedback to prescribers.

4. Implementation of point-of-care interventions to target inappropriate prescribing of antimicrobial use (for example, intravenous to oral switch, and dose optimisation).
5. Monitor performance of antimicrobial prescribing by collecting and reporting unit or ward-specific data, auditing antimicrobial use, and using the National Quality Use of Medicines Indicators for Australian Hospitals.
6. Ensure the clinical microbiology laboratory uses selective reporting of susceptibility testing results that is consistent with current endorsed Therapeutic Guidelines on antimicrobial usage and provides infectious diseases and infection prevention and control practitioners with access to susceptibility results.

The AMS Clinical Care Standard provides guidance to clinicians and health service managers on delivering appropriate care when prescribing antimicrobials. The AMS Clinical Care Standard includes eight quality statements and a set of indicators for safe and appropriate care.

Investment in education, relationships with other Health Organisations, and the provision of support networks for health workers may assist continuous improvement strategies for AMS. The effectiveness of the program should be reviewed periodically by the multidisciplinary committee that oversees AMS within the organisation. For more information refer to CEC Antimicrobial Stewardship, NSQHS Standard for Preventing and Controlling Infections and the Antimicrobial Stewardship Clinical Care Standard.

7.5 Environmental cleaning and disinfection for MROs

Environmental reservoirs for MROs are an important factor in HAI transmission. Environmental cleaning is essential in decreasing the spread of microorganisms, including MROs. Routine environmental cleaning should include cleaning of the patient environment daily, this includes frequently touched areas, surfaces and patient care equipment.

The use of disinfectants is recommended as part of terminal cleaning following an MRO or infectious disease. Routine daily cleaning and terminal cleaning are recommended for patients managed under transmission-based precautions. While employing a cleaning program the following should be considered:

- frequently touched surfaces in high-risk and extreme risk units should be cleaned at least twice daily
- for cleaning to be effective, audits of cleaning schedules and cleaning need to be undertaken regularly, with prompt feedback to key stakeholders including report to infection prevention and control committees, patient safety and work health and safety
- prompt corrective action arising out of audits as required to be escalated and reviewed at relevant committees
- functional areas and cleaning schedules should be reviewed yearly to ensure all extreme risks and high risks are cleaned adequately
- a review of the cleaning program should be conducted every 2 years to include audit schedule, audits, corrective actions, and training of environmental services staff
- provide education, documentation and competencies for all staff who attend to discharge cleans.

For more information refer to NSW Health Cleaning of the Healthcare Environment and Standard operating procedures.

The wet environment which includes faucets/taps, sinks, toilets and plumbing infrastructure within the healthcare environment presents unique challenges to infection prevention and control. Wet surfaces provide the solid-liquid interface that enables biofilm formation (Donlan, 2002). Biofilms

have been proven to harbor MROs. Waste material disposed into sinks and drains potentially provides the nutrients necessary for the formation and maintenance of biofilms which function as a reservoir for resistant organisms (Grabowski et al., 2018). As such it is crucial that environmental contamination and subsequent transmission of MROs are prevented by optimal infection prevention and control measures such as:

- dedicate clinical hand washing sinks for hand hygiene purposes only
- regular cleaning and disinfection of the environment including sinks, faucets/taps, toilets
- perform a risk assessment of all water systems and water-containing equipment
- avoid in-hospital decorative water features (water walls, reflecting pools, fountains, water bubblers)
- preventative maintenance program and schedule for all bowl and pan washer disinfectors and hand washing sink drains
- preventative maintenance for handwashing sinks should be assessed, and local processes should be followed for high-risk settings including haematology, oncology, ICUs, burns units or where outbreaks have occurred.

7.6 *Clostridioides difficile* infection

Clostridioides difficile (or C. difficile) is not an MRO, however given that the risks associated with *C. difficile* infection are like MROs, *C. difficile* will also be considered within the scope of this section.

Clostridioides difficile is an anaerobic, spore-forming, gram-positive bacterium typically associated with gastrointestinal disease. *C. difficile* spores are resistant to many disinfectants and antimicrobial agents used in healthcare settings. *C. difficile* may produce toxins that cause mild to severe gastrointestinal symptoms. *Clostridioides difficile* infection (CDI) or associated diarrhoea is often linked to prolonged and unnecessary use of antimicrobial therapy.

C. difficile is also common in the natural environment and in healthcare environments, and it can be spread between individuals through direct or indirect contact.

Table 36 Recommended measures for the prevention and control of CDI

Patient placement	Symptomatic cases are considered infectious until 48 hours after the last episode of diarrhoea. The duration of asymptomatic carriage and presumed ongoing shedding is unclear. Placement of patients with *C. difficile* infection should be based on risk assessment (patient with diarrhoea from *C. difficile* infection is infectious while symptoms persist) followed by prioritisation of the seriousness of the infection and any competing patient needs (does the patient have factors that would increase the risk of transmission?). Single room with ensuite is preferred while patient has diarrhoea. If there are a limited number of single rooms, it is recommended that patients with faecal incontinence or severe diarrhoea be prioritised to reduce the likelihood of transmission to other patients, and the individual should not share a room or bay with an immunocompromised individual and must have a dedicated toilet or commode. Confirmed cases (based on microbiological results) may cohort, if necessary, with other patients with *C. difficile* infection but take into consideration other isolation requirements such as MROs.

Always apply standard precautions	Hand hygiene as per the NHHI Hand Hygiene requirements. Hand washing is required for any unprotected exposure (for example, touching the patient or their environment without gloves on) or direct soiling of the hands, then thorough washing with soap and water should be performed. Alcohol-based hand rubs can be used after removal of gloves if hands are not visibly soiled. Clean equipment and the environment using a cleaning agent, detergent and sporicidal agent or buffered sodium chloride, chlorine dioxide or activated hydrogen peroxide (see table 37). Patients with CDI shed large numbers of spores in their faeces which can cause widespread contamination of the environment and can lead to transmission. Clean and disinfect all horizontal surfaces and all frequently touched surfaces within the patient area, including toilet, bathroom, ensuite, daily and on discharge or transfer. Shared patient equipment must be cleaned and disinfected after each use.
Apply contact precautions in addition to standard precautions	Contact precautions (in addition to standard precautions) should remain in place for at least 48 hours after diarrhoea has completely resolved. Health workers providing care involving extensive patient contact should wear a single-use long-sleeved gown or apron (based on risk assessment) and gloves. Contact precautions should be re-instituted if diarrhoea reoccurs.
Education	Provide health workers with education on CDI prevention and management. Provide relevant clinical staff with education on antibiotic prescribing, standard and transmission-based precautions. Audit and provide feedback on hand hygiene compliance, cleaning and disinfection and appropriate PPE use.
Patients and visitor education	Provide information on CDI prevention and management strategies. Educate patients and visitors on the importance of hand hygiene. Advise visitors who are assisting in patient care to wear appropriate PPE and how to don and doff safely.

For more information on management of patients with CDI refer to Monitoring Clostridioides difficile infection (CDI) in Australia, Australian Commission on Safety and Quality in Healthcare- Australian Guidelines for the Prevention and Control of Infection in Healthcare and Infection prevention and control, CEC Infection prevention and control Practice Handbook Chapter 6 Transmission based precautions and C. Diff resources.

See table 37 below for required concentrations and contact times for sporicidal efficacy for the agents commonly used in healthcare. Follow manufactures instructions and local procedures when selecting these agents.

Table 37 Sporicidal cleaning agents – concentrations and contact times

Agent	Concentration	Minimum contact time	Sporicidal efficacy	Key notes
Sodium hypochlorite	5000 ppm (0.5%)	10 minutes	≥6 log reduction (meets TGA/ARTG)	Prepare fresh daily; unstable; 1000 ppm (0.1%) for 5–10 min achieves ~4 log only.
Sodium hypochlorite	1000 ppm (0.1%)	5–10 minutes	~4 log reduction (not TGA/ARTG claim)	May be acceptable for routine cleaning; not for full sporicidal claim.
Chlorine dioxide	1000–2000 ppm (per label)	5–10 minutes	≥6 log reduction (per manufacturer)	Use as per manufacturer's instructions and ARTG listing.
Activated hydrogen peroxide	0.5–1.4% (per label)	5–10 minutes	≥6 log reduction (per manufacturer)	Use as per manufacturer's instructions and ARTG listing.

Additional Notes:

Only products listed on the ARTG as "sporicidal" can be promoted for this use.

For C. difficile, ensure clear communication to cleaning staff when sporicidal cleaning is required, especially if it differs from routine cleaning methods.

Always follow local infection prevention guidelines and manufacturer instructions for dilution, application, and safety.

Storage and Stability:

Sodium hypochlorite (bleach) solutions are unstable and lose potency rapidly, especially when diluted, exposed to light, heat, or air.

- Prepare diluted sodium hypochlorite solutions fresh daily.
- Store in a closed, opaque container at room temperature, away from direct sunlight and heat sources.
- Do not use solutions older than 24 hours unless the manufacturer provides validated stability data for longer storage.
- Label all prepared solutions with the date and time of preparation and expiry.
- Check for visible changes (for example, loss of chlorine smell, discoloration); discard if present.

Other Agents

Chlorine dioxide and activated hydrogen peroxide:

- Follow the manufacturer's instructions for storage and shelf-life.
- Many commercial products are more stable but still require protection from light and heat.
- Do not use beyond the expiry date on the packaging.

Where the chosen sporicidal agent or method for environmental cleaning and disinfection differs from the standard cleaning or disinfection methods used within the Health Organisation, the Health Organisation must have clear procedures in place to communicate the requirement for sporicidal disinfection (both routine and terminal) to environmental services staff. This ensures that all health workers are aware of when and how to implement sporicidal cleaning protocols, reducing the risk of transmission and ensuring compliance with infection prevention standards.

7.7 Screening and surveillance

Before implementing a screening and surveillance program Health Organisations need to consider factors such as the local prevalence of specific MROs, the likelihood a patient may be colonised with a MRO, the type of facility, the consequences of transmission and available resources for screening and how to manage the identified MRO status of the patient.

MRO surveillance strategies should include collection, analysis, reporting, and use of surveillance data to help identify and respond promptly to identified infection risks. Screening results, as well as any results obtained through diagnostic testing, should be used to inform subsequent infection prevention and control actions.

As part of risk identification, any MRO positive pathology report should clearly indicate the presence of a specific MRO. If unclear on the interpretation of pathology results or required infection prevention and control action, clinicians should promptly raise queries with the local clinical microbiology service or infection prevention and control unit for interpretation and guidance.

Preoperative screening for *Staphylococcus aureus* including MRSA and methicillin sensitive *Staphylococcus aureus* (MSSA) is recommended for select elective procedures such as:

- Open cardiac and valve procedures
- Shoulder, hip, or knee joint total arthroplasties (primary or revision)
- Aortic procedures (stent and open)
- Lower limb vascular reconstructions (bypass, endarterectomy)
- Iliac stents (covered stents)
- Haemodialysis catheter insertions.

The decision on this approach should be based on risk assessment, local prevalence and cost benefit analysis.

A major risk factor for acquiring an MRO is overseas travel, especially when medical care or treatment in a healthcare facility is involved. A risk assessment should be conducted at admission to identify people who require screening for specific MROs.

7.7.1 MRO screening

Screening for MROs should align with mandatory clinical indicators at a minimum. There are three categories of MRO screening programs:

Hospital admission screening, organism specific and/or specific area/ward-based screening (for example, extreme risk or high-risk area screening). See Table 38 for more.

Table 38 Risk factors and requirements for admission screening

MRO transmission risk	Is admission screening needed?			
	MRSA	CPE	VRE	*C. auris*
Any direct overseas hospital transfer	Yes	Yes	Yes	Yes
Received healthcare overseas in the preceding 12 months inpatient or outpatient or residence in an overseas RACF	No	Yes	No	Yes
Admission to an extreme risk rated clinical inpatient area, such as ICU, burns, renal dialysis, haematology, oncology and transplant units	Yes*	Yes*	Yes*	Yes**
Transfers from units in other NSW hospitals or residential care settings	Depends on local infection rate			
Receiving or transferring facility (for example, NICU) with known prevalence or MRO outbreak	Depends on local infection rate			
Presence of a chronic wound or invasive device	Depends on local infection rate			
Other MRO Gram negatives	Depends on local infection rate			

*According to local risk assessment and priorities.
** Any epidemiological link to a known case.

Also refer to the Guidelines on Surveillance and response for Carbapenemase-producing Enterobacterales (CPE) in NSW Health Facilities and Management and Control of Candida auris in NSW Health Facilities.

Admission screening for MROs requires the collection of at least one swab set. Swab set requirements are included in Table 39 Guide to swab set requirements. Seek advice from your local microbiology/laboratory service prior to sampling.

Table 39 Guide to swab set requirements

Microorganism	Specimen(s) required
CPE/CPO	Faeces (preferred) or rectal* and wound, ulcer, transcutaneous exit site(s) or urine (if indwelling or suprapubic catheter is present)
VRE	Faeces (preferred) or rectal* and wound, ulcer, transcutaneous exit site(s) or urine (if indwelling or suprapubic catheter is present)
MRSA	Nose + perineum and wound, ulcer, transcutaneous exit site(s) ± throat
C. auris	Bilateral axilla and groin, transcutaneous exit sites, urine (if indwelling device or suprapubic catheter present)

C. diff	If diarrhoea is present, faecal sample (only loose stool will be tested)
MRAB**	Faeces (preferred) or rectal* and throat or sputum ± wound, ulcer, transcutaneous exit site(s) or urine (if indwelling or suprapubic catheter is present)

*There must be faeces visible on the rectal swab.
**Multi-drug resistant Acinetobacter Baumannii based on local prevalence.
Additional note:
MRSA: Pre-moistening of swabs is not required, as evidence shows no improvement in microorganism recovery or sensitivity.
C auris: Satisfactory recovery is achieved using swabs with transport media.
Key Collection Sites: The success of microorganism recovery is primarily dependent on sampling from the axillae and groin, which may be combined into a single swab.

7.7.2 Ongoing MRO screening in extreme risk areas

Ongoing MRO screening may be necessary in clinical areas including dialysis units, haematology units, oncology units, NICUs and ICUs where there may be a risk of transmission and potential consequences. Screening programs may extend to mum/parent if a neonate is positive. Generally, if a neonate is MRO positive, the parent/s would be considered to also be MRO positive. In the opposite situation, if a parent has known colonisation with an MRO, the neonate would be considered to also be colonised with the same MRO.

Screening should be guided by the same principles as those indicated for admission screening and local infection prevention risk assessments and emerging concerns.

Where a patient is confirmed to be colonised or infected with a MRO, no further surveillance screening (except for clearance screening in the relevant timeframe) is required for that MRO.

7.7.3 MRO screening in non-extreme risk areas

Routine MRO screening should only be done before defined surgical procedures (for example, joint replacement, cardiac bypass). Outside of extreme risk areas, routine MRO screening is not recommended but may be required based on local prevalence, risk assessment, part of contact tracing or in response to an outbreak.

Extended-spectrum beta lactamase-producing organisms are known as ESBLs. Overall, the risk of healthcare associated transmission of ESBLs in adult patients appears to be low and patients colonised or infected with these organisms are to be managed with standard precautions. There is insufficient evidence to apply this advice to the management of children and babies, patients in extreme risk areas (for example transplant units, burns units or neonatal intensive care) or adults in long term care with ESBL colonisation or infection.

For managing ESBL colonisation Health Organisations should conduct a risk assessment based on:

- local prevalence
- mode of transmission
- patient risk factors
- existing standard precautions strategies already in place at a local level, such as, hand hygiene, cleaning of shared equipment and healthcare environment, cleaning audits meeting compliance, and so forth
- risk factors for adverse outcomes resulting from an HAI in other patients in the area or room being considered for patient-placement
- availability of single-patient rooms.

For more information refer to CDC's Core Infection prevention and control Practices for Safe Healthcare Delivery in All Settings, CDC Infection Control Summary of Recommendations and Practice Handbook Chapter 6 Transmission based precautions.

7.7.4 MRO screening prior to solid organ donation

The transmission of infection from solid organ donor to recipient during solid organ transplant is a rare event (Lumbreras et al., 2001, Cerutti et al., 2006, White et al., 2019). Transmission to the organ recipient is more likely to occur if the donor presents with symptomatic illness at the time of the procedure (Lumbreras et al., 2001)and a MRO is involved.

Blood cultures should be collected and screened if the donor is febrile. Screening should be done by the facility where the donor is receiving care. Results are to be made available to the facilities caring for intended organ recipients as soon as practically possible.

Transplant teams and infectious diseases physicians should consider the following when interpreting donor screening results:

- for donors positive for MRSA and VRE:
    - colonisation with MRSA or VRE, in the absence of infection, does not preclude organ donation
    - Any infection of the potential allograft precludes organ donation
- for donors positive for CPE:
    - donor can be a candidate for organ donation if infection is still sensitive to carbapenem (such as, resistance gene is not expressed)
- if the donor's medical team has determined that the donor has deep-seated MRSA, VRE or CPE infection that does not affect the potential allograft, then the donor's medical team should consult with the transplant team regarding:
    - the viability of treating the donor with appropriate antimicrobial therapy prior to transplant
    - the need to initiate appropriate antimicrobial prophylaxis to the recipient perioperatively
- Blood stream infection may preclude organ donation. Consult with Infectious Diseases.

Guidance for MRO screening in transplant recipients where donor is identified to have an MRO, particularly in the instance of enteric organisms should be at the discretion of treating team and infectious diseases. For more information refer to Transplantation Society of Australia and New Zealand and Therapeutic Goods Administration Understanding donor screening rules for human cell or tissue products.

7.7.5 MRO screening prior to faecal transplant donation

The use of faecal microbiota transplantation (FMT) has been reported for a variety of indications including severe, refractory, or relapsing *Clostridioides difficile* infection (CDI), and other non-infectious indications. Health Organisations performing FMT should have comprehensive protocols for screening donors. For more information refer to the Therapeutic Goods Administration Supplying faecal microbiota transplant (FMT) products as biologicals.

7.7.6 Health worker MRO screening

Routine screening of health workers for MRO colonisation is not recommended. However, in exceptional circumstances in extreme risk areas screening may be considered in consultation with

local infection prevention and control and infectious diseases (ID) team. Health workers who are identified, via screening or diagnostic testing, as being colonised with an MRO should be referred to staff health or infection prevention and control/ID for assessment, treatment, and management, as per local protocols.

7.7.7 Microbial genomics

Microbial genomics or whole genome sequencing (WGS) is the study and application of genome sequencing technologies to characterise and analyse microorganisms. It is a powerful and critical tool for the investigation and management of infectious diseases including MROs in enhancing national and international surveillance and response to infectious diseases. The use of sequencing data has shown to form the basis of robust disease surveillance through rapid pathogen detection identification, and monitoring that ultimately links to information on clinical, demographic, and exposure details (National Microbial Genomics Framework for Public Health 2025–2027). To achieve maximal health impact, genomic data must be linked to epidemiological and clinical data and that results from genomic data are rapidly disseminated back to 'end users' or even directly accessible. The integration of existing epidemiological networks will enable:

- detection and rapid response to disease outbreaks/cluster
- rapid detection and characterisation of emerging pathogens or new mechanisms of antibiotic resistance.
- proactive and coordinated gathering and sharing of information.

Furthermore, WGS will enable the identification of priority organisms for real-time diagnostics, supporting timely outbreak investigation. Consultation with the Infectious Diseases Service and the Medical Microbiologist with infection prevention and control input of the facility is recommended. Additional guidance can be sought from the CEC as part of the incident management team in the event of an outbreak.

7.7.8 MRO clearance screening

After acquisition of an MRO, patients may be colonised for many months with the same organism. Several observational studies show that colonisation with CPE or ESBL declines over time without intervention (Campos-Madueno et al., 2023, Bonnet et al., 2023). For active decolonisation, the most robust evidence is for MRSA, with insufficient evidence to support routine decolonisation strategies for other MROs (Brehony et al., 2021). However, in high prevalence settings in non-acute care, universal chlorhexidine bathing and intranasal iodophor reduced colonisation with VRE and ESBL (Gussin et al., 2024).

For individual patients, there are some general principles that can be considered for MRO clearance screening. Any clearance program within a health facility requires a risk assessment and consultation with infection prevention and control, infectious diseases and/or microbiology.

There are several key principles. At least 12 months have elapsed since the MRO was last identified in either a screening or diagnostic specimen; and at the time of rescreening, the patient must not have received antibiotics active against the MRO for at least the previous 2 weeks for gram-negative organisms and 12 weeks for *Staphylococcus aureus*. Clearance screening swabs should be done as described in Table 42 and may be performed after re-admission or as an outpatient.

A patient who has been cleared of MRO who subsequently returns a positive culture from either a clinical isolate or a screening specimen should be considered MRO colonised or infected again. For more information refer to Table 42 Recommended clearance program for multi-resistant organisms.

Note: Currently patients colonised with *C. auris* are considered to have life-long colonisation. Patients whose last positive CPE result was more than 12 months prior should have a risk assessment conducted to determine if they may still pose a risk of being colonised.

7.7.9 Audit and validation of screening programs

Health Organisations are to support clinical unit level programs that facilitate quality and safety improvement and performance audit. Where possible and practical Health Organisations are to:

- consider point prevalence survey of the MRO screening program to test the compliance rate of the screening program
- consider single or periodic point prevalence surveys to validate the screening programs in high-risk units
- Recommendation – annual review within facility.

7.8 Alerting and removing alerts

The management of MRO alerts within the Single Digital Patient Record (SDPR) must be overseen by the local infection prevention and control unit or their designated delegate. The process of alerting or removing an MRO flag in a patient's health record is governed by strict protocols to ensure patient safety and prevent transmission.

Minimum requirements for initiating or removing alerts apply across both inpatient and community settings and include comprehensive screening based on risk factors such as recent hospitalisation (domestic or overseas), admission to high-risk clinical areas, or transfer from facilities with known MRO prevalence. Specimen collection must follow defined procedures for each organism, including MRSA, VRE, CPE/CPO, ESBL, and *C. auris*, with documentation and alerting integrated into the SDPR via electronic medical record workflows. For more information refer to Table 40 Requirements for adding and removing MRO alerts in patient record.

The following factors are to be considered when deciding to alert or removing an alert:

- an MRO alert should be removed only if the patient meets the criteria for MRO clearance (see Table 42 Recommended clearance program for multi-resistant organisms)
- if a patient is cleared of an MRO, there is still potential for a patient to recolonise with an MRO, including the previous strain of MRO. If recolonisation is detected, MRO flags should be reinstated
- it is a local decision to use flags or alerts to identify patients with CDI. If alerts are used, the Health Organisation may consider removing alerts on these patients 48 hours after the return of a normal stool pattern. For more information refer to the Australian Commission on Safety and Quality in Healthcare Surveillance of Clostridioides difficile infection.

Table 40 Requirements for adding and removing MRO alerts

MRO	Alerting	Removing alerts
MRSA	Yes	Yes
C. auris	Yes	No
CPE	Yes	Determine locally*
VRE	Determine locally*	Determine locally*

* Determine based on local prevalence.

7.9 MRSA load reduction and decolonisation

For some patients, reducing the colonisation burden of MRSA reduces the risk of post-operative infection with MRSA. Patients undergoing cardiac, or joint replacement surgery and have a positive MRSA screen should be offered MRSA decolonisation. Other patients that may benefit from decolonisation are those who have recurrent skin and soft tissue infections with MRSA. To achieve this, clinicians should consider the feasibility of pre-operative load reduction or decolonisation. In the short term, pre-operative load reduction can be considered for some procedures (See section 7.7 Screening and surveillance for more details) whereas decolonisation should be used to reduce the risk of recurrent skin infection.

Table 41 Example of a preoperative MRSA load reduction (to be undertaken in the hospital or home environment)

Pre-operative load reduction for adults positive for MRSA	
Duration: Five days prior to surgery and continue after surgery if required. Ideally the full regimen should be completed prior to surgery. If this is not possible, administer as many doses as possible pre-operatively then complete the regimen post-operatively as needed.	
Hair and body	Use antimicrobial body wash (2% aqueous chlorhexidine or 1% Triclosan) when showering. Leave body wash in place for at least 3 minutes before rinsing well. After shower, dry with clean towel or use daily application of non-rinse aqueous 2% chlorhexidine wipes. Towels should be changed daily.
Nostrils	Treat with 2% mupirocin, two-three times daily (if resistance to mupirocin demonstrated, seek specialist ID advice). Apply inside nostril with cotton bud or swab (no further than 2cm deep) and then discard cotton bud. Repeat with new cotton bud or swab for the other nostril. Press nose with thumb and forefinger, spread in the nostril using a circular motion.
Treatment for fomites and inanimate objects	
Bed linen	Linen should be changed daily.
Personal clothing	Clean clothing, underwear and socks should be worn after showering.
Frequently touched surfaces	In hospital -Wipe surfaces such as bed rails, door handles and bedside equipment daily using a clean and disinfectant wipe used in the facility. Discard the wipe after use. At home – wipe surfaces such as benches in kitchen areas and bathrooms and door handles daily using a clean cloth and detergent

Source: Adapted from Hunter New England Local Health District, Policy Compliance Procedure – Management of Multi-resistant Organisms and Clostridium difficile (2014) and HICSIG – Healthcare Infection Control Special Interest Group. Patient MRSA preoperative local reduction instructions (2015).

Table 42 Recommended clearance program for multi-resistant organisms

Organism	Action to take	Criteria	Duration	Comments
C. auris	Patients are not cleared and continue to be managed under transmission-based precautions	There is not sufficient available evidence to guide clearance screening	Entire and subsequent admissions	Current evidence suggests that patients remain colonised for many months
CPE	Based on infection prevention and control risk assessment	Patients with no risk factors who are readmitted to a hospital more than 12 months since a positive result of CPE colonisation.	Patient colonised with CPE cannot be considered cleared within 12 months of a positive result	CPE clearance must be locally confirmed with infection prevention and control, ID and where possible microbiologist
ESBL	This guidance applies to paediatric population	Clearance is possible but depends on: A case-by-case risk assessment by Infection prevention and control team based on antibiotic usage, presence of medical devices such as drains, catheters, or other invasive devices and presence of underlying health conditions such as chronic illnesses may delay clearance.	Generally, three consecutive negative screening swabs, taken at least 48 hours apart, to confirm clearance of ESBL colonisation, however health facilities are to consult with Infectious Diseases on any specific requirements	Clearance is more likely in patients with no underlying immunosuppression or chronic conditions. Even after clearance, infection prevention and control precautions may still be applied during hospital readmission depending on risk assessment.
MRSA	Based on infection prevention and control risk assessment	Clearance could be considered if all the following are present: • More than 3 months elapsed time from the last positive specimen	At least two negative swab sets, collected from the same body sites, on the same day at different times	Some facilities may apply clearance program for selected group of patients (for example, prior to high-

		• All wounds healed, no indwelling medical devices present • No exposure to any antibiotic or antiseptic body wash for at least 2 weeks prior to screening • No exposure to specific anti-MRSA antibiotic therapy in the past 3 months.	or on separate days (such as, the two swabs sets are "separated by time").	risk elective cardiac or prosthetic implant surgery) along with decolonisation
VRE	Based on infection prevention and control risk assessment	VRE clearance is deemed possible when ALL of the following criteria are met: • Any infection caused by VRE has resolved • More than three months have elapsed since the last positive specimen • The patient must have ceased all antibiotics (intravenous or oral) for at least two weeks before specimens are collected • A period of at least 6 months free from hospitalisation (acute episode) and any invasive/indwelling devices • Not admitted to an extreme risk area.	Three consecutive negative stool samples or rectal swabs separated by a minimum period of one week per negative specimen. Clearance can also be considered in a patient who has a history of a single positive VRE faecal, or rectal culture followed by multiple negative cultures over a period of 6 months or more.	Clearance for most VRE colonised patients is not recommended as it is often not sustained. VRE colonisation may persist for prolonged periods (years) and screening cultures may not detect low-level colonisation, so negative rectal or stool cultures may not reflect true clearance.

7.9.1 MRSA decolonisation for ongoing carriage

MRSA decolonisation should be limited to colonised patients who have completed treatment for a symptomatic MRSA infection but remain at risk of recurrent symptomatic infection. Decolonisation for MRSA may not be effective if the individual (or other household members if decolonisation is being carried out at home) has an active chronic skin condition or is unwilling or unable to participate in the regimen.

MRSA decolonisation should be considered if **all** the following criteria are met:

- no antibiotics or antiseptics have been used in the preceding 2 weeks
- the isolate is susceptible to the decolonisation regimen
- there are no invasive devices present
- all wounds or ulcers have healed
- there are no exfoliative skin conditions
- there is capacity to follow a MRSA decolonisation regimen
- treatment for MRSA infection has been completed, and decolonisation is expected to prevent recurrent infection.

An example regimen is included in Table 43 Example of MRSA load reduction.

Current evidence indicates that MRSA decolonisation regimens have variable efficacy for long term elimination of MRSA and efficacy is dependent on several patient factors, including readmission to hospital. Information should be provided to patients and their carers regarding the expected efficacy of MRSA decolonisation prior to the commencement of any regimen. Where patients and/or carers are to carry out a MRSA decolonisation regimen, clear instructions should be provided to these individuals by the treating clinician.

After the decolonisation regimen is completed, the individual should be screened to determine if MRSA clearance has been achieved.

Screening procedures can be worked up locally but at a minimum should address:

- the time-points for screening
- the specimen type(s) required
- the involvement of primary care follow-up
- alternative strategies to be employed if decolonisation attempts are unsuccessful
- if a health worker, workforce management during and after decolonisation.

Repeated decolonisation attempts can lead to the emergence of resistance to the antimicrobial agents used in the regimen. Therefore, further advice from a microbiologist or an infectious diseases physician should be sought if MRSA colonisation persists after two attempts at decolonisation.

Table 43 Example of MRSA load reduction for ongoing carriage

Preparation of the individual
• Remove all body piercings for several days prior to commencing decolonisation regime and keep piercings out for the duration of decolonisation. Where piercings cannot be removed, the area around and underneath of any item must be carefully cleaned as much as possible. • Clean earrings and other piercing elements with soap and water and store dry.
Preparation of the household
• Replace old toothbrushes, razors, opened roll-on deodorant, skin adhesive tapes, skin creams and solutions, pumice stones, sponges, make up brushes, creams and implements. • Discard or hot wash all fluffy toys. • Discard magazines, newspapers and other clutter. • Wash hairbrushes and combs, nail files, plastic toys, and clippers in the dishwasher or discard. • Change bedsheets, pillowcases and towels each day of the treatment. • Wear clean clothing after shower. • Clean frequently touched surfaces each day using a clean cloth (disposable) and detergent, discard the cloth after use. • Ensure all members of the household have their own towels.
Treatment for adults positive for MRSA (and their household contacts)
• Hair and body: Use 1% Triclosan OR 2% aqueous chlorhexidine daily for 5 days. Apply to skin for at least three minutes and then rinse off. Avoid use of other soaps and body washes during this time. Usual shampoo and conditioners are suitable for use. • Nostrils: Treat with 2% mupirocin, twice daily for a week. Apply inside nostril with cotton bud or swab. Discard cotton bud after use. Repeat with new cotton bud or swab for the other nostril. Spread in nostril by squeezing nose with thumb and forefinger and rubbing together in a circular motion. If the colonising MRSA strain is mupirocin resistant, seek further advice from a microbiologist or infectious diseases physician. • Dentures: Remove dentures early evening and clean with mild soap and water or denture paste. Immerse in a denture cleaning solution every night for 1 hour or as long as prescribed. • Ask patient to keep a record of treatment application and bring this information with them when attending the hospital, regardless of whether they completed the 5 days of treatment.
Treatment for non-preterm neonates positive for MRSA
• Body: Treat with 1% chlorhexidine cream daily from day 1 (day of birth) until day 3.   ○ Wipe with water then apply by lightly smearing chlorhexidine cream. • Body: Treat with mild soap and chlorhexidine on alternate days after day 4.   ○ Wash with mild soap and then apply by lightly smearing chlorhexidine cream.

Treatment for household items
• Disinfect reused personal items with antibacterial wipes several times during the decolonisation period. • Clean and disinfect the shower floor and/or bathtub daily with a sodium hypochlorite solution/bleach-based cleanser. • On days 2 and 5 of treatment, clean the house well (especially the bedrooms and bathrooms). Clean dust off all surfaces then vacuum clean floor surfaces and soft furnishings. Wipe over all frequently touched surfaces with detergent wipes. Wash vinyl/leather covered furniture with warm soapy water and dry with a clean towel.
Pets
• Dogs and other companion animals can be colonised with the same strains of S. aureus without showing any signs of infection. • Wash animal bedding in hot wash with laundry detergent and dry in the sun or replace. • Wash the animal at least once with an antiseptic solution.

Source: HICSIG - Healthcare Infection Control Special Interest Group. Patient MRSA preoperative local reduction instructions (2015). Hunter New England Health Pathways. Recurrent Staphylococcal Infections. [Online] 2015.

7.10 Communication about MROs

Each Health Organisation is to ensure that clinicians inform and communicate with patients and their carers affected by MRO colonisation or infection and establish an understanding of the necessary infection prevention and control precautions required. For more information refer National Standards - Partnering with Consumers Standard.

Where screening or clinical diagnostic testing has indicated MRO colonisation or infection, the treating medical officer, or their delegate, is to advise the patient of this result. This includes providing the opportunity to discuss and determine an appropriate management plan and address any concerns the patient, or their carer, may have about MRO colonisation and its potential impact on their health and wellbeing.

The Health Organisation should ensure that MRO colonised or patients with infection are provided with easy-to-understand written and verbal information on the MRO. At a minimum, this should contain the following information:

- What is an MRO?
- What MRO does the patient have?
- What is the difference between colonisation and infection?
- How is the MRO transmitted between individuals or from the environment?
- How long will the MRO be carried?
- How can the patient assist in limiting the spread of the MRO?
- Can the MRO be treated?
- Are other individuals being at risk of getting the MRO from the patient?

- What infection prevention and control precautions are required as an inpatient, such as transmission-based precautions, visitor policies and any movement restrictions for patient and health workers?
- What infection prevention and control precautions are required after discharge (such as, at home)?
- What information should the patient share about their MRO colonisation and/or infection (for example, other healthcare providers including transport agencies)?

Refer to Australian Commission on Safety and Quality in Health Care Infection prevention and control resources for consumers for patient information brochures. Where a Health Organisation has specific local MRO concerns, the Health Organisation may prefer to publish and distribute their own patient information. In the event of an outbreak or increasing endemicity, a Health Organisation must provide rapid response communication and feedback to affected patients and their carers.

If a patient is discharged home before the MRO result is known, as per the Open Disclosure policy directive, there should be a local procedure to ensure communication with the patient - generally the treating team. This should be documented in their notes as they will be flagged when/if they come into hospital again. MRO colonisation should also be included in any discharge or referral information for patients GP practice or referring specialist or clinics as part of communications provided by clinicians.

7.10.1 Transporting a patient with an MRO

The transport of a patient within a hospital, between hospitals or place of residence is not to be delayed by MRO colonisation or infection and should be guided by clinical need and urgency.

Transport agencies are to, as a minimum, exercise standard precautions and, where possible, contact precautions during the transfer and transport of a patient with an MRO based on risk assessment. If this is not possible, refer to local procedures and/or seek advice from the local infection prevention and control team for alternative arrangements.

It is critical that the transport agency adheres to all elements of standard precautions, particularly hand hygiene and environmental cleaning, and implements measures to increase the spatial distance if multiloading between patients during transport.

The facility booking transport must notify the transport agency and receiving Health Organisation of the patient's status and type of MRO prior. If an MRO is identified after the transfer, the booking facility is responsible for informing the receiving Health Organisation of this new information. The receiving facility is responsible for conveying this new information to the patient and their family or carer.

Patients should be offered products to wash/clean their hands enroute and good hand hygiene practises encouraged and promoted.

The following general principles should be followed while transporting a patient with a known MRO status:

- Patient transport should not be delayed because of MRO status
- Patient can be multiloaded (transported with another patient) provided:
    - Patient Transport Service employees maintain standard precautions and, where possible, contact precautions during the transport if required
    - After risk assessment of patient's symptoms, for example, patients with low risk of organism dispersal

- Can be transported with a non-infectious patient after risk assessment conducted
- Patients perform hand hygiene with an alcohol-based hand rub when they enter and leave the transport vehicle.

7.11 Outbreak management

The detection, prevention and management of MRO require a coordinated approach in any Health Organisation, and especially in facilities with patients requiring complex and chronic care. Local transmission or an outbreak is defined as two or more cases of an MRO that are genetically related.

This may be from patient-to-patient, or environment-to-patient. If local transmission is suspected or confirmed, action should be taken immediately to prevent further transmission. Confirmation by whole genome sequencing should not delay outbreak management. Each Health Organisation must have written procedures that address outbreak management for common communicable infections and MROs.

Refer to Surveillance and Response to Carbapenemase-Producing Enterobacterales in NSW Health Facilities, Management and Control of Candida auris in NSW Health facilities and Triggers for escalation following detection of infection outbreaks or clusters guidelines for more information. Additionally, the outbreak management principles outlined in Chapter 8 Outbreak management, should be adhered to if an MRO outbreak occurs.

Note: The detection is poor when cohort screening is performed soon after exposure to a positive cohort. In some circumstances (for example, outbreaks), a second sample collection may need to be considered at a later point to improve case detection.

7.12 Precautions for non-acute inpatient settings

The precautions required to prevent MRO transmission in these settings should be based on a risk assessment which should address the following questions:

- are invasive procedures performed?
- is direct physical contact with blood, body substances, tissue, infectious materials, or surfaces/equipment anticipated?
- do patients have open wounds, invasive devices or immunocompromised?

Additional factors such as duration of appointment, age, setting, patient's/client's compliance with infection prevention and control requirements, faecal or urinary incontinence, available resources or outbreak incidents may impact on the level of risk and should be considered when conducting a risk assessment.

Hand hygiene is to be adhered to by all health workers who have contact with patients and/or their surroundings. All patients/clients and carers should be encouraged to perform hand hygiene when they attend community health outpatient clinics to minimise environmental contamination.

Standard precautions are adequate for activities where health worker contact with the patient is minimal.

Non-critical reusable/shared clinical equipment should be cleaned with a neutral detergent and disinfection should be based on risk assessment.

Any equipment that is taken into multiple client's homes should be cleaned and dry before returning to the car and used at the next client's homes (such as the baby scales or length measurer that the baby lays on).

