hai Healthcare Associated Infections Program

NSW GOVERNMENT

CLINICAL EXCELLENCE COMMISSION

INFECTION PREVENTION AND CONTROL PRACTICE HANDBOOK

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INTRODUCTION

Purpose

The purpose of this handbook is to provide practical, day-to-day guidance to support the implementation of the NSW Health Infection Prevention and Control Policy, which establishes the infection prevention and control mandatory standards for NSW health organisations (HOs) 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.

Relevant policies

This handbook complies with, and should be read alongside the most current versions of the following NSW Health Policy Directives and Guidelines (see Table 1).

Table 1. Relevant NSW policies to consider

NSW Health Policy or Guideline	PD/GL Number
Clinical and Related Waste Management for Health Services	PD2017_026
Code of Conduct	PD2015_049
Community Sharps Disposal by Area Health Services	PD2008_004
Environmental Cleaning Policy	PD2012_061
HIV, Hepatitis B and Hepatitis C - Management of Health Care Workers Potentially Exposed	PD2017_010
Management of health care workers with a blood borne virus and those doing exposure prone procedures	PD2019_026
HIV - Management of People with HIV Infection Who Risk Infecting Others	PD2019_004
Hospital Response to Pandemic Influenza Part 1: Emergency Department Response	PD2007_048
Infection Prevention and Control Policy	PD2017_013
Influenza Pandemic Plan	PD2016_016
Influenza Pandemic - Providing Critical Care	PD2010_028
Intravascular Access Devices (IVAD) - Infection Prevention and Control	PD2019_040
Maternity - Breast Milk: Safe Management	PD2010_019
NSW Contingency Plan for Viral Haemorrhagic Fevers	GL2016_002
Occupational Assessment, Screening and Vaccination Against Specified Infectious Diseases	PD2018_009
Oral Health: Cleaning, Disinfecting and Sterilizing	PD2013_024
Principles for the Management of Tuberculosis in New South Wales	PD2014_050
Surveillance & Response for Carbapenemase-Producing Enterobacterales (CPE) in NSW Health Facilities	GL2019_012
Work Health and Safety - Blood and Body Substances Occupational Exposure Prevention	GL2018_013
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	GL2019_013
Work Health and Safety: Better Practice Procedures	PD2018_013
Work Health and Safety - Other Workers Engagement	GL2019_007

Definitions and Abbreviations

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

Table 2. Table of 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 (1).
ACH	Air Exchange per Hour (ACH) is the measure of air volume that can be added/removed from a space in a given hour. One air change results when all air has been replaced. It is a complete recycling of the air. 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)	Very small lightweight particles that can remain suspended in the air for long periods and travel significant distances. Are generally < 5µm in diameter. Aerosols are formed from the evaporation of a larger droplet particle. Also referred to as ‘droplet nuclei’ (2, 3).
AGP	Aerosol generating procedure. Clinical procedures which are known to produce aerosols, such as suctioning, intubation, chest physiotherapy, nebuliser treatment or bronchoscopy.
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 (1) .
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 (< 5µm) that can carry microorganisms.
Alert/de-Alert (for infection control)	Enabling of an electronic communication warning ‘flag’ that indicates MRO colonisation, communicable disease or infection in a patient’s clinical records. De-Alert is the inactivation of the electronic infection control Alert (flag).
ANC	Absolute neutrophil count
Anteroom	A small room leading from a corridor into a room.
Antimicrobial	A chemical substance, usually a medicine, that inhibits or destroys bacteria, viruses, fungi, yeasts, moulds or protozoa (4).

Term	Definition
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 (5).
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 (1).
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.
CDI	*Clostridium difficile* infection. 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 (6). See *Clostridium difficile* information for clinicians (7) for further information.
CF	Cystic fibrosis
CLABSI	Central line associated bloodstream infection
Cleaning	The removal of visible soil (e.g. inorganic and organic material) from objects and surfaces and is normally accomplished manually or mechanically using water with detergents or enzymatic products (8).
Clearance	No evidence of current MRO colonisation determined by the retesting of patient samples and satisfaction of clearance screening criteria.
Clinical areas	Areas within a HO where patient-related activity is expected.
Clinical waste	Waste which has the potential to cause sharps injury, infection or offence. When packaged and disposed of appropriately there is virtually no public health significance. Clinical waste contains the following types of waste: sharps, human tissues (excluding hair, teeth and nails), bulk body fluids and blood, visibly blood stained body fluids and visibly blood stained disposable material and equipment, laboratory specimens and cultures, animal tissues, carcasses or other waste arising from laboratory investigation or for medical or veterinary research (9). Clinical waste does not include incontinence pads, drained dialysis wastes, sanitary waste or disposable nappies.

Term	Definition
Clostridium difficile	A gram-positive, spore-forming, toxin-producing bacillus (10). *C. difficile* is part of the normal intestinal flora in a small number of healthy patients and hospitalised patients (11).
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 (12). 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 HO.
Contact	1. The state or fact of touching or being in immediate proximity or association (13) . 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 environment (1).
CPE	Carbapenem-producing Enterobacterales. 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. See ACSQHC CPE factsheets and Clinical Excellence Commission CPE factsheet for further information NOTE: facilities may use an alternate acronym such as CRE or CRO
Decolonisation	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 (1) .
Disinfection	Reduction of the number of viable microorganisms on a product or item to a level previously specified as appropriate for its intended further handling or use (1) .

Term	Definition
Double cleaning	Cleaning procedure consisting of cleaning with neutral detergent followed with a TGA registered disinfectant e.g. 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 (14).
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 (15).
Droplet(s)	Small particles, approximately 5 -100µm in diameter (2).
Droplet transmission	Droplet transmission is a form of direct transmission that occurs by the dissemination of expelled aerosols (≥ 5µm) 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 (3).
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 (1) .
Endemicity	Usual level or incidence of a microorganism in a particular healthcare setting.
EPP	Exposure prone procedure
ESBL	Extended-spectrum beta lactamase-producing enteric Gram-negative bacillus (Enterobacterales).
Flagging	Enabling of a communication warning alert that indicates current colonisation or infection in a patient's clinical records (see "Alert", De-Flagging")
Fit check	A quick check to ensure that the respirator fits correctly each time it is put on (1).
FMT	Faecal microbiota transplantation.
Fomite	An inanimate object or surface that may become contaminated with microorganisms and serve in their transmission.
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.
HAI	Healthcare associated infection(s). Refers to infections acquired in healthcare facilities and infections that occur as a result of healthcare interventions and which may manifest after people leave the healthcare facility.

Term	Definition
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 ABHR to the surface of the hands (e.g. alcohol-based hand rub). When performed correctly, hand hygiene results in a reduction of microorganisms on hands(16).
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
HCV	Hepatitis C virus
HW(s)	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.
HEPA	High efficiency particulate air
HITH	Hospital in the Home
HIV	Human immunodeficiency virus
HO	Health Organisation(s). This term refers to Local Health Districts, statutory health corporations or an affiliated health organisation in response to its recognised establishments and recognised services, as defined in the *Health Services Act 1997*.
HSV	Herpes simplex virus
ICU	Intensive Care Unit
IFU	Instructions for use
IgM	Immunoglobulin M
ILI	Influenza-like illness. The case definition of ILI is sudden onset of fever (≥38°C) PLUS cough and/or other respiratory symptoms (e.g. shortness of breath) PLUS one or more systemic symptom/s (fatigue, muscle soreness, headache) with an onset within the past 10 days (17) . A case of influenza meets the ILI case definition PLUS a positive laboratory test result for influenza.
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 (e.g. hypogammaglobulinaemia, severe combined immunodeficiency) or acquired disorders (e.g. diabetes, HIV infection, malnutrition and drugs).
Immunosuppression	Inhibition or suppression of the immune response. This can be either deliberate (e.g. as part of disease treatment or preparation for transplantation to avoid graft rejection) or as a side effect of therapy (e.g. as may occur with corticosteroid therapy or chemotherapy)

Term	Definition
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.
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 (18).
Invasive procedures	Procedures that require entry into tissues, cavities or organs or repair of traumatic injuries (1) .
IV	Intravenous
IR	Interventional radiology
Key parts	Key parts are the sterile components of equipment used during a procedure e.g. bungs, needle hubs, syringe tips, dressing packs (19).
Key sites	Key sites include any non-intact skin and insertion or access sites for medical devices connected to the patient e.g. insertion/access sites of intravenous devices, urinary devices, open wounds (19).
Maintenance	The process of maintaining plant, equipment and building elements in their original condition.
MBL	Metallo-beta-lactamase
Medical examination gloves	Non-sterile medical examination gloves that meet the requirements of AS/NZS 4011:1997 *Single-use examination gloves - Specification*.
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 in order to identify change.
MRO	Multidrug-resistant organism(s). A microorganism that has evolved, developed, or acquired mechanisms to limit the efficacy of multiple classes of antimicrobial agents. A MRO is resistant to at least three antimicrobial classes.
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.
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 (20). Severe, or profound, neutropenia is defined as an ANC $\leq 0.01x10^9$/L (21).
NHMRC	National Health and Medical Research Council
NICU	Neonatal Intensive Care Unit

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 (12)
Outbreak	A state characterised by an incidence of an infection greater than what is typically expected in a particular healthcare setting.
P2/N95 mask	A close fitting mask worn for airborne precautions, which is capable of filtering 0.3µm particles. A P2 respirator must comply with AS/NZS 1716:2009.
Patient Surroundings (AKA 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 (eg. bed, bedside table, chair, personal belongings); and 2. Surfaces frequently touched by the staff member providing patient care (e.g. monitors, knobs). Patient surroundings will vary with the patient setting. For example: <u>Hospital Inpatient Setting</u> The patient surroundings will include items such as the patient's bed, bedside table, bed linen, monitors, other medical equipment and personal belongings kept at the patient's bedside. The patient observation charts (and health care record) are: • part of the patient surroundings if, for example, they are on the end of the patient's bed • not part of the patient surroundings if, for example, they are kept outside the door to the patient's room.
	Patient surroundings do not include curtains, partitions and doors between separate patient areas (22). <u>Operating Theatre</u> The patient surroundings will include, for example, the top of the operating table, arm board, and anaesthetic machine and trolleys. <u>Office Based Care e.g. clinics or hospital outpatient setting</u> The patient surroundings will usually include any procedural trolleys used and the examination table if the patient sits/lies on it. <u>Patient's Home</u> The patient surroundings may include all items in the patient's home including medical equipment.
PCR	Polymerase chain reaction
PHU	Public Health Unit
PICC	Peripherally inserted central catheter

Term	Definition
Plant	Large machinery/equipment in a health facility such as boilers, large sterilizing machines, reverse osmosis water systems, robotic-assisted surgical system, air handling equipment, MRI machines
Point of Care	The place where • the patient • the staff member • care or treatment involving touching the patient and/or his/her surroundings come together (16). An ABHR must be easily accessible and as close as possible – preferably within arms-reach of where patient care or treatment is taking place. In the hospital environment it will be in places including attached to the patient's bed, but in other contexts it could be in a treatment room, cot, chair, ambulance, carried on the staff or in a patient's home.
PPE	Personal protective equipment. Refers to a variety of infection prevention and control barriers and respirators used alone, or in combination, to protect mucous membranes, skin, and clothing from contact with recognised and unrecognised sources of microorganisms in healthcare settings.
Pre-operative load reduction	Use of topical or systemic antibiotics to reduce *Staphylococcus aureus* colonisation or infection prior to surgical procedures.
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 (23).
Protective environment	A specialised patient care area, usually in a hospital, with a positive airflow relative to the corridor (i.e., 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 have undergone allogeneic hematopoietic stem cell transplant (24).
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 (e.g. 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 (25).
RACF	Residential aged care facility

Term	Definition
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 (26).
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 of 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) (27).
RMD	Reusable medical device
SAB	*Staphylococcus aureus* bacteraemia
Screening	Microbiological testing, for the purpose of detection of multi-resistant organisms 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 sites	Sites that have an increased susceptibility to infection e.g. mucosal membranes or non-intact skin.
Sentinel event	Events that occur infrequently and may warrant further investigation into whether routine infection 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 and AS/NZS 4261:1994.
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: 
Social Contact	Any form of physical contact resulting from non-clinical, everyday interactions with others (e.g. handshaking, hugging etc.)