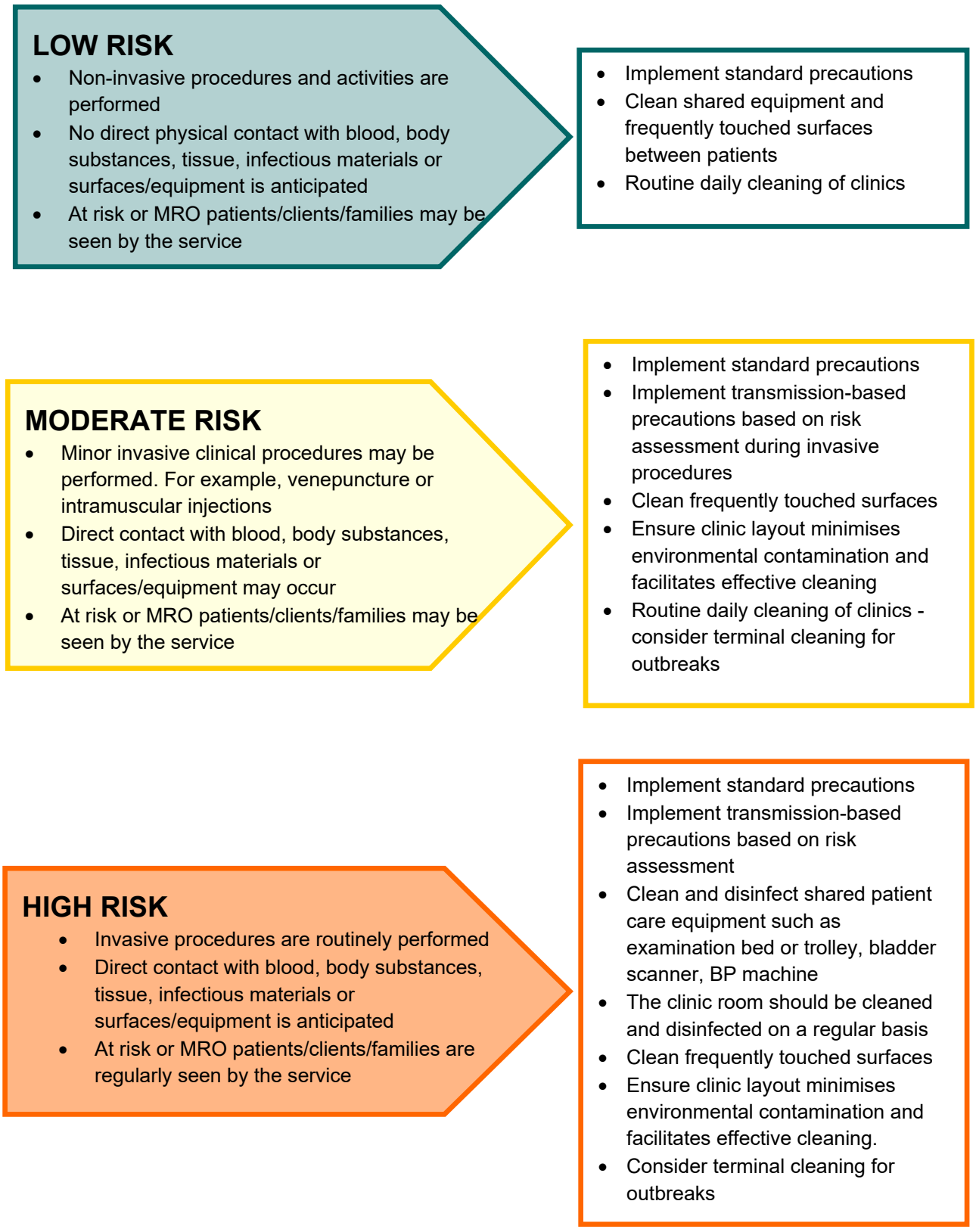
In case of loan equipment used for patients with an MROs, those items are to be reprocessed as per local procedures before re-distribution.

Frequently touched surfaces are to be cleaned between patients/clients with neutral detergent. Disinfection with an approved disinfectant (or dual purpose) may be required in circumstance where blood or body substance exposure anticipated.

The cleaning and disinfection process should be as per local protocols and be based on the risk assessment.

Refer to Figure 21 for additional advice on risk assessing for MRO transmission in community settings.

Figure 21 Risk assessing for MRO transmission in community settings



Chapter 8 Outbreak and cluster management

8.1 Introduction

An outbreak is the occurrence of disease exceeding the expected level for a given population within a specific timeframe. This includes single cases of some diseases not previously seen or those that have previously been eliminated. Typically, in healthcare this has been defined as two or more cases in a patient group, health workers or visitor of a health facility which should trigger an outbreak management process.

A disease cluster is an unanticipated high incidence of a particular microorganism occurring in proximity in terms of both time and geography. A closely grouped series of events or cases of diseases that fulfils the definition of a case, for example, two or more surgical site infections from the same surveillance period or theatre session of the same type of surgery.

The outbreak and cluster management and response process should aim to optimise the safety of patients, visitors, and health workers by implementing measures to identify potential risk and limit spread of communicable diseases, multi-drug resistant organisms (MROs) or other non multi-drug resistant organisms of significance. The outbreak management and response process will differ according to the nature of disease, the virulence of the organism and the vulnerability of the patients concerned.

Typically, in healthcare settings the outbreak and cluster management and response process should be triggered when there are two or more cases of the same infection within a certain area of the facility. Lines of transmission should be explored to determine whether there is a link between cases before triggering the outbreak or cluster management and response process.

8.2 Risk assessment

Risk assessment is a systematic process for gathering, assessing, and documenting information to assign a level of risk for taking action to manage and reduce the negative consequences of an event.

All NSW Health Organisations are to have surveillance systems in place that detect outbreaks or clusters in a timely manner. The surveillance system can be:

- Indicator-based surveillance – the routine collection of pre-defined information about infection/disease using case definitions (for example, surveillance of surgical site infection in joint replacement)
- Event-based surveillance – the rapid collection of ad hoc information about infections/diseases (for example, influenza or gastroenteritis).

In the event of an outbreak or cluster a risk assessment should be conducted to understand the context, identification of potential control measures, continuous monitoring and evaluation of the event, effective ongoing communication and an evaluation of the lessons learned (Figure 22 Risk management cycle).

Rapid risk management of outbreaks or clusters reduces or prevents transmission and reduces negative consequences. Additional benefits include:

- better decision-making
- implementation of appropriate and timely control measures
- more effective operational communication
- more effective risk communication

- improved preparedness.

Figure 22 Risk management cycle



Source: WHO Rapid risk assessment of acute public health events.

8.3 Outbreak preparedness and response procedure

NSW Health Organisations are to develop and maintain a facility specific Outbreak Management Plan that has been developed in consultation with facility chief executive or delegate, infection prevention and control, infectious diseases, microbiology, public health unit (PHU) and other stakeholders. This plan should be reviewed at least every two years and after an outbreak. The local outbreak response plan should be implemented in an outbreak.

The outbreak management and response process may include and identify the following:

Preparation

The preparation should include infection prevention and control human resources to initiate the investigation and contingency planning, along with:

- A description of the roles, responsibilities and accountabilities of each of the organisations and individuals
- An up-to-date list of stakeholders' contact details
- Arrangements for informing and consulting those who need to be informed of an outbreak
- Communication cascade for notification of the outbreak
- Arrangements for the implementation of an outbreak management team (OMT) to investigate and control a significant microorganism outbreak
- The support available to the OMT and their responsibilities in supporting the OMT
- Business continuity arrangements

- Resources required to manage an outbreak:
    - Human resource arrangements
    - Capacity to surge staff or a mechanism to activate surge staff
    - Training for all health workers involved in investigating the outbreak.
- Surveillance systems for outbreak detection.

Response procedure

Investigation of a disease outbreak involves a combination of epidemiological, laboratory and environmental components.

A case definition should be established by the OMT during the initial meeting by using standard criteria to determine whether an individual should be classified as a case.

A case definition usually includes clinical and epidemiological components:

- clinical and pathological information about the condition
- characteristics of the people who are affected
- information regarding the location and timing of the outbreak.

The OMT should also consider the following:

- Process for systematic collection and recording of information, including guidance on what information is required to be collected about each case
- Process for regular communication (situation reports) to stakeholders including guidance on information to be communicated
- Clear guidance to staff for outbreaks that are identified out of hours
- Criteria for when an outbreak is considered over
- The requirement to complete and disseminate the final outbreak report.

8.4 Outbreak investigation and management

The objective of outbreak management and response is to interrupt transmission as quickly as possible to prevent further cases. The key principles of outbreak investigation and management are:

- Recognising and confirming the outbreak
- Notification to public health
- Defining cases and collating information
- Implementing infection prevention and control measures to prevent further transmission
- Identifying and controlling the source of the outbreak
- Effective communication, education, escalation and reporting of the outbreak
- Debriefing and dissemination of findings to prevent recurrence.

8.5 Factors to consider in convening an outbreak management team

An OMT is a multidisciplinary group who work together to investigate and manage an outbreak. The core team is responsible for planning and coordinating the investigation.

The decision to convene an OMT will be made by the chairperson of the infection prevention and control committee or the local facility executive or LHD Chief Executive (CE) or their delegate. Not all outbreaks require an OMT. The following factors should be considered in the decision to convene an OMT:

- Epidemiology – number and characteristics of both cases and the population at risk
- Infectious agent, mode of transmission, infectiousness, and clinical significance
- Likely source of the outbreak
- Potential impact on service delivery
- Potential public health risk
- Public concern and media interest.

8.6 Outbreak management team – membership

An OMT may include expertise from the groups listed below. Where not available locally, the Health Organisation may contact the CEC to identify expert assistance as required. Communication and escalation should be as per Triggers for Escalation Following Detection of Infection Outbreaks or Clusters guideline and Incident Management policy directive. The lead of the OMT should have oversight of operations and management of the facility or service and be able to coordinate and direct the activities. The infection prevention and control team are to be heavily involved in the OMT and have regular input into the communications and logistics. The membership includes, but not limited to:

- Infection prevention and control
- Microbiology/Virology
- Laboratory
- Infectious diseases
- Hospital management
- Epidemiology
- Public Health Unit
- Communications
- Antimicrobial stewardship
- Environmental cleaning management
- Staff health
- Directors/managers of relevant clinical units – including nursing, medical and allied health where applicable.

A lead should be identified from the OMT, who is responsible for ensuring that:

- The OMT acts effectively, with all activities well-coordinated and managed
- Sufficient resources are allocated to the OMT
- Regular updates are provided to the LHD executive and the CEC
- Issues are escalated via an agreed pathway to the LHD/SHN executive

- Decisions made by the OMT are communicated and recorded appropriately
- An OMT report is prepared when the outbreak is over
- A debrief is held with the OMT and relevant clinical teams when the outbreak is over.

8.7 Outbreak management team – responsibilities

The responsibilities of the OMT may be grouped under operations, logistics and communications. The OMT should develop a plan to investigate and control the outbreak based on the following steps, which will be implemented concurrently. For more information refer to Appendix 8A Outbreak management teams tasks and Appendix 8B Outbreak management checklist.

Operations

The operations team responsibilities include:

- Review available evidence to establish the existence of an outbreak and identify additional information required
- Develop a case definition on which to base the epidemiological investigation
- Undertake active case finding using the agreed case definition
- Delegate the health worker responsible for developing and updating the line listing containing information on each case that includes potential risk factors
- Identify the source of the outbreak by examining common risk factors in cases; this may require an epidemiological analysis
- Implement control measures to prevent further transmission and assess the effectiveness of these measures
- Identify and utilise any opportunities for the acquisition of new knowledge about disease control
- Declare the conclusion of the outbreak, as per identified criteria and prepare and disseminate a final report. (Appendix 8E Outbreak situation report (example) and Appendix 8F Review, recommendations and reporting (sample)
- Evaluate the response to the outbreak and implement changes in OMT procedures as indicated.

Communications

Communication strategies include:

- Develop facility wide communication as required and maintain communication processes with key stakeholders, for example, situation reports
- Disseminate minutes and actions for each OMT meeting
- Keep relevant outside agencies, the public, and media appropriately informed.

Logistics

The following strategies are to be considered:

- Conduct formal outbreak control meetings on a regular basis
- Ensure adequate staff and resources are available for outbreak management, seek assistance from facility executive for additional resources if needed

- Allocate tasks to outbreak team members ensuring roles and responsibilities are clear
- Provide support and advice to everyone directly involved in the outbreak
- Consider the potential for health worker training opportunities generated by the outbreak.

8.8 Outbreak management team – communication requirements

The OMT should determine communication requirements locally and develop a communication plan accordingly. Triggers for Escalation Following Detection of Infection Outbreaks or Clusters should be used to determine the need to further escalate communication.

Outbreaks in specialty clinical areas that have limited bed numbers (for example, NICUs, Spinal and Burns units) have the potential to adversely affect service delivery and require immediate escalation locally and to relevant outside agencies.

At the conclusion of the outbreak, a final report should be prepared. The final report should be considered a public document so due regard should be given to confidentiality. The final report should include:

- The results of the outbreak investigation and control interventions
- Any difficulties or problems encountered
- Any action required to prevent recurrence and the agency responsible
- Any recommended revisions to the facility-specific outbreak management plan.

The final report should be circulated to all members of the OMT, the LHD executive, any relevant patient safety and quality committee members and any other relevant agencies.

8.9 The investigation and control of an outbreak

Outbreak management falls into four phases – detection, investigation, response, and evaluation of response. In practice there is considerable overlap between the phases especially between the detection, investigative and response phases.

8.9.1 Outbreak detection

Outbreak management begins with the detection and confirmation of an outbreak. Confirmation of an outbreak requires verification of the diagnosis of the disease (symptoms or pathology results) and evidence the number of infected individuals exceeds the expected number of cases.

If confirmed, the extent and significance of the outbreak is assessed, which will inform the decision to implement the facility-specific outbreak response plan and convene the OMT.

8.9.2 Outbreak investigation

In the initial stage of an outbreak investigation a case definition should be established. A case definition is a standard set of criteria to be used in outbreak investigation to decide who is a case and who is not. It should include well-defined clinical symptoms (+/- laboratory criteria) and restrictions by time, place and person. Once established, attempts should be made to find additional cases meeting the definition.

Detailed epidemiological data should be collected from each case. Information to be collected includes:

- Identifying information (name, identification number, date of admission)
- Demographic information (age, gender, address, and so forth)

- Clinical information (date/time of onset, place of onset, signs and symptoms, death, hospitalisation, treatment, and so forth)
- Laboratory information
- Potential risk factors (contact with known case, or individuals with similar symptoms, recent travel, immunosuppression, environmental exposure, other co-morbidities, and so forth).

The most common way this information is collated is by using a line list. An example line list form can be found in Appendix 8C Line listing for outbreaks in a hospital.

Other information which may assist in identifying the source include:

- Patient health record
- Environmental assessment (for example, identification of contaminated food or food handling equipment, infection prevention and control breaches, building infrastructure – location of sink, cleaning – product details, curtains – change, environmental sampling)
- Analysis of epidemiological data (for example, movements and contacts of cases)
- Laboratory data (for example, whole genome sequencing).

Depending on the infectious cause of the outbreak, it may be necessary to identify contacts of cases. Liaise with local PHU for guidance on what constitutes a contact. Contact tracing of staff and other individuals exposed within a facility should be carried out by that Health Organisation. If the exposure occurred in the community, contact tracing should be carried out by the local PHU. For individuals exposed in facilities, but who are now in the community, for example, patients discharged from emergency departments, local plans should specify who should conduct contact tracing. What constitutes a contact and management of contacts varies depending on the infection causing the outbreak.

Further information on the identification and management of contacts of different infections can be found in NSW Health control guidelines.

8.9.3 Outbreak response

The primary goal of outbreak response is control and prevention of further transmission. Control measures should be considered and implemented as soon as possible. Refer to Appendix 8D Common and important infectious diseases requiring isolation in hospitals for/and recommended precautions.

If an OMT is required, it should be established at this stage. The OMT should review and implement further control measures as deemed necessary. Control measures should aim to either eliminate the potential source of infection or prevent further transmissions.

8.9.4 Evaluation of response (debrief)

An evaluation of the outbreak response should be undertaken at the conclusion of the outbreak as part of the final report. The evaluation should determine if the incident objectives were met, identify positive outcomes and evaluate areas for improvement.

Aspects of the outbreak response for evaluation may include:

- Preparedness for this type of investigation (includes governance, resources, guidelines, questionnaires, databases, and so forth)
- Coordination of outbreak meetings, communication with stakeholders (including media management)

- Administration and record keeping
- Timeliness of outbreak detection, identification of source and implementation of control measures
- Effectiveness of investigation process and control initiatives implemented.

8.10 Outbreak management in community settings

The principles of outbreak investigation and response in community settings remain the same as those used in healthcare facilities. Escalation of the outbreak should occur by the local PHU to determine the need and scale of the response.

8.11 Emerging infectious diseases

An emerging infectious disease is one that has newly appeared in the population or has existed but is rapidly increasing in incidence or geographic range.

Emerging infections can be caused by:

- Previously undetected or unknown infectious agents
- Known agents that have spread to new geographic locations or new populations
- Previously known agents whose role in specific diseases has previously gone unrecognised
- Re-emergence of agents whose incidence of disease had significantly declined in the past, but whose incidence of disease has reappeared. This class of diseases is known as re-emerging infectious diseases.

The list of emerging infectious diseases is growing continuously, but the best examples include a wide variety of haemorrhagic fevers and other syndromes caused by viruses such as dengue, arenaviruses, filoviruses, and hantaviruses.

With people traveling more frequently and far greater distances than in the past, living in more densely populated areas, and coming into closer contact with wild animals, the potential for emerging infectious diseases to spread rapidly and cause global epidemics is a major concern.

The threat of emerging respiratory viruses such as pandemic influenza or a novel coronavirus are a potential cause of concern for the health system. One of the difficulties about the emergence of these viral infections is that no one can predict where and when the next epidemic or pandemic will occur.

Health Organisations should follow the disease specific NSW Health control guidelines in the event of a respiratory virus outbreak. Refer to NSW Health Pandemic influenza preparedness, NSW Health Early Response to High Consequence Infectious Diseases and Guidelines for management of specific high consequence infectious diseases, COVID-19: Managing Health Worker Exposures and Return to Work in a Healthcare Setting for more information.

For escalation and communication refer to Triggers for Escalation Following Detection of Infection Outbreaks or Clusters.

Appendix 8A Outbreak management teams tasks

The principal task of the outbreak management team (OMT) is to investigate the cause of the outbreak and to implement action to identify and remove/isolate the source and prevent further transmission of the communicable disease. The following tasks should be undertaken to deal effectively with an outbreak. The step-by-step approach does not imply that each action must follow the one preceding it. In practice, some steps must be carried out simultaneously and not all steps will be required on every occasion.

Outbreak management task list	
☐	Consider whether cases have the same illness and establish a tentative case definition
☐	Review epidemiology and laboratory data to determine disease in the group
☐	Establish a single comprehensive case list that meet the case definition
☐	Collect relevant clinical or environmental specimens for laboratory analysis
☐	Conduct unstructured, in-depth interviews of index cases if applicable
☐	Consider consulting with local public health unit (PHU) as required
Outbreak investigation	
☐	Identify population(s) at risk (for example, health workers, patients, visitors)
☐	Identify persons posing a risk of further transmission (contact trace)
☐	Initiate immediate control measures
☐	Assess the availability of adequate resources to manage the outbreak
☐	Notify the local PHU, the LHD executive, any relevant patient safety and quality committee members and any other relevant agencies as required
☐ ☐	If the outbreak involves a notifiable disease or gives rise to broader public interest or is of state significance notify the local PHU The PHU to notify Health Protection NSW who would then notify the Chief Health Officer (CHO) and/or Health Secretary
☐	Establish a case definition (clinical and/or microbiological)
☐	Identify other cases
☐	Complete the list (describe cases by time, place and person)
☐	Collect relevant clinical specimens, collect environmental specimens as directed by infectious diseases as required (environmental specimens are only collected in some outbreaks and pathogens)

☐	Conduct appropriate environmental investigation including inspection of involved or implicated premises
☐	Form preliminary hypotheses on the cause of the outbreak
☐	Make decision about whether to undertake detailed analytical studies
☐	Calculate attack rates if required
☐	Confirm factors common to all or most cases
☐	Where available, use whole genome sequencing (WGS) to confirm links and source of outbreak
☐	Test and review hypotheses of the cause
☐	Collect further clinical or environmental specimens for laboratory analysis
☐	Ascertain source and mode of transmission
Outbreak response	
☐	Control the source: patient, staff, equipment or environment
☐	Control the transmission by: a) isolation or exclusion of cases and contacts b) cohorting" if exclusion is not possible as in the case of inpatients or parents in children's ward or NICU c) personal protective equipment (PPE) for, for example masks for contacts and cases to minimise spread -anywhere relevant d) restrict movement in and out of the ward e) signage, entry to the ward/department, in the ward f) treatment of cases to reduce infectious period, where possible (for example, antivirals) g) screening and monitoring of contacts h) protection of contacts by immunisation or chemoprophylaxis i) enhanced infection prevention and control practices by staff and visitors including environmental cleaning, equipment decontamination procedures and hand hygiene j) education and communication, on the pathogen, transmissibility k) closure of wards/beds
☐	Monitor control measures by continued surveillance for disease
☐	Declare the outbreak over

Communication	
☐	Daily situation updates to the facility Executive, LHD Chief Executive (CE) or their delegate
☐	Consider the best means of communication with colleagues, patients and the public, including the need for an incident room and/or helplines
☐	Review the Triggers for Escalation Following Detection of Infection Outbreaks or Clusters guideline to determine the need for further escalation of communication
☐	Ensure appropriate information is given to the public, especially those at high risk
☐	Ensure accuracy and timeliness
☐	Prepare written final report as per the communication requirements
☐	Disseminate information on any lessons learnt from managing the outbreak and modify the procedure or standard operating procedures as required
Evaluation of response	
☐	Evaluate the management of the outbreak and make recommendations for the future (refer to section 8.9.4 Evaluation of Outbreak Response for possible criteria)

Appendix 8B Outbreak management checklist

Type of outbreak: _____
(for example, MRO, gastroenteritis, respiratory illness)

Date outbreak reported to infection prevention and control: _____

Reported by: _____

Outbreak location/facility: _____

Ward(s) affected: _____

Likely mode of transmission: ☐Contact ☐Airborne ☐Droplet ☐ Food-borne ☐Water-borne ☐ Unknown

The outbreak management team (OMT) should ensure the following steps are initiated as soon as possible and if initiated, completed. The order in which the tasks are undertaken may vary.

Action	✓ If action indicated	✓ If action completed	N/A
Do you have an outbreak? Such as, a higher-than-expected number of cases of infection/infectious diseases, multi-drug resistant organisms (MROs) with the same causative agent (if known in the early stages of the outbreak)	☐	☐	☐
Has the source of the outbreak been identified?	☐	☐	☐
Do you need to convene the outbreak management team? • refer to section 8.5 on factors to consider in convening an outbreak management team	☐	☐	☐
Inform health workers • inform relevant health workers that a possible outbreak is occurring including advice regarding infection prevention control ○ include supply and operational staff in correspondence ○ consider the need to inform visitors and patients • inform senior nursing and medical services on duty • inform your local microbiology unit of any additional specimen requirements	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Implement infection prevention and control measures			

• ensure sufficient supplies of appropriate personnel protective equipment (PPE) is available in the affected areas, for example, mask, gloves, gowns, aprons, eye protection, as indicated by mode of transmission • isolate affected patients in single rooms or cohort • display signage regarding necessary additional transmission-based precautions • review cleaning products to ensure efficacy against the causative organism • reinforce hand hygiene practices as appropriate ○ alcohol-based hand hygiene products may not be suitable for certain micro-organisms, for example, *Clostridioides difficile*, Norovirus	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
Stop or limit further transmission by: • dedicate staff to affected patients where possible • cohort patients with the same infection if needed • increase cleaning frequencies in affected areas • limit transport of affected patients to essential purposes only • restrict visitors, non-essential staff/students, volunteers, pastoral care where necessary, young children and people with suppressed immune systems • reinforce hand hygiene with patients, visitors and health workers	 ☐ ☐ ☐ ☐ ☐ ☐	 ☐ ☐ ☐ ☐ ☐ ☐	 ☐ ☐ ☐ ☐ ☐ ☐
Notify authorities including local PHU if applicable • review Triggers for Escalation Following Detection of Infection Outbreaks or Clusters to determine the need for further escalation	☐	☐	☐
Collect specimens • observe standard and transmission-based precautions when collecting relevant specimens • collect appropriate specimens - liaise with ID or microbiology to determine collection method and specimen types • ensure specimens are labelled appropriately	 ☐ ☐ ☐	 ☐ ☐ ☐	 ☐ ☐ ☐
Document the outbreak • list all known cases and update information daily	 ☐	 ☐	 ☐

• include details of affected patients and health workers in the line list • include details of onset date of symptoms/diagnosis for each case	☐ ☐	☐ ☐	☐ ☐
Outbreak management report • complete outbreak management report highlighting recommendations for prevention and disseminate as per local process • Review and up-date outbreak management plan	☐ ☐	☐ ☐	☐ ☐
Comments:			

Appendix 8C Line listing for outbreaks in a hospital

Name of ward(s) or unit(s):		**No. patients on ward/unit:**		**No. of staff:**	
Contact person:		**Position/title:**			
Phone No:		**Email:**			
PHU notified:	☐	**Date reported to PHU:**		**Date of first case:**	
Unique name/number for outbreak (PHU to fill in):					

Please use the same line listing for new cases – do not start a new one each day

Case details						Description of illness				Specimen			Outcome
Case No.	Full name & MRN	DOB & Age (yrs.)	Gender	Staff (S) or Patient (P)	Current ward/ bed	Date of onset	Time of onset	Length of illness (hrs.)	Symptoms (see key)	Specimen collected (Y/N) if yes, specify type	Date specimen collected	Result (specify name of bacteria, virus, parasite or toxin)	Recovered (R) Died (D) Transferred (T)

Case details						Description of illness				Specimen			Outcome
Case No.	Full name & MRN	DOB & Age (yrs.)	Gender	Staff (S) or Patient (P)	Current ward/ bed	Date of onset	Time of onset	Length of illness (hrs.)	Symptoms (see key)	Specimen collected (Y/N) if yes, specify type	Date specimen collected	Result (specify name of bacteria, virus, parasite or toxin)	Recovered (R) Died (D) Transferred (T)
Symptoms key: V = vomiting D = diarrhoea BD = bloody diarrhoea F = Fever>38.5^{c} AC = Abdominal cramps N = Nausea													

Note: Amend symptoms key for other infectious diseases.

Appendix 8D Common and important infectious diseases requiring isolation in hospitals

Disease	Transmission route	Type of precautions				Comments and additional guidance
		Standard	Contact*	Droplet	Airborne	
Clostridioides difficile	Faecal/oral	✓	✓			Consider patient to be infectious until at least 48 hours after cessation of diarrhoea. Precautions can then cease. An ensuite bathroom or dedicated toilet is required. Review patients with stoma, ileostomy or colostomy. **CEC**: Resources
COVID-19	Exposure to infectious respiratory particles	✓			✓	Infection prevention and control Manual Acute Respiratory Infections including COVID-19
Gastroenteritis – bacterial and parasitic For example, *Campylobacter. Salmonella, Giardia, Shigella*, and *E. coli*	Ingestion of contaminated food and water Contact transmission from infected animals	✓	✓			Consider patient to be infectious until at least 48 hours after cessation of diarrhoea. Contact precautions can then cease. An ensuite bathroom or dedicated toilet is required. Gastroenteritis outbreaks in institutions are notifiable to your local PHU under the Public Health Act 2010. Giardiasis is not a notifiable condition in NSW and there is no public health response required for individual infections. **Communicable Diseases Network Australia (CDNA)** Norovirus and suspected viral gastroenteritis – CDNA National Guidelines for Public Health Units **NSW Health:** Gastro Pack for Hospitals Gastroenteritis in an institution control guideline Foodborne-illness outbreak guideline Campylobacteriosis control guideline
Gastroenteritis – viral For example, Rotavirus, Norovirus	Ingestion of contaminated food and water Exposure to faecal and vomit aerosols	✓	✓	✓		

Disease	Transmission route	Type of precautions				Comments and additional guidance
		Standard	Contact*	Droplet	Airborne	
						Giardiasis control guideline Rotavirus control guideline Salmonellosis control guideline Shigellosis control guideline Shiga toxigenic E. Coli control guideline
Haemophilus influenzae type B	Respiratory droplets Contaminated fomites/environment	✓	✓	✓		Can cease precautions after 24-48 hours of effective antibiotic treatment Children and immune compromised people are most at risk of infection Invasive Haemophilus influenzae type B infections are notifiable to your local PHU under the *Public Health Act 2010* **NSW Health:** Haemophilus influenzae type b (Hib) control guideline
Hand, foot and mouth disease – Coxsackie virus and other enteroviruses	Contact with fluid in blisters or faeces Inhalation of respiratory secretions	✓	✓	✓		**NSW Health:** Hand, foot and mouth disease factsheet Enteroviruses and human parechoviruses - information for clinicians
Herpes simplex virus – disseminated	Contact with fluid from lesions Contaminated fomites/environment	✓	✓			Precautions to remain in place until lesions are dried and crusted Immune compromised staff should not care for patients Infected staff will require urgent review for leave/ redeployment in high-risk clinical areas such as maternity and NICU **WHO:** Herpes simplex virus

Disease	Transmission route	Type of precautions				Comments and additional guidance
		Standard	Contact*	Droplet	Airborne	
Hepatitis A	Faecal/oral	✓	✓			Duration of precautions: • Adults - for 7 days after onset of jaundice • Children <5 yrs- duration of hospitalisation. An ensuite bathroom or dedicated toilet is required **NSW Health:** Hepatitis A control guideline
Hepatitis B **Hepatitis C** **Hepatitis D**	Blood-borne	✓				Immunise and test all health workers (Hepatitis B) Occupational exposure protocol for blood-borne viruses **NSW Health:** Hepatitis B control guideline Hepatitis C control guideline Hepatitis D control guideline
Hepatitis E	Faecal/oral	✓	✓			Infectious for 14 days after onset of symptoms. An ensuite bathroom or dedicated toilet is required. **NSW Health:** Hepatitis E control guideline
Impetigo	Contact with lesions	✓	✓			Infectious as long as there is discharge from the sores or until 24 hours after effective therapy
Influenza	Respiratory droplets Indirectly from contaminated fomites/ environment	✓	✓	✓		Annual immunisation of staff recommended. Patients are infectious for 3-5 days after onset of symptoms (longer in children, elderly and immune suppressed patients) or until after 72 hours of the patient receives anti-influenza medication. Ant-influenza medications may be indicated for treatment of cases and prophylaxis of high-risk contacts and for outbreak management.

Disease	Transmission route	Type of precautions				Comments and additional guidance
		Standard	Contact*	Droplet	Airborne	
						Communicable Diseases Network Australia (CDNA) National Guideline for the Prevention, Control and Public Health Management of Outbreaks of Acute Respiratory Infection in Residential Aged Care Homes **NSW Health:** Influenza control guideline, Acute respiratory infections including COVID-19
Lice – head and body	Close person to person contact	✓	✓			Patients are infectious until 24 hours of effective treatment. Repeat treatment after 7 days.
Measles	Inhalation of respiratory secretions	✓			✓	Non-immune staff should not care for patient Airborne precautions (negative pressure room if available) are required for 4 days after onset of rash Patients transported for tests/procedures to wear a surgical mask if infectious. Room with at least 12 air changes per hour must be left 30 minutes prior to reuse. Measles cases are notifiable to your local PHU under the Public Health Act 2010. Pre-employment screen for HWs are required. **NSW Health:** Measles control guideline
Meningococcal disease – *Neisseria meningitidis*	Close contact with respiratory droplets	✓		✓		The patient is infectious until 24 hours of effective treatment Invasive meningococcal disease cases are notifiable to your local PHU under the *Public Health Act 2010*. **NSW Health:** Meningococcal disease control guidelines

Disease	Transmission route	Type of precautions				Comments and additional guidance
		Standard	Contact*	Droplet	Airborne	
Multi-resistant organisms – MRSA, VRE, CPE, *Candidozyma auris*	Contact with skin or secretions HW unwashed hands Indirectly from contaminated fomites/environment	✓	✓			Refer to your local guidelines and risk assess for patient placement and PPE requirements. **NSW Health:** MRSA in the community control guideline Surveillance and Response for Carbapenemase-producing Enterobacterales (CPE) in NSW Health Facilities guideline Management and Control of Candida auris in NSW Health facilities
Mumps	Respiratory droplets Contaminated fomites/ environment	✓		✓		The patient is infectious until 9 days after onset of swelling reported. Non-immune staff should avoid caring for the patient Pre-employment screen for HWs are required **NSW Health:** Mumps control guideline
Mycoplasma pneumoniae		✓		✓		Apply droplet precautions for patients with respiratory symptoms when providing prolonged care.
***Mycobacterium tuberculosis* (TB) – pulmonary or laryngeal**	Inhalation of respiratory secretions	✓			✓	Precautions required until 3 negative expectorated sputum smears (AFBs) and PCR if available or one induced sputum smear negative and PCR negative, such as lower infectivity &/or lesion drainage has ceased. Negative pressure room. Patients wear surgical mask when outside room or attending tests. Wait until 30 mins after the patient has left before reuse. Confirm room air exchange/hour with local infection prevention and control team. **NSW Health:** Tuberculosis control guideline

Disease	Transmission route	Type of precautions				Comments and additional guidance
		Standard	Contact*	Droplet	Airborne	
Parvovirus B19	Respiratory droplets	✓		✓		Immune compromised individuals may be infected for longer periods. Can cross the placenta (rare). Infected pregnant women need urgent referral to an obstetrician Pregnant healthcare workers must not look after infected patient (s). **NSW Health:** Parvovirus B19 (Fifth Disease) fact sheet
Pertussis – Whooping Cough	Respiratory Droplets	✓		✓		Infectious until completion of 5 days of appropriate antibiotics. If no antibiotic treatment has commenced, they are infectious for 21 days from onset of symptoms. **NSW Health:** Pertussis control guideline
Emerging respiratory coronaviruses – MERS and SARS	Inhalation of respiratory secretions	✓	✓		✓	Notify your local PHU immediately on suspicion. MERS and SARS cases are notifiable to your local PHU under the *Public Health Act 2010*. **NSW Health:** MERS-CoV control guideline Severe Acute Respiratory Syndrome coronavirus (SARS-CoV) control guideline
Rubella	Inhalation of respiratory secretions	✓			✓	Infectious until 7 days after onset of rash Non-immune pregnant staff must not care for the patient Pre-employment screen for HWs is required Australian Guidelines for the Prevention and Control of Infection in Healthcare
Scabies	Skin to skin contact Indirectly from contaminated	✓	✓			Treatment and isolation of cases should occur concurrently

Disease	Transmission route	Type of precautions				Comments and additional guidance
		Standard	Contact*	Droplet	Airborne	
	fomites/environment					Isolate for 24 hours after first treatment **NSW Health:** Scabies factsheet **WHO:** Scabies
Typhoid fever – *Salmonella typhi/paratyphi*	Faecal/oral	✓	✓			Infectious for duration of illness Dedicate toilet for duration of hospitalisation. **NSW Health:** Typhoid and paratyphoid fevers control guideline
Varicella-zoster virus **Chickenpox and Shingles**	Inhalation of respiratory secretions (Chickenpox only) Contact with fluid from lesions Contaminated fomites/ environment	✓	✓		✓	Airborne precautions are NOT required for localised shingles. Disseminated zoster and primary varicella (chicken pox) require airborne precautions and negative pressure room if available. Duration of precautions must continue until all lesions are dry & crusted non-immune staff should not care for patients Pre-employment screen for HWs is required Post exposure prophylaxis for non-immune HWs recommended **The Australian Immunisation Handbook:** Varicella (chickenpox)
Viral Haemorrhagic fevers (VHF)	Contact with the blood or bodily fluids of people with VHF, and the bodies of people who have died of VHF. Objects contaminated with blood or bodily fluids of	See **NSW Health** Early Response to High Consequence Infectious Diseases policy directive for infection control measures. VHFs are notifiable infectious diseases and scheduled medical conditions under the *NSW Public Health Act (2010)*. VHFs are *listed human diseases* under the national Biosecurity Act 2015. This allows biosecurity measures to be implemented to manage risks to human health, mainly through imposing human biosecurity control orders such as isolation measures.				

Disease	Transmission route	Type of precautions				Comments and additional guidance
		Standard	Contact*	Droplet	Airborne	
	people with VHF.	**NSW Health:** Ebola virus disease control guideline				
*Apply contact precautions based on risk assessment, if aerosol generating procedures are conducted apply airborne precautions.						

Appendix 8E Outbreak situation report (sample)

Outbreak situation update			
Outbreak name			
Date of report		Investigation start date	
Person completing		Ward/department	
Case information			
Confirmed	Possible	Total	Inpatients
Case definition			
Confirmed outbreak cases: Possible outbreak cases:			
Summary of investigation			
Epidemiological:			
Control measures			
Actions			
Supporting documents			
For example, epidemic curve, line listing, tables			

Appendix 8F Review, recommendations and reporting (sample)

Brief overview of case presentation	
Brief overview of case or outbreak management **Include as relevant**: Were visitation restrictions put in place Were appropriate isolation facilities available, including aspects such as ventilation air conditioning suitable for management of patients Was there adequate space for health worker to safely don and doff PPE? What was the number and proportion of potentially preventable cases?	
Brief overview of impact to service delivery **Include as relevant:** How timely was the response in relation to the index case and subsequent cases? Did health workers comply with policy?	
Red flags or policy gaps identified Free text description	

Source: Adapted from ISLHD Infection management and control service.

Chapter 9 Surveillance, auditing and notification

9.1 Role of surveillance

Each year, numerous patients in Australia experience a complication in the form of a hospital associated infection (Lydeamore et al., 2022). 'A hospital acquired complication' (HAC) refers to a complication that occurs during a hospital stay and for which clinical risk mitigation strategies may reduce (but not necessarily eliminate) the risk of that complication occurring' (ACSQH).