Term	Definition
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 healthcare personnel and prevent the spread of infections among patients(1) .
Sterile	Free from all living microorganisms, usually described as a probability (e.g. the probability of a surviving microorganism being 1 in 1 million) (8).
Sterile gloves	Sterile gloves that meet the requirements of AS/NZS 4179:2014.
Sterilization	A validated process used to render a product free from viable microorganisms (27).
Stock	Medical consumables
SSI(s)	Surgical site infection(s)
Susceptible	Likely or liable to be influenced or harmed by a particular thing (28).
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 (29).
Terminal clean	Double cleaning of a room following transfer or discharge of a patient where transmission-based precautions were required (14).
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 (1).
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 (15).
Type 5/Class N room	A Class N/Type 5 isolation room is a single room with an ensuite that is not shared. It is used for patients who require isolation to reduce airborne transmission of disease (e.g. varicella, measles, pulmonary or laryngeal tuberculosis) (30).
VHF(s)	Viral haemorrhagic fever(s)

Term	Definition
VRE	Vancomycin-resistant enterococcus. A strain of *Enterococcus,* a typical gut bacterium that displays resistance to vancomycin. VRE is an opportunistic microorganism that may cause infection in ICU patients (IV line-associated sepsis, intra-abdominal infection and urinary tract infection), neutropenic and other haematology patients (IV line-associated sepsis) and bacteraemia associated with mucositis or enteritis and in solid organ transplant patients.
VZV	Varicella Zoster Virus
WHO	World Health Organization

SECTION 1
HEALTHCARE ASSOCIATED INFECTIONS

1.1 The risk of healthcare associated infections

'Along with medication errors, hospital acquired infections cause a great many deaths and illnesses within our hospitals'.

Peter Garling SC, Final Report of the Special Commission of Inquiry, Acute Care Services in NSW Public Hospitals, 2008

Healthcare associated infections (HAIs) are the most common complication affecting patients in healthcare settings. The literature suggests that at least 5.9% of hospital visits are affected by HAIs (31). Patients, visitors and health workers (HWs) are all at risk of acquiring a healthcare associated infection (HAI). HAIs are not limited to patients receiving care in a hospital - those receiving healthcare in community or home-based settings are also at risk.

Case study 1: Kevin's story - an all too common story

Kevin, a 58 year old builder, presented to the emergency department of a local hospital with a history of self-resolving episodes of confusion, dizziness and impaired memory over the course of a few weeks. Kevin's wife convinced him to go to the hospital after he had another, rather severe, episode of dizziness and limb weakness whilst at work on a building site.

Kevin was admitted to hospital and underwent numerous investigations with a subsequent diagnosis of transient ischaemic attack. Kevin was started on medication and having experienced no further neurological symptoms over the weekend, he was declared medically fit to return home. On the intended day of discharge (day 5), Kevin developed rigors and was found to be febrile, dyspnoeic and tachycardic. Methicillin-susceptible Staphylococcus aureus (MSSA) was cultured from his blood.

Kevin was referred to an infectious diseases physician for management of his MSSA bacteraemia, which required two weeks of IV antibiotics in hospital, followed by another four weeks via the hospital-in-the-home service. Kevin's recovery was complicated and, due to his infection and other stressors, Kevin was at an even higher risk of further ischaemic events (such as a stroke), which was very distressing for his wife. Although he did eventually recover, Kevin was unable to return to work until four months after his initial presentation to hospital.

Kevin's MSSA acquisition would be considered HAI as the date of positive culture was >48 hours from his admission. Investigations would need to determine most likely causative factor (e.g. possible association with peripheral intravascular cannula).

Potentially any microorganism may cause a HAI (32). A common misconception is that HAIs are caused only by multidrug-resistant microorganisms (MROs), such as methicillin-resistant *Staphylococcus aureus* (MRSA). HAIs can be caused by any bacteria, fungi, viruses, parasites and prions. Examples of microorganisms that cause HAIs include *Pseudomonas* spp., *Enterobacterales* spp., *Clostridioides difficile, Acinetobacter* spp., *Candida spp.*, norovirus and influenza virus.

A HAI may occur in the presence or absence of an invasive procedure or device, and acquisition of a HAI is associated with greater morbidity and mortality risks. The literature reports:

- 3% of surgical procedures result in an infection (33);
- HAIs prolong the length of a patient's hospitalisation by an average of 10 days (34);
- The type of HAI and the microorganism involved influences the duration of additional hospitalisation required:

    - A post-operative Clostridioides difficile (*C. difficile)* infection (CDI) will prolong hospitalisation by an average of 9 days (35)
    - Surgical site infections prolong hospitalisation by an average of 10 days (36)
    - Bloodstream infections can prolong hospitalisation by up to 12 days (37)
- 30% of patients with a HAI are likely to be readmitted to hospital within 12 months (38);
- Intensive care unit (ICU) patients with a bloodstream infection are 2-3 times more likely to die than ICU patients without a bloodstream infection (37); and
- A patient's risk of mortality is at least three times greater if a HAI is acquired (33, 39).

In most instances HAIs are preventable. New South Wales (NSW) Public Health Organisations (HOs) and their HWs have an ethical and professional obligation to do no harm to the patients in their care. Registered HWs also have a legal requirement to adhere to infection prevention and control practices as required under the NSW Health Practitioner Regulation. This includes ensuring that patients do not acquire a HAI during their healthcare encounter. Implementing and adhering to infection prevention and control strategies to avoid the transmission of microorganisms is a crucial step in fulfilling this obligation.

Infection prevention and control programs are a core element in healthcare patient safety and quality programs. HOs require a comprehensive program to make sure that current and future risks, challenges and threats of HAIs, transmissible multidrug-resistant organisms and communicable diseases are identified and managed. The core components of a comprehensive infection prevention and control program comprises (1):

- A governance structure that incorporates risk escalation, reporting and feedback
- A description of what the program includes, goals, risks and assigned responsibility for each core component
- Clear objectives that have scalability to manage endemic multidrug-resistant organisms/outbreaks
- Trained professional(s) to lead and manage the program
- Executive engagement, clearly defined infection prevention and control (IPC) leadership and strong relationships between IPC, executive teams and clinical governance
- Linkages between national, state, Local health district (LHD) and facility policies/guidelines
- Microbiological/infectious diseases support
- Education and training programs for all HWs that are evaluated for effectiveness and applicability to each of the health professional groups
- A HAI surveillance program that includes national, state and facility clinical and process indicators
- Multimodal strategies based on risk assessment to drive improvements in HAI rates, infection prevention practices, and patient infection risks
- Monitoring/audit/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
- Built environment, materials and equipment at both the facility, clinical level and point of care to reduce the risk of HAI and transmission of multidrug-resistant organisms

1.2 Modes and routes of transmission

A mode of transmission describes how a microorganism moves from one host to another. Transmission can either occur vertically, from mother to child, or horizontally, between individuals who are not necessarily related. In horizontal transmission, microorganisms will use either a direct or indirect mode of transmission to leave the current host and colonise the next host. Routes of transmission may involve direct contact, indirect contact, droplet, airborne and/or vector-borne. Common source transmission is the spread of microorganisms from a single source. This is often facilitated by the contamination of food or water and is best illustrated by institutional foodborne outbreaks. There are certain microorganisms that simultaneously employ multiple transmission routes. For example, norovirus can be spread by direct contact, indirect contact, droplet transmission and common-source transmission through contaminated food.