In 2012 the Independent Health and Aged Care Pricing Authority (IHACPA) and the Australian Commission on Safety and Quality in Health Care (ACSQHC) established a joint working party and developed a national list of 16 HACs. The HACs list offers a set of agreed, high-priority complications which clinicians, managers and others can work together to address and improve patient care. For the full list of HACs refer to the ACSQHC Hospital-acquired complications (HACs).

Health care associated infections that are included in HACS are the following:

- Urinary tract infection (UTI)
- Surgical site infection (SSI)
- Pneumonia
- Blood stream infection (BSI)
- Central and peripheral line associated blood stream infection
- Multi-drug resistant organism
- Infection associated with prosthetics/implantable devices
- Gastrointestinal infection.

Health Organisations record primary and secondary diagnoses and complications routinely for every admission after discharge. Analysis of this "coded data" provides health services with information about the occurrence of complications to identify potential areas for safety and quality improvement (ACSQHC). For more information refer to ACSQHC Hospital-Acquired Complications (HACs) List – Specifications.

Healthcare associated infection (HAI) surveillance programs enable Health Organisations to identify complications, investigate, monitor the outcomes of current practice and provide timely feedback to clinicians to ensure practice improvement and better patient outcomes. Surveillance is a key aspect in detecting disease, triggers a response and potentially prevents clusters and outbreaks from occurring.

Surveillance is an essential component of any infection prevention and control program and patient safety initiative. Surveillance involves the systematic collection, collation, analysis, interpretation and dissemination of data for use in the planning, implementation and evaluation of the provision of healthcare as well as safety and quality of patient care (German et al., 2001). All NSW Health service organisations need to meet the National Safety and Quality Health Service Standards in particular, Standard 3 action 3.05 Surveillance.

The primary purpose of surveillance in infection prevention and control is to monitor for sentinel events, HAIs and report to the relevant stakeholders including infection prevention and control service. Significant incidents such as outbreaks or clusters of HAIs, multi-drug resistant organisms (MROs) and/or non-MROs should be escalated to the Health Organisation or local health districts (LHDs) management as soon as possible to determine ongoing action. Refer to NSW Health guideline Triggers for Escalation Following Detection of Infection Outbreaks or Clusters.

Process indicators

Process indicators are most commonly actions that should be carried out to reduce the probability of patients contracting infections in healthcare organisations.

Process indicators review practices directly related to patient care. For example, hand hygiene auditing to identify whether the practices comply with facility infection prevention and control procedures and policies.

Outcome indicators

The outcome indicators are mostly infections. The process consists of collecting/documenting data on individual cases and comparing the collected data to standard written definitions (criteria) of infections.

When the Health Organisation collects and submits any surveillance data, a suitably qualified or experienced health worker who can reliably interpret, evaluate and report recommendations to a peak committee is needed. In addition to mandatory indicators, other clinical indicators may be used locally. When establishing additional clinical indicators consider:

- Prevalence – has there been an unexpected or unexplained increase in cases?
- Setting – will all departments be surveyed or only specific ones?
- Capacity to undertake surveillance – are there staff and systems available to undertake this surveillance?
- Availability of data – is there sufficient data available to support this?
- Potential for change – is there potential for an intervention to be introduced and supported locally to improve HAI rates?
- Relevance to the risk – does the risk warrant measuring and reporting the indicator?
- Feedback and reporting lines – who is this new information going to be reported to?

When conducting HAI surveillance:

- use standardised definitions and data collection tool where available
- undertake regular data collection in line with reporting requirements
- regularly review surveillance activities to ensure objectives and outcomes of surveillance remain relevant to safety and quality practices.

It is imperative to only collect data that is useful and directly related to the prevention and control of HAIs. If there is no useful outcome for data collection (such as intervention is not possible, and/or improvement cannot be achieved) then surveillance objectives should be re-assessed.

9.2 Clinical indicators

The NSW HAI Clinical Indicator Manual outlines the minimum level of mandatory HAI surveillance that all NSW Health Organisations are to undertake. For more information refer to CEC Healthcare Associated Infection (HAI) Clinical Indicator Manual.

Health Organisations should have systems in place to ensure health workers whose role is to conduct mandatory surveillance can receive all reports, documents and results that are necessary to conduct HAI surveillance. This includes microbiology reports, access to medical records and theatre management systems.

The CEC's Quality Improvement Data System (QIDS) provides support to local health districts and speciality health networks (LHD/SHNs) with processing data and sharing information to assist with patient safety and quality improvement activities. It has reporting and charting capacity for business intelligence, and for management of hospital complications including infections, falls, pressure injuries, venous thromboembolism and medications. QIDS is intended as a single point of access for

clinicians and managers to view incident and hospital coded data as well as provide access to tools and resources fundamental to improvement work. The system facilitates collaborative decision making allowing LHD/SHNs to manage and organise their own permissions and information sharing with clinicians and managers.

Quality Audit Reporting System (QARS) is another electronic tool developed by the CEC in collaboration with all other organisations in NSW Health, including LHD/SHNs. QARS is used for conducting clinical audits, patient surveys, and other data collection processes in a more efficient and effective way for NSW Health Organisations.

As part of a statewide transformation, NSW Health is implementing the Single Digital Patient Record (SDPR), a secure and integrated electronic health record system that will unify patient information across all public hospitals and health services.

The SDPR will enhance clinical workflows by providing real-time access to comprehensive patient data, including test results, treatment history, and appointments. Critically, the SDPR will support improved surveillance and management of HAIs by offering advanced tools for documentation, analysis, and reporting. This capability will strengthen infection prevention and control practices, enable timely interventions, and support data-driven decision-making, ultimately contributing to safer, more connected care across the NSW Health system.

9.3 Reporting of notifiable disease

Medical practitioners and hospital chief executives are required to report notifiable incidents/ conditions to their local PHUs based on reasonable clinical suspicion. Timelines for reporting vary dependent on urgency and clinical risk. Information for each notifiable disease and condition is available from the NSW Health Disease notification.

9.4 Investigation of outbreaks or clusters

The main goal of investigating an increased or unexpected incidence of transmission, outbreak or a cluster is to prevent further transmission, prevent additional cases or incidence and to identify contributing factors. This allows for the development and implementation of measures to contain the current increased incidence and prevent future outbreaks or clusters. Refer to NSW Health Triggers for Escalation Following Detection of Infection Outbreaks or Clusters for more information. For more information refer to Chapter 8 Outbreak and cluster management.

The following table contains trigger points which may assist when investigating an infection or a cluster.

Table 44 Points of consideration for investigation of outbreaks or clusters

Consideration	Risk assessment
The point you consider an investigation?	• As soon as the rate increases. • A death caused by an HAI (review the cause of death). • Based on the local prevalence and significance of the microorganism when there are 2 or more cases above the baseline (some microorganisms – one case may be of significance). • When there is a sustained increase in a particular infection.
Investigation method	• IMS+ or relevant system for case reviews.

	• Morbidity and mortality (M&M) for case reviews. • Root cause analysis (RCA), or the type of review as per the Serious adverse event review (SAER). • Ensure an infectious diseases and infection prevention and control person is part of the team.
Immediate actions to be taken	• Establish a case definition. • Determine who collects the data – consistency. • Treat like an outbreak and use same methodology (refer to Chapter 8 Outbreak and cluster management).
Investigation plan	• Lookback process with other surgical site infections (SSIs). • Review of microbiology reports. • Develop a checklist to assist with the lookback and investigation. • Detail where, when, who, what, how with a timeline. • Full review of cases within the defined period. • Determine who will be part of the investigation team, for example, infection prevention and control, operating theatre, surgical ward, medical staff, clinical governance unit (CGU) or patient safety, microbiology and/or infectious diseases. • Determine what you will review and perform risk assessments on for the investigation. • Determine the type of education and training required. • Determine how you will check for other linked incidents/adverse events.
Pre-operative assessment	• Review of MRO screening practices. • Pre-operative care, for example, chronic wounds. • Admission timeframes from pre-operative assessment to admission for surgery, number performed, patient education, specific specialty group, MRSA/MSSA decolonisation. • Patient factors. • Review of patient risk factors, for example, obesity, diabetes, nutrition, smoking, staph aureus carriage/colonisation.
Surgical or anaesthetic procedure	• Surgical teams – is there a common theme person/group. • Common operating theatre room. • Check changes in practice within operating theatres, for example, draining method or type, new equipment, performing skin prep before scrubbing. • Check surgery type, for example, elective versus emergency.

	• Compliance with scrubbing, gowning and gloving. • Review the existing pre-op antiseptic (type and how it is applied) and if any changes have been made. • Review antisepsis. • Review aseptic technique competency and audit compliance. • Review type of wound closure method and dressing used. • Check antimicrobial prophylaxis, time, dose. • Review workflow within operating theatre during surgical procedures. Observe any changes to operating theatre equipment or patient beds.
Environment	• Results of environmental cleaning audits. • Any changes to the environmental cleaning, for example, usual cleaner on leave. • Check practices within sterilization department, for example, changes to the procedure, equipment used or changes in chemicals, changes to staffing. • Water sample testing (automated flexible endoscope reprocessor, cooling towers, and so forth).
Workforce	• Staffing and skill mix in operating theatre. • Review of governance structure. • Any changes to management or education programs within the peri-operative setting.
Inpatient ward/unit	• Perform a ward round. • Observe standard precautions including hand hygiene, review compliance reports and use. • Environmental cleaning audits results. • Look at other process measures, for example, surgical prophylaxis, wound care. • Review all audit and risk assessment outcomes/results. • Review other services that are involved in the care/treatment of surgical patients, for example, rehabilitation. • Education on wound management, aseptic technique, hand hygiene. • Review documentation on wound, indwelling devices management and any patient education care and management of these devices/wound.

Evaluation, response and escalation plan	• Evaluate all the known gaps and check progress on actions. • Escalate data to all key stakeholders. • Monitor data trend ○ Benchmark with other sites ○ Set measurable goals • Determine what audits need to have continuous monitoring (the timeframes for these may be changed as HAIs reduce). • Determine if an independent review is to be undertaken. • Present investigation and outcomes as a case study – what were the learnings. • Develop a regular feedback mechanism, for example, monthly 1 page summary that includes action plan achievements, surveillance data. • Continue to have a visual presence in the clinical areas, for example, operating theatre, surgical wards. • Provide education, feedback and resources to clinicians as appropriate. • Review the infection prevention and control meetings to determine whether the reports are tabled and trend results discussed. If reports are not tabled, then need to add as a standing agenda item. • Review the recommendations that are made from the investigation. Ensure that recommendations have a risk rating assigned to each one before they are submitted. • Review what risks were identified from the investigation and determine what high risks should be added to the facility risk register, for example, capability of relief for infection prevention and control professionals.

9.5 Surveillance in non-acute settings

The incidence of HAIs in non-acute settings should be regularly monitored. The type and scope of surveillance will be determined by the type of service being provided and the associated risk to the patient.

Monitoring should be specific to a significant organism, condition or process where HAIs pose an increased risk. Surveillance should be evidence-based, utilise clear definitions and, where possible, allow for benchmarking between similar Health Organisations.

Adaptations of standardised clinical indicators or locally developed clinical indicators should be reviewed by a suitably qualified health worker(s) with experience in data collection and analysis prior to implementing such programs.

Surveillance activities for community-based settings could include but are not limited to:

Oral health clinics

Infections identified following dental treatment. This can be recorded as a HAI register or through data entry record of an antibiotic script following a procedure.

Community-based settings

Infection rates associated with peripherally inserted intravenous cannulas, the management of intravascular access devices (IVADs) and urinary catheterisation.

Occupational exposure reporting

Collection and reporting of occupational exposures to blood and/or body substances are mandatory for all public facilities, including:

- Community, acute without surgery
- Community non-acute
- Aged care facilities
- Multi-purpose services
- Hospices.

9.6 Antimicrobial resistance surveillance methods

To meet the Australian National Safety and Quality Health Service Standards, Health Organisations are to monitor antimicrobial usage and resistance. A suggested means of monitoring antimicrobial resistance is through the development of an annual hospital-level cumulative antibiogram, which will provide information on likely antimicrobial susceptibilities for common microorganisms.

The Antimicrobial Use and Resistance in Australia (AURA) Surveillance System, coordinated by the Australian Commission on Safety and Quality in Health Care (noting AMR function is also incorporated as a function in scope for the Australian CDC with pending detail), provides essential information to develop and implement strategies to prevent and contain antimicrobial resistance (AMR) in human health and improve antimicrobial use across the acute and community healthcare settings.

The AURA Surveillance System coordinates data from a range of sources to provide a comprehensive and integrated picture of patterns and trends of AMR and antimicrobial use in human health across Australia. The AURA National Coordination Unit (NCU) is responsible for the conduct of the AURA Surveillance System. The cumulative hospital-level antibiogram should be used to inform local empirical antimicrobial recommendations and formulary management.

Antibiogram should be available to clinicians and groups who are responsible for local antimicrobial therapy guidelines. The Commission has published a Specification for a Hospital Cumulative Antibiogram which provides more information on the use of hospital cumulative antibiogram.

Monitoring antimicrobial resistance aligns with the Australian Government's National Antimicrobial Resistance Strategy which provides a framework to guide actions on preventing the development and spread of antimicrobial resistance. For more information refer to Australia's National Antimicrobial Resistance Strategy – 2020 and beyond.

For smaller Health Organisations where a hospital-level cumulative antibiogram may not be feasible or appropriate, antimicrobial resistance may be monitored through review of MRO data in liaison with the microbiology service provider. Also liaise with the committee that oversees antimicrobial stewardship in the organisation, with a specific focus on how local antimicrobial susceptibility patterns may impact empiric antibiotic therapy.

In community health settings, antimicrobial resistance may be monitored by reviewing infection rates associated with insertion of medical devices, checking whether these infections are due to MROs, and conducting targeted surveillance, where appropriate, for microorganisms, including MROs.

Antimicrobial Stewardship in Dental Practice was developed to strengthen AMS in dental services. For information on implementing an AMS program in a dental practice refer to Antimicrobial Stewardship in Australian Health Care 2022.

9.7 Auditing

9.7.1 Auditing principles

In the context of infection prevention and control, performance measures or auditing is a process aimed at measuring the quality-of-care Health Organisations provide against relevant standards to reduce clinical variation with specific infection prevention or control strategies. If Health Organisations fail to meet a set of agreed standards or benchmarks, the performance measure will assist Health Organisations and infection prevention and control professionals to understand the factors causing non-compliance and enable priorities to be set and make improvements.

Establishing, monitoring, and reporting performance can enhance credibility by demonstrating the extent to which we are meeting our goals and providing value to the patient safety measures. Using a systematic and objective approach to assess the effectiveness of and/or compliance with specific infection prevention or control strategy, an audit may be conducted to yield quantitative or qualitative data, or both.

Infection prevention and control performance measures or audit should focus on a specific topic, be repeatable and preferably involve the use of a standardised tool if benchmarking is required(Bryce et al., 2007). Performance measures/audits therefore should be brief and easy for the auditor to complete and understand. Following the audit, an action plan should be formulated to address any areas which do not meet the required practice. The action plan should be shared with the overseeing Infection prevention and control Committee (or equivalent committee) and direct line management.

Performance measures in infection prevention and control can be used to identify specific practices and behaviours against standards or policies, with the purpose of marking compliance or areas for improvement (Australian Guidelines for the Prevention and Control of Infection in Healthcare). Performance measures can be done at the point-of-care, through the review of healthcare records, or both.

Examples of point-of-care audit could be to measure compliance with policies or procedures for:

- post-insertion peripheral cannula management
- aseptic technique
- standard or transmission-based precautions
- fingernail and/or hand/wrist jewellery of the health worker.

Examples of audits that involve a review of healthcare records may include:

- correct documentation for insertion or removal of intravascular access devices (and/or proceduralist identification)
- accurate documented dates/procedure of invasive device insertion or removal
- screening swabs on admission/discharge (for example, MRO, wound swabs)
- health worker uptake of immunisation.

Infection prevention and control performance measures can identify areas for improvement and areas of exemplary practice in relation to safety and quality. In addition, an audit provides a level of

assurance around the compliance with standards and policy requirements developed by NSW Ministry of Health and supported by the NSQHS – National Standards (specifically Standard 3). An audit should complement a range of infection prevention and control activities which aim to improve or provide assurance on the safety and quality of patient care.

Performance measures should focus on the Health Organisation 's governance processes for safety and quality and not on individual performance. Infection prevention and control auditing and frequency should be based on a risk management framework which aims to evaluate the systems and processes in place to control HAI risks to patients. Outcomes of audits can be evaluated through a combination of self-assessment and/or independent verification processes to assess improved patient care.

9.7.2 Auditing for the National Hand Hygiene Initiative

In alignment with NSQHS – National Standards version 2, NSW Health Organisations must regularly audit the hand hygiene compliance of its workforce.

To do this, NSW Health Organisations should use a method consistent with the National Hand Hygiene Initiative (NHHI).

This approach allows comparison of:

- hand hygiene compliance within healthcare facilities and between professional groups at a facility level
- comparison of hand hygiene compliance between facilities and local health districts and specialty health networks at a state level.

NSW Health Organisations should refer to the Australian Commission's National Hand Hygiene Initiative(NHHI) for further advice on the data collection process, clinical area selection and number of moments required for a facility, based on acute inpatient bed numbers.

Hand hygiene compliance data from Health Organisations is added to the national database once validated by regional and state jurisdictional leads.

Hand hygiene compliance data is also published on websites such as QIDS where a Health Organisation 's aggregated hand hygiene compliance rate will be compared to the national interim benchmark.

Results from hand hygiene auditing should be discussed in a relevant and timely fashion. Therefore, it is imperative that a Health Organisation 's hand hygiene compliance report is generated locally and received by everyone, from the senior executive team through to the health workers from where the data was collected.

The concept of frontline ownership of hand hygiene data is emerging as an important enabler of hand hygiene culture sustainability. It follows that clinical areas and their management are responsible for their own hand hygiene compliance results and as such, should engage in strategies to improve and invigorate their ward or departments hand hygiene compliance.

Public display of ward and facility hand hygiene compliance results can act as a visual cue for clinical practice improvement and reinforce consumer awareness that hand hygiene is everyone's core business.

Health Organisations may wish to track their progress in hand hygiene resources, promotion, activities, plan their actions, aim for improvement and sustainability using the World Health Organization Hand Hygiene Self-Assessment Framework. This self-assessment framework is a tool to obtain a situation analysis of hand hygiene promotion and practices within an individual healthcare facility, according to a set of indicators. This framework also acts as a diagnostic tool,

identifying key issues requiring attention and improvement. Repeated use of this framework may allow documentation on hand hygiene compliance progress with time.

The NHHI recognise that the standard '5 Moments for Hand Hygiene' auditing model is not suitable for the operating theatre due to its sterile environment. Instead, surgical hand hygiene techniques must be practiced ensuring infection prevention and control (ACSQHC, NHHI direct observational auditing of hand hygiene compliance user guide 2024).

In perioperative areas such as the anaesthetic bay and recovery, the 5 Moments framework remains applicable and should be used for auditing hand hygiene compliance through direct observation.

The NHHI provides a range of auditing tools and resources that organisations can use or adapt to suit local contexts, particularly where direct observational auditing is impractical.

Health Organisations are also encouraged to implement local quality improvement initiatives within theatre settings to raise awareness and promote hand hygiene best practices among perioperative staff, complementing national infection prevention and control strategies. For more information refer to ACSQHC National Hand Hygiene Initiative Implementation Guide.

9.8 Incident management and notification

NSW Health Organisations are to respond, manage and escalate outbreaks or clusters of communicable diseases, HAIs, MROs and/or non-MROs to minimise local and state-level health impacts. During situations of increased infection prevention and control risk, it is important to be able to escalate and provide a proportionate response with specific infection prevention and control precautions.

For more information refer to the NSW Health guidelines Triggers for escalation following detection of infection outbreaks or clusters.

9.8.1 Clinical incident

Clinical incidents or concerns may include healthcare associated infections, blood or blood products; operating theatre products, devices and equipment; information technology systems; imaging; privacy breaches; and cybersecurity (PD2023_003 Lookback).

An infection prevention and control clinical incident is the transmission or risk of transmission of microorganisms or infectious disease to an individual or group of patients and/or an individual or group of health workers in the healthcare setting. A clinical incident involves a breach in infection prevention and control practices which may cause:

- actual or potentially contaminated instruments/equipment from inadequate disinfection or sterilizing processes that could lead to transmission of an infectious disease
- provider-to-patient exposure from infected health workers who perform exposure prone procedures (EPPs) on patients
- any acute illnesses due to blood borne pathogens that are likely to have been transmitted in a Health Organisation
- patient-to-patient transmission of an infectious disease or MRO
- transmission of microorganisms from the environment or a health worker to a patient.

Health Organisations are responsible for identifying clinical incidents and for taking immediate action to ensure the safety of patients, visitors and health workers. For more information refer to the NSW Health Policy Directive on Incident Management.

9.9 Lookback

Lookback is a process that is triggered when a notification of a clinical incident or concern from any source leads to the need for the notification, investigation and the management of a group of commonly affected patients.

Where there is a significant failure of infection prevention and control processes, an assessment should be made as to whether patients may be at risk of cross infection, and if so, whether those patients should be notified of the incident and actions to be taken.

Assessment is required on a case-by-case basis. Where a patient notification exercise is thought necessary, a risk-based approach should be considered, such as those people who are at highest risk of infection should be assessed first.

Lookback involves:

- forming a local committee including infectious diseases, public health, infection prevention and control, sterilizing services, clinical governance, clinical risk manager and other participants as indicated, to investigate the incident and prepare a risk assessment
- identifying, tracing, communicating and providing appropriate ongoing advice to, and/or management of the group of patients affected
- reporting the risk assessment and incident to the CEC, the NSW Ministry of Health, health service or LHD management and formation of a communication strategy
- notification to the wider public, if applicable
- evaluation or review of the Lookback process.

For more information refer to the NSW Health Policy Directive on Lookback.

9.10 Open disclosure following a patient safety incident

Open disclosure is a process for ensuring that open, honest, empathic and timely discussions occur between patients and/or their support person(s) and health workers following a patient safety incident. Health Organisations are required to implement open disclosure as part of the Clinical Governance Standard in the National Safety and Quality Health Service (NSQHS) Standards.

The Open Disclosure policy directive sets out the minimum requirements for a consistent open disclosure process within NSW Health Organisations, to ensure that patients and their support person(s) and health service staff are:

- communicating effectively about a patient safety incident
- provided with an opportunity to recount their experiences, concerns and feelings and are listened to
- treated respectfully and provided with ongoing care and support for as long as is required.

Open disclosure is:

- a patient's and consumer's right
- a core professional requirement of ethical practice and an institutional obligation
- a normal part of an episode of care should the unexpected occur
- a critical element of clinical communications
- an attribute of high-quality health services and an important part of health care quality improvement.

For more information refer to NSW Health Policy Directive on Open Disclosure.

Chapter 10 Infection prevention and control in specialised settings and patient groups

10.1 Background

As a direct effect of their impaired immune defences, immunocompromised patients have an increased risk of infections and are at risk of significant morbidity and mortality. This risk is compounded by the frequent requirement for indwelling vascular devices for the delivery of therapy, for example, dialysis and transfusion support, the high requirements for antibiotics, and frequent hospitalisation, which increase the potential for exposure to and/or acquisition of multi-drug resistant microorganism (MROs) or healthcare associated infections (HAIs). In addition, impaired immunity may lead to increased shedding of microorganisms, resulting in increased potential for disease transmission (Agrati et al., 2023).

A Health Organisation is to develop a risk mitigation strategy that includes the regular auditing and reporting of compliance with standard precautions, environmental cleaning, HAI surveillance outcomes and adherence to antimicrobial stewardship initiatives within the clinical areas, particularly where immunocompromised patients are accommodated. When compliance with standard precautions falls below acceptable levels, or an HAI is confirmed, remedial action to address breaches in infection prevention and control should be implemented.

A system for the early detection and screening of patients for risk factors and signs or symptoms of infection should be developed for the clinical services that manage immunocompromised patients. Screening for a number of infections including tuberculosis (TB), hepatitis B and C and MROs may be particularly relevant for those undergoing intensive immunosuppressive regimens. For information on the management of high consequence infectious diseases refer to NSW Health Early Response to High Consequence Infectious Diseases and CEC High Consequence Infectious Diseases – Infection prevention and control Principles.

Respiratory viruses and other pathogens circulating in the community may be introduced into healthcare facilities by visitors (particularly young children) and health workers. Each Health Organisation is to implement local policies for leave or deployment of unwell health workers working in areas such as intensive care unit (ICU), oncology, transplant units, neonatal intensive care units (NICUs) and delivery suites, and for the exclusion of unwell visitors, participants in care, and young children from these clinical areas (Singh et al., 2014).

Annual influenza vaccination of health workers, other clinical personnel, students, and contacts with those who are immunocompromised is mandated for some risk categories and strongly recommended for other groups to reduce the potential for influenza transmission in extreme risk areas.

10.2 Management of tuberculosis in healthcare settings

Mycobacteria are a group of bacteria that can cause a variety of diseases. Some mycobacteria are grouped within the *Mycobacterium tuberculosis* complex because they cause tuberculosis (TB) disease.

Non-tuberculous mycobacteria can cause disease similar to TB; however, they do not usually require transmission-based precautions, noting that infection prevention and control requirements for Cystic Fibrosis (CF) patients with *Mycobacterium abscessus* complex should be determined by local experts in CF care and infection prevention and control. These decisions should be based on individual risk assessments, clinical presentation, and local protocols to ensure safe and effective management.

TB disease most commonly affects the lungs, referred to as pulmonary TB, but can also affect other organs or systems, referred to as extra-pulmonary TB. Lymph node TB is the second most common site of disease. Pulmonary TB and TB of the larynx (voice box) should be assumed to be infectious. Extra-pulmonary TB is generally non-infectious, assuming that concurrent pulmonary involvement has been actively excluded.

Pulmonary or laryngeal TB may be transmitted in healthcare settings to health workers and other patients. *M. tuberculosis* is spread via inhalation of small particle aerosols (airborne route).

When an individual with laryngeal or pulmonary TB coughs, sneezes, laughs, or sings, they release droplet nuclei containing *M. tuberculosis*. These particles are typically 1–5 micrometres in diameter, small enough to remain suspended in the air for extended periods. Depending on ventilation and airflow, these infectious particles can be carried throughout a room or even across different areas of a building. Transmission can also occur from aerosolisation of *M. tuberculosis* from other sites of disease.

Airborne precautions are indicated for all patients where laryngeal or pulmonary TB is suspected or confirmed. These patients should not be co-located with other patients. Where possible, home management should be considered for these patients.

Patients with TB are to be cared for according to relevant NSW Health Tuberculosis policies and guidelines.

Airborne precautions are not required for individuals with extrapulmonary tuberculosis, where concurrent pulmonary involvement has been excluded.

For more information refer to Department of health and Aged Care Infection control guidelines for the management of patients with suspected or confirmed pulmonary tuberculosis in healthcare settings.

10.2.1 TB infection without TB disease

Individuals diagnosed with TB infection identified through a tuberculin skin test (TST) or interferon-gamma release assays (IGRA) such as QuantiFERON-TB Gold Plus®—should undergo a clinical assessment for signs and symptoms of TB disease. Typical signs and symptoms of TB disease include prolonged cough (with or without haemoptysis), fever, unexplained weight loss, lymphadenopathy, unexplained night sweats and / or unexplained fatigue. A plain chest X-ray should be performed to exclude pulmonary TB disease.

Patients with TB infection (latent TB infection without active disease) are not infectious and do not pose a transmission risk to others. Therefore, if such individuals require care in a healthcare setting, there is no indication for isolation or the implementation of infection prevention and control precautions specific to TB.

10.2.2 Precautions for people with presumptive and confirmed TB disease

The period prior to a confirmed TB diagnosis is critical for infection prevention and control. Transmission is significantly more likely when TB is not initially suspected, or when appropriate precautions are not implemented early in a patient's interaction with the healthcare system.

Health workers should maintain a high index of suspicion for TB when assessing patients with respiratory symptoms and radiographic findings suggestive of TB such as pulmonary cavities or upper zone infiltrates, particularly in individuals with known risk factors (for example, birth in, or travel to, countries with a high TB incidence or known contact with an infected individual).

Hospital admission and airborne precautions

Prompt isolation of patients with presumed TB disease, including in Emergency Department settings, is a key administrative control strategy to reduce the risk of healthcare associated transmission. Early implementation of airborne precautions and timely diagnostic evaluation are essential components of effective TB infection prevention and control in hospital settings.

Patients with presumptive pulmonary or laryngeal TB should be asked to wear a surgical mask while awaiting placement in an appropriate airborne infection isolation room. Once inside a properly ventilated isolation room, mask use by the patient is no longer required. All individuals with presumptive or confirmed pulmonary TB should be educated on cough etiquette to reduce the risk of transmission. In cases of presumptive extrapulmonary TB, it should be assumed that pulmonary involvement may be present until definitively excluded. These patients should be isolated accordingly to prevent airborne transmission.

All infectious TB patients require isolation in airborne precautions in a negative pressure room. Where a negative pressure room is not available, patients should be placed in a single room with the door closed. Patients should not be co-located until cleared by local infection prevention and control teams who can collaborate with the local TB coordinator/TB service if uncertain.

For health workers, visitors and carers, a fit checked P2/N95 respirator must be worn while inside the isolation room to ensure adequate protection. Refer to 6.3.2 Airborne precautions.

In cases of presumptive extrapulmonary TB, it should be assumed that pulmonary involvement may also be present until definitively excluded. These patients should be isolated accordingly to prevent potential airborne transmission.

Home isolation considerations

Unless there are specific clinical or public health concerns, patients with a confirmed diagnosis of infectious TB disease should be considered for home isolation in consultation with the local TB Coordinator/TB service, provided the home environment is deemed suitable.

Key considerations include the home infrastructure and ability to isolate (including availability of separate bathrooms), whether children less than 5 years of age or immunocompromised people are living in the household, capacity of the local TB service to deliver or coordinate care, treatment and monitoring in the community.

10.2.3 De-isolation of people with presumptive TB where the diagnosis has been excluded or is considered highly unlikely

Patients with presumptive TB disease may be removed from isolation whether in hospital or in the community when infectious TB disease is considered clinically unlikely, and one or more of the following criteria are met:

- The patient has undergone testing with at least two (2) expectorated and/or induced sputum specimens (collected during the same procedure), or one (1) bronchial lavage specimen, and all specimens have returned negative results for acid- fast bacilli (AFB) on smear microscopy and are PCR-negative for *M. tuberculosis.*

Note: PCR testing for *M. tuberculosis* should be requested on at least one specimen.

AND/OR

- No procedures are being performed that could result in aerosolisation of infected tissue, such as surgical drainage or wound irrigation of TB-related lesions

AND/OR

- An alternative diagnosis has been confirmed that explains the clinical presentation.

The decision to de-isolate a patient must be clearly documented in the clinical record, including the rationale and supporting test results.

10.2.4 De-isolation of people with infectious TB

For patients with confirmed pulmonary or laryngeal TB who are in isolation either in hospital or in the community, decisions regarding de-isolation should be based on a comprehensive clinical assessment and guided by the following criteria:

- The patient is adherent to and tolerating the prescribed treatment
- The patient has received effective treatment* for at least two weeks
- There is clinical improvement, or the patient remains asymptomatic
- There is microbiological evidence of response to treatment, such as a reduction in AFB on follow-up smear microscopy in patients who were initially smear-positive.

*Effective treatment is defined as a regimen appropriate to the drug susceptibility profile (if known) and site of disease, resulting in a clinical response.

The isolation period for people that have multidrug resistant TB is often extended, particularly whilst in hospital. This is determined on a case-by-case basis usually in collaboration with the NSW TB Expert Panel.

All decisions to de-isolate a patient must be clearly documented in the clinical record, including the rationale and supporting clinical findings.

10.2.5 Decontamination of isolation rooms following occupation by a person with infectious TB

Isolation rooms used by patients with presumptive or confirmed infectious TB whether in the Emergency Department, inpatient wards, or prior to discharge to home isolation, must be appropriately decontaminated before reuse.

The required time for the room to remain vacant after patient transfer or discharge depends on the room's ventilation system, specifically the air changes per hour (ACH). This determines how quickly airborne pathogens, including *M. tuberculosis*, are removed from the environment.

To ensure safe re-entry and reuse of the room, please consult your local Engineering Department to confirm the ACH rating for the specific isolation room. This information will guide the appropriate duration for room vacancy and any additional cleaning protocols required. For more information refer to section 6.3.2 Airborne precautions.

10.2.6 Patients with confirmed TB requiring hospitalisation after commencing TB treatment

It is not uncommon for patients who have recently commenced anti-TB treatment to require hospitalisation due to adverse drug reactions or other medical complications. In cases where TB treatment is interrupted for a prolonged period, the patient's infectiousness may recur, necessitating reassessment of isolation requirements.

Decisions regarding isolation for hospitalised patients already on TB treatment should be made in consultation with the treating TB physician and/or the local TB coordinator/TB service, and guided by established isolation and de-isolation criteria, including clinical status, microbiological findings, and treatment adherence.

10.2.7 Contact tracing of tuberculosis in hospitals

In the event of TB in a patient, health worker or visitor, the infection prevention and control team and the TB coordinator in the local health district/network should be notified. The relevant TB coordinator/TB service will work with the Health Organisation to undertake contact investigation, screening and follow-up for patients, health workers and other contacts as required.

Contact tracing in hospitals should be undertaken in accordance with legislative requirements and the NSW Health Guideline Tuberculosis contact investigations (GL2019_003).

Facilities should ensure that roles and responsibilities between themselves and TB coordinator/services are clearly defined regarding contact tracing and screening within the facility.

This should include designating:

- an appointed position or unit within the facility to be the designated contact for confirmed tuberculosis case notification
- an appointed position or unit to be responsible for collating a list of contacts including staff, patients and visitors
- the responsibility for assessing the contacts
- the responsibility for conducting screening of identified contacts, as appropriate
- a mechanism for documenting and reporting the outcomes of a contact screening investigation.

10.2.8 Transplant screening for tuberculosis

All patients on the active transplant list for solid organ transplantation and bone marrow transplantation must be assessed for their risk of previous exposure to TB and should be screened as part of the transplant workup as per NSW Health Guideline Testing, diagnosis and management of TB Infection (GL2024_015) and local protocol.

10.3 Neutropenia

For patients who are predicted to have prolonged and profound neutropenia, such as allogeneic stem cell transplant recipients, a protective environment should be considered to reduce potential exposure to HAIs and fungal spores, especially *Aspergillus.*

Protective environment

A protective environment is a set of prevention measures comprising engineering and design interventions that decreases the risk of exposure to environmental fungi and other infectious microorganisms for severely immunocompromised allogeneic hematopoietic stem cell transplant patients during their highest risk phase. This includes specific air quality requirements as well as a number of other considerations.

Specific air quality requirements include:

- HEPA filtration of incoming air
- twelve air changes or more per hour
- ventilation (or airflow that goes from the patient room to the corridor) – greater air pressure in the room than in the corridor
- well-sealed rooms
- air flow patterns require monitoring and documentation

- strategies to minimise dust.

Dried or fresh flowers and potted plants in the rooms are not recommended as they often contain environmental organisms that may be pathogenic in these vulnerable patients.

Hand hygiene is a very important practice and should be performed before and after patient contact, in between episodes of care, before and after PPE donning and doffing.

Personal protective equipment

As per standard precautions and risk assessment:

- health workers and visitors are to wear a surgical mask
- patient is to wear a mask when out of room, (surgical or P2/N95) – if appropriate.

Note: Protective environment does not include the use of barrier precautions beyond those indicated for standard and transmission-based precautions.

10.4 Management strategies of specialised settings during construction or renovation

Construction activity, especially in the initial phases when excavation is being undertaken, can disturb fungal reservoirs, leading to aerosolisation of fungal spores into the facility. *Aspergillus fumigatus*, a common pathogenic fungal mould that produces airborne spores, is often in circulation during construction activities in hospital (Talento et al., 2019). Fungal spores are resistant to drying, can remain suspended in the air for long periods and can travel substantial distances from the source of generation.

Exposure to even a low spore load can result in infection in immuno-compromised individuals. Patients who are at the most risk of infection are those receiving bone marrow transplants, solid organ transplants, haematology, oncology and those receiving immunosuppressive medication.

To protect vulnerable patients, prior to any construction or maintenance activity, a Health Organisation is to undertake a risk assessment and implement a risk management strategy to minimise the risk of infection in immuno-compromised individuals.

The risk assessment should include the following:

- the extent of construction work
- the identification of the patient population at risk
- the location of the patient population in relation to the site and construction
- ventilation system types and potential impact
- traffic and supply routes
- determination of air monitoring requirements, methodology and frequency, including baseline measurements if required (air quality and dust monitoring)
- the identification of possible contaminants and their locations, as contaminants may be present in ceiling dust; service shafts (especially damp conditions); sprayed fire retardants, and bird droppings
- prophylactic treatment options for at risk patients, if required.

During construction/renovation Health Organisations should develop a local procedure based on risk assessment of the area involved and the patient groups will potentially be affected. Health Organisations are to provide patient and carer information.

Table 45 Risk assessment checklist

Task	Completed
Construction, renovation, installation, and maintenance activities must have a formal infection prevention and control risk assessment undertaken, and mitigation strategies planned and approved, prior to the commencement of any works.	☐
Engineering controls for risk mitigation are articulated in contracts agreed between the health service and external contractors.	☐
A risk assessment of the patient population group within the construction/renovation site is undertaken and appropriate controls to minimise individual risk implemented.	☐
Additional measures are implemented to minimise the risk of infection to these patient groups during construction, for example, air sampling, provision of P2/N95 respirator to high-risk patients to wear if transit near construction zone is unavoidable.	☐
The relevant stakeholders are consulted, such as infection prevention and control department, executive and the project team/engineering and maintenance in conjunction with Work Health and Safety coordinator.	☐
Strategies to minimise the risk of infection associated with construction activities, for example, dust control is implemented.	☐
Dust control measures and monitoring requirements indicated during the project including costs of monitoring.	☐
Clear processes are established if risk changes during the project and unforeseen risks occur, such as, additional dust monitors needed, contracts can be updated to include that additional expenses will be incurred by the contractor.	☐

10.5 Cystic fibrosis

Cystic fibrosis (CF) is a progressive, genetic disease that affects the lungs, pancreas, and other organs. CF can cause persistent lung infections and impaired lung function. Patients with CF are at risk of both acquiring and transmitting respiratory infections. Respiratory infection in patients with CF can be more significant than for other individuals and is associated with deterioration of lung function. Many different bacterial organisms, viruses and fungi can infect the respiratory tract of patients with CF. It is important that units that care for patients with CF (respiratory wards, non-CF respiratory wards and hospitals with CF clinics) partner with local infection prevention and control units to implement the additional measures described in this section. Adherence to these measures should be monitored and fed back to the unit to enable continual improvement.