- **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-** Being bitten or scratched by an infected animal or handling animal waste can be hazardous.
- **Mother to unborn child-** A pregnant woman may pass pathogens that cause infectious diseases to her unborn baby
- **Food Contamination- C**ausing pathogens can infect is through contaminated food and water.

1.2.1 Contact transmission routes

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 involves skin-to-skin contact and the physical transfer of microorganisms directly from an infected person to a susceptible host.

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

Indirect contact transmission involves the initial transfer of microorganisms from a host individual to an intermediary object and then subsequent transfer to another individual. The unwashed hands of HWs are common mediators of indirect contact transmission (40-42), due to contact with fomites and the environment.

Reusable medical devices that are inadequately reprocessed between patients are also implicated in the indirect contact transmission of microorganisms to patients (43, 44).

AS/NZS 4187:2014
Reprocessing of reusable medical devices in health service organizations

AS/NZS 4815:2006
Office-based health care facilities - Reprocessing of reusable medical and surgical instruments and equipment, and maintenance of the associated environment

Refer to Section 8, *Reprocessing* for further advice

1.2.2 Droplet transmission route

Droplet transmission involves large droplets carrying microorganisms from a colonised or infected individual, often produced by coughing, talking and breathing (45, 46).
Due to their size, large droplets can only travel very short distances (≤ 1 metre) before either settling and contaminating surfaces (2) or making contact with and potentially infecting the mucosal surfaces of susceptible individuals. Therefore droplet transmission requires close contact between the colonised or infected host and other susceptible individuals.

1.2.3 Airborne transmission route

Airborne transmission is a form of indirect transmission that occurs by the dissemination of small expelled aerosols that can carry microorganisms. Aerosols are much smaller than droplets and are often produced by coughing, talking and breathing (46) as well as during clinical aerosol generating procedures (AGP) such as suctioning, intubation and chest physiotherapy (47). Such aerosols can travel long distances and can remain suspended in the air for prolonged periods of time.

Case study 2: Reece's story - a tale of transmission

A nine year old boy, Reece, presented to the hospital's emergency department with abdominal cramping, continuous vomiting and a headache. Reece's mother told the triage nurse that Reece had started vomiting two hours ago. The medical officer recorded the observation of 'projectile vomiting'. The medical officer put in a lab order for a stool specimen to test for norovirus. Reece was admitted to the paediatric ward for monitoring and rehydration.

Reece was placed in a single room on the unit. He continued to vomit on and off throughout the afternoon. To take his mind off his illness, his mother let Reece play with communal toys from the unit. The toys were placed back in the play room after he finished playing. The lab results confirmed the boy had norovirus.

24 hours later, Neya complained of stomach cramps and started vomiting. Neya was later diagnosed with norovirus and found to have the same strain that was found in Reece's stool specimen.

What happened?
Reece contaminated the toy with norovirus via droplet and contact routes. The toy had been returned to the play room without cleaning were Neya was able to play with the same toy. Neya's hands became contaminated with Norovirus through the indirect contact route. Neya had not performed any hand hygiene and the toy was not cleaned in between use.

How could this have been prevented?
Providing parent education on the importance of hand hygiene.
Reece should practise hand hygiene after going to the toilet and vomiting. This could also be included in patient and parent education programs
Personal effects, including toys and other communal devices, should not be shared between patients where practical and cleaned between uses when shared. Everybody, including visitors and carers, should clean their hands before and after contact with a patient, equipment or the surrounding environment.

1.3 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. This is called colonisation of commensal microorganisms.

The commensal microorganisms of one person may be a pathogen for another person. Patients exposed to HWs 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 HWs 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 HWs and visitors (48).

Colonisation in itself is not harmful to the patient and does not require treatment.

1.4 Infection

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 (e.g. febrile illness,

elevated white cell count) and/or a local response (e.g. cough, localised inflammation). Infection in certain individuals 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 will precede the onset of symptomatic clinical illness. Depending on the causative microorganism, an individual may also shed infectious material during asymptomatic infection. As an example, the influenza virus is shed prior to the onset of flu symptoms (49). If the patient is immunocompromised, pregnant or is undergoing certain surgical procedures, having an asymptomatic infection may pose a significant clinical risk to the patient (50, 51).

Clinical Practice Guidelines
Antenatal Care - Module 1

An infection may be considered to be latent whereby the infection is dormant; the infection may or may not reactivate at a later stage. An individual with a latent infection is not clinically unwell and does not usually shed infectious material during the latent phase. Reactivation of the infection is often triggered by the waning of the immune response. Latent infections are often associated with tuberculosis (TB), hepatitis B virus and varicella-zoster virus.

NSW Health Factsheet:
Tuberculosis

NSW Health Factsheet:
Hepatitis B

NSW Health Factsheet:
Chickenpox

SECTION 2
CLINICAL GOVERNANCE

'What is meant by a clinical governance framework is a set of initiatives designed to enhance care, and the promotion of a productive culture and climate within which care can thrive.'

Braithwaite & Travaglia 2008 (52)

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 HAIs, by creating an environment in which excellence in clinical care will flourish (53, 54).

Clinical governance accountabilities for infection prevention and control include:

- Executive engagement and clearly defined leadership;
- Implementation, reporting and evaluation of a local HAI prevention program;
- Increasing consumer participation and education for infection prevention and control;
- HAI and antimicrobial stewardship surveillance; and
- Where relevant, inclusion and consultation with non-acute healthcare services in the HAI prevention program.

NSQHS - VERSION 2 NATIONAL STANDARDS

NSW Health
Incident Management Policy

The local HAI program is an integral component of each HO's clinical governance system and should be regularly evaluated. Evaluation findings should be used to update the HO's risk management plan. The NSW Health Incident Management System (IMS) should be used to record incidents.

2.1 National standards

The National Safety and Quality Health Service (NSQHS – Standard 3 Preventing and Controlling Healthcare-Associated Infection Standard) (Version 2) are a quality assurance mechanism aimed at protecting patients from harm and improving the quality of health service provision (12). The clinical governance and partnering with consumers Standards set the overarching system requirements for all other standards and are to be included in gap analysis, action plans and evidence requirements. . Specifically for the preventing and controlling healthcare associated infection Standard, the criteria are:

- Clinical governance and quality improvement to prevent and control HAIs and support antimicrobial stewardship
- Infection prevention and control systems
- Reprocessing of reusable medical devices
- Antimicrobial stewardship

Successful infection prevention and control requires a collaborative approach and several strategies across all levels of the healthcare system. These strategies include:

- Governance
- Risk identification and management
- Surveillance activities to identify areas for action and quality improvement activities (hand hygiene assessment, awareness and practice of aseptic technique)
- Safe and appropriate prescribing and use of antimicrobial agents through antimicrobial stewardship and consumer engagement.