10.5.1 Infection prevention and control principles

When caring for any patient (inpatient or outpatient) with CF, health workers are to employ:

- **Standard precautions**, particularly:

    - hand hygiene before and after patient contact
    - use of PPE, such as gloves, apron/gown and mask, for handling body substances/sputum, performing chest physiotherapy or if there is an increased risk of contamination to the health worker
    - environmental cleaning
        - single rooms occupied by inpatients with CF must be terminally cleaned before their admission and after discharge
        - during inpatient admission, frequently touched surfaces should be cleaned routinely with a hospital grade disinfectant
        - all medical equipment used for CF patients and in clinics must be cleaned and disinfected with approved agents (as per manufacturers' IFU) before and after use
- **Respiratory hygiene**
    - patients (inpatient or outpatient) with CF are encouraged to wear a fluid resistant surgical mask (not a P2/N95 respirator) when ambulating around general hospital areas (anywhere except own bed area and gym with the physiotherapist)
    - prevent mixing of CF patients, regardless of their respiratory tract culture results, CF patients are to maintain ≥2m distance from each other in all settings, to reduce the risk of droplet transmission of pathogens between patients
    - cough etiquette should be encouraged among CF patients when attending any group activities
- **Pulmonary function tests** (PFT) are to be performed in one of the following areas to reduce transmission from one person with CF to another person with CF:
    - in the exam room at the beginning of the clinic visit, allowing sufficient time to elapse between CF patients (times will depend on air changes per hour in the room and will vary within and between facilities)
    - in a negative pressure room (airborne precautions room)
    - in a PFT laboratory with high-efficiency particulate (HEPA) filters
    - in a PFT laboratory without HEPA filters, allowing 30 minutes to elapse between individuals with CF.

The need to employ additional infection prevention and control precautions when caring for a patient with CF is dependent on the presence or absence of certain risk criteria. Table 46 describes the risk criteria and outlines the transmission-based precautions that should be employed, depending on the patient's risk level, for inpatient and outpatient settings.

In addition, for outpatient settings (including oral health):

- all contact between patients should be minimised and avoided if practical
- limit patient time in common waiting areas, at reception, in waiting rooms or at the pharmacy. Where this is unavoidable ensure the CF patient is wearing a fluid resistant surgical mask
- as soon as possible, patients should be placed in a single clinic room
    - patient flow and list for the clinic should be pre-planned before every clinic session

- Patients known to have *Burkholderia cepacia* complex or *M. abscessus* colonisation should not attend routine CF clinics but be seen in other non-CF clinics. If this is unavoidable, book appointment on alternate days of the CF clinic, implement strategies to reduce environmental contamination of the clinic room. The clinic room must be cleaned and left for a sufficient period before another patient with CF can enter the room (times will depend on air changes per hour in the room and will vary within and between facilities).

Note: Refer to Cystic Fibrosis Australia Standards of care for Cystic Fibrosis.

Table 46 Levels of precautions for CF patients

Risk level	Risk criteria	Inpatient management	Outpatient management
Tier 1	Any patient with a diagnosis of CF (suppurative lung disease) and: • no pathogens in their sputum no detection of any bacteria listed in level 2 risk criteria.	Standard precautions where possible, patients should be managed in ensuite single rooms. Otherwise, CF patients should not share a room with other CF patients or patients with respiratory illness*.	• Own room in CF outpatient clinic • Room to be terminally cleaned prior to next patient.
Tier 2	Any patient with a diagnosis of CF (suppurative lung disease) and: • Non-tuberculous mycobacteria • Mucoid or non-mucoid pseudomonas **resistant** to aminoglycosides and beta lactams MRO (MRSA, ESBL, VRE, CPO)	• Patients with a known MRO are to be managed as per local risk assessment • Below neck PPE (apron/gown and gloves as per risk assessment) • Droplet precautions (above neck PPE) • Isolate in single room with ensuite* • Shared equipment is to be cleaned and disinfected as per manufacturers' IFU after use.	• Droplet precautions • Own room with door closed • Room to be terminally cleaned and disinfected after use • Shared equipment to be cleaned and disinfected as per manufactures' IFU after use.
Tier 3	Any patient with a diagnosis of CF (suppurative lung disease) and: • *Burkholderia cepacia* complex • *Mycobacterium abscessus*	• Droplet precautions (above neck PPE – surgical mask and eye protection) • Below neck PPE as per risk assessment • Isolate in single room with ensuite* • Patients known to have *B. cepacia* complex or *M.*	• Droplet precautions • Own room with door closed • Room to be cleaned and disinfected after use • Shared equipment to be cleaned and disinfected as per manufactures' IFU after use.

	• *Mycobacteria avium* Other (unusual resistant organisms).	*abscessus* must be admitted to single rooms with ensuites, located on separate wards from other patients with CF. • If multiple patients with either organism are admitted simultaneously, they must be accommodated in individual rooms on different medical wards to prevent cross-transmission. • In paediatric units where rooming options are limited, patients with *B. cepacia* complex should not be cared for by the same nursing staff assigned to patients with *M. abscessus*, to reduce the risk of transmission between organisms.	

* Familial cohorting is permitted, as the risk of transmission is comparable to the home environment.

Additional precautions can be applied based on risk assessment and facility discretion. Health workers are to ensure that the patient and their carers/participants in care are provided with information on why any additional precautions are required and any actions that they are required to undertake. Patients with other non-CF like lung conditions and accompanied immune deficiencies should be risk assessed similarly to above.

10.5.2 Clearance screening

Patients with CF do not fit the normal MRO clearance recommendations. Clearance for patients with CF will need to be determined on a case-by-case basis by the patient's clinical team, Infection prevention and control with consideration being given to aetiology, epidemiology and other key clinical factors.

10.6 Haemodialysis

Haemodialysis has been associated with blood stream infection, blood borne virus (BBV) acquisition and transmission of MROs.

The increased risk of infection in this patient population is mainly due to:

- accessing catheters regularly for treatment
- the immunocompromised status
- proximity to other dialysis patients during treatment
- nonadherence to recommended infection prevention and control practices by caretakers and health workers.

Bloodstream and bloodborne virus (BBV) infections can arise during haemodialysis from several sources. These include events such as venous access, issues within the dialysis system like the extracorporeal circuit, breaches in established protocols, inadequate monitoring for contaminants, failures in reprocessing equipment, or insufficient training and education of staff.

The risk of infection in the haemodialysis setting may be reduced by:

- adherence to standard precautions, including routine cleaning and reprocessing of shared equipment
- adherence to procedures for cleaning, disinfection and maintenance of equipment according to manufacturers' instructions
- a patient education program that includes teaching patients, participants in care and visitors on their role in the prevention of infections
- routine screening, monitoring and follow up of patients undergoing dialysis
- appropriate vaccination for all susceptible haemodialysis patients and health workers.

Patients that are hepatitis B surface antigen positive (HBsAg) should be treated in a separate room (or another area away from susceptible patients, if room is not available) with dedicated equipment and, where possible, nursing staff (Centers for Disease Control and Prevention, 2001).

A dedicated room can be reused for other patients after it has been cleaned and disinfected. The dedicated equipment can be reused for seronegative patients after being cleaned and disinfected as per manufacturer's instructions (CARI Dialysis Guidelines, 2018 Infection Control for Haemodialysis Units).

There is insufficient evidence to justify the routine isolation of dialysis patients positive for HCV or HIV (Garthwaite et al., 2019). Isolation should be considered if high prevalence (>30%) of HCV is observed (Gallego et al., 2006).

10.7 Interventional radiology settings

Interventional radiology (IR) techniques are used to treat a wide variety of diseases involving minimally invasive, diagnostic and interventional procedures, performed under image guidance including digital subtraction angiography, computed tomography, ultrasound and magnetic resonance imaging. Although the risk of infection during these procedures is generally reduced when compared with their surgical equivalents, the risk of infectious complications remains. The risk of infection potentially increases as this technology and its complexities advance. Interventional radiology techniques are required to adopt infection prevention and control principles.

10.7.1 IR worklists

When developing IR worklists:

- always prioritise clinical need and urgency over disease or MRO status
- where flexibility is possible, arrange the IR work list so that clean and clean-contaminated procedures are performed prior to contaminated procedures (Chan et al., 2012).

10.7.2 IR equipment

Many procedures within NSW Health are performed under ultrasound guidance, including the insertion of central venous access devices. While surface probes are most commonly used, intra-cavity probes may also be required for procedures such as transrectal prostate biopsies.

To ensure patient safety and prevent cross-contamination, disposable sterile probe sleeves or sheaths must be used and disposed of according to local waste management protocols. Regardless of sheath use, all ultrasound probes must be reprocessed between patient uses in accordance with the manufacturer's Instructions for Use (IFU), the requirements of AS5369:2023, and the Australasian Society for Ultrasound in Medicine (ASUM) Guidelines. If a probe is used on a semi-critical site (for example, mucous membranes or non-intact skin), high-level disinfection (HLD) is mandatory.

The probe/transducer must be cleaned and disinfected as per IFU and risk assessment, regardless of sheath or cover use. Only disposable sheaths that are compatible and approved for use with the ultrasound device should be used. Always follow the manufacturer's IFU for cleaning, disinfection, and storage of reusable ultrasound devices. See section 11.12 for information of covers and sheaths.

Reprocess used devices as per AS 5369:2023 *Reprocessing of reusable medical devices and other devices in health and non-health related facilities* and Australasian Society for Ultrasound in Medicine (ASUM) Guidelines for Reprocessing Ultrasound Transducers.

10.7.3 IR environment

Installation of positive pressure air change ventilation should be considered when planning new IR facilities. There is evidence to suggest that the number of viable airborne microorganisms in a surgical suite is directly proportional to the number of persons present in the procedure room. It is therefore prudent to limit the traffic in the IR suite to essential personnel only.

The IR suite should be treated as a sterile environment. The personnel who work in this clinical area need to follow aseptic practices and follow appropriate procedure room attire requirements.

IR procedures, particularly sterile and clean procedures, should be performed under positive pressure air change ventilation. If this is not available, the doors to the procedural room should remain closed during procedures to decrease the transmission of microorganisms into the suite and potentially onto the sterile field, which may contribute to infections secondary to the procedure. Traffic into and around the room should also be restricted.

Sterile, clean and clean-contaminated procedures should follow absolute sterile technique. This includes at the minimum:

- scrub attire that is intended for wear only in the IR suite and to be worn as per operating theatre attire
- hair coverings and masks to be worn while in the suite and when open instruments/trays are present
- sterile gowns and gloves for those participating in the sterile field and procedure
- the use of sterile drapes in a manner that allows adequate coverage of the sterile field and site
- a semi-restricted area to serve as a barrier between the unrestricted area and the fully restricted area (suite) when interventional procedures are being performed.

Contaminated and dirty procedures should follow sterile technique procedure when feasible and appropriate. The level of infection prevention and control may depend on the urgency of the procedure. However, for an emergency procedure at the very least a clean environment with sterile instrumentation must be available.

The IR setting is rated as an extreme risk functional area; therefore, environmental cleaning is important in the prevention of cross infection. Cleaning in IR settings should be in line with the NSW

Health Cleaning of the Healthcare Environment policy directive. Particular attention should be made to the cleaning of arm boards and ceiling mounted equipment. The IR procedure suite and work surfaces should be cleaned and disinfected thoroughly after every procedure to decrease the amount of dust and microbial burden.

10.7.4 Aseptic technique in IR

Prevention of surgical site infections (SSIs) in the IR procedure suite involves multiple aspects, which focus primarily on the adherence to aseptic practices (surgical asepsis) related to personnel attire, appropriate hand hygiene, gowning, gloving, preparing, draping, maintaining a sterile field, and cleaning of the IR suite. The responsibility for reducing microbial burden within the IR procedure suite to the lowest level possible must be shared by all members of the IR team.

To ensure that aseptic technique is used in IR:

- thorough skin preparation should be performed on clean skin using an appropriate antiseptic (such as 2% chlorhexidine in 70% alcohol). If there is a contraindication to chlorhexidine, a suitable alternative should be used (for example, povidone-iodine)
- if hair removal is required, hair should be clipped rather than shaved immediately prior to the procedure
- appropriate attire should be worn including caps, masks, sterile gown, and sterile gloves
- sterile drapes are to be used to create a barrier between the surgical field and potential sources of microorganisms
- maintain asepsis of key sites and key parts of catheters, prostheses and implantable devices.

10.8 Respiratory and sleep study clinics

It is evident that the burden of disease associated with respiratory and sleep disorders is great, given their high prevalence and significant associated morbidities. All healthcare organisations, regardless of the level of care provided, must make infection prevention and control a priority and must be equipped to observe standard and transmission-based precautions.

10.8.1 Nebulisers

Nebulisation, combined with disease symptomatology, such as coughing, have been a risk for the aerosolised spread of certain transmissible diseases. Therefore, to minimise the likelihood of the aerosolised transmission, it is recommended that effective alternatives, such as metered dose inhaler with spacer, are used where possible.

Where it is not feasible to use a metered dose inhaler and spacer, a nebuliser can be used in a designated room or area where other patients and visitors have limited access. Health workers attending to a patient using a nebuliser should wear a P2/N95 respirator and eye protection.

Aerosol delivery equipment used to administer inhaled medications includes the nebuliser, positive expiratory pressure devices added to the nebuliser, and valved holding chambers (spacers). Where available single patient use respiratory equipment should be used. When use of equipment for multiple patients is unavoidable, a risk assessment should be performed and cleaning carried out according to the manufacturer's instructions. These devices are semi-critical medical devices, and reusable parts must be cleaned, disinfected, rinsed with sterile water, and air-dried.

10.8.2 Use of filters on respiratory devices

Where available, single-use respiratory equipment should be used. Single-use respiratory equipment designed for use on one person only, does not require a filter. If single use equipment is

not available, a filter is to be used for blow-and-inhale procedures. The use of filters does not interfere with the quality of the recordings. Certain types of equipment, such as older types of spirometers which have positive pressure when in use, require a filter.

10.8.3 Resuscitation devices

Health workers should use resuscitation devices, such as masks, during cardiopulmonary resuscitation (CPR) to prevent direct contact between the mouth of the resuscitator and the person being resuscitated. Health Organisations should ensure that individual resuscitation devices are available and accessible in all patient areas. Where possible, single use resuscitation devices should be used. Reusable manikins used for teaching CPR must be reprocessed after each use as per manufacturers IFU.

CPR training provided or approved by the Health Organisation should include instruction on the use of all resuscitation devices.

10.8.4 Semi-critical resuscitation devices

Semi-critical equipment used for clinical procedures in the sleep and/or respiratory investigation labs are to be cleaned and disinfected or sterilised between each patient use according to manufacturer's IFU to prevent and minimise the occurrence or transmission of infection.

10.9 Maternity settings

In Australia, where childbirth is safe for most women, maternal death is rare, however, the maternal mortality ratio (MMR) in Australia in 2022 was 4.8 deaths per 100,000 women giving birth (14 maternal deaths) [AIHW]. Most maternal infections and their consequences can be avoided by implementing appropriate infection prevention and control practices, antenatal screening and appropriate antibiotic use.

10.9.1 Prevention of vertical transmission

Universal screening for Hepatitis B virus (HBV) is recommended by the Australasian Society of Infectious Diseases for all pregnant women regardless of previous testing or vaccination. The recommended screening test for HBV is hepatitis B surface antigen (HBsAg), and this should be offered at the first antenatal visit. Health Organisations should have a referral process in place for mothers with BBVs to ensure they are referred to appropriate clinical services during the antenatal period.

The National Hepatitis C Virus (HCV) Testing Policy recommends selective antenatal screening for HCV based on identified risk factors. For identified risks refer to Antenatal Testing and Blood-Borne Viruses (BBVs).

Universal antenatal screening for Human Immunodeficiency Virus (HIV) is recommended in the National HIV Testing Policy. For more information refer to National HIV testing policy.

Vertical transmission of infectious diseases

A neonate has an increased potential of vertical transmission of infectious diseases when its skin integrity has been breached *in utero*. To minimise this risk, avoid the following medical procedures if possible:

- HIV positive or HCV PCR RNA positive or HBsAg or HBeAg positive
    - fetal scalp electrode monitoring and fetal blood sampling on babies of mothers who are HIV positive or HCV PCR RNA positive or HBsAg or HBeAg positive. It may be performed on HCV PCR RNA negative mothers

- Herpes simplex virus (HSV) or *Group B Streptococcus* positive
    - fetal scalp electrode monitoring and fetal blood sampling on babies of mothers who are HSV active or *Group B Streptococcus* positive who have not been given appropriate antibiotics 30 minutes prior to the procedure.

10.9.2 Prevention of blood-borne virus

After birth, initial skin-to-skin contact and the first breastfeed are important and a priority. This should occur prior to cleansing the baby of blood and body substances (Widström et al., 2019). Blood and other body substances must be removed from the baby's skin and eyes as soon as practicable. Standard precautions must be adhered to by all health workers, visitors and family (except the mother) when handling the baby until the baby has been bathed (United Nations Children's Fund).

Additional considerations are needed when cleaning baths are used in birthing suites. Equipment such as a long-handled sponge mop may facilitate cleaning. If reusing the bath plug, ensure the plug and any attachment can be cleaned. The following cleaning procedure is recommended for baths to address risks associated with exposure to blood and body substances:

1. Empty water out of the bath. Plugs are required to be attached to a chain for easy removal
2. Rinse bath with water
3. Clean bath using long handled sponge mop with a neutral detergent and hospital grade disinfectant
4. Important to allow the required contact time as recommended by manufacturers' instructions before rinsing bath with water
5. When cleaning baths in birthing suite replace the bath plug and ensure the plug is included in the cleaning process.

10.10 Mental health, drug and alcohol settings

The infection prevention and control program are adapted to account for the patient's physical health status and mental acuity, the focus of treatment and the facilities/layout of the unit. Infection prevention and control equipment, such as trolleys for PPE and brackets for hand rub, that are left in areas accessible to patients need to be carefully reviewed for safety, for example, ligature risk.

Health Organisations and health workers providing care in this setting should:

- identify potential infection risks, and develop safe work practices to mitigate these risks
- encourage patients to perform hand hygiene by facilitating hand hygiene education and providing patients and health workers with safe access to hand hygiene facilities
- encourage and facilitate patients to maintain their personal hygiene.

10.11 Residential, rehabilitation and long-term care settings

Infectious diseases have the potential to spread readily in residential, rehabilitation (including Hospices) and long-term care settings, as residents live in proximity, typically with communal facilities, for example, dining rooms and lounges.

In residential, rehabilitation and long-term care settings, the infection prevention and control program should be adapted according to the patient's physical health status, mental acuity, requirement for a home-like environment and the facilities/layout of the premises. For more information refer to the Australian Commission of Safety and Quality in Healthcare Infection

prevention and control in aged care, The Aged Care Infection prevention and control Guide (the Guide) and Australian Government Department of Health and Ageing Managing infectious diseases in aged care.

Vaccination is an effective way to stop people from acquiring vaccine preventable diseases. Refer to the Australian Immunisation Handbook for further advice on use of vaccines.

In the aged care context, the infection prevention and control program must also address the Aged Care Quality and Safety Commission Accreditation Standards.

Services may be available to assist and support keeping patients within a residential, rehabilitation or long-term care facility when there is an infectious disease outbreak to reduce the need to transfer patients to acute hospital facilities. In consultation with the relevant public health unit (PHU) and NSW Ambulance local management, it may be appropriate to request extended care paramedics or specialist paramedics to assist in managing aspects of an infectious disease outbreak (for example, patient assessment, rehydration and ongoing monitoring on site) in these settings or similar services may be available within some NSW LHDs/SHNs.

10.11.1 Using extended paramedic services in residential and long-term care facilities

In consultation with the relevant PHU and NSW Ambulance local management, it may be appropriate to request Extended Care Paramedics or Specialist Paramedics to assist in managing an outbreak of an infectious disease within residential or long term care facilities. This has the potential to provide definitive care (for example, patient assessment, rehydration and ongoing monitoring as needed) on site and avoid or reduce the need to transfer patients to other healthcare facilities.

10.12 Ambulatory care settings

Each Health Organisation may be responsible for a diverse array of speciality ambulatory care clinics and services.

Ambulatory care settings that involve unique infection prevention and control risks include:

- Renal outpatient clinics
- Oncology and cancer care outpatient units
- Bone marrow transplant clinics
- Outpatient units that perform medical procedures
- CF clinics
- Day surgery
- High risk foot services/clinics
- Day rehabilitation.

Each setting requires:

- a risk management plan in place that identifies potential infection risks for outpatient settings, including an environmental assessment, and detailed strategies to mitigate these risks. This may include developing strategies to enable early detection of patients with infectious diseases prior to attendance at an outpatient clinic/service or at entry points of a facility and employing patient placement procedures for presenting patients who require isolation or designated toilet facilities

- resources to implement the risk management plan to be employed
- health workers to observe other infection prevention and control principles, such as antimicrobial stewardship and occupational vaccination
- an assessment of the requirement for transmission-based precautions dependent on the patient populations treated and procedures performed
- promotion of hand hygiene, respiratory hygiene and cough etiquette to patients and their participants in care and the provision of resources, for example, alcohol-based hand rub, tissues and rubbish bins.

Infections may cause morbidity and mortality in many of the patients who require frequent services from these clinics and units, particularly those that are immunocompromised, thus infection prevention and control is a key patient safety priority.

During pregnancy, the clinical consequences of acquiring a communicable disease may be more severe. Therefore, any outpatient settings where pregnant women are likely to attend should identify potential infection risks to pregnant women and ensure that these risks are minimised or eliminated as much as practically possible.

10.13 Oral health settings

Health workers working in oral health care settings are at risk of being exposed to high concentrations of aerosols and splatter during dental procedures and may be at risk of infection transmission. Oral health care must be delivered in a manner consistent with the NSW Health Infection prevention and control in Healthcare Settings policy directive, Australian Commission on Safety and Quality in Healthcare Oral healthcare for adult inpatients, National Safety and Quality Primary and Community Healthcare Standards and Australian Dental Association Infection Control.

10.14 Ophthalmic and optometry settings

The cornea and conjunctiva are classified as semi-critical sites and are highly susceptible to infection. For example, epidemic keratoconjunctivitis. Optometrists and optometric practice staff should adopt measures to minimise the risk of transmission of infection. Equipment used on semi critical sites require high level disinfection (HLD). Refer to Infection control guidelines for optometrists 2016 for more information. Equipment (retinal camera) used to screen for Retinopathy of Prematurity (ROP) in low-birth weight neonates require cleaning and disinfection as per manufacturer's IFU to promote safety.

Contact lenses are not to be shared. Diagnostic contact lenses should be reprocessed in accordance with the manufacturer's IFU. Single use or disposable ophthalmic equipment should be used if adequate cleaning or reprocessing cannot be achieved. Products used for cleaning and disinfecting ophthalmic equipment that is used on the external eye must not be harmful to the eye. After cleaning or reprocessing, the equipment must be rinsed thoroughly and dried to ensure no chemical residue is present to prevent eye damage.

10.15 Community and home settings

A Health Organisation may provide care to patients in a range of settings outside hospitals, including private homes and community health centres.

The Health Organisation responsible for providing these services is to ensure that appropriate infection prevention and control practices, such as hand hygiene products, disposable paper towels, equipment cleaning solutions or wipes, PPE and sharps containers, are available to health workers working in these settings.

The Health Organisation and health workers should also ensure that the risk of infection transmission within the community is minimised by provision of hand hygiene products and education of patients on hand hygiene, personal hygiene, respiratory and cough etiquette, cleaning and healthy lifestyle.

At the minimum, health workers working in these settings are to adhere to standard and transmission-based precautions. Health workers working in home and community settings may experience difficulties in accessing facilities and resources typically found in a hospital. Due to these constraints, the Health Organisation should apply a risk assessment approach to identify potential infection risks for its specific community settings and develop safe work practices to mitigate these risks.

Antenatal and maternal care provided in home settings must follow strict infection prevention and control protocols to ensure the safety of both families and health workers. Standard precautions such as hand hygiene, appropriate use of PPE, and safe disposal of clinical waste are essential. All equipment used must be cleaned and disinfected using a TGA approved product according to the manufacturer's instructions and relevant standards, with risk assessments guiding the level of disinfection required.

10.16 Ambulance, paramedic and patient transport services

The transport of patients within or between healthcare organisations should be based on clinical need and urgency, rather than infection status. All agencies involved in patient transport must adhere to standard precautions, including appropriate cleaning and disinfection of vehicles and equipment between each patient. The guidance in this handbook applies equally to NSW Ambulance, paramedics and patient transport services.

The Health Organisation booking transport should notify all agencies involved of the patient's history including infectious status. Refer to section 7.10.1 Transporting a patient with an MRO. The Health Organisation booking the transfer should ensure the patient performs appropriate personal hygiene prior, where possible. This may include hand hygiene, showering and use of clean clothing prior to transport.

It is the responsibility of the transporting agency to ensure health worker staff have undertaken appropriate training and education to enable them to employ the appropriate transmission-based precautions in addition to standard precautions, during transport. A recommended framework for training is outlined in the national unit of competency HLTINF001 - Comply with infection prevention and control policies and procedures.

10.17 Mortuary and care of the deceased

Standard precautions are recommended when handling the deceased body and if the deceased is known or suspected to be infected, continue transmission-based precautions after death. The washing and dressing of a body (hygienic preparation) should not be carried out if the deceased is known or suspected to be infected by invasive streptococcal infection, anthrax, rabies or high consequences infectious diseases (HCIDs) including viral haemorrhagic fevers (VHFs). The viewing of the body should also be avoided when the deceased is suspected or known to be infected with HCIDs, however a local risk assessment should be undertaken to inform any decision making. More information can be found on NSW Health Final arrangements of the deceased.

For more information on handling of bodies refer to *NSW legislation Public Health Regulation 2022 Division 2 Handling of bodies*.

Prescribed infectious diseases

Additional handling and labelling requirements apply to the bodies of deceased persons with prescribed infectious diseases. Prescribed infectious diseases means any of the following diseases:

(a) avian influenza in humans

(b) diphtheria

(c) Middle East Respiratory Syndrome Coronavirus

(d) plague

(e) respiratory anthrax

(f) Severe Acute Respiratory Syndrome

(g) Smallpox

(h) tuberculosis

(i) a viral haemorrhagic fever, including Lassa, Marburg, Ebola and Crimean-Congo fevers.

In accordance with the Public Health Regulation 2022:

Bodies to be placed in body bags

(1) A responsible person must ensure the body of a dead person is not removed from a place unless:
   a) the body has been placed and secured in a bag or wrapping in a way that prevents the leakage of anybody exudate or other substance, and
   b) the name of, or an identification of, the dead person is clearly and indelibly written on the top outer surface of the bag or wrapping, and
   c) if the person has reason to believe that the body is infected with a prescribed infectious disease—the bag or wrapping is clearly and indelibly marked with the words “PRESCRIBED INFECTIOUS DISEASE—HANDLE WITH CARE”.

10.17.1 Post-mortem care

When handling the bodies of deceased persons, or when undertaking a post-mortem examination, standard precautions are always required.

Depending on the known or suspected infection status of the deceased person, transmission-based precautions may also be required and should be maintained until the body has been completely enclosed for transport.

Procedures for handling bodies of the deceased, the use of body bags and removal of bodies from body bags are outlined in the NSW Public Health Regulation 2022: Part 8 Disposal of bodies.

If the death is reportable to the Coroner under the Coroners Act 2009 (NSW), the body must be managed as per the PD2024_036 Coroners Cases and Coroners Act 2009.

Prior to death, if the deceased had or may have had a prescribed infectious disease as listed under clause 79 of the Public Health Regulation 2022 (NSW), then a label stating clearly and indelibly “Prescribed Infectious Disease - Handle With Care” (stock code NH606645), available from the State Forms Catalogue must be attached to the body and the body must be placed only in a plastic body bag.

The body must then be placed in a second plastic body bag with a second label with the same information affixed outside. Neither label should specify the condition. The body must not be washed with antiseptic solution.

10.17.2 Post-mortem examination

Practices used for post-mortem examinations are to minimise the risk of exposure of health workers to infectious diseases and minimise the risk of infection being passed from the autopsy room to other areas in the healthcare facility. Engineering controls and changed work practices should be adopted as part of standard precautions.

Precautions may also include adopting engineering controls and changed work practices. For example:

- work surfaces contaminated during post-mortem procedures should be cleaned with a neutral detergent or degreaser solution
- instruments and equipment used in post-mortem procedures must be reprocessed as described in as per *AS 5369 Reprocessing of reusable medical devices and other devices in health and non-health related facilities*
- instruments and equipment used on cases of Creutzfeldt-Jakob disease should be handled in accordance with national guidelines for infection prevention and control
- engineering controls such as ventilation and safety devices for autopsy equipment should be in place
- sharps injuries may be minimised by using the minimal number of sharp instruments, using cut-resistant gloves and blunt dissection tools and techniques
- employing airborne precautions when performing aerosolising procedures during post-mortem.

10.18 Cryotherapy

Care should be taken to ensure that liquid nitrogen canisters do not become contaminated during cryotherapy procedures. Evidence indicates that if contamination occurs, viruses and bacteria may be able to survive in liquid nitrogen (Bajerski et al., 2021).

Where the practice of decanting liquid nitrogen is used for routine removal of warts, sufficient liquid nitrogen should be decanted into a new disposable cup or dish, or one that can be sterilised after each patient use (decanting of any liquids/solutions are not routinely recommended due to increased risk of cross contamination, where possible alternative mode of delivery should be adopted).

Where decanting is the only means of delivery, a risk-based approach should be undertaken to mitigate any cross-contamination risk. A new disposable cotton-tipped applicator should be used for each application.

The residual and disposable cup or disk should be discarded after each patient use. For reusable equipment follow manufacturer's instructions for use.

Similar precautions should be taken with carbon dioxide and other cryotherapy systems used in the treatment of skin conditions.

10.19 Pets and therapy animals

The NSW Health Animal Visits and Interventions in Public and Private Health Services in NSW guideline outlines the appropriate measures to be taken in implementing a program of animal assisted intervention in NSW.

Pets as therapy

This refers to casual 'meet and greet' activities that involves animals and handlers visiting patients and their families at the bedside or in common areas. Specially trained volunteers, or professionals, with animals that meet specific criteria, deliver these more casual visitation programs.

Animal assisted therapy

This is a structured mode of tailored individual therapy run under professional supervision with animals trained for the role. Such programs are designed to improve the physical, social, emotional and/or cognitive functioning of the patient, as well as providing educational and motivational effectiveness for participants.

Companion animal

A companion animal refers to a dog, cat or any other animal prescribed in the NSW Companion Animal Act 1998 No. 87. Companion animals are usually domesticated animals who have some training and acceptable behaviour for human/animal interaction.

A Health Organisation that is implementing a program of animal assisted intervention should consider their responsibilities under the Companion Animal Act 1998 and Companion Animal Regulations, requirement for animal welfare and veterinary screening for animals in the Companion Animals (Outdoor Dining Areas) Act 2010 No 33. Consideration should be given to:

- infection prevention and control principles during animal visit
- safe management of animals in the healthcare setting
- hygiene requirements
- training and health requirements of animals and handlers
- transportation of animals to and from the Health Organisation
- environmental controls during and following animal visits.

The implementation of therapy dogs and animal visitations need careful consideration to address potential risks of zoonotic transmission to patients and health workers when pets are present within a Health Organisation.

Animals can serve as a vector for infections and, in particular multi-resistant organisms, posing a potential risk of cross contamination with pathogenic organisms that may impact on patients. There are also considerations where these risks may be heightened in specific high-risk environments. Areas where animal visits or animal activities would be considered unsuitable include:

- sterile areas
- patient Treatment areas
- patient or ward isolation units
- kitchen and food preparation areas
- intensive care and high dependency areas
- immunosuppressed patients.

Points of consideration for animal visits should include:

- Health Organisations should establish a policy for assistance animals that aligns with relevant Commonwealth, State, and local council legislation. Similarly, any organisation that

allows facility pets or personal pet visits must develop a policy that complies with these legislative requirements

- In addition to complying with relevant State and local council legislation, the policy should address the types of animals permitted, certification requirements for both animals and their trainers/handlers, training for organisational staff, and education for animal trainers/handlers on organisational policies and procedures, hygiene standards for both animals and patients, and guidelines for animal access
- The Health Organisations infection control professional is notified when a patient is admitted with an accredited assistance animal to establish any specific requirements
- All animals visiting or permanently residing in Health Organisations are screened for parasites, skin problems and are fully vaccinated (a veterinary immunisation certificate should be provided)
- All animals are restricted from entering operating theatres, intensive care areas, cardiac catheterisation labs, dental surgeries, MRI scanners, sterilising departments and food preparation areas
- Animal access for isolated patients and immuno-suppressed patients is negotiated based on individual patient/client requirements
- Obtaining an accurate history from patients/staff for phobias and allergies, regular grooming of the animal to reduce the risk of allergic reaction, vaccination records, and so forth
- Selecting well-trained and well-behaved animals to minimise the risk of animal bites or injuries.

Hand Hygiene is essential for all participants:

- handlers must wash their hands and use alcohol-based hand rub (ABHR) before and after entering patient's areas and between patient visits
- animals must be cleaned and checked for parasites and general health prior to each visit
- animals should not be allowed near patients with open wounds or burns
- patients, staff and visitors must wash their hands or use alcohol-based hand rub before and after handling an animal
- animal handlers should wash their hands with soap and warm water after toileting animals and after disposing of soiled or dirty towels, using alcohol-based hand rub if necessary
- a new towel must be placed under the animal where an animal is placed on a bed to interact with a patient
- visits by an animal that is unwell or shedding a lot of hair should be postponed until the animal is well again
- volunteers and handlers are to always stay with the visiting animal
- be respectful of an individual's wishes where patients do not want a visit due to cultural and religious belief or may find them offensive.

10.19.1 Animals as patients

Animals may be present within Health Organisations for medical research, patient therapy and companionship and, in rare circumstances, for clinical treatment.

The risk for zoonotic transmission should be considered when animals are present within a Health Organisation. In particular, the risk of cross-contamination between animal and human is to be assessed when the facilities of a Health Organisations are being used for the clinical treatment of an animal. For those Health Organisations who provide or are considering providing this service, a risk assessment should be undertaken that considers:

- whether the room/area used for animal care can be made safe for human patients after animal treatment
- which disinfecting or sterilising procedures need to be done to ensure the safety of human patients
- animals must not be treated in clinical areas where invasive procedures on humans are undertaken
- where animal treatment requires the use of reusable medical equipment, such equipment must be dedicated for animal care only. Even if adequately reprocessed, equipment which has been dedicated for animal care must not be used for human patient care.

Chapter 11 Reprocessing reusable devices in health

11.1 Background

Reprocessing refers to the activities required to ensure that a reusable medical device (RMD) is safe for its intended use. Reprocessing is a multistep process that includes cleaning, inspection and assembly, functional testing (if applicable), disinfection (if applicable), packaging and labelling, sterilization (if applicable) and storage.

Each reusable medical device has specific requirements for reprocessing. Many variables can impact the effectiveness of reprocessing such as device design, reprocessing methodology and methods for validating cleaning and high-level disinfection or sterilization.

RMD technology is constantly evolving and reprocessing requires precision, quality systems, ongoing training and competency of all health workers involved, and compliance to reprocessing procedures.

The Health Organisation undertaking reprocessing of RMDs must:

- have appropriate governance around the management of RMDs including a quality management system in accordance with *AS 5369:2023 Reprocessing of reusable medical devices and other devices in health and non-health related facilities*, Australian Commissions Safety Advisory notices and NSW Health policies, guidelines and standard operating procedures
- ensure that health workers responsible for the reprocessing of RMDs within a facility have relevant qualifications and experience in reprocessing
- ensure that they have the facilities, equipment, and easy access to manufacturer-specified cleaning, disinfection/sterilization agents
- ensure that the manufacturers' instructions for use (IFUs) and local procedures are followed
- RMDs, reprocessing agents including hospital grade disinfectants, instrument grade chemical disinfectants, sterilising products and technologies that are used in Health Organisations are listed on the Australian Register of Therapeutic Goods (ARTG) for reprocessing RMDs
- check for microbicidal effectiveness and compatibility of reprocessing agents and chemical disinfectants with the device, and validate
- ensure that appropriate PPE is worn by health workers when reprocessing RMDs
- disinfectants and sterilising products should only be used for their approved purpose
- prior to purchase, obtain a copy of the Therapeutic Goods Administration (TGA) listing or registration certificate. This should be carried out by the health workers involved in the purchase or use of disinfectants or sterilising products (refer to NSW Health Procurement (Goods and Services) Policy Directive). Therapeutic Goods Order No. 54 - Standard for Disinfectants and Sterilant, Australian Register of Therapeutic Goods
- after reprocessing RMDs, store in accordance with *AS 5369:2023 Reprocessing of reusable medical devices and other devices in health and non-health related facilities* - Handling, transport and storage of released reprocessed RMDs/other devices.

11.2 Reprocessing categories

RMDs and other devices in health are to be reprocessed based on Spaulding's classification. The Spaulding classification system classifies a medical device as critical, semi-critical or non-critical based on risk to patient safety from device contamination. The system categorises medical equipment and devices according to their intended use and the subsequent level of reprocessing required to render them safe for reuse. Table 47 outlines these categories and includes examples of equipment and devices for each category.

Critical and semi-critical RMDs should be reprocessed in a designated reprocessing environment. However, it is not uncommon for a non-critical, usually non-invasive, RMDs to be reprocessed at the point of use.

Whatever the reprocessing method may be, appropriate validation and control of cleaning, disinfecting, packaging and sterilization is essential for reducing the transmission risk associated with the use of RMDs.

Appropriate infrastructure and resources are required to ensure effective and safe reprocessing activities, for example, provision and validation of water and steam quality; trained and competent sterilising technicians; and defined and documented work procedures.

Table 47 Reprocessing categories and processes

Level of risk	Process	Examples of items (lists are not exhaustive)
Critical		
An RMD or other device that have contact with the vascular system or sterile tissue. Must be sterile at the time of use.	Clean as soon as possible after use with a detergent solution. Sterilize by moist heat after cleaning. If RMD is heat or moisture sensitive, sterilize using an alternative process.	Surgical instruments, diagnostic and interventional radiology catheters, cystoscopes, arthroscopes, biopsy forceps, bronchoscopes, cardiac catheters, duodenoscopes, ERCP scopes, dental hand pieces, ultrasonic scalers, cardiac and renal intraoperative probes*
Semi-critical		
An RMD or other device that have contact with mucous membranes or non-intact skin.	Clean as soon as possible after use with a detergent solution. Sterilize by moist heat after cleaning. If RMD is moist heat sensitive, use a low temperature sterilization process or thermal disinfection or disinfection	One-way breathing valves, pneumotachograph screens, mouth shutters, respiratory/sleep therapy equipment, laryngoscope blades, vaginal ultrasound transducers, colonoscopes, gastroscopes, nasoendoscopes specula, ultrasound probes used on non-intact skin

	using a high-level instrument grade chemical disinfectant.	
Non-critical		
An RMD or other device that only have contact with intact skin and not mucous membranes.	Clean as soon as possible after use with a detergent solution. If necessary, disinfect with compatible low-level or intermediate-level disinfectant after cleaning.	Bedpans, commodes, EEG and ECG leads, blood pressure cuffs, beds, thermometers, SaO2 probes and stethoscopes.

* Intraoperative probes that will have contact with sterile tissue or the vascular system.

11.3 Reprocessing methods

In accordance with AS 5369:2023, the three usual methods for reprocessing are defined as:

- **Cleaning:** The removal of contamination from an item to the extent necessary for further processing or intended use
- **Disinfection:** Process to inactivate viable microorganisms to a level previously specified as being appropriate for a defined purpose
- **Sterilization:** A validated process used to render a product free from viable microorganisms.

11.3.1 Cleaning

Reprocessing begins with processing at the point of use, such as, proximity to the point of use of the device to facilitate subsequent cleaning steps. The point-of-use processing includes prompt, initial cleaning steps and/or measures to prevent drying of organic material and contaminants in and on the device.

Thorough cleaning and removal of contaminants by manual or automated systems is essential for further processing either by disinfection (thermal or chemical) and sterilization of RMDs. Residual contaminants (organic or inorganic) on the RMD surface can interfere with the effectiveness of these processes.

Instruments are to be cleaned either by hand and/or mechanically, following both manufacturer's instructions for use (IFUs) and the requirements set by *AS 5369:2023 Reprocessing of reusable medical devices and other devices in health and non-health related facilities* to assist with identifying the level of reprocessing required.

If the device has removable parts, then reprocessing instructions must include step by-step instructions for disassembly and reassembly of the device to facilitate cleaning and reprocessing. The equipment needed to perform these activities must be identified and provided to health workers performing these tasks. For easy access to information diagrams, photographs, illustrations and/or videos on manufacturer's instruction for use (IFU) are recommended. In addition, the instructions should indicate the location where this step should be performed (for example, at the point of use, at the designated cleaning area).

Disassembly and reassembly instructions must be explicit, device-specific, and concurrent with the validation activities. Health workers performing these tasks must be trained, competent and qualified. The cleaning process must be validated and at a minimum by visual inspection.

For cleaning of RMDs, IFU often recommends a neutral or near-neutral pH detergent solution because such solutions generally provide the best material compatibility profile and good soil removal. Enzymes, usually proteases, sometimes are added to neutral pH solutions to assist in removing organic material by attacking proteins that make up a large portion of common soil (for example, blood). Enzyme solutions should be used in accordance with manufacturer's IFU, which include proper dilution of the enzymatic detergent and contact with equipment for time specified on the label.

The cleaning process should flow in one direction from dirty/contaminated to clean and, ideally the reprocessing of the RMDs should be in a dedicated area if not well clear of the contaminated zone.

11.3.2 Disinfection

Disinfection (thermal or chemical) of RMDs kills many pathogenic microorganisms. However, unlike sterilization, disinfection is not effective against high numbers of bacterial spores. Many factors affect the efficacy of a disinfecting process, such as, presence of soil, nature and level of microbial contamination, RMD design, concentration of disinfectant, temperature and exposure time, pH levels and presence of biofilm. Therefore, users should read labels carefully to ensure the correct product is selected for the intended use and applied to meet maximum efficacy.

Chemical disinfectants vary significantly in their antimicrobial abilities and speed of action. Specifically:

- low-level disinfectants kill most vegetative bacteria (except *Mycobacterium tuberculosis*), some fungi and inactivate some viruses
- intermediate-level disinfectants kill vegetative bacteria including mycobacterium species, viruses and all fungi and inactivate most viruses but do not kill bacterial spores
- high-level disinfectants kill all microorganisms except for high numbers of bacterial spores. Some disinfectants used as high-level disinfectants are capable of sterilization with prolonged exposure, under controlled and defined conditions.

RMDs that require exposure to a disinfection process must have been categorised as semi-critical or non-critical according to Spaulding classification (*AS 5369:2023 Reprocessing of reusable medical devices and other devices in health and non-health related facilities*).

Semi-critical RMDs:

- must be sterilised by either validated moist heat or low temperature sterilising process between uses on individual patients unless RMD is not compatible with these processes
- that are not compatible with sterilization must be subject to a validated thermal disinfection process between uses on individual patients unless RMD is not compatible with this process
- that cannot withstand thermal disinfection process must be subject to a validated high level chemical disinfecting process between uses on individual patients. If this process is also not compatible alternative options such a single use should be sought.

11.3.3 Sterilization

Sterilization destroys all microorganisms on RMDs, rendering them free of viable microorganisms. There are several forms of sterilization, and the selected method must be recommended by the RMD's manufacturer.

Moist heat sterilization is the preferred process of sterilization of RMDs where the item can withstand the high temperature and pressure of this process. If an item cannot withstand a moist heat sterilising process, a suitable and alternative validated process will be necessary.

An alternative form of sterilization may be a low temperature gas, plasma or liquid chemical sterilising process and may also depend on resources available within the Health Organisation.

The delivery of sterile products for use in patient care depends on the effectiveness of the sterilization process including the unit design, decontamination, disassembling and packaging of the device, loading the sterilizer, monitoring, sterilant quality, quantity, appropriateness of the cycle for the load contents, and other aspects of device reprocessing.

Ensuring consistency of sterilization practices requires a comprehensive program by Health Organisations that ensures operator competence and proper methods of cleaning and wrapping instruments, loading the sterilizer, operating the sterilizer, and monitoring of the entire process.

11.4 Reprocessing of critical RMDs

Reprocessing of a critical RMD should involve the steps shown in the below figure.

Figure 23 Reprocessing a critical RMD



Note: follow instruction for use as per manufacturers specifications at each step.

11.5 RMDs on loan or brought by clinicians

With the ever-increasing complexity and cost of medical procedures and surgical instruments in general, many Health Organisations utilise loan equipment and loan sets. Loan sets have become an integral part in the care of patients requiring surgical intervention.

In the decision-making process regarding use of loan sets, privately owned RMDs and/or RMDs brought in by clinicians, Health Organisations should identify:

- key stakeholders and their roles and responsibilities, local governance and accountability
- the financial and resource implications, including the capacity to accommodate the volume, complexity, storage and resources required for reprocessing
- Health Organisations must always check for approval for use in Australia, ARTG certificate, manufacturers IFU, local procurement processes and biomedical engineering requirements.

For more information refer to the CEC Reprocessing of Reusable Medical Devices (RMDs) on Consignment or Loan for Use in Surgical, Dental or Other Invasive Procedures guidance document.

All loan transport containers must comply with Work Health and Safety Regulation 2011 and SafeWork NSW guide on Design and handling of surgical instrument transport cases: A guide on health and safety standards.

The supply, packaging, transportation, handling and processing of loan sets must be undertaken in a manner that ensures the safety of patients, health workers involved, environmental sustainability and comply with occupational health and safety regulations including:

- the transport containers are to be maintained by the supplier in a clean, dry state and in good working order
- the Health Organisation needs to have a system in place for handling loan equipment that complies with Work Health and Safety Regulation 2011
- the medical team should provide the designated health workers with a full description of the RMDs required to be ordered
- health workers must provide all instructions necessary for the provider to supply the loan sets in a manner that is safe and timely to allow for sufficient time for reprocessing and micro testing, if required
- the scheduling of procedures may be influenced by whether additional reprocessing, education and training requirements need to be met prior to or after reprocessing and the duration of reprocessing required
- suppliers are to send disassembling, cleaning and sterilization/disinfection instructions for multi-component instruments and these instructions should be followed.

Prior to use, loan sets must undergo cleaning and disinfection or sterilization as appropriate for the intended use. This applies to instruments and equipment loaned by sponsors and other Health Organisations, for example, loan sets, borrowed RMDs from private facilities and RMDs used between public facilities, as well as instruments and equipment owned or supplied by individual staff including locums, visiting medical officers and staff specialists.

Prior to reprocessing, health workers must inspect loan set instruments against the supplier documentation of contents on arrival and on return to confirm that the contents are correct and complete and that all appropriate documentation (such as tray lists) is present (NSW Health PD2023_002 Accountable Items used in Surgery and Other Procedures). Health workers are also to check that the manufacturer's IFU and local procedures for reprocessing are provided and followed.

Health workers are to ensure that loan sets are delivered for use on time and with all required documentation. Perceived lack of time should not permit the cleaning and disinfection or sterilization process to be bypassed.

After use, and before being returned, a loan RMD at a minimum should be processed by a validated cleaning and high-level disinfection process in accordance with the IFU. Any damaged instruments or instruments needing repair should be reported to the provider. Any instruments missing should be reported immediately to the operating theatres. The notification should comply with the NSW Health policy directive Accountable Items used in Surgery and Other Procedures and NSW Health Incident Management Policy.

Note: reusable loan set instruments used on humans must never be used on animals, or for necropsy or autopsy.

Where a Health Organisation is expected to reprocess clinician owned RMDs or loan sets, the Health Organisation's reprocessing unit is to be provided with the following information when receiving the device/sets:

- manufacturer's name
- name and contact details for manufacturer's local representative
- ARTG certificate or list number
- device manufacturer's IFU
- time requirement for reprocessing, identified risks and control measures if any; and specific training if needed.

Without the provision of this information, local reprocessing units will be unable to adequately reprocess privately owned RMDs or loan sets.

To reduce the risk of damage to privately owned RMDs or loan sets during transit to the Health Organisation, instrument containers should be fit for purpose, packaged and transported in a way that prevents damage; and meet the requirements for manual handling of the Work Health and Safety Regulation 2011.

On receipt at the Health Organisation, the local reprocessing unit should examine the integrity of the container. If the integrity of the container has been compromised the following actions are required:

- decant contents of broken container into an intact container
- remove the broken container from circulation
- reprocess instruments, regardless of whether the contents have been previously reprocessed
- report issues to the sponsor and the TGA.

11.6 Implantable devices

Medical device (other than an active implantable medical device) that is intended by the manufacturer to:

(a) be, by surgical intervention, wholly introduced into the body of a human being and to remain in place after the procedure
(b) replace, by surgical intervention, an epithelial surface, or the surface of an eye, of a human being and to remain in place after the procedure; or
(c) be, by surgical intervention, partially introduced into the body of a human being and to remain in place for at least 30 days after the procedure.

There are two types of orthopaedic implant:

1) Sterile implants (for example, joint prostheses) are distributed sterile ready-for-use

2) nonsterile implants (for example, plates, screws, Schanz pins, intramedullary rods) are processed by a healthcare facility's sterile service department (SSD).

Many such implants are classified as single use, according to the manufacturers, and should not be re-used following any contact with a patient.

Orthopaedic implants, such as screws and screw banks, are provided in a non-sterile state and must be reprocessed before each use, therefore they may be subjected to multiple reprocessing cycles until they are implanted in the patient. Health Organisations are to be aware of, and risk assess, the impact of various exposures to physical, chemical and biological agents and this can compromise their quality/safety and promote biofilm formation.

Health Organisations using or managing implantable devices are to ensure that:

- single use devices or items intended for human implantation must not be reprocessed or reused after patient use
- implantable devices used for orthopaedic and dental surgery that are received packaged and sterilised with identification from the manufacturer, should not be opened and used to restock racks or trays
- implantable devices must not be 'flash' sterilised
- manufacturers provide validated cleaning instructions for non-sterile implantable devices
- implantable devices labelled as "single use" are not reprocessed, due to inability to reprocess adequately
- documentation is completed as per NSW Health Care Records - Documentation and Management.

11.7 Management of incidents

Health Organisations that undertake reprocessing of RMDs must have an established system in place to manage incidents of real or suspected failure of cleaning, disinfection or sterilization.

If any item(s) used on a patient are subsequently found to be inadequately disinfected or sterilised and sterility has been compromised, the Health Organisation must establish the risk and determine the extent of the issue.

A risk assessment framework must be used to determine infection prevention and control breaches related to disinfection or sterilization failure. Processing failures relating to items used in patient care must be investigated and managed in accordance with current *AS 5369:2023 Reprocessing of reusable medical devices and other devices in health and non-health related facilities*, Infection prevention and control in Healthcare Settings and Incident Management policy directive.

Effective management of the recall process requires the traceability of RMDs to patient records by either electronic or manual systems. Traceability is imperative when looking back at the history, location or application of the RMDs that is under consideration.

Where the processing equipment has failed, the equipment under question must not be used again until rectified and satisfactory results are obtained from physical, chemical and/or biological monitoring.

When the processing equipment has been repaired and or rectified, physical and chemical monitoring to be conducted to confirm if the equipment is fit for reuse.

11.8 Education and training

Health workers working in reprocessing areas should understand the principles and practices outlined in Australian standard *AS 5369: 2023: Reprocessing of reusable medical devices and other devices in health and non-health related facilities*. For more information refer to CEC Assessment of Reprocessing Competencies. Health workers who collect microbiological samples of scopes are to complete training in aseptic technique.

11.9 Management of complex and difficult to reprocess RMDs

Reusable medical devices (RMDs) are classified as complex and difficult to reprocess when it is not possible to ensure the effectiveness of cleaning, disinfection, or sterilization. Devices that are difficult to clean often have intricate designs, such as cannulations or internal channels, which present ongoing challenges during decontamination. To ensure effective cleaning:

- The device must be designed to allow physical friction—either through brushing or ultrasonic methods—on all surfaces and enable visual inspection of those surfaces
- RMDs with dead-end lumens should be recognised as particularly difficult to clean
- Reprocessing departments, perioperative teams, and procedure-based facilities should aim to phase out complex and hard-to-reprocess RMDs, replacing them with designs that can be disassembled to facilitate thorough cleaning and reprocessing
- Maintain an up-to-date list of RMDs that are difficult to reprocess and ensure these are documented in the organisation's risk register.

Health Organisations are to adopt a comprehensive risk management approach when making decisions about purchasing, hiring or borrowing medical instruments and equipment to reduce the risks associated with difficult to reprocess RMDs (figure 24 Risk assessment flow chart). Also refer to CEC General rules for reprocessing complex and difficult to clean devices – video laryngoscopes.

Figure 24 Risk assessment flow chart

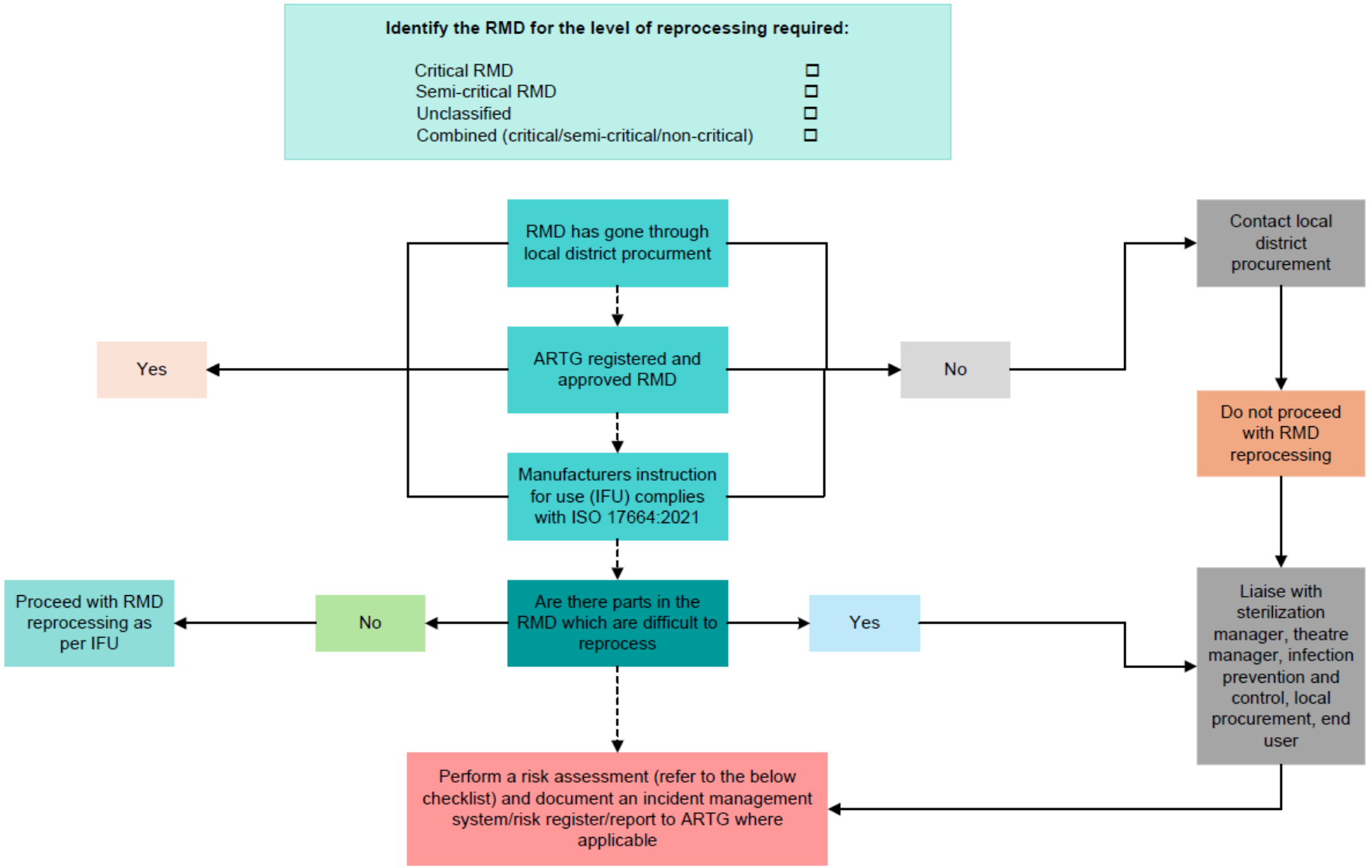


Table 48 Risk assessment checklist for RMDs when IFU does not comply with AS 5369:2023 or RMD identified as difficult to clean

☐ IFU does not comply with AS 5369:2023 ☐ RMD identified as difficult to clean			
Name of the RMD …… Manufacturer ……			
Liaise with the following stakeholders to proactively conduct comprehensive risk assessment using the below checklist			
☐ Sterilization services team ☐ infection prevention and control ☐ Procurement (local/district) ☐ End users (for example, surgeon, theatre manager) ☐ Other			
	Yes	**No**	**N/A**
Are there alternative methods available for the RMDs to be reprocessed according to AS 5369:2023 to a safe level which minimises infection risks to patients?			
If the answer to the above question 'no', consideration must be given to the following:			
Is the RMD able to be substituted with a more suitable device?			
Is the use of this RMD necessary at the facility?			
Is the non-use of this RMD life threatening to the patient?			
Is there a single use option available for this RMD?			
If there are no alternatives, review the device's IFU to identify: • is it a complex item? • are there correct tools available to assemble/reassemble this RMD? • are there correct solutions available to reprocess this RMD? • is there enough inventory to allow for adequate turn-around time to effectively reprocess the device			
Whether parts and/or the whole device can be sterilised?			
Is there a need for sterile sheath/cover?			
Is there a need for any process change to reprocess this RMD?			
Are there risk mitigation strategies able to be implemented to reduce infection prevention and control risks to patients?			
Staff responsible for reprocessing RMDs are trained to perform all reprocessing steps as per the device's IFU			
Are the risk mitigation strategies implemented and documented?			

Is there a need for this RMD to be reported to ARTG?			
Have you contacted your peer group for input to establish if device use is wide-spread or isolated?			
Incidents of surgical site infections or adverse events associated with procedure or this RMD use has been recorded and reported?			
Comments …… Name ……... Designation …… Signature …… Date ……			

11.10 New technologies

New technologies have made great advancements with beneficial outcomes for patients requiring specialised and complex surgical procedures. Extensive consultation with the reprocessing unit and infection prevention and control is required prior to the purchase of any new technologies.

A risk assessment of the RMD may be required, particularly if the instrument is deemed to be 'difficult to reprocess' (refer to figure 23 and table 48 for further information).

The assessment should consider:

- the design of the instrument:
  - can it be taken apart for thorough cleaning?
  - are there any complex joints that cannot be cleaned adequately?
  - will the design affect the ability to clean over time?
- local capacity and expertise:
  - review the manufacturer's instructions for use (IFU) and reprocessing requirements
  - ARTG listed or registered
  - can optimal and validated reprocessing of this instrument be done in this unit?
  - is this unit equipped to reprocess this instrument?
  - do reprocessing staff need specific training to reprocess this instrument?

Risk assessment outcomes should be reported to the appropriate Clinical Governance delegate for further discussion with the Health Organisation 's product selection committee or equivalent.

When new instrumentation is purchased, the Health Organisation to ensure that the manufacturer or their representative provides initial training to health workers. Once initial training has been provided, local trainers are responsible for providing education to other health workers, including new staff.

11.11 Maintenance and repair

RMDs that are to be sent for maintenance or repair must, prior to dispatch, be cleaned and disinfected or sterilised in accordance with the manufacturer's IFU.

On return prior to placing back into circulation for use, these items must be checked or inspected, disassembled if required and reprocessed in accordance with manufacturer's IFU and facility procedures.

11.12 Covers and sheaths

Some RMDs may require a single-use sterile cover or a sheath to protect the instrument or equipment during procedures. When covers or sheaths are used the reusable item(s) must be completely reprocessed between patient procedures.

Covers and sheaths must not be used as a substitute for routine cleaning, disinfection or sterilization of instruments and equipment.

11.13 Quality assurance

Health Organisations are to perform regular periodic audits to confirm that the requirements of AS 5396:2023 are being met. The audit findings are to be documented and, where applicable, corrective action implemented to rectify deficiencies. Corrective actions are to be reviewed to ensure that it has been effective in addressing the deficiency. Health Organisations are to have a formalised and documented process for delivery and pick-up of instruments.

11.14 Reprocessing in Oral Health

The practice of dentistry frequently involves the use of sharp instruments which can pierce skin and mucous membranes during treatment. In dental practice there is a risk of cross-contamination as treatment may involve contact with saliva, blood and endodontic pulp tissue. These and other dental materials may be difficult to remove if allowed to dry.

Effective sterilization of instruments relies on effective cleaning prior to sterilization. Therefore, all visible dental materials should be removed from instruments at point of use to prevent substances drying on these instruments. Formal training in reprocessing of RMDs is required for all personnel who clean and reprocess dental equipment.

Many of the reusable instruments and burs utilised in oral health services are classified as ‘difficult to reprocess’ and require special attention and cleaning procedure. Refer to the flow chart in figure 23 and table 48 for further information on risk assessment on difficult to reprocess RMDs.

Oral health services utilising a steam sterilizer to sterilize dental equipment within their unit are to follow the requirements for testing, documentation and quality control as specified by AS 5369:2023.

The Dental Board stipulates the expectations for infection prevention and control based on the current edition of the ADA’s Guidelines for Infection prevention and control, NHMRC Australian Guidelines for the Prevention and Control of Infection in Healthcare and AS 5369:2023.

When RMDs are being reprocessed outside of the oral health service unit, an initial pre-treatment is to be performed at the point of use of all RMDs/other devices before being transported. These items must be contained within a puncture-proof and lidded container for transportation, and the transport vehicle should be temperature controlled.

Surface barriers help prevent contamination of surfaces and equipment. Surface barriers on equipment need to be placed carefully to ensure that they protect the surfaces underneath and should be changed and cleaned between patients. Cleaning clinical surfaces, including equipment, should always occur between patients or uses, regardless of whether a surface barrier has been used or not, any exceptions should be justified by risk assessment (NHMRC Australian Guidelines for the Prevention and Control of Infection in Healthcare).

For specialised equipment which is difficult to clean and the application of detergent directly onto the device is not recommended by the manufacturer, a custom surface barrier should be used, for

example, intraoral camera. Any custom surface barrier used on such equipment should be disposed of after each patient treatment and replaced with a new custom surface barrier.

The custom surface barriers are specific to each type of specialised equipment and provided by the manufacturer of that specialised equipment. Health Organisations are not to use other surface barriers on that specialised equipment.

Health Organisations are to have a local policy that describes their specialised equipment and its specific reprocessing.

According to section 5.6.15 of AS 5369:2023, it is important to control temperature and humidity where RMDs are packaged and where sterilised RMDs are being stored.

Where 24-hour air-conditioning control of temperature and humidity of the sterile stock storage area does not occur, the permitted use life of packaged RMDs needs to be set at an appropriate interval, due to degradation of the packaging material, such as at 12 months. For situations where high temperature and humidity conditions exist in sterile storage areas outside of working periods, setting a shorter interval such as three or six months is appropriate. Regardless of where the reprocessing area is located (collocated or standalone), the ventilation, humidity and temperature control within these areas should be managed to ensure the sterility of the items are maintained (ADA). An action plan should be in place to rectify any issues that may arise.

11.15 Intracavity ultrasounds

Intracavity ultrasound transducers (for example, transvaginal, trans-rectal or intraoperative) are to be reprocessed in accordance with the manufacturer's IFU and AS 5369:2023. If an intracavity ultrasound transducer cannot be sterilised, thermal or high-level chemical disinfection is required to minimise the risk of cross contamination and ensure patient safety. Additionally, automation, validation, and traceability of disinfection systems for ultrasound probes are recommended.

Sterile gel and sterile single-use probe covers are also to be used. The use of disposable/sterile covers are not used as a substitute for cleaning, disinfection or sterilization.

Reprocessing cycle records are to be maintained by the Health Organisations with the following information as a minimum:

- transducer serial number
- date and health worker responsible for reprocessing
- method of disinfection; disinfection cycle or load number
- name and signature of the person releasing the transducer for use.

When using chemical disinfectant:

- fume extraction cabinets may be required
- specialised requirements are to be followed during disposal
- approved spill kits are to be available in the reprocessing area in case of spillage
- appropriate PPE is to be worn by health workers when reprocessing ultrasound transducers.

If using chemical disinfection, batch information, preparation date and use by date of the chemical disinfectant should be documented.

Any failed cycles or interruption during the disinfection process are to be documented and the transducer must be fully reprocessed prior to use. In addition, chemical indicators are to be used to

validate concentrations and/or holding time and documented as recommended by the chemical disinfectant manufacturer. To ensure heath worker safety and reduce the risk of damage:

- Contaminated ultrasound transducers are to be transported to the reprocessing area immediately after use, in a closed container that can be effectively cleaned and disinfected
- Transport containers are to be thoroughly cleaned and dried between uses
- Reprocessed ultrasound transducers are to be stored in a clean environment to maintain the sterilization or disinfected process.

Each sterilised or disinfected ultrasound transducer is to have an indicator attached to confirm that appropriate reprocessing methods have been followed.

11.16 External ultrasounds

RMDs, including bladder scanners, ultrasound machines and transducers may act as both a source and a vector of potential cross contamination.

Ultrasound transducers used in percutaneous procedures are classified as non-invasive medical devices as the transducer does not penetrate inside the body, either through a body orifice or through the surface of the body. After use it requires cleaning, as per the manufacturer's IFU and depending on the outcome of a risk assessment, low level disinfection (LLD) with an approved and compatible disinfectant.

Ultrasound transducers that penetrate inside the body through areas of non-intact skin (for example, burns sites, open wounds, skin ulcers) or contact areas with mucous membranes (for example, rectum, vagina), are classified as invasive medical devices. Invasive ultrasound transducers are classified as semi-critical devices and require a minimum of high-level disinfection (HLD) before patient use.

If a transducer used for a non-invasive procedure have contact with non-intact skin or body substances during the procedure, it should be reclassified as a semi-critical item. In such cases, high-level disinfection is required, regardless of the use of a protective sleeve/sheath.

For more information refer to ACSQHC Cleaning and disinfection of ultrasound transducers.

Sterile ultrasound gels are packets or sachets that are labelled as sterile and have not been opened. Ultrasound gels that are labelled as non-sterile, or do not reference sterility, are considered non-sterile.

Under certain unfavourable circumstances ultrasound gel can also become contaminated with a variety of microorganisms and cause infection.

Ultrasound gels may be sterile or non-sterile and have been the source of past outbreaks of infection (Angrup et al., 2022, Hudson et al., 2022). Health Organisation are to implement controls to ensure no refilling of bottles, maximum use period despite expiry date to minimise amount of bacterial growth in multi-use gel.

The use of non-sterile gel should be limited to low-risk general examinations on intact skin. The use of reusable containers is discouraged due to the lack of appropriate sinks and drying areas in most facilities.

If a non-sterile gel is being used on a patients, regardless of their infectious disease status, a single-use gel bottle or sachet should be used (ASA The safe use and storage of ultrasound gel 2022).

Due to the risk of bacterial contamination and growth within a warm environment, heating of gel/s is not recommended. In circumstances where warm gel is necessary, the use of dry heat is the preferred method. After each use, lids should be closed on reusable gel bottles.

As per the ASUM Guidelines for Reprocessing Ultrasound Transducers, the basic minimum standards to minimise the infection transmission risk through the use of contaminated ultrasound gel are as follows:

- always follow the manufacturer's instructions for care and use
- ensure reusable dispenser bottles are completely emptied, thoroughly washed and dried daily/weekly, according to your facility's infection control practices
- clean all reusable equipment according to the manufacturer's instructions
- for procedures that require the use of sterile gel, ensure that only unopened containers/sachets labelled ‘sterile’ are used
- Any unused portion of single-use sterile gel packets must be discarded and not reused for another examination or patient.

Surface probes used on intact skin and bladder scanners

Following a non-invasive procedure, for example, scanning over intact skin or bladder scan, all gel is to be removed from the probe, and the transducer probe is to be cleaned with a neutral detergent non-residual wipe and, if required, disinfected with an appropriate hospital grade disinfectant in compliance with the manufacturer’s IFU and TGA regulations.

After use the cleaning procedure should include the entire cable from the transducer to the machine and extend to the surface of the machine.

If an ultrasound transducer or associated equipment has contact with blood and/or body substance, first clean with a neutral detergent and then disinfect with an appropriate disinfectant in compliance with the manufacturer’s IFU and TGA regulations.

Ultrasound devices used on non-intact skin or contact with mucous membrane

Ultrasound transducers used for imaging the vascular system for insertion of venous access devices should be used with a sterile probe cover and sterile gel.

If the probe cable is likely to have contact with a sterile drape, for example, during insertion of a central access device, the cable should be covered with a long sterile sheath and be managed in such a way as to maintain the sterility of the procedural region.

Following use, the cable cover is to be removed without contaminating the surface of the cable or the ultrasound machine. Cleaning after use as per the manufacturer’s IFU and, depending on the outcome of a risk assessment, high level disinfection with an approved and compatible disinfectant.

The probe/transducer must be cleaned and disinfected as per IFU and risk assessment, regardless of the use of sheath/cover. A risk assessment should determine the level of disinfection required.

After cleaning, all transducers must be stored in an appropriate environment to protect from environmental contamination. It is recommended that a specific cabinet is used, but if this is not available, the minimum standard recommended is a clean disposable cover applied to the transducer to mitigate risks from environmental contaminants.

Records of reprocessing must be kept in accordance with the requirements specified in AS 5369:2023 and manufacturers IFU to ensure a system of traceability is in place to enable recall procedures to be followed in case of decontamination failure.

11.17 Light based disinfection systems for use with ultrasound probes

Light based disinfection systems (LBDS) are listed on the Australian Register of Therapeutics Goods (ARTG) as Class IIB medical devices. Before purchasing light-based disinfection systems for ultrasound probes, the below risk assessment in table 49 is recommended.

Table 49 LBDS risk assessment checklist for use with ultrasound probes

No.	Item	Yes	No	N/A
1	The manufacturer provides device (for example, ultrasound probe) specific IFU	☐	☐	☐
2	Determination if the device is compatible with the light-based disinfection system (LBDS)	☐	☐	☐
3	Determination if the LBDS is registered with TGA	☐	☐	☐
4	LBDS is validated to comply with AS 5369:2023	☐	☐	☐
5	Will this system provide the correct Spaulding classification level reprocessing for the ultrasound?	☐	☐	☐
6	Has the risk verses benefit been determined for patient safety?	☐	☐	☐
7	The manufacturer of LBDS provides evidence for microbial reduction/antimicrobial efficacy	☐	☐	☐
8	Determination of any treatment of RMD that is required prior to exposure to the process to ensure its effectiveness	☐	☐	☐
9	Determination of any restrictions or limitations relating to the size, mass, configuration, or loading orientation of RMDs being processed	☐	☐	☐
10	Review has been conducted of current evidence related to the light-based disinfection systems	☐	☐	☐
11	Risk assessment of physical location for the LBDS to determine reprocessing workflow, storage requirements and maintenance	☐	☐	☐
12	Determination on how the ultrasound probes will be tracked, location of the record storage and in the patients record	☐	☐	☐
13	Documented procedure for reprocessing, including PPE requirements	☐	☐	☐
14	Approval has been obtained to purchase and use the LBDS by local infection prevention and control team, sterilising manager and local procurement	☐	☐	☐
15	Program has been established for staff training and competency assessment for reprocessing ultrasounds	☐	☐	☐

16	Does this improve the current system for reprocessing of ultrasounds?	☐	☐	☐
17	Will there be additional consumables and costs associated with using this system?	☐	☐	☐
18	Will the routine monitoring included in the purchase contract and a person is identified to have responsibility for completing and documenting this?	☐	☐	☐
19	Will using this system impact on any other workflow or service provision?	☐	☐	☐

11.18 Endoscope reprocessing

There are two main types of endoscopes, rigid and flexible.

Rigid endoscopes are made of metal tubes which contain the lenses, and the light channel(s) and are available in a large range of external diameters. These mainly enter the sterile tissues and organs of the human body directly or via a surgical incision, such as laparoscope, thoracoscope, arthroscope, intervertebral disc mirror, and ventriculoscope.

Flexible endoscopes are an optic reusable or disposable medical device that transmit light and carry images back to the proceduralist through flexible transparent fibres. They are used to inspect, monitor and treat interior portions of the body.

Types of flexible endoscopes

Different endoscope types and models have features in common and important differences that need to be considered for them to be cleaned correctly or appropriately. Examples are shown in the below table.

Table 50 Examples of non-channelled and channelled endoscopes

Non-channelled flexible endoscopes	Channelled flexible endoscopes
Nasendoscope	Gastroscope
Transoesophageal Probe (TOE)	Colonoscope
Some Bronchoscopes	Bronchoscope
Some flexible brachytherapy scopes	Cystoscope
	Ureteroscope
	Duodenoscope

Contaminated endoscopes with pathogenic organisms have the potential to transmit microorganisms in three different ways:

- patient to patient from contaminated endoscopes and accessories
- contaminated endoscopes and accessories to the healthcare environment and equipment
- contaminated healthcare environment and equipment to health workers and patients.

Accurate reprocessing of endoscopes and accessories is critical for patient safety, maintenance of the integrity of the scope and prevention of contamination. It is essential that a comprehensive reprocessing, transport, storage and health worker competency gap analysis and/or risk

assessment is conducted on a regular basis and when a significant incident occurs (Chang et al., 2024).

Each endoscopic reprocessing unit requires detailed and easy to understand documented procedures for each step of the endoscope reprocessing program from pre-cleaning to storage and maintenance as per the AS 5369:2023, Gastroenterological Society of Australia (GESA) and manufacturer's instruction for use (IFU).

Education and training

Health Organisations are to ensure that health workers reprocessing endoscopes can consistently demonstrate accountability and responsibility during all stages of reprocessing. Onsite training with experienced and competent staff to be available during onboarding, prior to assessment of competency and in response to incidents. Competency assessment should include information listed in the below table.

Table 51 Sample competency assessment for pre-cleaning

Minimal training undertaken	• Perform bedside pre-cleaning. Flush the endoscope with approved chemical and water, until it is clear with water • Clean outside of the scope • Place in transport container with appropriate identification that it is contaminated • Transport to the designated area where it will be reprocessed • Complete tracking information • Note any issues with the scope, for example, damage, blockage
Training undertaken but competency not completed	• As above plus: ○ perform leak testing ○ clean and brush ○ complete tracking information ○ place in designated area
Training and competency completed	• As above plus: ○ place in Automated Flexible Endoscope Reprocessor (AFER) for high level disinfection ○ complete tracking information

The competency assessment should also include:

- donning and doffing of personal protective equipment appropriate for the task
- hand hygiene compliance as per the NHHI hand hygiene requirements
- selection and use of chemical compatible to the scope
- understanding of scope type, design (biopsy/suction, air, water, auxiliary water and elevator).

Pre-cleaning

Pre-cleaning begins immediately after the endoscopic procedure and before the scope is disconnected from the power source. Pre-cleaning is a two-step process:

- wet wiping the external surface of the scope with a lint free cloth/surgical sponge with an enzymatic/biofilm remover to remove any organic matter before it dries

- suctioning of the working channels using no less than 300mls off water and enzymatic/biofilm solution as per the manufacturers IFU.

On completion of the pre bedside clean, the used scope is disconnected from the endoscopic power source and:

- remove from the point of care
- place into a transport tray/container to avoid damage to the scope
- allow the scope to coil in relaxed loops with the manual controls facing up
- avoid placing/resting the fixed hard components of the scope directly on the flexible components
- cover, clearly identifying the scope is contaminated
- transport to the reprocessing area.

The method of transport between the procedure and reprocessing rooms must reduce the risk of scope cross contamination.