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 healthcare associated infection standard.

To understand the evidence requirements for accreditation NSQHS - VERSION 2 NATIONAL STANDARDS Hospitals Accreditation Workbook (55) provide further information on all the NSQHS.

2.2 Risk management framework

Infection prevention and control risks and being risk aware are an integral part of organisational IPC operations and must be identified and managed at the appropriate level for an IPC program to be effective (32).

Infection prevention and control threats should be addressed through a risk management process in order to maintain and improve patient and HW safety and provide safer care.

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

- **Facility wide**—for example, providing support for effective risk management through an organisational risk-management policy, staff training, follow-up of outcomes, monitoring and reporting.
- **Ward or department based**—for example, embedding risk management into all policies so that risks are considered in every situation.
- **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 (e.g. hand hygiene or respirator fit testing).

NSW Health PD
Risk Management - Enterprise-Wide Risk Management Policy and Framework - NSW Health

Australian Guidelines for the Prevention and Control of Infection in Healthcare

When implementing IPC measures all healthcare facilities need to consider the risk of transmission of infection and implement according to their specific setting and circumstances.

The local IPC program and plans should use a risk management framework consistent with NSW Health policy. For IPC, the risk framework for HOs should address five key actions of the NSW Health Risk Management Framework (56) described in Figure 1.

Figure 1. Steps of risk management, based on the NSW Health Risk Management Framework

Case study 3: Hospital with high *Staphylococcus aureus* Bacteraemia (SAB) rate

Regular performance monitoring at St Elsewhere Hospital revealed a higher than benchmark SAB rate over the preceding six months. The Infection Prevention and Control (IPC) Committee undertook a risk assessment to determine the appropriate management strategies.

1. **Establish the context**
   - A major metropolitan tertiary referral hospital with a regional cancer care service.
   - Provide a significant trauma service.
   - There has been a significant re-development of the cancer care services.
   - A significant staff turnover within last year.
   - Have operating theatres with over 90% utilisation
   - Perform many intravascular insertion procedures on a daily basis
2. **Identify infection risks**
   - Significant patient risk of infection associated with the trauma and cancer care service.
   - A large number of patients have either short or long term central lines in place.
   - Many patients are immunocompromised.
   - IPC service regularly monitors SAB rates and vascular access device use.
   - Adherence to aseptic technique and hand hygiene compliance.
   - High turnover of staff may have impacted on staff education and training.
3. **Assess the risk of infection**
   - Determine the type, source, location and significance of the infections.
   - Determine the number of patients with intravascular access devices, their use and infections.
   - Establish training and assessment of staff who insert intravascular devices.
   - Review audits of intravascular access device insertion, access, care and compliance with policy and procedures.
   - Identify if the risk is in a particular patient population by performing case reviews.
   - Determine causal and infection risks posed by using trend data, type of patients and the location of the patients with infections.
4. **Control the risk of infection**
   - Discuss the risk of infection with appropriate clinical groups to determine linkages and risks.
   - Quality improvement program to improve compliance with intravascular access device procedures and infection control processes.
   - Provide education and credentialing for the insertion, management and access of intravascular devices.
   - Review aseptic technique and hand hygiene understanding and compliance.
   - Development of a methodology for validation for each SAB case
   - Development of a system to identify each suspected or known SAB infection to enable immediate investigation
5. **Review the effectiveness of control measures**
   - Continue to monitor SAB rate.
   - Ensure reporting to IPC and peak quality committees on a regular basis.
   - Provide feedback to HWs.
   - Develop a regular evaluation method that includes: monitoring of SAB rates, compliance with aseptic technique, SAB case validation, credentialed staff numbers, and audit processes for the insertion, management and removal of intravascular access devices.

2.3 Infection prevention and control program

Every HO is to have an infection prevention and control program in place. The success and effectiveness of such a program requires the development and involvement of suitably qualified personnel or the development of adequate systems to link in with such expertise. In line with the core components of an infection prevention and control program, the practical aspects include(1, 57):

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 3

Table 3. IPC core components

Core components	Examples of practical application
A governance structure that incorporates risk escalation, reporting and feedback	• Documented organisational structure that includes committees that the program reports to with various aspects of the program • An understanding with reporting manager on what is required to be reported urgently and how it is to be reported • Knowledge of how to collect accurate and verified information, assess risk and document the information for reporting urgently (Brief) • A simple documented reporting line for routine and urgent information • A simple documented feedback plan for routine reports, incidents, audit results, quality improvement projects, outbreak reports etc.
Clearly defined objectives, functions and annual action plans	• This is the overview of the program that is provided for accreditation surveys • Certain information should be in a position description for infection prevention and control staff • Can be included in a risk/operational plan for the infection prevention and control program • Operational and business plans including actions and evaluations
Clear objectives that have scalability to manage any potential risks	• Can be included in a risk/operational plan for the infection prevention and control program • Identification and management strategies for organisms specific to local epidemiology • Can also be included in response and escalation plan for outbreaks
Trained professional(s) to lead and manage the program	• Relief or untrained staff should have an experienced mentor assigned • Information on network of experienced staff who are able to answer questions or provide advice
Linkages between national, state, LHD and facility policies/guidelines	• These will be reflected as 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	• Evaluations may include competency/clinical assessments, aseptic technique audits, hand hygiene audits, environmental cleaning audits

for effectiveness and applicability to each of the health professional groups	• Review of incidents • HAI surveillance results • Reports 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 e.g. hand hygiene, cleaning shared patient care equipment, patient education, standard and transmission based precautions, surgical antisepsis • What other programs are involved in contributing to the strategies e.g. antimicrobial stewardship, environmental cleaning, reprocessing of reusable medical devices, education programs, competency assessment programs • What committees contribute to these strategies e.g. 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 environmental and equipment risks	• 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/NZS4187 • 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 • purchase of new equipment • compatibility of equipment and cleaning chemicals

2.3.1 Roles and responsibilities of the health worker (HW)

Everyone who works in a HO 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.

NSW Health PD
NSW Health Code of Conduct

Infection prevention and control is incorporated into the work practices of all clinical and non-clinical HWs. Each HW is accountable for the inclusion of infection prevention and control in the work they do. In addition, each HW 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 HWs. Registered HWs 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.