Leak testing and visual inspection

For endoscopes that require a leak test, it detects any damage to the interior or exterior of the scope. Leak testing must be completed before further cleaning of the scope occurs. Manual leak testing no longer required if AFER performs leak testing as part of its cycle. Manufacturer's instructions must be followed on how to perform the leak test including how to:

- check the leak tester is functioning
- confirm removal of valves/buttons/caps from the scope
- attach the leak tester to the scope
- angulate the scope
- amount of water required for the scope to be leak tested
- identify if there is a leak
- length of time to depressurise the scope following the leak test.

Manual or automated cleaning

Automated cleaning is using an Automated Flexible Endoscope Reprocessor (AFER) is recommended as the optimal process. Manual cleaning is performed by hand by removing biological material from endoscopes. Brushing of the channels is highly recommended regardless of the use of AFER. The AFER manufacturer's instructions for use (IFU) must be followed before connecting the endoscope and beginning the cycle. When not using an AFER with automated cleaning, manual cleaning including brushing and flushing of channels and ports consistent with the manufacturer's IFU is required before HLD or sterilization.

Endoscopic disinfection and sterilization options

The decision to use high level disinfection or sterilization methods will be dependent on the manufacturer's IFU for each type of scope. The common recommended method is high level disinfection for most scopes. Chemicals used for each step for the cleaning process must meet the requirements articulated within the Therapeutics Goods Administration (TGA) regulation of disinfectants and sterilant.

At completion of the cycle, check that cycle parameters have been met, and all channel adaptors are still connected.

Transport of endoscopes

The type of container system or method for transport of reusable scopes must be evaluated to ensure that cross contamination does not occur.

The principles for transporting reprocessed scope(s) include:

- perform hand hygiene prior to handling a reprocessed scope(s)
- clean reusable lined container or trolley
- disposable or rigid container that enables the scope to be coiled into large loops
- includes any required attachments or accessories
- clearly identifiable as ‘clean’
- use of a sterile drape if required.

Storage of endoscopes

The purpose of storing endoscopes is to minimise contamination and protect them from damage. The length of time that a processed scope can be safely stored and maintained in a patient ready state is reliant on:

- accurate and validated reprocessing that meets the required parameters
- drying of scopes (internal and external)
- cleanliness and maintenance of the storage cabinet/cupboard
- storage parameters and of sufficient height, width, and depth to allow scopes to be stored either vertically or horizontally
- risk of contamination, for example, tips of scopes sitting on floor of storage cabinet/cupboard is stored vertically
- microbiological sampling results over time
- handling by health workers.

Documentation

Documentation (electronic or manual) for storage should include:

- ‘time in’ (date and time)
- ‘time out’ (date and time)
- print out from endoscope storage cabinet (if relevant).

Tracking is a real-time process of documenting all scope reprocessing stages through to clinical use on a specific patient. Tracing is following steps to uncover and understand the actions along its way. It is either the monitoring of the process (auditing) or examining the process for errors due to an incident.

Documentation for tracking endoscope reprocessing will likely be obtained from multiple sources and may be stored in a combination of paper and electronic systems. Some commercial tracking systems permit input from various systems.

Documentation also includes use of an incident reporting system to record any reprocessing incidents that involve endoscopes, accessories or associated equipment.

Microbiological surveillance

Microbiological surveillance of channelled endoscopes and the Automated Flexible Endoscope Reprocessor (AFER) are a quality control measure or verification of the effectiveness in cleaning, high level disinfection or sterilization and the structural integrity of the channels within a scope. It provides an outcome measure for reprocessing and can assist in identifying unrecognised or undetectable damage.

Collection of microbiological samples requires an aseptic technique and health workers are to be suitably trained to undertake this task. For more information refer to GESA Infection prevention and control in Endoscopy 2025.

Testing of loan scopes

The GENCA guidance requires that loan scopes are to be tested within 72 hours of receipt of the instrument to the organisation (Genca, 2025). All endoscopes returning from servicing or received on loan are to be cleaned and disinfected before use. Endoscopes can be used after cleaning and disinfection and do not need to be quarantined while awaiting microbiological surveillance test results (Genca, 2025).

11.19 Management of endoscopic tube shaft Instruments

Endoscopic tube shaft instruments are used in minimally invasive surgery to grasp, cut, dissect and coagulate tissue and organs, as well as for pinching off vessels. The device has a reusable part that can be removed for cleaning (tube shaft). This part is not necessarily allocated to one device but can be shared between endoscopes. As with many endoscopes these devices have complex designs that require meticulous management throughout the reprocessing process. Inappropriate handling of the device and specific parts may lead to reduction of durability or damage.

There is a risk that a damaged tube shaft may go unnoticed during reprocessing and final check. This could result in the use of damaged instruments, leading to broken parts dislodging during (intra-cavity) patient procedures. Damage may go undetected if the required cleaning and disinfection processes, including checks and validation, are not adhered to.

Product instructions for use (IFU) provide clear guidelines for life expectancy, reprocessing and testing requirements.

Health Organisations using these devices are to ensure that reprocessing of the endoscopic tube shaft instrument is in accordance with both their manufacturer's instructions and *AS 5369:2023 Reprocessing of Reusable Medical Devices in Health Service Organizations*.

All devices must be inspected visually and functionally during cleaning, packaging and prior to each use. Use of any damaged or faulty equipment should be discontinued immediately.

Functional test includes:

- correct assembly
- fulfilment of predefined function
- absence of damage.

Reprocessing steps should include cleaning, disinfection/sterilization, inspection and assembly, testing (electrosurgery insulation testing full length of sheath with particular focus on tip of sheath) and packaging.

Health Organisations are to provide education and training to relevant health workers in reprocessing, use and visual inspection/checks of endoscopic tube shafts as outlined in the product IFU.

11.20 Use of impregnated chemical disinfectant wipe systems

Health Organisations are to exercise caution when using 'ready-to-use' disinfectant wipes (also known as pre-impregnated disinfectant wipe) with active ingredients such as isopropyl alcohol, chlorhexidine gluconate, chlorine dioxide and dimethyl oxazolidine, for high-level disinfection of non-lumened/non channelled RMDs.

These systems are not intended for use on critical medical devices which must be sterilised prior to use on a patient.

Unlike automated reprocessing systems which have a measured dosage of chemistry and a validated reprocess cycle, impregnated chemical disinfectant wipe systems rely on the manual (human) process of applying each wipe in the recommended sequence. This assumes that each part of the device has been in contact consistently for the specified period. The devices for which impregnated chemical disinfectant wipe systems are intended are not easily stabilised aseptically, which makes it very difficult to ensure and verify that all parts of the device have been contacted by the disinfecting agent consistently at the required concentration for the required time (Kühnel and Gühne, 2024).

Most chemical disinfectant wipe systems rely on:

- manual activation of enzymatic cleaner within the disinfectant wipes
- ensuring that all areas of the RMD have contact with active agent within the wipe
- manual tracking of the reprocessing process
- ongoing education and training requirements of health workers conducting high level disinfection
- adequate record keeping and frequency of competency assessment
- health worker vigilance on manual process with cleaning and disinfection with potential for contamination risk post cleaning.

Health Organisations deciding to use impregnated chemical disinfectant wipe systems are to consider the following to minimising risks to patients:

- a risk assessment should be conducted to ensure that there is no alternative reprocessing system available or suitable for this specific RMD
- ensure and verify that impregnated chemical disinfectant wipe systems are not used in any situation where an RMD is required to be sterile for an invasive procedure
- evaluate if there are alternative reprocessing systems for which adherence to best practice standards can be more readily ensured and verified
- ensure and verify that use of an impregnated chemical disinfectant wipe system is in accordance with the RMD's manufacturer's instructions
- ensure health workers are trained and competent in the use of the system and adhere to relevant NSW policies
- ensure that impregnated chemical disinfectant wipe systems' manufacturer's instructions for use are strictly adhered to
- ensure that all surfaces are cleaned and adequate contact made with the active chemical for the appropriate time.

11.21 Use of fume or vapour soaking stations

Engineering controls are physical in nature, including mechanical devices or processes that eliminate or minimise the generation of chemicals fumes, suppress or contain chemicals, or limit the area of contamination in the event of spills and leaks. Ventilation is a means of maintaining a safe atmosphere by the introduction or recirculation of air; by natural, forced or mechanical means. Maintaining a safe atmosphere in the storage and handling area of hazardous chemicals is an important control measure to ensure health worker safety (Managing risks of hazardous chemicals in the workplace Code of Practice, 2020, Safe work Australia).

Fume or vapour soaking stations facilitate the immersion of reusable medical devices such as flexible endoscopes and/or sonographic devices to bring them into contact with a liquid chemical disinfectant.

The high-level disinfection occurs through the action of the active ingredient. The fume or vapour soaking stations provide a receptacle to soak the device and remove the fumes and vapours. Manufacturers' instructions for the use of the fume or vapour soaking station and the active ingredient must be followed, as well as any relevant Work Health and Safety instructions.

Fume/vapour soaking stations are not listed on the Australian Register of Therapeutic Goods (ARTG) as the Therapeutic Goods Administration (TGA) does not consider them to be medical devices.

Steps for minimising risk when using fume/vapour soaking stations

Health Organisations are to review their facilities' use of fume or vapour soaking stations.

Where fume or vapour soaking stations are used, Health Organisations are to ensure that systems and procedures are in place to:

- selecting areas suitable to maintain dirty to clean flow
- adequate training and PPE availability
- SOPs for handling, soaking, and rinsing reusable devices, including soak times, concentration of chemicals and rinsing
- monitor that they are used in accordance with their manufacturer's instructions for use
- monitor their performance.

11.22 Infant feeding equipment

Before use by another baby, reusable baby bottles, teats and caps must be cleaned and thermally disinfected in accordance with the manufacturer's IFU.

Breast feeding equipment, such as breast pump components, must be cleaned and sterilised between patients. A designated cleaning space should be allocated to minimise cross infection of prep areas and equipment reprocessing.

Health Organisations are to ensure that these items are reprocessed as per the IFU within the given parameters, at a minimum, as per the AS 5369:2023. In situations where the IFU acknowledges the variation in jurisdictional requirements, the local facility should follow AS 5369:2023 requirements.

Chemical disinfection must only be used on equipment that is designated to and reused by one baby.

Prior to transfer, health workers should provide guidance to parents or carers about cleaning and disinfecting feeding equipment that is appropriate for the home setting.

11.23 Cleaning and disinfection of heater cooler devices

A Health Organisation should employ infection prevention and control strategies to minimise the risk of non-tuberculous *Mycobacterium* (NTM) infection associated with heater-cooler devices (HCDs) and other relevant devices.

Heater-cooler devices contain water tanks that regulate temperature during procedures. Although this water does not come into direct contact with the patient, it can become contaminated with NTM. During operation, tiny airborne particles can be released from the device's internal components, especially the water tanks. These aerosols may carry NTM and disperse into the operating room environment, posing a risk of infection to patients undergoing surgery.

Health Organisations should have a designated person responsible for coordinating management and response to device related infection. At a minimum, the following should be in place where an HCD is in use:

- Adhere to all maintenance, cleaning and disinfection according to manufacturer's instructions for use (IFU)
- Routine testing and maintenance of HCD
- Ensure systems for maintaining records of testing, maintenance and use are in place
- Process for management of HCDs that are sent overseas for repair
- Use ventilation systems or exhaust tubing to direct any aerosol emissions away from the sterile
- Identify and test relevant equipment
- Ensure the results of confirmed device contamination are reported to the TGA, the manufacturer of the device, and NSW Health
- Establish policies and procedures to minimise exposure risk to patients, and to enable service continuity
- Communicate potential risks and local response strategies to senior management, relevant clinicians, and primary health providers. This may include the hospital executive as well as infection prevention and control, infectious diseases, cardiac surgery, perfusion, anesthesia, clinical microbiology, anatomical pathology services and patients.

For more information on identification of a positive result *M chimaera* from a heater cooler device refer to NSW Health Mycobacterium chimaera and open-heart cardiac surgery.

11.24 Stethoscopes

Auscultation of the heart, lungs, abdomen, and major arteries with a stethoscope has long been considered an integral part of the physical examination and most clinicians prefer to use their own stethoscope. Evidence suggests that stethoscopes are potential vectors for microorganism transmission between patients (Jovanovic et al., 2024, Messina et al., 2018). *S. aureus* has been identified surviving on earpieces of stethoscopes for longer than 18 hours.

All parts of the stethoscope that have been in direct contact with skin (patient's or clinician's) should be cleaned with a neutral detergent, at minimum, before reuse.

In extreme risk clinical areas, or during outbreaks, health workers should consider cleaning and disinfection of reusable stethoscopes or using disposable stethoscopes.

11.25 Toys

Toys are potential vectors for fomite transmission and are reservoirs for microorganisms. Toys and items that are handled or placed in children's mouths or used in baths are to be washable, quick drying and easy to clean. Health Organisations are not to purchase or encourage the use of water-retaining bath toys, non-washable soft toys and other toys which are difficult to clean. If such toys are brought into the Health Organisation by the patient or their visitors, use should be limited to a single patient only.

Used toys and therapeutic aids should be cleaned between each patient with a neutral detergent. Health Organisations are to purchase products that can be cleanable and withstand disinfection if necessary.

If toys or therapy items become contaminated with body substance including saliva, by actions such as sneezing or putting into a child's mouth, remove from use until washed in warm water and detergent and dry. Should it be required, dry cleaning instructions for the toy should be discussed with the patient and/or carer. If a toy cannot be cleaned it should be discarded.

Soft toys should not be permitted in a communal area unless the toy is being used as a therapeutic aid for an individual patient. Clinicians who use soft or otherwise 'difficult to clean' toys as therapeutic aids should consult with local infection prevention and control team and undertake a documented risk assessment for the selection, maintenance and cleaning of these items. For more information refer to the ACSHQC guidance on Safe management and use of shared toys and play therapy equipment in healthcare settings.

11.26 Cleaning and reprocessing of items used in community and home settings

Any reusable item used between patients/clients must be cleaned with a neutral detergent at minimum in between use and disinfected as per the IFU if necessary.

The following practices are recommended regarding cleaning and reprocessing of reusable portable equipment in community and home settings:

- A risk assessment for selection of portable items is to be undertaken by the health worker
- Portable reusable materials and equipment, for example, equipment bags, weight scale, chair pads, examination mattresses, laptops or IV volumetric pump/pole, used in the provision of patient care are to be:
    - able to be cleaned
    - routinely cleaned at regular intervals in accordance with manufacturer's IFU and/or health service recommendations
    - cleaned after use and between patients
    - removed from use if worn or damaged.

Other Considerations

Health workers are encouraged:

- not to take unnecessary equipment into the area
- to use a protective sheet between the equipment
- to clean and, if necessary, disinfect equipment on removal from the room.

Equipment provided to clients for use at home, for example, commodes, chairs, heel protectors, pressure relieving cushions, are to be:

- non-porous, fluid resistant and able to be washed
- single patient use (if unable to be washed).

The Health Organisation is to have a program for ensuring that loaned equipment is cleaned and, if necessary, disinfected when it is returned from a client's home.

Reusable equipment that can be reprocessed must be reprocessed in accordance with the manufacturer's IFU and local policy.

11.27 Transport of RMDs and equipment

A reprocessed RMD should be handled and transported in a manner which minimises the risk of contamination. This includes:

- placing the reprocessed reusable medical device into a protective barrier system (PBS) prior to transport
- using transport containers that are:
    - designated for that purpose only and clearly labelled
    - rigid, robust, and leak-proof
    - adequate in size to hold items securely and safely, protecting their integrity until point of use
    - able to be cleaned regularly and disposed of and replaced when no longer serviceable
    - able to be sealed or locked, such as tamperproof
- dedicating sterile transport containers for the transport of reprocessed RMDs only
- transporting the reprocessed RMD in a fully enclosed or covered trolley
- labelling transport containers clearly to prevent transport errors, clean/dirty segregation, and safe handling practices.

Before transport occurs, a risk assessment should be undertaken to assess the likelihood of contamination and whether additional controls are required to mitigate this risk or an alternative to transporting equipment is required. Appendix B of AS5369:2023 provides guidance on the risk assessment processes to be undertaken.

If transporting contaminated semi-critical or critical RMDs is necessary, the RMDs are to be confined and contained within a single use, leak-proof plastic bag. The bag should then be placed in a rigid reusable container that is secured within the vehicle and separated from the driver's compartment.

Contaminated RMDs/equipment and unused sterile equipment should not be transported in the same container.

Personnel responsible for packaging, transport and the collection of the used RMDs should be trained to do so.

When transporting reprocessed RMDs the following items should be considered:

- where possible, temperature and humidity monitoring of sterile stock while in transit is recommended including maintaining records of the information. For short transport a climate-controlled vehicle is recommended
- mechanical cleaning of all the transport containers after transport of dirty items and before transportation of sterile stock
- external labelling of container and securing methods to prevent unauthorised access to contents

- minimum requirements for the fit out of transport vehicles, such as physical separation of sterile and dirty stock
- transport vehicle guideline regarding breaches in parameters in transit/in the event of an accident where stock has been compromised.

Where problems have been encountered during transport and storage of a reprocessed and released RMD recall and risk assessment of the RMD is necessary.

11.28 Stock room for RMDs/sterile equipment or consumables

Sterile items including RMDs sterilized in the healthcare facility including oral health and sterile items produced from commercial suppliers shall be stored and handled in a manner that maintains the integrity of packs and prevents contamination from any source.

The planning of stock storage areas and systems is integral in ensuring efficiency and that the sterile stock maintains its integrity, is fit for purpose and safe for patient use. The storage area should have suitable materials with smooth finishes, water resistant and robust enough to withstand frequent cleaning. Lighting should be fitted flush into ceiling to reduce dust entrapment.

Within the perioperative environment equipment that is purchased as sterile, or RMDs that have been reprocessed, must be stored in a way that:

- maintains the level of sterility or reprocessing (for example, sterile, high or low-level disinfection)
- maintains the integrity of equipment packaging and ensures that the equipment and its packaging are protected from damage by sharp objects, repetitive handling or other physical movement, for example, consider the use of protective packaging or barrier systems or a sealed cabinet
- prevents contamination, damage and environmental exposure, including:
    - temperature controlled within the range of 18°C to 25°C, or otherwise specified by the equipment manufacturer
    - relative humidity controlled within the range of 35% to 70%, or otherwise specified by the equipment manufacturer
    - controls to prevent exposure to light, dust and moisture, including managing risks associated with water source
    - implementing controls other than traps or chemicals to prevent contamination by vermin, as these measures may damage or contaminate sterile stock and reprocessed RMDs
- ensures adequate ventilation of the storage area that is based on a risk assessment of the space, and includes:
    - controlling ventilation to prevent build-up of humid or stagnant air
    - avoiding storage under air inlet or outlet vents
    - maintaining ventilation continuously at positive pressure to all adjoining areas.

Other strategies that Health Organisations can employ to ensure adequate storage of sterile medical devices, or RMDs that have been reprocessed, include:

- restricting access to storage areas
- providing dedicated storage areas for these equipment
- ensuring segregation of any dirty activities or contaminated items away from storage areas
- ensuring these storage areas are included in routine cleaning schedules
- promoting and enabling hand hygiene prior to the handling of stored items (such as, providing hand hygiene facilities near storage areas).

In areas where commercially purchased sterile equipment is stored, contents from external cardboard boxes must be decanted outside of the storage area. Protective inner boxes (for example, dispenser boxes) may be required to be stored in the storage area to protect the integrity of single use sterile items.

Do not use cardboard boxes (transport or outer packing) including corrugated cardboard carton as routine storage. Items should be removed from outer packaging material but not to be removed from inner primary packaging even if it is in cardboard box to reduce direct handling of consumables. Bulk storage area should be located on the periphery of the unit so that deliveries of commercially prepared sterile stock is de-boxed from outer store/transportation packaging before being brought into the sterile stock storage area. Space is needed to unpack cartons. Where consumables may only have a primary packaging layer, the storage of these items should be managed based on risk assessment.

Access to the storage area(s) for reprocessed RMDs should be restricted to individuals that have been trained and deemed competent in the handling of these devices, with restricted access for authorised personnel signage clearly displayed.

AS5369:2023 provides additional guidance on the storage requirements for reprocessed RMDs; it does not provide guidance on the storage requirements for commercially purchased sterile equipment or medical devices that are intended for single use only. Additionally, GENCA Infection prevention and control in Endoscopy 2025 provides specific guidance on the storage of reprocessed endoscopes.

Storage of RMDs in clinical areas including peri-operative environment

Reprocessed RMDs need to be stored in a manner that maintains integrity of the sterile barrier system and minimises the risk of environmental contamination. This can be achieved by providing dedicated storage areas of reprocessed RMDs that have been released for use, including:

- dedicated rooms that have walls, floors and ceilings which are continuous, smooth, impervious, and easy to clean
- joins and hard-to-clean corners must be avoided or minimised where possible
- surfaces that are well maintained (such as, are clean, dry, and dust-free)
- sterile storage area is not to be used as a shared equipment storage space (for example, wheelchairs)
- sterile stock storage areas must be designed and constructed to prevent any risk of contact between sterile items and water
- in storage areas, temperatures should be controlled and maintained to ensure supplies are protected from direct sunlight
- sterile RMD and sterile consumables should be stored on or in designated shelving or containers
- RMDs must be handled in a manner that does not cause contamination of the contents or damage to the sterile barrier system
- sterile store areas must be regularly cleaned to a routine, documented schedule
- if the packaging of a sterile item becomes compromised by moisture or damage, the stock must be considered unsterile
- if unsterile stock cannot be reprocessed, stock should be disposed of immediately. If unsterile stock can be reprocessed, the stock should be repackaged and reprocessed again before use
- decision to use or dispose of the items after a potential contamination event should be based on risk rating and the potential level of contamination

- the Health Organisation is responsible for ensuring that a stock rotation procedure and policy is in place. Stock levels should be maintained to meet the needs of the clinical area while not compromising stock sterility or wastage
- the method of transport should also be assessed to ensure delivery occurs in a safe and clean manner
- semi-critical items should be stored appropriately to prevent environmental contamination. All endoscopic instruments (except those in sterile packaging) should be stored in an appropriate cabinet or reprocessed within set timeframes prior to use.

Shelving, including compactors, used to store sterile stock and reprocessed RMDs should meet the following criteria:

- be constructed from robust, non-shedding materials that are easy to clean and maintain. The use of metal open wire shelving/racks or alternative plastic/polypropylene baskets with perforated bases is recommended. Solid-based storage containers are prone to dust collection and require significant cleaning resources to maintain in a clean dust free state, which can lead to increased sterile stock handling and the potential for increased environmental contamination
- has smooth surfaces, to avoid damaging items and packaging
- has a top shelf that is at least 520mm below the ceiling to meet requirements for fire sprinkler systems (AS2118.1) and is no higher than 1700mm from the ground to enable safe work practices (AusHFG)
- has a bottom shelf that is at least 250mm above the floor for fixed shelving (AusHFG) or 150mm above the floor for non-fixed shelving (AusHFG), to minimise the risk of damage and contamination during floor cleaning processes as it is easier to clean underneath higher mounted shelving
- avoid contact with other room fixtures, such as windows, to prevent contamination and environmental exposure
- support safe handling and work health and safety practices, such as consideration of the height of shelving and accessibility to stock.

11.29 Event-related sterility

The shelf-life of a packaged sterile item is event-related and depends on the quality of the sterile barrier system (wrap, pouch and container), the storage conditions, conditions during transport, and the amount of handling.

Certain events compromise the sterility of a package. These events include multiple handlings, moisture penetration, and exposure to airborne contaminants, all of which can compromise the integrity of the packaging and seal and allow contaminates to enter the packaging.

Association for the Advancement of Medical Instrumentation (AAMI) ST79 Section 10.3.3 states that event-related dating can be used unless the product has an identifiable expiration date because of the degradation of the product based on information from the device manufacturer. The wraps and pouches manufacturer should provide evidence to confirm the duration of product integrity and product specific expiry date and the IFU should be referenced as per AS 5369:2023.

To effectively implement event-related sterility, healthcare organisations must manage the handling of sterile items from the moment they are removed from the sterilizer through transportation, storage, and eventual patient use. Health Organisations are to have:

- Written procedures for how shelf-life is determined, and risk assessment approach should be applied in the event of a potential breach
- Process in place to ensure that sterile stock is stored according to the date of manufacture, with older stock to be used first

- Inspect all sterile items prior to use to ensure the integrity of the packaging, chemical indicator change, and condition of the item
- Return compromised sterile items to the appropriate personnel so that protocols related to the management of these items may be implemented.

Refer to figure 25 as a guide to determine the event related sterility of an item.

Figure 25 Event related sterility risk assessment



Risk assessment in the event of sterility compromise in non-perioperative environment

In the event of potential contamination within the sterile stock areas/room due to breakdown or issue with air/traffic movement, location, humidity, insects, vermin, flooding of the storage area, open/closed shelving, the facility should perform a risk assessment to identify all the risks. The risk assessment should include:

- the condition of walls, hard surfaces and shelving units
- the condition of the storage containers for moisture pooling, dust or dirt
- microbial barrier properties of the packages, if packages are heat-sealed in impervious plastic and the seal is intact or not (qualified packaging protects its contents from adverse environmental conditions, including therein variations of temperature and room humidity).

Temperature and humidity controls are designed to maintain a suitable environment that reduces risk of microbial growth. An intact sterile barrier system should protect the contents from microbial contamination during temperatures and humidity outside acceptable ranges for a short period of time. An isolated incident or breach will need to be risk assessed however ongoing and sustained breaches increase the overall risk and potential impact. There is limited evidence that connects breaches of temperatures or humidity directly to the sterility of contents with an intact sterile barrier system. Inspection and risk assessment is recommended to determine quality status of items within the sterile stock area.

In the event of humidity or temperature concerns in the sterile stock area the Health Organisation should conduct a risk assessment to assure the sterility of the stock (event related sterility principles apply; refer figure 25):

- identify all the risks within the sterile stock area/s
- check walls, hard surfaces and storage containers with lots and/or laminates for moisture pooling
- check packages for soiling, wetness and moisture
- isolate potential contaminated items for further review
- where no compromise identified and items released for use, health workers should be reminded of responsibilities to check sterility during set up and escalate as required
- where the above occurs; additional inspection of sterile stock areas should be conducted
- where items have been deemed compromised; discard or reprocess
- write a brief report with your recommendations on non-conformance of the item and the resultant outcome
- document and escalate the findings to relevant executive representatives for further decision making.

Any issue that compromises sterile stock during transport or storage should have a similar risk assessment and escalation process. Refer to Appendix 11A for more information on risk assessment and escalation of temperature or humidity variation in perioperative and sterile stock environments.

Appendix 11A Risk assessment and escalation of temperature or humidity variation in perioperative and sterile stock environments

Background

Published data on the impact of relative humidity on bacterial and fungal growth in healthcare is limited. The majority of publications appear to be either related to the food industry or buildings, particularly for fungi (Wolkoff et al., 2021). Many bacterial pathogens have longer survival times with higher relative humidity, and fungal growth is increased.

When it comes to healthcare environments, ideally, the temperature range within the operating environment will vary in different locations (refer to table 52). Individual operating rooms should have a temperature range of between 20°C and 22°C; this temperature range inhibits bacterial growth and is tolerated well by patients and health workers (ASHRAE 2019 Humidity Control Events in Perioperative Care Areas). However, the temperature may require adjusting to accommodate some types of surgery or the condition of individual patients. For example, a higher ambient temperature may be required for burns or paediatric patients, as these patients are highly susceptible to hypothermia. Lower ambient temperatures may be required for some types of neurosurgical procedures (Wan et al., 2011).

Relative humidity (RH) is the amount of water vapor present in air expressed as a percentage of the amount needed for saturation at the same temperature. RH depends on the temperature and pressure of the system of interest. To acutely decrease the RH level of an operating room, either remove water vapor or increase temperature (it is unlikely that one would increase the atmospheric pressure). Cold operating rooms have a higher RH than warm operating rooms with the same absolute humidity.

The RH in the operating room should be maintained at between 50% and 60% to both inhibit microorganism growth (such as fungi and bacteria) and decrease risks associated with static electricity. The RH requirements in other perioperative areas, such as the sterile stock room, is between 35% and 70% and perioperative environment is between 40% and 60% (refer to table 52).

The rationale for the current 30% lower limit is that low RH:

- decreases the shelf-life of certain supplies, such as biological indicators and chemical indicators, used for sterilization monitoring and electrocardiogram electrodes
- increases the chance of electrostatic discharge that could harm or interfere with electromedical equipment (Curless et al., 2021) and potentially spark a fire (this is less of a recent issue because the risk of electrostatic discharge is less with non-flammable anaesthetics and antistatic surgical gowns).

The rationale for the current 60% upper limit is that high RH:

- increases the chance of surface mould and mildew growth
- may increase the risk of wound infections
- is less comfortable for operating room personnel.

It should be noted that there is sparse experimental evidence documenting the exact levels where these risks increase.

Risk identification

The maintenance of recommended temperature and humidity in healthcare environments is necessary to ensure patient and health worker safety and comfort. This is particularly important in specialised areas, such as the operating theatre, perioperative environment, and sterile stock areas where reusable medical devices (RMDs) are stored in bulk. Where heating, ventilation and air

conditioning (HVAC) systems are unable to maintain the recommended temperature and relative humidity, facilities are to have a local risk assessment and escalation process in place to ensure minimal impact to service provision (Kramer et al., 2006, Tang, 2009).

Temperature and humidity variations that persist for extended periods in perioperative areas – including areas where RMDs are stored in bulk – can increase the risk to patient safety through:

- impaired sterility of stock
- operating or service list disruption
- discomfort to health workers, patients and visitors/carers
- environmental contamination
- damage to clinical equipment
- potential increased infection risk to patients
- financial implications
- workforce impact.

Optimising ventilation to reduce respiratory particle transmission and airflows for transmission-based precautions are equally important. Activities in support of those precautions are not covered in this document (refer to Infection prevention and control in Healthcare Settings PD2023_025).

Risk management

The clinical significance of variations in temperature and humidity can depend on many factors, including the duration of the event, the rapidity of the parameter changes, and the activities that occur in the affected locations.

The operational or functional capacity to fully control variations of inside temperature and humidity ranges may also depend upon HVAC system capacity load and response capability to external weather variations. Decreasing inside temperatures may impact and increase the RH.

In the case of perioperative environmental areas and any locations where bulk RMDs are stored, facility staff need to consider undertaking a risk assessment and develop a local response or trigger plan for activation in the event of variances outside the recommendations.

A risk assessment may be used as evidence that the operational breech had no negative safety consequence and may also be used as a basis for future performance evaluations.

Risk assessment steps

If the relative humidity is below or above 5% or the temperature below or above +/-1.5^{0}C for the specified period within the operating theatre, sterile stock area where bulk RMDs are stored or perioperative environment on the risk assessment, the individual responsible for monitoring must notify relevant authorities. Escalation and review should occur at the earliest sign of variation (NHS England 2021 Health Technical Memorandum 03-01: Specialised ventilation for healthcare premises).

The facility must conduct a risk assessment and initiate immediate action plans as per local response and recover plan in consultation with local engineers, sterilization services, clinical professionals, management and infection prevention and control staff.

If unsuccessful in maintaining the recommended parameters in any of these areas continuously for more than 8 hours within any 24-hour period, the incident must be escalated to the highest authority within the facility to define necessary actions.

Table 52 Humidity and temperature thresholds

Area	Relative humidity (%)	Temperature (ºC)	Time	Corrective actions
Operating theatre	Upper limit >60 Lower limit <35	Upper limit >22 Lower limit <18	2 hours	Inform facility engineers
Sterile stock area	Upper limit >70 Lower limit <35	Upper limit >25 Lower limit <18	8 hours	Conduct a risk assessment
Perioperative environment*	Upper limit >60 Lower limit <40	Upper limit >25 Lower limit <18	24 hours	Notify hospital management

* Recovery and other supporting spaces.

Reference- AusHFG B.0190 Sterilising Services and Endoscope Reprocessing Unit, Australian College of Perioperative Nurses (ACORN) Standards for Perioperative Nursing in Australia, Australian Standard 5369:2023, Reprocessing of reusable medical devices and other devices in health and non-health related facilities, NHSW Health Engineering Services Guide, Victorian Health Building Authority Response to humidity control events in sterile store and perioperative areas Health Technical Advice, WHO guidelines for indoor air quality : dampness and mould).

Suggested process or triggers for establishing appropriate humidity and temperature level in the perioperative area

Step 1

Evaluate the history of relative humidity and temperature in the area, where possible. Local facilities in consultation with subject matter experts (such as, HVAC engineers, infection prevention and control, infectious diseases or microbiologists) to agree in the timeframe of the measurements (for example, between 30 and 60 minutes) and the length of time the facility wants to measure.

Step 2

Determine the relative humidity and temperature recommended for the clinical environment.

Step 3

Determine if conflicts exist between history, current parameters and product requirements.

Step 4

Assess the risk to sterile stock and patient care if the parameter variation continues. The following considerations should be given when conducting a risk assessment:

- identification or likely cause of the variation
- the duration of the expected outage and any likely reoccurrence risk (for example, predicted weather patterns and power access)
- the duration and magnitude of the variation in temperature and humidity, if any
- evidence of condensation, dampness, water splashes or water damage
- concern for compromise of equipment function or supply sterility
- the risks profile of the potentially affected supplies
- the manufacturers instruction for use (IFU) regarding supply or medication storage

- the level of gross contamination (for example, for water intrusion, if any)
- the presence or possibility of visible environmental fungi or microorganisms
- the effect on functionality of fixed and mobile equipment.

Step 5

Establish appropriate temperature and humidity level based on risk to sterile stock and patient care.

Additional timeframe considerations

Any humidity and temperature variation outside of the recommended parameters (refer to table 52) should be escalated within a timeframe of between 2 and 8 hours. In the event an immediate rectification is not available, and remains persistent, the following steps should be considered.

In event of high humidity (>60%) for more than 18 consecutive hours

Where there has been a variation and humidity has been determined to be in the upper limit for more than 18 hours:

- promptly assess all surfaces in the room, including walls, floors, furnishings, equipment, and sterile stock, for evidence of visible or tactile dampness
    - if all visible surfaces are dry, locate items most likely to be affected (for example, RMDs and implantable devices)
    - relocate supplies if there are concerns for storage at high humidity levels
    - if any visible dampness is found, do not start any new operative or other invasive procedures until the humidity level no longer causes condensation. An exception may be made to proceed with emergency surgery ideally using surgical supplies from an area unaffected by the humidity event
- all RMDs with evidence of moisture in or on the packaging are to be considered contaminated and should be reprocessed again
- consult with the local infection prevention and control team for additional assessments in conjunction with the perioperative team, and equipment and RMD manufacturers, if relevant
- if condensation is observed during the intraoperative period, notify the surgeon of the potential risk to patient and failure in electrical equipment
- report any patient care that occurred in an area with visible dampness or mould growth as an event in the local incident reporting system
- discard any damaged supplies that cannot be reprocessed and determine if surgical procedure can continue safely
- report any visible dampness and/or mould growth as the event in the incident reporting system.

In event of low humidity (<30%) for more than 18 consecutive hours

Conduct a careful fire prevention risk assessment to identify if there are potential fire ignition hazards including any fuel, ignition, and heat or oxidizer sources. Take appropriate measures to prevent surgical fires, including:

- ensuring alcohol-based skin preparations do not pool and are fully dry before draping
- removing drapes soaked with antiseptic before using potential ignition sources
- seek specialist advice from engineering and fire safety experts in your service.

Following steps are to be taken for high temperature for more than 18 consecutive hours:

- physically inspect all surfaces in the room for humidity and evidence of visible or tactile dampness
- assess supplies and review the manufacturer's IFU to ensure supply performance is not affected by high temperatures for the duration of the event
- relocate stored items likely to be affected by high temperatures
- discard any damaged supplies and conduct risk assessment to determine if operations can continue safely
- report the event in the incident reporting system.

Following steps are to be taken for low temperature for more than 18 consecutive hours:

- review patient status especially those who are vulnerable to unintentional perioperative hypothermia and reschedule if appropriate
- ensure the patient's temperature is monitored upon arrival to the postanesthetic care unit and until normothermia is reestablished
- promptly assess all surfaces in the room, including walls, floors, furnishings, equipment, and sterile stock, for evidence of visible or tactile dampness
- relocate items most likely to be affected by storage at low temperatures
- report the event in the incident reporting system.

Suggested mitigation steps:

In order to prevent any humidity and temperature variation outside of the recommended parameters, the following risk mitigation steps are to be considered:

- the local maintenance team to check and re-set chiller settings, if needed, to accommodate increasing outside temperature
- engage appropriate experts (such as engineers) to analyse the role of energy efficiency strategies that may potentially contributing to increases in temperature +/- humidity
- check ventilation systems in adjacent parts of the hospital to make sure they are not having an impact that the operating theatre ventilation system is trying to compensate for (for example, energy efficiency measures, such as increasing ambient temperatures or decreased the function of air conditioning systems afterhours)
- check air handling system capacity and, where able, increase
- outside air intake is key to ensure sufficient fresh air is available within the theatre. Steps should be taken to condition the outside air entering the operating suite
- consider dehumidification to reduce the humidity. However, these portable items can pose work health and safety issues. Location, placement, and type of dehumidifier are crucial due to potential changes to air flow and impact on sterile field. (note: portable dehumidification devices can pose additional infection risk in the perioperative environment; if used, they must be cleaned, and water trap emptied)
- implement an automatic monitoring system with active alerts when the temperature or humidity thresholds are exceeded, where possible or available. These devices require calibration and maintenance. Consider incorporating signs of condensation into the monthly checklist, particularly in low-risk areas

- establish a built-in process for facilities engineering services staff to perform early investigation and corrective action to restore temperature and humidity to normal parameters
- implement an active internal escalation, notification and response process to relevant stakeholders when out-of-range temperatures or humidity occur and are expected to be prolonged
- implement early decision-making by authorised team to relocate supplies and, when needed, stop procedures in consultation with infection prevention and control, infectious diseases/microbiologist and facilities engineering services.

Table 53 Recommended temperature and relative humidity as per various standards

Standard/guide	Area	Relative humidity range (%)	Temperature range (ºC)*
Health Engineering Services Guide:2022	Operating theatres	35 – 60	18 – 27
	Bronchoscopy, endoscopy procedural room	35 – 60	20 – 23
	Sterile stock store operating theatres	35 – 60	20 – 23
AusHFG Part B 0190	Sterile stock store for RMDs	35 – 70**	Not exceed 25
ACORN	Operating theatres	50 – 60	20 – 22
	Sterile stock store	35 – 68	18 – 22
	Perioperative environment	40 – 60	18 – 24
AS 5369:2023	Sterile stock store	35 – 70	18 – 25
ASHRAE (US guideline)	Operating theatres	20 – 60	20 – 24
HTM-03 (UK guideline)	Operating theatres	Floating with max 60%	18 – 25

* Local adjustable +/1ºC from setpoint
** Many commercial RMDs require <60

Chapter 12 Surgical Site Infection Prevention

This chapter offers an overview of the key principles for preventing surgical site infections (SSIs). It does not address procedure-specific requirements, as these can vary widely between different types of surgeries. For detailed guidance on specific procedures, please refer to local protocols or guidelines.

As part of surgical management, it is expected that facilities have procedures and guidelines for best practice management of patients before, during and after surgery, in particular for high-risk patients as infection prevention is just one aspect of safe surgical care. This chapter focuses on those aspects of care that are particularly important for the prevention of surgical site infections.

12.1 Background

Surgical site infections are infections of incision sites or an organ space following a surgical procedure (Chaker et al., 2024). SSIs are associated with significant morbidity and mortality, prolonged hospital stays, and increased risk of readmission. SSIs also lead to a substantial strain on healthcare systems, contribute to the spread of antibiotic resistance and threaten the lives of millions of patients each year (Global Guidelines for the Prevention of Surgical Site Infection WHO 2018). Many factors influence surgical wound healing and the potential for infection. These include patient-related (endogenous) and process/procedural-related (exogenous) variables that affect a patient's risk of developing an SSI. Some of the factors are the health of the patient's immune system, presence of foreign material, degree of bacterial wound contamination, and use of antibiotic prophylaxis (Seidelman et al., 2023).

Some common patient-specific risk factors include advanced age, obesity and malnutrition, diabetes, immunosuppressive therapy, concurrent infection at another site, and smoking. In paediatrics, premature infants are also at higher risk, especially those undergoing gastrointestinal surgery early in life. Some of these risks can be reduced such as nutritional status, tobacco use, correct use of antibiotics and intraoperative techniques such as adequate surgical scrub, the antiseptic preparation of the skin and duration of surgery (Calderwood et al., 2023, World Health Organization, 2018).

12.2 Environmental controls in operating theatres

The rate of surgical wound infections can be influenced by operating theatre air quality, environmental cleanliness, health worker behaviour, theatre clothing, communication and health worker knowledge.

12.2.1 SSI prevention strategies

SSIs can largely be prevented if appropriate strategies are implemented. The most common strategy has been through the development and implementation of care bundles. A care bundle is a collection of evidence-based practices that can be applied when managing a certain condition (Chaker et al., 2024). For SSI prevention they are usually divided into three areas as follows, noting this is not a comprehensive list:

- preoperative measures
    - patient screening and modifying risk factors as appropriate including optimising glycaemic control in diabetes
    - antibiotic prophylaxis
    - appropriate skin preparation
- intraoperative measures

    - maintaining normothermia while in the operating room
    - aseptic technique
    - minimising traffic in the operating room
    - cleaning of theatre environment
    - airflow-clean, non-circulated air or HEPA filtration
- postoperative measures
    - best practice wound care
    - patient education on how to manage wounds
    - timely removal of catheters and drains.

Ventilation

The management of airflow, clean air (minimising recirculation of potentially contaminated room air) and the creation of a turbulence-free environment are essential to reduce bacteria in the air, which may lead to post-operative wound infection. Air flow into the operating theatre should be by means of a distribution system that provides a flow of clean supply of air over the operating area first then away. For more information refer to NSW Health Engineering Services Guide (2022).

Routine use of laminar air flow is not required to reduce the risk of SSIs for patients undergoing total arthroplasty surgery, and laminar air flow is not required in new operating rooms (Ling et al., 2019, Ouyang et al., 2023, World Health Organization, 2018).

Environmental cleaning

A regular and audited cleaning schedule is required for operating theatres. This includes cleaning of frequently touched surfaces between each patient, cleaning and disinfection after contaminated or dirty procedures and/or any areas contaminated by blood or body fluids. Shared equipment must be cleaned and disinfected after each patient, including anaesthetic machines, and before the next patient arrives in the operating room.

Where possible clean beds with fresh, clean linen to be brought into operating theatre complex directly from clinical areas.

Bacterial and dust counts in operating theatre air are associated with the number of door openings and traffic in and out of the operating theatre. This can be reduced by minimising non-essential staff movement and door openings during surgical procedures.

Organisational and behavioural characteristics

It is expected that health workers will comply with the best practice while in the operating theatre area. Some of the key practices are:

- hand hygiene must be performed for all stages of patient care within the perioperative area
- correct surgical attire must be worn
- health workers who are scrubbed are not to wear forearm, wrist or hand jewellery
- operating room staff are not to wear artificial or polished nails in the operating theatre
- health workers in the operating room are to wear a head covering and a face mask in accordance with local procedures
- no food or drink is to be consumed in the operating room
- avoid bringing any personal items into the operating room

- if staff need to leave the operating room area temporarily and they are wearing scrubs they either need to change into their usual clothes including their shoes or cover their operating theatre attire with an over gown and change their footwear.

There is no need to place patients with suspected or confirmed multi-drug resistant infection/colonisation at the end of an operating list as long as the operating room is cleaned and disinfected to standard between patients, and the theatre ventilation is running without interruption.

12.2.2 Pre-operative measures

Best practice for the prevention of surgical site infections requires attention to a number of pre-operative areas.

Length of stay

An extended period of hospitalisation prior to surgery is a known risk factor for SSIs as this increases patient risk of colonisation with some pathogens (VICNISS 2020). If possible, shorten patient's pre-operative hospital stay to admission on day of surgery (Sulzgruber et al., 2020, Yang et al., 2023).

Pre-operative bathing

Preoperative bathing on the day of, and/or the day before surgery is commonly recommended (APSIC 2019). This can either be with soap, chlorhexidine 2% or chlorhexidine impregnated cloths. However systematic review of the evidence for preoperative bathing or showering does not show an impact on SSI rates.

Nasal decolonisation for *Staphylococcus aureus*

Staphylococcus aureus (S. aureus) carriage increases the risk of post-operative SSIs. However, decolonisation has only been shown to be of benefit in patients undergoing cardiac and joint replacement surgery and is not recommended for patients having other surgical procedures. Patients having cardiac or joint replacement surgery should be screened pre-operatively for *S. aureus* carriage by swabbing the nares and groins or perineum.

If swabs show *S.* aureus carriage, advice should be given to commence decolonisation the week before their planned procedure (VICNISS 2020). Routine administration of intranasal mupirocin in the absence of testing for *S. aureus* carriage is not recommended as there is increasing evidence of mupirocin resistance (Abdulgader et al., 2020, Dadashi et al., 2020, Prakash et al., 2023).

For more information refer to Chapter 7 Management of MROs.

Hair removal

If hair needs to be removed, moderate-certainty evidence suggests using clippers or depilatory cream probably results in fewer SSIs and other complications compared with shaving using a razor. There may be a small reduction in SSIs when hair is removed on the day of, rather than the day before surgery (Tanner and Melen, 2021).Therefore:

1. hair removal should be avoided unless hair interferes with the operative procedure
2. if hair removal is necessary, use electric clippers as close to surgery as possible. Do not use razors for hair removal.

Antimicrobial prophylaxis

Correct timing, dose and antimicrobial selection for surgical prophylaxis reduces surgical site infection. Administer antimicrobial prophylaxis according to evidence-based standards and guidelines including Therapeutic Guidelines: Antibiotic. Some key principles include:

- use surgical antibiotic prophylaxis only where there is a clear indication for use (Ling et al., 2019)
- antibiotic choice needs to consider the presence of current infection, any recent antimicrobial use, colonisation with multi-drug resistant bacteria, prolonged hospitalisation or the presence of prostheses
- a single preoperative (before skin incision) dose of antibiotic(s) given as per *Therapeutic Guidelines: Antibiotic* is sufficient for the majority of procedures. In specific circumstances, a repeat intraoperative dose may also be necessary. Note: most antibiotic prophylaxis should be given within 60 minutes of the procedure starting
- for a minority of procedures, it is unclear if a single dose is as effective as 24 hours of prophylaxis. For these procedures, postoperative doses can be considered but should be ceased after 24 hours
- re-dosing should be considered to maintain adequate tissue levels based on agent half-life and or the amount of blood loss
- urinary catheterisation or the presence of a surgical drain are not indications for prolonged antibiotic prophylaxis.

Nutrition

Malnutrition is associated with an increased risk for SSIs and may occur in both underweight and overweight patients. Underweight patients undergoing major surgical procedures, especially oncology and cardiovascular operations, may benefit from the administration of oral or enteral multiple nutrient-enhanced nutritional formulas for the purpose of preventing SSI (Ling et al., 2019).

12.2.3 Intra-operative measures

Surgical hand antisepsis

Surgical hand antisepsis is performed to substantially reduce the number of resident and transient microorganisms on the hands prior to performing any aseptic or surgical procedure. A surgical scrub with either antimicrobial soap or surgical alcohol/chlorhexidine-based hand rub with persistent antimicrobial activity must be performed prior to donning sterile gloves. Scrub brushes may damage skin and should not be used. Surgical hand antisepsis is required prior to performing any surgical procedure that enters a sterile site (SA Health Hand hygiene clinical Guidelines 2020).

Operating team members should not wear wrist or hand jewellery, nail polish or artificial nails. If hands are visibly soiled, perform hand hygiene with liquid soap prior to scrubbing. Remove debris from underneath fingernails using a nail cleaner, preferably under running water. Prepare hands for surgery by scrubbing, using the correct technique with a TGA approved suitable antimicrobial soap and water OR surgical alcohol-based hand rub (before donning sterile gloves).

Glycemic control

One of the commonest surgical complications in patients with pre-existing diabetes mellitus and hyperglycaemia is infection, with superficial SSIs, deep wound infections, surgical space abscesses, urinary tract infections and pneumonia accounting for a large percentage of infectious complications (Ling et al., 2019). Implement perioperative glycemic control during and in the post-operative period and use blood glucose target levels less than 10mmol/L in patients with and without diabetes (Duggan et al., 2017), (VICNISS 2020).

Detailed management of glycaemic control is out of scope for this document and more information can be found in comprehensive guidelines from the Australian Diabetes Society.

Normothermia

Exposure of large surfaces of skin to cold temperatures in the operating room can cause hypothermia and vasoconstriction and is a risk factor for SSIs(Kurz et al., 1996, Pu et al., 2014).

Maintain perioperative normothermia. This may include use of a warmed blanket or intravenous fluid warming devices. For procedures not requiring hypothermia, maintain normothermia (temperature>35.5°C) during the perioperative period (VICNISS 2020).

Normovolemia

Hypovolemia and reduced cardiac output theoretically trigger musculocutaneous and splanchnic vasoconstriction, causing hypoperfusion and tissue hypoxia. Strategies need to be in place to avoid prolonged fasting as part of pre-operative preparation. Hemodynamic goal-directed therapy is recommended to reduce SSI (World Health Organization, 2018).

Maintenance of asepsis

Surgical aseptic technique refers to work practices that result in prevention or minimisation of microorganisms entering sterile body areas. Aseptic technique involves applying the correct protocols before, during and after a procedure, along with establishing and maintaining an aseptic field.

Movements in and out of the operating area should be kept to a minimum. Use sterile disposable non-woven drapes, or sterile reusable woven drapes. Ensure all surgical equipment is sterile and maintain asepsis throughout surgery (VICNISS 2020).

Skin preparation and wound management

Use alcohol-based solution preferably containing an antiseptic, for example, chlorhexidine gluconate for skin preparation unless contraindicated, for example, patient sensitivity/allergy, mucous membranes. Ensure processes are in place to mitigate risk of fire if using alcohol-based skin preparation.

Antimicrobial sealants should not be used after surgical site skin preparation for the purpose of reducing SSI.

Irrigation

As per the (World Health Organization, 2018) and NICE guidelines (Ling et al., 2019):

- there is insufficient evidence to recommend for or against irrigating incisional wounds with saline before closure for the purpose of preventing SSI
- antimicrobial agents must not be used to irrigate the incisional wounds before closure to reduce the risk of SSI
- povidone iodine irrigation – consider the use of irrigation of the incisional wound with an sterile aqueous povidone iodine solution before closure for the purpose of preventing SSI, particularly in clean and clean-contaminated wounds(World Health Organization, 2018)
- other topical antimicrobial agents (for example, ointments, solutions, and powders) applied to the surgical incision may cause hypersensitivity reactions and have not been shown to reduce risk of SSI (VICNISS 2020).

Antimicrobial impregnated sutures

Several international reviews and guidelines have been reviewed to synthesis the evidence for antimicrobial/antiseptic impregnated sutures and there is only weak evidence to support their routine use as a strategy to reduce SSI. It is important to note this evidence only applies to wound closure

systems (including muscle) in clean/clean contaminated operations with limited animal or human studies of their efficacy and safety in anastomosis or non-closure systems.

Individual facilities may consider them as an additional strategy if SSI are not controlled by optimising other measures. Such decisions must consider the evidence base for individual procedures, the added costs, and the risk of resistance and cross resistance to antibiotics (Elsolh et al., 2017, Yang et al., 2024).

12.2.4 Post operative period

Wound drain

The wound drain should be removed when clinically indicated. The optimal timing for wound drain removal for the purpose of preventing SSIs is unknown. Perioperative surgical antibiotic prophylaxis should not be continued due to the presence of a wound drain for the purpose of preventing SSI (World Health Organization, 2018).

Negative pressure wound therapy (NPWT)

Prophylactic negative pressure wound therapy may be used when there has been primary closure of surgical incisions in high-risk wounds and, taking resources into account, for the purpose of preventing SSI. Benefits of NPWT vary according to type of surgery and patient risk factors (Norman et al., 2022, Zwanenburg et al., 2020), (WHO 2018, VICNISS 2020).

Glycaemic control

Maintenance of normoglycaemia in the post-operative period will support better wound healing (Wang et al., 2018).

Antibiotic prophylaxis

For almost all clean and clean-contaminated procedures, prophylactic antibiotics are not required after the surgical incision is closed, even if there is a surgical drain or a urinary catheter in place.

If post-operative dosing of antibiotics is required, it should be ceased within 24 hours of the procedure. Prolonged duration of antibiotic prophylaxis increases the patient's risk of subsequent infections with resistant pathogens and *Clostridioides difficile* (VICNISS 2020).

Wound management

Advanced dressing of any type should not be used over standard dressing on primarily closed surgical wounds for the purpose of preventing SSI. Aseptic technique should be used when undertaking wound dressings and wound management. Evaluate and manage wound appropriately using aseptic technique, including cleansing, dressing and care (World Health Organization, 2018).

12.3 SSI surveillance

The surveillance of healthcare associated infections (HAIs) is one of the core components of an effective infection prevention and control program. Surveillance of SSI with feedback of appropriate data to surgeons, as well as all staff involved in caring for the patients in the perioperative journey has been shown to be an important component of strategies to reduce the risk of SSIs (APSIC guidelines for the prevention of surgical site infections 2019).

A successful surveillance program includes the use of standardised SSI definitions and surveillance methods, stratification of SSI rates according to risk factors associated with SSI development and timely feedback of data.

For more information on SSI surveillance refer to CEC HAI Clinical Indicator Manual.

12.4 SSI from contaminated heater cooler device

Some heater-cooler units used in cardiac surgery were contaminated with a rare bacterium called *Mycobacterium chimaera* (or *M. chimaera*), and there is a small risk that exposure to these units in the operating theatre may lead to infections in exposed patients that can appear months to years after surgery.

For more information refer to NSW Health Mycobacterium chimaera and open-heart cardiac surgery, Australian Commission in Safety and Quality in Health Care National Infection Control Guidance Non-tuberculous Mycobacterium infections associated with heater-cooler devices, Therapeutic Goods Administration Infections associated with heater-cooler devices.

Chapter 13 Building, construction and renovation

13.1 Background

This chapter provides an overview of some of the infection prevention and control best practices during construction, renovation or maintenance within a Health Organisation. This advice is adapted from the International Health Facility Guidelines 2022, SESLHD Infection prevention and control during construction, renovation or maintenance procedure 2024, Western Australia Infection prevention and control during Construction and Renovation Activities Policy 2023, and Australasian Health Facility Guidelines Part B and Part D.

Building construction, renovation and maintenance activities undertaken within a Health Organisation impose health risks, as they can disturb and disseminate reservoirs of dust, debris and microorganisms into the environment.

Health Organisations are to ensure that all construction, renovation and maintenance activities on their sites are undertaken in a safe and appropriate manner to reduce disease transmission risk to patients, visitors, carers, volunteers and health workers. These activities require planning and coordination to minimise the risk. The planning should include involvement of a multidisciplinary team, inclusive of infrastructure (facilities maintenance and engineering), support services, infection prevention and control, work health and safety (WHS), the external project team and the manager of the relevant department/s.

A formal approach to risk assessment and management should be part of all building construction and renovation activities. It is not a one-off activity but rather an ongoing process throughout the whole development or redevelopment process. Health Organisations are to have a process for assessing risk and adopting appropriate precautions in consultation with local infection prevention and control early in the planning and building stages of any new build, demolition, refurbishment or construction activity. Refer to Australasian Health Facility Guidelines for more information.

The risk assessment should include processes to identify opportunities to prevent the transmission of infectious organisms during construction activity and implement engineering and environmental controls in any facility that will be built, renovated or repaired.

13.2 Infection prevention and control risk assessment

In occupied facilities, a range of systems and precautions will need to be implemented to support construction and renovation activities. The infection prevention and control risk assessment should include the following:

1. Define the activity
2. Identify population at risk
3. Define class of precautions
4. Establish mitigation plan.

Define the activity

Prior to any type of work beginning, whether it be maintenance or large construction, Health Organisations are to consider the implications of the activities and associated risks. For the purpose of infection prevention and control risk assessment, construction activities have been divided into four types: A, B, C and D (see table 54 Construction activity type).

Table 54 Construction activity type

Type	Construction activity
Type A Inspections and general upkeep activities	Includes but not limited to: removal of ceiling tiles for visual inspection (limited to 1 tile per 5 m^2), painting (but not sanding); installation of wall covering; electrical trim work; minor plumbing; any activities that do not generate dust or require cutting into walls or access to ceiling other than for visual inspection.
Type B Small scale, short duration activities, which create minimal dust	Includes, but is not limited to: installation of telephone and computer cabling, access to chase spaces, cutting into walls or ceiling where dust migration can be controlled.
Type C Any work that generates a moderate to high level of dust	Includes, but is not limited to: demolition or removal of built-in building components or assemblies, sanding of wall for painting or wall covering, removal of floor covering/wallpaper, ceiling tiles and casework, new wall construction, minor ductwork or electrical work above ceiling, major cabling activities.
Type D Major demolition and construction projects	Includes, but is not limited to: heavy demolition, removal of a complete ceiling system, preparation of foundations which causes earth disturbances, and new construction.

Identify population at risk

At-risk population (patients/residents and health workers) can be exposed and infected through the introduction and dispersal of dust (contaminants) during construction in the healthcare environment. Each Health Organisation has its own unique population with different susceptibility to construction related infections. Mapping critical care areas will help to take the right precautions. Not all patients carry the same level of risk or require the same level of environmental controls. By knowing which at risk populations (table 55 Clinical risk assessment of at-risk population) are most susceptible to these activities, can actively reduce the potential of exposing these groups unnecessarily.

Health Organisations are to conduct a risk assessment of the patient population within or adjacent to construction site/s prior to the commencement of any construction or renovation (table 56 Risk areas in Health facilities/organisations). Infection prevention and control risk assessments require the integration of multiple strategies and should include the use of the hierarchy of controls framework in conjunction with infection prevention and control principles to strengthen the risk assessment. See section 10.4 for more information.

This is particularly important when demolition or major construction works are planned within the Health Organisation. This type of activity is recognised as the most significant risk for the severely immunocompromised patient group (refer to table 55 Clinical risk assessment of at-risk patients). All clinicians must be aware of potential risks to their patient group when construction projects are undertaken and take all measures to identify symptoms, diagnose, treat, and consult infectious diseases as necessary.

Table 55 Clinical risk assessment of at-risk population

Level of risk	Risk factors
No evidence of increased risk	• All patients, health workers, service providers and contractors not listed below
At-risk patients	• Current use of prolonged courses of high dose steroids particularly if hospitalised for prolonged periods • Moderately to severely immunocompromised • Mechanical ventilation • Chemotherapy without neutropenia* • Dialysis
High-risk patients	• Neutropenia* for less than 14 days following chemotherapy • Solid organ transplantation • Neonates in Intensive Care Units (NICU) • Adult Acute lymphoblastic leukaemia (ALL) on high dose steroid therapy • Chronic Granulomatous Disease
Very high-risk patients	• Allogeneic bone marrow transplantation within 12 months of transplant, if >12 months, consult with haematologist • Autologous peripheral blood stem cell transplantation, such as during the neutropenic period • Neutropenia for greater than 14 days following chemotherapy or immunosuppressive therapy. For example, acute myeloid leukaemia (AML), acute lymphoblastic leukaemia (ALL), primary CNS lymphoma • Aplastic anaemia • Severe Combined Immunodeficiency Syndrome or Chronic Granulomatous Disease of Childhood • Peripheral stem cell transplantation, such as, during the neutropenic period.

* Neutropenia defined as absolute neutrophil count (ANC), $<1x10^9/L$.

Define class of precautions

The precaution classification matrix (refer to Table 57 Precautions matrix) offers four distinct classes of precautions based on the identified activity type and patient risk group. Each class lists control elements to be implemented before start of work and maintained during work activities. The risk assessment document should be reviewed when there are substantial changes to the work effort, which can either increase or decrease the classification. Once the type of construction project and risk group is defined, then the information is matched in a matrix to determine the infection prevention and control classification most appropriate for the project (refer to table 56 and Appendix 13A).

Table 56 Risk areas in health facilities/organisations

Group 1 – Low	• Office areas • Non-patient/low risk areas not listed elsewhere
Group 2 – Medium	• Patient care and other areas not listed under groups 3 or 4 • Laundry • Cafeteria • Dietary • Material management • Allied Health • Admissions/discharge • MRI • Nuclear medicine • Echocardiography • Laboratories not specified under group 3 • Public corridors used by patients and to transport linen & supplies
Group 3 – Medium/high	• Emergency department • Medical imaging – general • Recovery rooms • Delivery rooms • High dependency unit • Newborn nurseries • Paediatrics (except paediatric ICU) • Microbiology labs • Virology labs • Long stay, subacute units • Pharmacy • Endoscopy • Bronchoscopy • Dialysis
Group 4 – Highest	• Oncology unites • Radiation therapy • Oncology clinical areas • Chemotherapy • Transplant • Pharmacy admixture/clean rooms • Operating rooms • Sterile supply units • Cardiac catheterisation • Angiography rooms • Outpatient invasive procedure rooms • Anaesthetic and pump rooms • All intensive care units – adult, paediatric, neonatal • Burns unit

The intent of the precaution's matrix is to provide the level of mitigation necessary only at a given point of a project. Many projects begin with higher classes of precautions, primarily due to demolition activities, then require stepdown levels of precaution on the journey to completion.

Table 57 Precautions matrix

Construction activity risk level	Type A	Type B	Type C	Type D
Group 1	Class* I	Class II	Class II	Class III/IV
Group 2	Class I	Class II	Class III	Class IV
Group 3	Class I	Class III	Class III/IV	Class IV
Group 4	Class III	Class III/IV	Class III/IV	Class IV

* Refer to Appendix 13A for detailed instructions required for each Class.

Match the construction activity type (A, B, C, D) determined in table 54 with the patient risk group determined in table 55 (low, medium, high, highest) to ascertain the class of precautions required (I, II, III, IV).

Establish risk mitigation plan

The risk mitigation plan should identify the minimum required infection prevention and control strategies using the Table 57 precautions matrix and Appendix 13A Infection prevention and control construction guidelines. These controls include several physical as well as individual personnel actions. The risk mitigation plan should address as a minimum:

- the extent of construction work
- the identification of the patient population at risk
- the location of the patient population in relation to the site and construction
- ventilation system types and potential impact
- traffic and supply routes
- determination of air monitoring requirements, methodology and frequency
- air quality samples taken to establish a baseline
- the identification of possible contaminants and their locations.

13.3 Risk management

Infection prevention and control measures to be considered during construction and renovation include:

- At the time of site induction for building workers, infection prevention and control should be presented as a major component of the WHS induction. This induction process should be documented and signed off by each participating worker
- Monitoring worker compliance with procedures. The builder should routinely communicate the results of this monitoring to the workers. A systematic approach should be in place to ensure the management of major breaches

- Consultation with the facility microbiology department and/or microbiologist. Collaboration between the facility's microbiology department and infection prevention and control is essential, especially during redevelopments when infections may appear out of the norm
- Increased frequency of HEPA filter changes in high-risk departments that may be at risk of exposure during construction work activities
- Installation of barriers to contain the impact of construction
- Inspections by the nominated representatives during the construction of the barriers. These inspections should be monitored and reported
- Documenting all inspections, including a non-conformance system for defaults, complete with a corrective and preventative action loop.

Minimise patient exposure to construction-associated contaminants by:

- understanding airflow traffic direction, intake at potential construction zone to ensure no transfer and drop off into patient care areas
- if possible, relocating at-risk patients who are adjacent or near to the construction zone
- where indicated, inform high-risk patients of the risks of exposure when going near construction zone
- ensuring surgical masks are available to high-risk patients to wear in transit when near construction zones, if it is unavoidable
- where HEPA-filtered positive pressure rooms are available, high-risk inpatients must have priority access.

13.4 Environmental control

Environmental controls such as effective ventilation, dust suppression and adequate cleaning is required to minimise any impact on air quality within the construction zones to reduce the risk of potential adverse health effects For more information refer to NSW Health Engineering Services Guide. The following key considerations are essential for ensuring effective ventilation and air quality control within construction zones, particularly in sensitive environments:

- The design, installation, and commissioning of ventilation systems for new builds, or upgrades to current infrastructure, requires technical expertise from qualified biomechanical or ventilation engineers who are also responsible for the operation, maintenance and monitoring of these systems
- Negative pressurisation of the construction zone is recommended to eliminate dust or pollutant penetration into clinical areas. The exhaust or extraction systems specified in the contract documentation must be constantly monitored and maintained to ensure no failures occur. These inspections should be documented and reported on
- If HEPA filtration is required, a person must be nominated as the responsible person for that duty. The filters should have differential pressure monitoring with alarms. Spare filter elements must be kept on hand. These inspections should be documented and reported on
- Dust-proof barriers between patient care areas and any building work should have airtight seals (sealing and taping all joint edges including top and bottom and sealing temporary doors/hoarding/air locks connecting the construction zone to the adjacent area/occlusion where relevant of ventilation ducts within the construction/building work area)
- Consideration to be given to sealing service ducts in adjacent areas

- Additional dust containment measures as necessary (use of water sprays)
- Review of air exhausted to outside the building from the construction site to ensure this is undertaken in a safe manner
- Ensuring all waste material is removed with minimal creation of dust, for example, bagging of waste, covering of skips/waste bins
- Dust sheets/walk on and off dust mats should be single use or replaced regularly
- Restriction to staff, patients, residents, clients, and visitors entering construction areas
- Installing more elaborate barriers as indicated for long-term projects
- Routine inspections of barriers should be conducted by the hospitals nominated representative from the contractor. These inspections should be documented and reported
- Cleaning pre, during and post construction incorporating increased cleaning frequency in adjacent area/s by the builders/contractors
- A high level of site cleanliness is essential. It is recommended that tools with efficient dust extraction systems connected to HEPA filters be used. Tasks, such as sanding plasterboard, present a high level of potential risk. Therefore, it is recommended that mechanical sanding with vacuum duct collection be used
- HEPA vacuuming, not sweeping, should be used to clean up. Conventional vacuum cleaners disseminate huge quantities of dust and fungal spores and should not be used
- Movement in and out of the site must be controlled by restricting access to only those who have undergone site induction. This will assist greatly in reducing the spread of contaminants
- All inspections should be documented including a non-conformance system for defaults, complete with a corrective and preventative action methodology
- The infection prevention and control implications of preserving any existing structures during a refurbishment should also be considered and assessed for infection risks as part of the planning process.

Prior to any demolition, refurbishment and construction activity, the Health Organisation should appoint an infection prevention and control and clinical microbiology team that determines and evaluates:

- risk of airborne dissemination of microorganisms during construction activity
- whether any environmental or air sampling is required and, if required, how sampling will be undertaken
- infection prevention and control requirements of the new, renovated, or repaired facility
- whether additional infection prevention and control measures are required for patients, health workers and visitors during construction activity
- what infection prevention and control measures are required by construction workers during construction activity
- how the local infection prevention and control unit should participate in site inspections and commissioning of the new or refurbished facility.

Building contractors, engineers and any other individuals involved in construction activity should comply with infection prevention and control requirements, as determined locally, when on site. A

notification and remediation process should be implemented to address any breaches in infection prevention and control that have arisen during construction activity. The following points are to be adhered to by the building contractors and other relevant stakeholders as appropriate:

- appropriate physical barriers, for example, floor to ceiling hoarding where required and timely repair of any breaches in hoarding barriers
- appropriate containment strategies for transportation of debris, for example, covering waste with plastic sheeting before removing it from the construction zone
- appropriate dust containment strategies, for example, utilisation of dust mats at the exit and entrance to an internal construction zone
- identification of possible contaminants and their locations - ceiling dust, service shafts (especially in damp conditions), bird droppings, presence of environmental organisms
- regular cleaning, vacuuming and damp mopping of affected areas
- consideration for occluding air ducts and other openings if applicable, such as air conditioning outlets and extraction fans, in consultation with facilities maintenance
- regular observation and monitoring of construction work, noting breaches in the barrier precautions and implementing additional controls as required
- air monitoring requirements and/or air sampling if applicable. If air sampling is required it should be factored into the building costs prior to construction occurring.

Ensure line managers are notified of any complications related to the construction work as soon as possible.

During the construction or renovation phase dust barriers and other protective measures should be regularly monitored. The frequency of monitoring depends on a risk assessment of the area involved, for example, if high risk areas and patient groups are involved then daily monitoring should occur using the Environmental monitoring compliance checklist (Appendix 13B).

At the completion of construction, the infection prevention and control requirements for sign off will require a documented risk assessment. The risk assessment will be scalable depending on the extent of construction.

13.4.1 Assessment of existing air quality controls

Health Organisations undertaking major construction or renovation, including demolition and excavation are to:

- identify the location of all air-conditioning intake vents in relation to proposed works
- identify the areas within the facility served by these vents
- confirm type of primary air filter installed is compliant with AS 1324.1 2001 *Air filters for use in general ventilation and air conditioning*
- retrofit air vents that do not comply with this standard, especially if servicing high-risk areas. If the air handling units cannot tolerate the retrofit of these filters, then the highest rating tolerable should be installed
- increase routine inspection, maintenance and replacement of filters as necessary during the construction works
- where construction work is being undertaken, the competent person completing the Legionella risk management plan should evaluate the risk of construction dust on the cooling water system and increase monitoring sampling and cleaning/maintenance where required.

Refer to NSW Guidelines for Legionella Control in Cooling Water Systems for further information

- cleaning, disinfection and maintenance processes and schedule must be consistent with AS/NZS 3666.2: 2011 *Air-handling and water systems of buildings - Microbial control,* these may need to be increased during periods of heavy excavation.

13.5 Microbial sampling

Air and water sampling should be part of the risk management program and be implemented during commissioning. Cumulative data should be used to establish indoor and outdoor background levels of filamentous fungi for a particular site. Sampling should involve engineering and specialist microbiologists.

The purpose of microbiological air sampling is to gauge the efficacy of the HVAC systems, including high-efficiency particulate air (HEPA) filters following installation or after major structural refurbishment.

13.5.1 Fungal spore sampling

Baseline microbial sampling for fungal spores may be considered prior to the commencement of major construction and renovation activities (for example, group 3 and 4 areas). Cumulative data is used to establish indoor and outdoor background levels of fungi or bacteria for a particular site.

The location for sampling is determined in consultation with the facility planners and in consultation with key stakeholders, such as Microbiology, WHS, Infectious Diseases, Infection prevention and control, using the location of the proposed works, population and geographical risk groups.

13.5.2 Dust monitoring

Construction or renovation, including demolition and excavation can have a substantial, temporary impact on local air quality. The most common impacts are increased particulate matter (PM) concentrations and dust soiling. Depending on the risk of effects from dust occurring, monitoring may need to be carried out during both demolition and construction activities to:

- establish a period of baseline monitoring prior to the start of construction activities (including any demolition or site clearance works)
- ensure that the applied mitigation measures are effective
- all construction activities must be managed to ensure they do not cause exceedances of air quality objectives or limit values for PM_{10} and $PM_{2.5}$, nor surpass recognised threshold criteria for dust deposition or soiling
- provide an ‘alert’ system regarding increased emissions of dust, and a trigger for cessation of site works or application of additional abatement controls
- help attribute any high levels of dust to specific activities on site to enable appropriate action may be taken.

In the selection of monitoring locations, a number of issues need to be considered, including:

- a decision on the number of monitoring locations that are to be established
- whether the monitoring devices are to remain in a permanent position throughout the entire construction works
- whether monitoring is required for direct comparison with the objectives or limit values.

There are a number of practical issues that also must be considered, such as the availability of electrical power, access to the monitoring sites, and security.

As reports are often retrospective. It is important for builders to document findings of daily visual assessments, including obvious reasons for increased release of dust, such as weather (dry periods with higher wind speeds) and site operations (activities with increased potential for dust release). This assists to provide evidence to Health Organisation about strategies that were used at the time of the spike to mitigate risk, such as increasing the use of sprinkler systems.

When these conditions are occurring, the nominated representative (building supervisor) should increase the frequency of visual assessments of dust release and monitoring of any visible surface soiling. This is particularly the case if the prevailing wind is in a direction towards sensitive receptors. If cooling water systems are impacted, increase frequency of microbial water sampling to assess elevated legionella risk.

13.5.3 Operating theatre commissioning microbiological testing

There is no national or international consensus on the methods, frequency, types of sampling or acceptable levels of microbial contamination. However, there is evidence to support microbiological air sampling of operating rooms as part of the commissioning process of a new facility or following major refurbishment, as an adjunct to other heating, ventilation and air conditioning (HVAC) quality assurance controls.

The purpose of microbiological air sampling is to gauge the efficacy of the HVAC systems, including high-efficiency particulate air (HEPA) filters following installation or after major structural refurbishment. Refer to Appendix 13C for Microbiological air sampling of operating rooms.

13.6 Environmental sustainability

The NSW Health Infrastructure Design Guidance Note No. 058 – Environmentally Sustainable Development (ESD) provides a comprehensive framework for integrating sustainability into the built environment of healthcare facilities. It outlines minimum sustainability requirements that must be considered in all Health Infrastructure projects, including:

- Energy efficiency measures such as all-electric heating systems, high-performance building fabrics, and solar PV installations.
- Operational waste management plans that detail priority waste streams, waste generation, and on-site collection and storage strategies to reduce landfill and support recycling.
- Climate resilience initiatives, including water-sensitive urban design, increased rainwater harvesting, and heat island effect mitigation through landscaping and reflective materials.

These measures align with broader NSW Health goals for net zero emissions and support the delivery of safe, high-quality care while reducing environmental impact. Embedding these design principles into infection prevention and control planning and infrastructure ensures infection prevention and control practices are resilient to climate risks and contribute to sustainable healthcare delivery.

Health Organisations are to embed sustainability initiatives and deliver value to the community by creating future-focused and sustainable healthcare infrastructure and asset solutions. For more information refer to NSW Health Infrastructure Sustainability Commitment and Strategy.

Health Organisations are to ensure that the environmentally sustainable solutions will not affect quality and safety of patients. For example, mixed mode air conditioning systems are not recommended for acute inpatient settings where it is important to control the quality of the air through ventilation (air changes per hour), air flow and filtration to remove particles.

For more information refer to Chapter 14 Environmental sustainability and infection prevention and control.

13.7 Commissioning a healthcare building

Commissioning a healthcare facility with an infection prevention and control focus involves a structured, multidisciplinary approach to ensure the environment is safe, clean, and compliant with relevant standards before patient care begins. This includes verifying that all surfaces and equipment are thoroughly cleaned and disinfected, ensuring HVAC and water systems meet operational and microbiological standards, and confirming that critical infrastructure such as isolation rooms, hand hygiene stations, and HEPA filtration systems are functioning as intended.

Collaboration between infection prevention and control professionals, engineering, facilities management, and clinical teams is essential to identify and mitigate risks early, ensuring a safe transition to operational readiness.

Infection prevention and control commissioning - risk assessment

The risk assessment checklist (table 58 Infection prevention and control commissioning) outlines key elements required to assess infection prevention and control readiness during the commissioning of healthcare areas.

Each element is evaluated against established standards to ensure a clean and safe environment for patient care. Where standards are not met, recommendations are provided along with an assessment of the associated risk level (low, moderate, or high).

This structured approach supports consistent decision-making and helps identify areas requiring corrective action prior to occupancy or use.

Table 58 Infection prevention and control commissioning - risk assessment checklist

Infection prevention and control commissioning risk assessment element	Meets required standard: Yes/No or N/A	Recommendation if No	Risk level (low, moderate, high)
The area has been vacuumed with a HEPA filter vacuum.			
The area has been thoroughly cleaned. This includes all horizontal and vertical surfaces to ensure all dust and debris has been removed.			
All installed medical/information technology equipment is clean.			
The cleaning has been performed with the correct detergent/disinfectant (chemical or other).			
Air conditioning is working correctly and within recommended parameters as per engineering and building services and/or the contractor.			
The operating theatre or pharmacy clean room: air sampling and particle counts have been performed, and results are within acceptable limits.			
HEPA filters and clean flow systems (where installed) have been recertified.			
If the water supply has been disrupted: maintenance/contractor has flushed water through all taps and water sampling has occurred (as per the Guidelines for the Control of Legionella (2013), as necessary, with results within acceptable levels (<10 cfu/ml).			
Sinks and plumbing fixtures are suitable for the task and properly located (as per relevant Standards).			
Air intake and exhaust outlets are located and working properly.			
Single rooms meet requirements for patient isolation.			
Hand hygiene basins are correctly set up, for example, water flow, sealed near wall, hand hygiene products available.			
Alcohol based hand rub is available, installed in correct height, positions and no risks identified, for example, near electrical outlets.			