2.4 Preventative maintenance and asset management

Each HO is responsible for developing and carrying out its own maintenance and asset management strategy to meets the needs of the HO and the population it serves. This strategy must include consideration of the infection prevention and control implications of purchasing and maintaining plant and equipment and the construction and maintenance of buildings.

NSW Health Strategic Asset Management Plan

2.4.1 Purchasing new equipment

Infection prevention and control, and where relevant, reprocessing advice should be obtained before the purchase of any new consumables or equipment. Reprocessing staff should also be consulted for any reusable medical devices that require reprocessing. Advice should be based on an assessment of whether:

- the product is registered with Therapeutic Goods Administration (TGA) or an exemption from TGA is obtained
- the manufacturer is able to 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;
- the company has provided advertising material making bogus claims with no or little evidence to support the claims;
- there have been previous product recalls or shortages for the product;
- the product will increase or decrease the risk of infection to the patient or other individuals who may be present during the delivery of care;
- the product may be implicated in the transmission of infection over time (e.g. corroding materials);
- 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 new product;
- the product is compatible with existing equipment (if necessary);
- alternative products are available and whether these other products present a lower risk of infection; and

NSW Health PD
NSW Health Goods and Service Procurement

NSW Health PD
Process of Facility Planning

NSW Health GL
NSW Framework for New Technologies and Specialised Services

- If new technology it meets the criteria for new technologies and will require referral to the LHD/SHN New Technologies and Specialised Services Committee for review

2.4.2 Review and maintenance of existing equipment

Each HO should undertake regular maintenance and routine review of all patient and non-patient care equipment, furnishings and fixtures according to manufactures instructions, mandatory requirement or a 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.

2.4.3 Demolition, refurbishment and construction

The local infection prevention and control unit should be involved in the planning and building stages of any demolition, refurbishment or construction activity.

During the planning stage, the local infection prevention and control staff should be allowed 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.

NSW Health GL
Health Facility Guidelines - Australasian Health Facility Guidelines in NSW

Australasian Health Facility Guidelines
Part D Infection Control

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 HO should appoint IPC and clinical microbiology to the team that determines and evaluates:

- the 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;
- the infection prevention and control requirements of the new, renovated or repaired facility;
- whether additional infection prevention and control measures are required for patients, HWs and visitors during construction activity;
- what infection prevention and control measures are required by construction workers during construction activity; and
- the involvement of the local infection prevention and control unit in site inspections and commissioning of the new or refurbished facility.

NSW Health PD
Water - Requirements for the Provision of Cold and Heated Water

NSW Health GL
Engineering Services Guidelines

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. The following table provides a minimum risk assessment checklist.

Table 4. IPC Construction checklist example

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 correct set up e.g. water flow, sealed near wall, hand hygiene products			
Alcohol based hand rubs available, installed in correct positions and no risks identified e.g. near electrical outlets			

2.5 Staff health and HAI risk

HWs noncompliance with infection prevention and control can contribute to the potential transmission of microorganisms within healthcare settings (58-62). HWs carry their own commensal microflora and at times may become colonised or infected with other microorganisms that are in circulation within a healthcare facility (63).

HOs have a responsibility to take a proactive position on staff health matters that may put the health of patients, visitors or other HWs at risk of a HAI. A HW diagnosed with an infectious condition is obliged to practise in such a manner that does not put patients, visitors or other HWs at risk of infection.

NSW Health PD
Code of Conduct

2.5.1 Risk assessing HWs

There are times when the HW may be the source of an infection and may promote the transfer of microorganisms to patients or to other HWs. Where a HW is unwell, ask the following questions prior to the delivery of any patient care to establish the presence and severity of this risk:

- Is the HW known or suspected of being colonised or actively infected and poses a direct risk to others with an MRO or other communicable disease such as a blood-borne virus?
- Is the HW displaying signs of an acute respiratory illness such as coughing or fever? e.g. Influenza, Pertussis, or Tuberculosis?
- Is the HW vomiting or has diarrhoea?
- Does the HW have any open wounds that are unable to cover with a waterproof or other dressing? This is particularly important if any wound inhibits compliance with hand hygiene.
- Is there a history of recent overseas travel or overseas hospitalisation?
- Is performance of an exposure prone procedure (EPP) likely?

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

- **Procedures that are being performed by the HW.** EPPs and aerosol generating procedures (AGPs) may increase the likelihood of microorganisms being transferred from patient to HW.
- **Presence of wound, 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, e.g. 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.
- **Contacts and exposure to particles carrying infectious material**. Consider whether the HW has had exposure to a patient with an infectious illness or exposure to symptoms of infectious disease (e.g. vomit, diarrhoea) without practicing transmission based precautions.
- **Vaccination or immunity status.** Prior vaccination or identified immune status to specified infectious diseases may protect the HW from the establishment of an infection. In some cases vaccination may also reduce the severity of illness.

The HO must have systems to ensure compliance with the Policy Directives that protect HWs. Where a HO identifies, or is made aware, that a HW is at risk or poses an infection risk to patients, visitors or other HWs, 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 HW must be managed to ensure that the health and welfare of the HW or patients, visitors or other HWs are not compromised. This may result in exclusion of HW from the workplace or reassignment of duties in consultation with the relevant stakeholders.

NSW Health PD
Occupational Assessment, Screening and Vaccination Against Specified Infectious Diseases

2.5.2 Managing HWs

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

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

NSW Health PD
Open Disclosure Policy

The implementation of these will require continual support and reinforcement at the HO Executive level.

NSW Health PD
Work Health and Safety: Better Practice Procedures

Where a HW 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 HW'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.

NSW Health PD
Injury Management and Return to Work

NSW Health PD
Occupational Assessment, Screening and Vaccination Against Specified Infectious Diseases

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

NSW Health PD
Leave Matters for the NSW Health Service

NSW Health PD
HIV, Hepatitis B and Hepatitis C - Management of Health Care Workers Potentially Exposed

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

NSW Health PD
Management of health care workers with a blood borne virus and those doing exposure prone procedures

If a HW is immunocompromised or lacks sufficient protection against a vaccine preventable disease, a suitable management response may be to change the HW's duties or redeploy the HW in an area where there is a lower risk of infection. HWs 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 (e.g. penetrating needle stick injury), the exposed HW may require immediate first aid, clinical care and/or treatment.

NSW Health GL
NSW Contingency Plan for Viral Haemorrhagic Fevers

If a HW is exposed to an infectious disease during the course of their work (e.g. caring for an infected patient without using standard or transmission based precautions), the management response should address:

- Notifying the HW of the exposure (if they are unaware);
- Whether they require 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 HW 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; and
- Referral to their General Practitioner or relevant specialist consultant.