Appendix 13A Infection prevention and control construction guidelines

Class	Guideline
Class I	Execute work by methods to minimise raising dust from construction operations Replace any ceiling tile displaced for visual inspection as soon as possible.
Class II	Provide active means to prevent air-borne dust from dispersal Seal unused doors with duct tape Contain construction waste before transport in tightly covered containers Damp mop and/or vacuum with HEPA filtered vacuum Place dust-mat at entrance and exit of work area and replace or clean when no longer effective Isolate HVAC system in areas where work is being performed Wipe all surfaces at completion of project.
Class III	Isolate HVAC system in area where work is being done to prevent contamination of the duct system Complete all construction barriers before construction begins Maintain negative air pressure within work site utilising HEPA filtered ventilation units or other methods of maintaining negative pressure. In each jurisdiction, the relevant public safety officers will monitor air pressure Do not remove barriers from work area until complete project is thoroughly cleaned Wet mop or vacuum twice per eight-hour period of construction activity or as required to minimise tracking Remove barrier materials carefully to minimise spreading of dirt and debris associated with construction. Barrier material should be wet wiped, HEPA vacuumed, or water misted prior to removal Contain construction waste before transport in tightly covered containers Place dust-mat at entrance and exit of work area and replace or clean when no longer effective Wipe all surfaces at completion of project Infection prevention and control signoff on completion of cleaning and prior to occupation.
Class IV	Isolate HVAC system in area where work is being done to prevent contamination of duct system Complete all construction barriers before construction begins Maintain negative air pressure within work site utilising HEPA filtered ventilation units or other methods of maintaining negative pressure. In each jurisdiction, the

	relevant public safety officers will monitor air pressure Seal holes, pipes, conduits and punctures to prevent dust migration Construct anteroom and require all personnel to pass through the room. Wet mop or HEPA vacuum the anteroom daily During demolition, dust producing work or work in the ceiling, disposable shoes and coveralls are to be worn and removed in the anteroom when leaving work area Do not remove barriers from work area until completed project is thoroughly cleaned Remove barrier materials carefully to minimise spreading of dirt and debris associated with construction Barrier material should be wet wiped, HEPA vacuumed, or water misted prior to removal. Contain construction waste before transport in tightly covered containers Place dust-mat at entrance and exit of work area and replace or clean when no longer effective Keep work brooms clean and remove debris daily Wet mop hard surface areas at completion of project HEPA vacuum carpeted surfaces at completion of project Wipe all surfaces at completion of project Infection prevention and control signoff on completion of cleaning and prior to occupation.

Appendix 13B Environmental monitoring compliance checklist

Items	Yes	No	N/A	Corrected
Construction hoarding (panels that surround a construction site)				
Barriers sealed, no penetrations	☐	☐	☐	☐
Walk off mats in place and clean	☐	☐	☐	☐
Barrier doors have closers, and they are working	☐	☐	☐	☐
Door frames have gaskets; doors are closed and properly sealed	☐	☐	☐	☐
Signs posted informing about spread of dust	☐	☐	☐	☐
Comments:				
Negative air				
Negative pressure at barrier entrance	☐	☐	☐	☐
All windows and doors closed behind barrier	☐	☐	☐	☐
Negative air units or exhaust fans running	☐	☐	☐	☐
Negative air filters clean	☐	☐	☐	☐
Negative air units discharge ducts intact	☐	☐	☐	☐
Comments:				
Adjacent areas with health worker or patient access				
Adjacent floor is clean, and no dust tracked	☐	☐	☐	☐
Adjacent ceiling areas intact	☐	☐	☐	☐
Walls intact and dry	☐	☐	☐	☐
Vents dust free	☐	☐	☐	☐
All ventilation ducts from building site sealed	☐	☐	☐	☐
No signs of pest infestation	☐	☐	☐	☐
Comments:				

Traffic flow				
Building contractors accessing site through approved nonpatient care areas	☐	☐	☐	☐
Debris removed in containers	☐	☐	☐	☐
Route and timing of debris removal as per agreement	☐	☐	☐	☐
Comments:				
Occupied areas				
Work authorised and scheduled	☐	☐	☐	☐
Barrier in place and properly sealed	☐	☐	☐	☐
Ceiling access sign posted	☐	☐	☐	☐
Surrounding areas are clean	☐	☐	☐	☐
Comments:				
Water management and legionella control				
Legionella risk management plan reviewed	☐	☐	☐	☐
Warm and cooling water system maintenance per plan	☐	☐	☐	☐
Warm and cooling water system monitoring per plan	☐	☐	☐	☐
Comments:				

Appendix 13C Microbiological air sampling of operating rooms

Air sampling must be undertaken in collaboration with Perioperative Services and Infection prevention and control Services. A National Association of Testing Authority (NATA) accredited laboratories for environmental testing must be utilised for this process. The sampler used must be capable of sampling a minimum of 1,000 litres (1m3) from each OR without causing excessive drying of the recipient's agar surface. The air sampler must be checked prior to ensure it has been collaborated and serviced in accordance with the manufacturer's instructions. Prior to sampling, agar plates should be at room temperature.

Date	
Operating room/anaesthetic bay	
Company	

Pre-procedure

Cleaning attended ☐ Yes ☐ No Date ……

Door sealed ☐ Yes ☐ No Seal breached ☐ Yes ☐ No

PPE required	Yes	No
Theatre attire	☐	☐
Scrub hat	☐	☐
Surgical shoe cover	☐	☐
Surgical mask	☐	☐
Sterile gloves	☐	☐

Procedure

Prior to entering the room to be sampled	Yes	No
Ensure door has been closed for at least 1 hour	☐	☐
Air sampler was run briefly prior to loading agar strips/plates	☐	☐
Air sampler cleaned prior to and between use	☐	☐
Hand hygiene	☐	☐
On entering the room to be sampled	**Yes**	**No**
Air sampler is placed in the middle of the operating table	☐	☐
Technician performs hand hygiene	☐	☐

Technician to don sterile gloves	☐	☐
Places agar strips/plate into the sampler	☐	☐
Sets timer to commence 15 minutes after technician leaves the operating room OR technician closes the doors and exits the operating room	☐	☐
Aseptic technique is maintained throughout the process	☐	☐
Operating room remained empty of personnel until sampling is complete	☐	☐
Post sampling	**Yes**	**No**
Hand hygiene	☐	☐
Don sterile gloves	☐	☐
Removes agar strip/plate and packages to avoid contamination	☐	☐
Aseptic technique is maintained throughout the process	☐	☐

Labelling

Date: …… Hospital name: ……

Room No. …… Volume of air sampled ……

Comments:

……

……

Chapter 14 Environmental sustainability and infection prevention and control

14.1 Background

Australia's health system is responsible for approximately 5.4% of nation's total carbon emissions, with public hospitals contributing around one-third of that footprint (Malik et al., 2018). Key sources of emissions include energy, waste, water, transport, procurement, and infrastructure. Within clinical care, emissions arise from pharmaceuticals (for example, medications, anaesthetic gases, metered dose inhalers), medical equipment, and their supply chains.(Malik et al., 2018).

The NSW Government's Climate Change (Net Zero Future) Act 2023 legislates net zero greenhouse gas (GHG) emissions by 2050, including a 50 per cent reduction by 2030, and a 70 per cent reduction by 2035 (based on 2005 GHG emissions).

On 29 May 2025, NSW Health released its first Net Zero Roadmap 2025–2030, outlining how the health system will reduce its environmental impact while continuing to deliver safe, high-quality care to the people of NSW. The roadmap is guided by four principles and sets out six strategic priorities. It identifies 18 key emission sources that account for approximately 80% of NSW Health's estimated carbon footprint. The roadmap is informed by the NSW Government's Climate Change (Net Zero Future) Act 2023 and the Net Zero Government Operations Policy (NSW Health, 2024 and 2025).

This chapter focuses on infection prevention and control in the context of sustainability. It provides targeted guidance for maintaining a safe and high-quality healthcare environment while supporting environmental goals. It does not cover all sustainability requirements; for broader legislative context, refer to The Climate Change (Net Zero Future) Act 2023.

Infection prevention and control is a critical aspect of healthcare, with a profound impact on patient safety and the overall effectiveness of healthcare systems. A robust infection prevention and control program is integral in responding to current and emerging infectious disease challenges and to achieving a resilient, responsive, and sustainable health system (Saravanos et al., 2024). It is important to ensure sustainability efforts support infection prevention and control which is carefully considered. Ensuring sustainability is vital, but must not compromise provision of safe, quality care (Saravanos et al., 2024).

Infection prevention and control play a key role in delivering a sustainable healthcare system by generating specific policies and guidelines incorporating a holistic approach to safety and quality improvement. Infection prevention and control practitioners should be engaged early, as a collaborative partnership between Infection prevention and control practitioners, sustainability experts and clinicians. This collaboration supports NSW Health becoming a leading modern, high-quality, low- carbon and climate resilient health system by focusing on quality, value, innovation and equity.

14.2 Sustainable infection prevention and control program

Infection prevention and control programs play an important role in improving environmental sustainability in healthcare (Jain et al., 2025). Infection prevention and control practices should aim to reduce the spread of infections while also considering the longer-term impact of practices on the environment, which can be complicated (ACSQHC 2024).

Expanding the scope of a sustainable infection prevention and control program is essential to ensure it supports a resilient and responsive health system, particularly in the face of climate change. Infection prevention and control play a critical role not only in routine healthcare safety but also in disaster and emergency management responses to climate-related hazards such as floods,

bushfires, and heatwaves. These events can disrupt healthcare access, increase the risk of infectious disease outbreaks, and strain already burdened systems.

To build health system climate resilience, infection prevention and control programs must integrate strategies that address the health risks driven by climate change, including shifts in vector ecology leading to increased incidence of vector-borne and water-borne diseases. This includes strengthening surveillance systems, adapting protocols for extreme weather events, and ensuring continuity of infection prevention and control practices during infrastructure disruptions.

Embedding climate resilience into infection prevention and control also means aligning with broader safety and quality systems to reduce vulnerabilities and enhance preparedness. For example, sustainable infection prevention and control practices such as reducing reliance on single-use plastics and improving ventilation systems can contribute to both environmental sustainability and infection prevention and control effectiveness. For more information refer to the ACSQHC, 2025 Healthcare Sustainability and Resilience Module.

Health Organisations can consider developing and integrating specific Key Performance Indicators (KPIs) or metrics such as waste reduction percentages, energy and water efficiency improvements, and training participation rates to measure and report performance. Embedding regular program audits and feedback loops will support continuous improvement and organisational learning.

Infection prevention and control teams should also establish clear links to procurement policy, ensuring that selected products and equipment reflect both lifecycle sustainability and infection prevention and control best practice.

Infection prevention and control measures, such as hand hygiene, cleaning and disinfection of the environment, shared patient care, and isolation strategies, significantly contribute to the reduction in healthcare associated infections (HAIs). These practices form the cornerstone for safeguarding patients and health workers in addition to playing a pivotal role in sustainability efforts, reducing the environmental impacts tied to HAIs (Haque et al., 2020).

A sustainable infection prevention and control program should consider (Lee et al., 2024, Morgan and Synnott, 2024) the following:

Leadership and culture

As part of any sustainability initiatives, Health Organisations must ensure engagement with infection prevention and control to promote a culture where sustainability is integrated with infection prevention and control, supporting an environment that maintains safe, high-quality care.

1. Infection prevention and control leadership should advocate for sustainable practices, integrating environmental considerations into policy and decision-making (Alruwaili et al., 2023).
2. Promote a culture of sustainability within infection prevention and control teams through targeted training and role modelling, ensuring infection prevention and control aligns with broader environmental goals.

Environmental impact and resource management

1. Low-emission procurement: Influence purchasing decisions to favour products and other supplies with lower carbon footprints. For example, reusable, biodegradable materials where practical and applicable.
2. Lifecycle analysis of products: Evaluate the environmental impact of items used in infection prevention and control, from production to disposal and promote alternatives with reduced emissions.
3. Resource-efficient procedures: Design infection prevention and control procedures that minimise unnecessary use of water, energy, and materials without compromising safety.

Waste management and environmental contamination

1. Sustainable waste segregation: Ensure infection prevention and control procedures support correct segregation of clinical, recyclable, and general waste to reduce contamination and improve recycling rates.
2. Microplastic and contaminant reduction: Collaborate with environmental health teams to monitor and mitigate the release of microplastics and other contaminants from waste.

A centralised and standardised education model, developed and endorsed by relevant health authorities, can help ensure consistency and credibility across healthcare settings. While sustainability leads can deliver education locally, teams often respond more effectively to guidance from trusted, system-level entities.

Patient care and disease containment

1. Eco-conscious zoning: Implement patient zoning strategies that optimise resource use. For example, reusable equipment, efficient room turnover.
2. Sustainable containment practices: Balance effective containment with environmental considerations, such as reducing single-use items were safe and feasible.

Education and training

A centralised and standardised education model, developed and endorsed by recognised health authorities, can help ensure consistency and credibility across healthcare settings particularly. While sustainability leads can deliver education locally, teams often respond more effectively to guidance from trusted, system-level entities**.**

1. Sustainability-focused education: Embed environmental stewardship into infection prevention and control training modules, highlighting the intersection of infection prevention and control and sustainability.
2. Virtual and hybrid learning: Reduce travel and resource use by promoting online and blended learning formats for infection prevention and control education.

14.3 Reducing the use of medical devices classified as single use

The healthcare sector faces a growing environmental burden from the widespread use of single-use devices (SUDs), which contribute significantly to waste generation, resource depletion, and carbon emissions. While SUDs have historically supported infection prevention and control by reducing cross-contamination risks, their environmental impact has prompted a shift toward more sustainable practices.

There is increasing recognition of the need to incorporate SUDs into a circular economy framework one that prioritises resource efficiency, waste reduction, and product lifecycle extension. However, infection prevention and control and the delivery of safe, high-quality care must remain paramount in any sustainability initiative.

Reusable medical devices are the first preference where clinically appropriate, supported by robust reprocessing advice, infrastructure, and resources to enable their safe and effective use. This approach ensures that sustainability does not compromise infection prevention and control standards.

To support sustainability and reduce reliance on SUDs, Health Organisations are encouraged to adopt clinically appropriate reusable items. Where effective cleaning and disinfection can be assured such as with reusable tourniquets, these items may be safely reused without compromising infection prevention and control standards. This approach aligns with both environmental goals and safe clinical practice.

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To support safe reuse, infection prevention and control teams should provide targeted training and conduct regular audits, ensuring that cleaning protocols are followed and embedded into routine practice. These checks can be incorporated into existing audit tools and checklists. Additionally, some items currently packaged as single use may be available in alternative reusable formats through different suppliers or presentations, offering further opportunities to reduce waste.

This approach aligns with the broader goal of integrating circular economy principles into healthcare, as outlined in the CEC's Applied Sustainability for Safety and Quality in Health Care framework. It ensures that environmental sustainability is achieved without compromising the safety, quality, or regulatory compliance of patient care.

To guide decision-making, the following priority list outlines the preferred hierarchy for device use in clinical settings:

1. Reusable Devices – First preference, with appropriate reprocessing protocols and infrastructure.
2. Single-Use Devices (SUDs) – Used when reuse is not feasible or safe.
3. Remanufacturing by original equipment manufacturer (OEM) – Where validated processes exist.
4. Third-Party Reprocessing – Must follow strict listing principles and regulatory compliance.

Sustainability teams have a responsibility to support infection prevention and control professionals in evaluating and implementing environmentally responsible alternatives. Collaboration between infection prevention and control and sustainability teams is essential to ensure that environmental goals align with clinical standards and infection control requirements.

Reuseable medical devices (RMDs)

Reusable medical devices (RMDs) are devices that can be reprocessed and reused on multiple patients. Australian Standard (AS) 5369:2023 Reprocessing of reusable medical devices and other devices in health and non-health related facilities, stipulates the required standards for safe and effective reprocessing of RMDs and other devices to ensure patient and health worker safety.

The Spaulding Classification System provides a system to determine, based on intended use, the level of reprocessing necessary for shared patient equipment or RMDs. The RMDs and other shared patient care items were categorised according to the degree of risk for infection involved in use of the items:

- critical (items that enter sterile tissue or the vascular system) require sterilization
- semi-critical (items contact mucous membranes or nonintact skin) require sterilization or high-level disinfection
- noncritical (items are those that have contact with intact skin but not mucous membranes) require low-level disinfection.

The level of reprocessing is determined by the categorisation of these items. Medical device features vary considerably in design complexity, thus effective cleaning prior to disinfection or sterilization is important to reduce elicit toxicological risks to patients from residual organic matter on inappropriately reprocessed items. This classification is not intended for use for the reprocessing/remanufacturing of single use devices.

Single use devices

Single use devices are those devices that are intended for use as either single use once or single patient use and then discarded (Therapeutic Goods Act 1989). They are governed by policy, legislation and regulations such as the Australian Guidelines for the Prevention and Control of Infection in Healthcare 2019, NSW Health Policy Directive Infection prevention and control in Healthcare Settings, the Therapeutic Goods (Medical Devices) Regulations 2002 (Commonwealth)

Section 41BG (2) of the Therapeutic Goods Act 1989 (Commonwealth) and Health Practitioner Regulations.

Remanufacturing process

Remanufacturing is a comprehensive and rigorous industrial process that involves rebuilding a product back to its original manufactured form with parts that are new, repaired or re-used (Teixeira et al., 2022).

Manufacturer's responsibility for reusable devices

For medical devices intended, by the manufacturer, to be reused according to the essential requirements, the manufacturer must provide information on the appropriate process to allow reuse including cleaning, disinfection, packaging and, where appropriate, the method of sterilization to be used, and any restriction on the number of reuses (Spaulding Classification System). The decision to market a reusable or a single-use medical device is the responsibility of the product manufacturer.

Policies and standards

Infection prevention and control policy and standards do not recommend reprocessing of single use or single patient use devices. TGA requires a device to be used as intended and to perform as intended and where labelled as single use, the device is required to be used once and then disposed of (Therapeutic Goods Act 1989). The TGA enforces strict compliance with the Essential Principles under the Therapeutic Goods Act 1989. According to the Australian Regulatory Guidelines for Medical Devices (ARGMD):

- Devices must be used as intended by the manufacturer and perform as intended.
- If a device is labelled as single use, it must be used once and then discarded.
- Reprocessing of single-use devices is not permitted unless the device has been re-manufactured and approved under ARTG.

The Australian Commission on Safety and Quality in Health Care reinforces that:

- Reprocessing must follow AS 5369:2023 standards and manufacturer's guidelines.
- Single-use items must not be reprocessed under any circumstances.

The Health Practitioner Regulation (New South Wales) Regulation 2025 includes provisions under Part 2-Infection Control Standards, which outline mandatory compliance for health practitioners with infection control standards set out in Schedule 2. Under Part 3, Schedule 2, includes a clear directive regarding single-use equipment:

"Equipment designed for single use must be discarded after use."

This statement reinforces the legal and clinical requirement that single-use medical devices (SUDs) are not to be reused under any circumstances. It aligns with infection prevention and control standards and supports safe, high-quality care by preventing cross-contamination and maintaining device integrity. View the full regulation here: NSW Legislation – Health Practitioner Regulation 2025.

Risks to patients

Patients may be at risk from the presence of biological or chemical residues from the reprocessed single use item, changes in the physical characteristics of reprocessed item and risk to vulnerable patient population such as immunocompromised or prematurely born infants (Mansur, 2017). There is a scarcity of data and on the safety and efficacy of reprocessed single use items. There is also a lack of information on the risk-benefit analysis on the practice of reprocessing single use items and there is a need for high quality studies evaluating patient outcomes following the use of reprocessed single use items regardless of their classification or categories (Kaulback and Horton, 2024).

Additional concerns for consideration include patient safety, patient informed consent, equivalent manufacturing standards for both the original manufacturer and the reprocessing company, and the potential ethical issues of 'single use' device re-use. Reprocessed single-use medical devices could lead to an increase in cross infection from patient-patient (European Union 2020).

Validation and quality control

Validation and quality control check to ensure safety and performance as intended by the manufacturer is the responsibility of the end user. Health Organisations are responsible for ensuring the conformity assessment procedure is in place (Therapeutic Goods Act 1989).

Health Organisations are responsible for ensuring patients and health workers know when a reprocessed single-use device is being used (Grantcharov et al., 2019) and are informed of any potential risks. Health Organisations must regularly update incident detection systems and support open disclosure if harm is caused by a failure or malfunction of a medical device (Australian Open Disclosure Framework - Better communication, a better way to care, 2013).

Remanufacturing and reprocessing concerns

Remanufacturing is a comprehensive and rigorous industrial process that involves rebuilding a product back to its original manufactured form with parts that are new, repaired or re-used ((Teixeira et al., 2022). According to device classification, additional decontamination is also required for this process. The terms reprocessing and remanufacture are often used interchangeably with very different meanings and actions. The proposal to remanufacture/reprocess single use devices has raised a number of concerns in relation to patient safety and carries potential significant risk to the patient.

Potential risks of reprocessing single use devices

Reprocessing single-use medical devices (SUDs) involves cleaning, sterilising, and reusing devices intended for one-time use. While this practice can reduce costs and waste, it carries several potential risks (Mansur, 2017), Therapeutic Goods Act 1989) including:

- Design limitations for cleaning
    - Many single-use devices are not designed to allow thorough cleaning, making it difficult to completely remove contaminants
- Alteration of device characteristics
    - Reprocessing may alter physical or functional properties, compromising device performance and safety
- Lack of validation for reuse
    - Single-use devices typically do not undergo validation or extensive testing for repeated use, so safety and efficacy after reprocessing are uncertain
- Risk of cross-infection due to design
    - Certain designs (for example, fine bore tubes or complex lumens) can harbor microbes and are difficult to disinfect, increasing the risk of cross-contamination
- Absorption and leaching of cleaning agents
    - Some materials absorb disinfectants or cleaning chemicals, which can later leach out, potentially causing toxicity or adverse reactions
- Chemical corrosion and material changes
    - Cleaning agents or sterilant may chemically react with device materials, causing corrosion, degradation, or other material changes
- Mechanical stress and device failure
    - Device materials may experience stress during cleaning and reuse cycles, leading to stretching, cracking, breakage, or outright failure during use
- Residual endotoxins

- Inadequately cleaned devices may carry bacterial endotoxins that remain even after sterilization, potentially causing inflammatory or toxic reactions in patients.

Decision to reprocess single-use devices

The decision to reprocess and reuse single-use or single patient use devices is complex, with minimal evidence to provide clear direction. Quality of recycled products that are classified as single use only by the product manufacturer cannot be guaranteed. This is further complicated where the remanufacturer is not the original device manufacturer. The legal and ethical implications for the organisation and the end user must be considered. Sustainability strategies claiming to remanufacture single-use devices raise infection prevention and control concerns that requires greater understanding before deemed appropriate for both infection prevention and control and sustainability.

Quality check and risk assessment

An approved quality check by the government agencies such as Therapeutic Goods Administration (TGA), NSW HealthShare, consultation with relevant experts and infection prevention and control is needed to ensure the care provision will not be impacted. The Health Organisations are to conduct a risk assessment as part of any decision making to reprocess single-use medical device (Lee et al., 2024) (Appendix 14A – infection prevention and control risk assessment for reprocessing single-use devices). This risk assessment should be conducted alongside all relevant legislation and policy requirements.

14.4 Environmental cleaning – application of novel technologies to support sustainability

Like single-use medical devices, environmental cleaning consumes vast quantities of plastics, increases waste generation, and disperses chemicals into water ways, thus increasing cost to organisations and the environment. Although reducing consumption of chemical agents may seem easy, this may negatively impact on the contamination levels of healthcare environments. Health Organisations introducing new or emerging technologies as part of environmental sustainability initiatives are to follow Appendix 14B Risk assessment checklist for emerging environmental cleaning technology (Jain et al., 2025) to guide their decision making.

Refer to NSW Health policy Directive on Cleaning of the Healthcare Environment and Guideline on New Health Technologies and Specialised Services for further information.

14.5 Supporting infection prevention and control building a culture of sustainability

The ACSQHC has developed the Healthcare Sustainability and Resilience Module as a strategic framework to help Health Organisations integrate environmental sustainability and climate resilience into their safety and quality systems. This module supports health services in addressing both the health impacts of climate change and the environmental footprint of healthcare delivery, aligning with existing standards such as the NSQHS Standards.

To align with this module and future accreditation expectations, health workers can play a vital role in mitigation efforts. For example, safely disposing of unused, unwanted, or expired medications helps reduce pharmaceutical pollution, which can harm aquatic ecosystems and contribute to antimicrobial resistance (ACSQHC Medication Safety Standard).

By embedding these practices into routine infection prevention and control operations, Health Organisations can contribute to climate-resilient care while maintaining high standards of safety and quality (ACSQHC Environmentally Sustainable Healthcare). This positions infection prevention and control teams as key enablers of sustainable healthcare transformation.

The Environmental Sustainability in Quality Improvement initiative by the CEC supports NSW Health staff in integrating environmental considerations into safety and quality improvement (QI) projects. Aligned with the CEC Strategic Plan 2024–2027, the program provides practical resources and guidance to help healthcare professionals design, implement, and evaluate QI initiatives that reduce environmental impact. It encourages staff to consider sustainability throughout the project lifecycle from planning and implementation to measurement and reporting, while maintaining high standards of care. The initiative promotes a systems-thinking approach to healthcare improvement that balances environmental, social, and financial outcomes.

For more information refer to CEC Environmental Sustainability in Quality Improvement resources.

Infection prevention and control professionals can integrate a range of strategies into their practices and programs to help reduce the carbon footprint and promote environmental sustainability. (Lee et al., 2024).

Reducing use of single use items

The Health Organisations are to implement strategies to enable an effective and sustainable approach to healthcare provision by (Davies et al., 2024):

- engaging local infection prevention and control and sterilization department
- source reusable medical devices where practical and available
- circularity, environmental impact and life cycle assessment to evaluate relevance of medical devices materials and reusability
- product procurement decision should include environmental sustainability
- educate health workers on the advantages and disadvantages of reusable versus single use items
- consider resource requirements for reprocessing reusable medical devices.

A centralised approval process for reusables, supported by evidence-based evaluation, would help standardise practice and remove barriers to adoption.

Circulatory and life cycle considerations and infection prevention and control

The application of circular economy principles in healthcare, particularly in clinical and patient care settings, must be carefully aligned with existing regulations, policies, and clinical guidelines to ensure that care remains safe and of high quality.

Circular systems such as reuse, repair, refurbishment, and recycling aim to extend the life of products and reduce waste, pollution, and carbon emissions. In healthcare, this approach can be integrated into both non-clinical and clinical domains, but clinical applications require a more nuanced, hierarchical approach to avoid compromising infection prevention, patient safety, or therapeutic outcomes.

The CEC's Applied Sustainability for Safety and Quality in Health Care initiative supports this integration by promoting sustainable practices that align with safety and quality goals. For example, infection prevention strategies can shift from resource-intensive practices to more sustainable ones, such as prioritising hand hygiene over glove use, thereby achieving both environmental and clinical benefits.

Building on the importance of aligning circular economy principles with clinical safety and quality, Health Organisations must also assess the risks associated with circularity, particularly when it involves the reuse or recycling of clinical materials. This includes evaluating the life cycle parameters of products and ensuring that any circular initiatives such as companies offering to collect and recycle used single-use devices are subject to rigorous consultation with infection prevention and control, clinical governance, and procurement experts.

The CEC's Applied Sustainability for Safety and Quality in Health Care framework reinforces that sustainability efforts must not compromise patient safety or regulatory compliance. Instead, they should be integrated through structured, evidence-informed approaches that uphold the integrity of care while reducing environmental impact.

Health Organisations are to consider the risk associated with circularity and life cycle parameters and subject matter consultation must be sought for agreements where companies promising capacity to recycle and pick up used single-use devices as waste. The Health Organisation are to ensure that (Mansur, 2017, Davies et al., 2024, Alruwaili et al., 2023):

- the agreement should specify sustainable destruction or recycling methods to be used in connection with collections made
- related sustainability impacts are to be brought into the discussion (collection, shipping, remanufacture, disposal, and recycling processes)
- Health Organisations comply with disposal of clinical items (given the potential risks associated), which includes how they may be used or misused
- Health Organisations are to consider legal implications such as liability for selling or gifting a manufacturer's used, single-use product, to another organisation for their resale in the market and use outside of the advised parameters. This may also be perceived poorly with health impacting or subverting manufacturer sales where resale potential exists due to 'remanufacture'
- health workers are to be educated on the risks, benefits, legal obligations and work health and safety requirements.

Waste storage and equipment considerations in circularity projects

When planning the waste volume and bin location the anticipated volume of waste, including the need for additional bins, must be incorporated into the initial planning phase of circularity or sustainability projects. This ensures alignment with the NSW Health Waste Management Plan (WMP) requirements.

Existing infrastructure and bin placement

Health facilities already utilise a significant number of bins for various waste streams. Any increase in bin numbers must be assessed for:

Space availability

- Safe placement, particularly avoiding high-traffic or hazard-prone areas
- Work Health and Safety (WHS) risks, in accordance with PD2020_049.

Placement of bins must not obstruct emergency exits, corridors, or clinical pathways. Risk assessments should be conducted to mitigate trip hazards, contamination risks, and ensure compliance with WHS protocols.

Storage of exposed clinical equipment

If clinical equipment is stored for extended periods, especially in exposed conditions, accreditation standards and infection prevention and control protocols must be strictly followed. This includes:

- Ensuring equipment is stored in designated clean areas
- Avoiding prolonged exposure that may compromise integrity or safety
- Accreditation and compliance.

All waste and equipment storage practices must meet the minimum standards outlined in NSW Health directives. This includes:

- Licensing and segregation of waste streams

- Documentation and auditing
- Alignment with environmental and infection control legislation.

Standard precautions

Infection prevention and control measures incorporating appropriate hand hygiene and sustainable glove use by developing a checklist for glove use, such as when to wear gloves, when to change them and when to perform hand hygiene. Refer to Chapter 5 Standard precautions for more information.

Transmission based precautions

Implementation of a risk assessment approach at facility level on:

- how to employ contact precautions, and other transmission-based precautions
- gloves off projects that promotes a risk assessment for glove use rather than universal use
- education to promote hand hygiene instead of glove use where appropriate to reduce glove usage which reduces glove volume to landfill
- promote a culture of risk assessed PPE use, rather than waste generating practices such as universal gown or apron use for contact precautions
- optimising waste management by reducing clinical waste, which results in high environmental footprint by autoclave or incineration.

Refer to Chapter 6 Transmission based precautions for more information.

Antimicrobial stewardship

Robust infection prevention and control strategies to ensure appropriate antimicrobial prescription, duration of treatment and waste reduction.

Safe medication disposal

Local process and procedures on safe disposal of unwanted or unused medications to prevent them from being disposed into bins, then into landfill and contamination of water or waste systems.

Diagnostic stewardship

Infection prevention and control strategies promoting diagnostic algorithms to avoid unnecessary microbiological testing, resultant misdiagnosis, wasted testing consumables, unnecessary PPE use, and antimicrobial use.

Increasing water efficiency

Water is essential for care provision. Water is used for heating, cooling, waste management, laundry services, reprocessing of reusable medical devices and equipment maintenance. To minimize unnecessary water waste, healthcare design should include the placement of handwashing sinks and the installation of water-saving devices in showers and ward appliances. Collaborate closely with engineering departments to establish water-efficient benchmarks, measure water consumption based on patient bed days, and ensure regular maintenance of patient care equipment and appliances.

Healthcare infrastructure

Promote healthcare infrastructure towards more environmentally sustainable, but still patient-centred, practices such as energy efficient heating, ventilation, air conditioning (HVAC) and air filtration practices (Silva et al., 2024).

Any move towards an environmentally sustainable approach should be taken with caution along with an understanding of the complexities and risks to patient and health worker safety and healthcare associated infection. The unique challenges in health where additional requirements

must be considered relate to the risk of contamination, potential transmission of infections and onward risk to patients, health worker and the wider community not experienced in the same manner in other industries (Silva et al., 2024, Lee et al., 2024).

New strategies to reduce carbon emissions will continue to develop and will always be required; however, their introduction and adoption should always be part of a managed process in which evidence plays a significant role. Local infection prevention and control professionals must be consulted from early discussions to ensure a balanced approach to environmental sustainability and safe care provision to healthcare.

Infection prevention and control risk assessment

Health organisations must conduct a comprehensive risk assessment before making any decision to reprocess single-use medical devices. This process must be undertaken in consultation with infection prevention and control and other relevant stakeholders, including clinical governance, procurement, biomedical engineering, and legal teams.

Where no formal LHD or local-level assessment exists, organisations may seek support from procurement teams, suppliers, reprocessing facilities, and the Therapeutic Goods Administration (TGA) (if applicable) to inform their decision-making. Any such checklist or risk assessment tool should, at a minimum, include:

- Device classification and intended use
- Manufacturer's instructions for reprocessing (if available)
- Evidence of validated cleaning, disinfection, or sterilization processes
- Assessment of residual risk to patients and staff
- Infrastructure and resources available for safe reprocessing
- Training and competency of staff involved
- Monitoring and audit mechanisms
- Regulatory compliance and TGA approval (if remanufactured).

This risk-based approach ensures that sustainability initiatives involving SUDs do not compromise patient safety, infection control standards, or regulatory obligations. Refer to Appendix 14A infection prevention and control risk assessment for reprocessing single use devices (sample) for more information.

Appendix 14A infection prevention and control risk assessment for reprocessing single use devices

The Health Organisations are to conduct a risk assessment as part of any decision making to reprocess single-use medical device in consultation with infection prevention and control, any other relevant stakeholders including procurement, supplier, reprocessing facility, TGA (if applicable).

No	Risk assessment	Yes	No	Unsure
1	The effects of cleaning, disinfecting, and sterilization on the function of the device have been assessed and meet requirements?	☐	☐	☐
2	Does reprocessing of the single-use device change the design specifications of the device?	☐	☐	☐
3	Can the reprocessing organisation confirm that reprocessing has not changed the device's functionality or performance?	☐	☐	☐
4	Can the reprocessing organisation provide information on how the medical device is reprocessed and provide microbiological testing assurance?	☐	☐	☐
5	If an issue is identified with a reprocessed device, is there a way to trace that device to the patient on whom it was used?	☐	☐	☐
6	Has the reprocessing facility been inspected by an authorised governmental agency?	☐	☐	☐
7	Which government authority has approved the reprocessing facility to reprocess single-use devices? …….. Can documentation of this approval be provided? Which aspects of the reprocessing process have been validated?	☐ ☐Cleaning ☐Disinfection ☐Sterilization	☐	☐
8	Does the reprocessing facility have limits on how many times items can be reprocessed?	☐	☐	☐
9	How are those limits determined? What process is in place to make sure those limits are not exceeded? ……			

"No or Unsure" response needs to have mitigation strategies and local escalation processes.

Health organisations are required to undertake a risk assessment when considering the adoption of emerging environmental cleaning technologies. This process must be conducted in consultation with Infection Prevention and Control and other relevant stakeholders, including procurement teams, suppliers, clinical engineering, and regulatory bodies such as the TGA (if applicable).

In the absence of a formalised LHD or local-level evaluation, Health Organisations may draw on supplier documentation, regulatory approvals, and independent validation data to support their assessments. At a minimum, the risk assessment checklist should include:

- Technology description and intended application
- Evidence of efficacy. For example, against relevant pathogens
- Compatibility with existing cleaning protocols and materials
- Impact on patient and staff safety
- Training and competency requirements
- Infrastructure and maintenance needs
- Regulatory status and approvals
- Monitoring, audit, and reporting mechanisms

This structured approach ensures that innovation in environmental cleaning supports both sustainability goals and infection prevention standards, without compromising safety or compliance. Refer to Appendix 14B Risk assessment checklist for emerging environmental cleaning technology (sample) for more information.

Appendix 14B Risk assessment checklist for emerging environmental cleaning technology

The Health Organisations are to conduct a risk assessment as part of any decision making to reprocess single-use medical device in consultation with infection prevention and control, any other relevant stakeholders including procurement, supplier, reprocessing facility, TGA (if applicable).

No.	Item	Yes	No	Unsure
1	Is there sufficient evidence from well-designed studies that the approach or change is not inferior to the existing cleaning method/s?	☐	☐	☐
2	Have any potential unintended consequences of the approach or change been considered and evaluated?	☐	☐	☐
	• Are there any storage requirements for products that may have shorter shelf-life?	☐	☐	☐
	• Are there any waste disposal implications?	☐	☐	☐
	• Is there a risk of resistance developing?	☐	☐	☐
	• Is there a risk of skin or other allergic reactions in staff?	☐	☐	☐
	• Will any changes in personal protective equipment be required?	☐	☐	☐
	• Will overall costs rise, including is the system requiring more of staff's time?	☐	☐	☐
	• Is the required contact time for efficacy achievable in normal use?	☐	☐	☐
	• Are there any material compatibility issues?	☐	☐	☐
	• Do manufacturers of products approve the use of the product on materials used in healthcare?	☐	☐	☐
	• Are there any potential reactions with other chemicals?	☐	☐	☐
	• Does the product meet all regulatory requirements?	☐	☐	☐
3	Is additional infection prevention and control education or training required for individuals who will be using this product?	☐	☐	☐
4	Have human behavioural considerations been considered?	☐	☐	☐
	• Will this change increase or complicate workflow?	☐	☐	☐
	• Will this change increase or complicate compliance?	☐	☐	☐
The below questions should be aimed at the industry. Additional information can also be gained from sustainability leads/program or as part of procurement process.				
5	Has the carbon cost of the product been considered?	☐	☐	☐
6	Has a Life Cycle Assessment (LCA) of the product been undertaken?	☐	☐	☐
7	Has the LCA been independently verified?	☐	☐	☐

8	Are additional actions required to reduce the carbon emissions and associated waste from the product?	☐	☐	☐
10	Does it include a net zero target?	☐	☐	☐
	What is the target? Comment: ……			
	What demonstrable actions are underway to meet your target? Comment: ……			

Source: Jain S et al 2024 “No or Unsure” response needs to have mitigation strategies and local escalation processes.

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