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

2.5.3 Exposure prone procedures (EPPs)

EPPs are a subset of invasive procedures in body cavities, or in poorly visualised or confined sites (e.g. mouth), where there is potential for contact between the skin of the HW and a sharp.

Key practice points:

- HWs who perform EPPs must know their human immunodeficiency virus (HIV), HBV and Hepatitis C virus (HCV) status and undertake annual testing in line with current NSW Health Policy and National Hepatitis B and C testing policies.
- HWs who are either HCV PCR positive or HBV DNA positive or HBeAg positive or HIV positive must not perform EPPs. Criteria for with HIV, HBV or HCV are under review and are expected to be updated in the near future. These HWs should seek expert advice. HWs who do not perform EPPs are not required to undergo routine blood borne virus testing.

NSW Health PD
HIV, Hepatitis B and Hepatitis C - Management of Health Care Workers Potentially Exposed

NSW Health PD
Management of health care workers with a blood borne virus and those doing exposure prone procedures

National Hepatitis B Testing Policy v1.2

2017 National Hepatitis C Testing Policy v1.2

2.5.4 HW screening and vaccination

Routine HW screening is not required for most infectious diseases. TB screening should be undertaken for new HWs who have been born or have lived (≥3 months cumulatively) in countries with a high incidence of TB or new and current HWs that have recently travelled (≥3 months in past three years) to countries with a high incidence of TB.

HWs with direct patient contact require immunological protection against the following vaccine preventable diseases:
diphtheria,
tetanus,
pertussis,
hepatitis B Virus,
measles,
mumps,
rubella,
chickenpox

NSW Health PD
Occupational Assessment, Screening and Vaccination Against Specified Infectious Diseases

The Australian Immunisation Handbook

Annual influenza vaccination is either recommended or mandatory for HWs who work in high risk clinical settings.[191]

2.5.5 HWs with cystic fibrosis

HWs with cystic fibrosis (CF) should consult with their line manager and infection prevention and control staff on specific requirements for delivery of care. The patient management requirements described in Section 9.3- *Cystic Fibrosis* are not intended to be used to manage HWs with CF.

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

2.5.6 HWs with herpes simplex virus

There is a risk that a HW with an oral/facial lesions (i.e. cold sores) associated with herpes simplex virus (HSV) may transmit infectious material to a patient when providing direct care. The appropriate management response should ensure that these HWs 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 should be determined locally and be based on an established risk assessment.

2.6 Healthcare worker education

2.6.1 Mandatory requirements

Completion of mandatory training helps maintain a safe and healthy work environment and must be undertaken by all NSW Health staff to meet the 6 criteria specified in *NSW Health* Policy Directive - Mandatory Training - Criteria for Approval and NSQHS - VERSION 2 NATIONAL STANDARDS.

Infection prevention and control training of HWs is an essential core component of an effective IPC program.

Currently there are core training modules that are mandatory for all clinical staff, including specific infection prevention and control issues; In addition, there are a number of additional training requirements targeted to HWs based on their roles and responsibilities within the organisation.

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

2.6.2 Local education and training

Each HO 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 analyses. 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 HWs. 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 HWs.

2.7 Consumer/Patient/Carer education

The provision of education to patients and their family, carers and visitors is an effective way to reduce further carriage and spread of infection in the health care setting and in the community.

Patient education empowers patients, carers, their family and visitors to feel comfortable to ask questions about their care and participate in infection prevention and control activities. Starting conversations on education enables patients to express their concerns and further their knowledge on infection risks.

HOs should continually provide education to their consumers, patients and carers on general infection prevention and control topics, such as hand hygiene, vaccination programs, respiratory hygiene and cough etiquette.

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 2

Clinical Excellence Commission Guide to Health Literacy

The time to give infection prevention and control information varies from patient to patient and not every patient will require specific infection prevention and control education. In general, individualised education should be provided to a patient:

- when an infection risk is identified and continued until the risk has subsided e.g. chemotherapy, organ or tissue transplant
- with a suspected or confirmed infectious disease
- undergoing surgery
- with a newly identified MRO
- in transmission based precautions
- who has an identified medical condition or immune disorder that increases their risk of acquiring an infection or MRO e.g. diabetes, hypogammaglobinaemia
- 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.

Patients 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 care plan until the risk has abated.

When providing infection prevention and control education to patients, treating clinicians should provide personalised 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 HWs 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?

ACSQHC Antimicrobial Stewardship Clinical Care Standard

ACSQHC information sheets
Carbapenem Resistant Enterobacterales

Clinical Excellence Commission information sheets
Clostridium difficile
Carbapenem-resistant Enterobacterales

National Hand Hygiene Initiative Manual

NHMRC information sheets
Healthcare associated infections
Clostridium difficile
Methicillin resistant *Staphylococcus aureus*
Vancomycin resistant enterococci

NSW Health Infectious Diseases Factsheets

HW should first provide verbal education to the patient and then, if appropriate, provide the patient with written patient information sheets that have been approved by the HO. Any written material should be provided to patients as reference material rather than as a primary source of education.

Written material should always be explained and discussed with the patient. Any education and/or patient information provided to the patient is to be documented in the health record.

Every HW has a responsibility to provide infection prevention and control education to patients in their care and the patient's family, carer and visitors. HWs should provide infection prevention and control education to consumers/patients based on the scope and context of the patient/HW relationship, as illustrated by the following examples:

- A physiotherapist may educate a patient on why their wound must heal before the patient can use the hydrotherapy pool.
- A surgeon 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 an infection.
- An infection prevention and control professional may educate a visitor with persistent cough not to visit a relative in NICU.
- An infectious diseases physician may educate a patient regarding their new diagnosis of CPE when discussing their treatment options.
- A nurse may educate their patient with a 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 patient information (e.g. sexual history, disease status, pregnancy). When providing education to a patient or their family, carer and visitors, clinicians should be aware of the physical environment and seek permission from the patient to disclose any sensitive information to family, carers or visitors.

NSW Health Privacy Manual for Health Information

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 health care and take appropriate action (64).

The health literacy of one person may vary markedly to the health literacy of the next person. The health literacy of most patients is usually very different to that of a HW. 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.

NSW Health PD
Interpreters - Standard Procedures for Working with Health Care Interpreters

Depending on the individual consumer, it may be necessary to provide education and information in languages other than English. This can be done by engaging the services of a language interpreter or information sheets written in the patients preferred language.

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

NSQHS - VERSION 2 NATIONAL STANDARDS
Partnering with consumers

HOs 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 e.g. 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 it is 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. An example of 'teach back' is provided in Case Study 5. 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.

NSW Health PD
NSW Health Policy & Implementation Plan for Culturally Diverse Communities

NSW Health GL
Consumer Representatives - Working with Consumers in NSW Health

NHMRC
How to present the evidence for consumers: preparation of consumer publications

NHMRC
How to present the evidence for consumers: implementation and dissemination strategies

2.7.1 Evaluating the delivery of information to consumers

As part of a HO'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 HO consumer advisory groups
- Consumer surveys or focus groups
- Testing on a small number of patients

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

2.8 Communication between providers

Processes for communicating a patient's infectious status should be in place whenever responsibility for care is transferred between service providers or HOs. This includes communicating the status of the patient to the receiving facility and any health-related transport providers such as NSW Ambulance or Non-Emergency Patient Transport.

NSQHS - VERSION 2 NATIONAL STANDARDS

See **Section 7** *Communicating with other hospitals* for information about communicating about patients with MROs

Case study 4: William's story - Using Teach back in the pre-admission clinic

William is having knee replacement surgery next week. He has brought along his wife, Kate, to his pre-admission clinic visit. Simone is the nurse attending to William at the pre-admission clinic. This is a part of their conversation that shows how the Teach back method can be used when having a conversation with a patient.

Simone: William, your surgery will take place at 11am next Thursday. You will need to be at the hospital at 7am so we have enough time to prepare you for theatre.

William: Okay.

Simone: Next Wednesday night, you need to take a shower before you go to bed. This is the special wash you need to use. It is different to the soap or body wash that you buy at the shops. Washing yourself with it will help reduce the risk of you getting an infection from the operation. Are you following me?

Both William and Kate nod their heads in agreement

Simone: You also need to have a shower on Thursday morning before you come to hospital. So that means two showers with the special wash before you come in.

William: Okay.

Simone: So that I am sure that you know what needs to be done, can you tell me what you are going to do before the surgery next week William?

William: Sure. On Wednesday, I will have a shower at night and then on Thursday morning I will have two showers, using the special wash you have given me.

Simone: Let's go over that again. On Wednesday night you need to take one shower and use this special wash. Then on Thursday morning, you need take only one shower and use this special wash. How about I give you two packets of special wash and I'll write Wednesday night on this packet and Thursday morning on the other packet?

**Simone labels the special wash packets **

Kate: That will make things easier to remember.

Simone: Okay William, so tell me in your own words what you are going to do next Wednesday night?

William: I'm going to have a shower after dinner and I will use this packet of special wash.

William holds up the special wash packet labelled 'Wednesday Night'

Simone: Great. What else do you need to do?

William: On Thursday morning, I will have another shower and use this *special wash packet*. Then I'll come in at 7am. I better be clean after all of that!

Simone: Do either of you have any questions about using the *special wash packet*?

Kate: Should I use the *special wash packet* too? We share the same bed and I'll be driving him to the hospital.

Simone: No need for you to use it Kate. Just use the usual soap or body wash you have at home.

Simone: Do you have any further questions. It is important that you both know what needs to be done before William's operation.

SECTION 3
RISK IDENTIFICATION OF HEALTHCARE ASSOCIATED INFECTIONS

3 Risk identification of HAIs

"Risk assessment is one of the cornerstones of infection prevention and control …."
The Joint Commission, 2010 (65)

ESTABLISH THE CONTEXT

IDENTIFY INFECTION RISKS

ASSESS THE RISK OF INFECTION

CONTROL THE RISK OF INFECTION

REVIEW EFFECTIVENESS OF CONTROL MEASURES

Where possible, HOs should use existing risk identification strategies and adopt the principles outlined in this section.

NSW Health
Health Risk Assessment

A HAI may occur if a susceptible person acquires a sufficient quantity of a microorganism from either:

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

It is important to initially determine and continually review any risks that promote the transfer and spread of microorganisms and any risks that promote the acquisition of an infection by a susceptible person. As new and emerging evidence identifies infection risks to patients and whether they increase the risk of HAIs, these must be considered when assessing the effectiveness of control measures. Infection risks may be associated with:

- the individual patient;
- shared patient care equipment;
- contaminated foods, medications or water sources;
- inadequately reprocessed reusable medical device;
- cleaning of the functional area;
- the providing care; and
- the patient's family, carer or visitors.

3.1 Risk assessing the patient

The patient may be:

- the source of an infection and may promote the transfer of infectious material or
- the target of an infection (i.e. 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 period of communicability and the way the infectious diseases is transmitted to others at risk
- determine the type of room accommodation e.g. single room with en-suites
- determine the type of precautions required and the duration of these precautions
- determine patient education requirements to prevent transmission to others

It is important to determine whether a patient is a source of infection as early as possible 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:

- Is the patient known or suspected of being colonised or infected with an MRO or communicable disease or risk of classical creutzfield Jacob disease (CJD)?
- Has the patient been screened for a MRO previously?
- Has the patient recently received or is currently taking antimicrobials?
- 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 wounds?
- Does the patient have any invasive devices?
- Is the patient a resident of a residential care facility?
- Is there a history of recent overseas travel or overseas hospitalisation?

A patient's susceptibility to an infection is affected by a number of 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 individual 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.

3.2 Risk assessing the functional area

Functional area is defined as the classification of an area (department/unit/specialty) based on the activity conducted and associated risks.

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.

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

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.

Consider adapting the **ACSQHC Aseptic Technique Risk Matrix** to determine the functional area risk rating.

To establish whether a functional area is likely to promote the establishment or spread of a HAI, each functional area in hospitals should be risk assessed with specific consideration to the following matters (32):

- **Procedures:** Performing a highly invasive procedure that breaches the skin and exposes normally sterile body substances and tissue may increase susceptibility to infection.
- **Patient mix:** Consider whether there are certain patients that may be more susceptible to infection than others.
- **Physical environment**: Certain procedures should be carried out in fit-for-purpose settings in order to minimise the risk of transmission (e.g. catheter labs, interventional radiology (IR), operating theatres).
- **Patient Movement:** Constant moving of patients through variable functional areas contributes to the potential for increasing the risk of infection and complicates strategies for control and contain (66).

NSW Health PD Infection Prevention and Control Policy

3.2.1 Community settings

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

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

- **Procedures:** Performing a highly 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 portions or sets are used, remaining parts should be disposed of according to current waste management procedures.
    - Sterile products or equipment are to be stored in a manner to maintain their sterility.
    - 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.
    - Event related sterility applies to all sterile stock (refer to Section 8)
    - 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 transmission.
- **Waste management:** Inappropriate clinical waste disposal may promote the spread of infection.
- **Contacts:** The type of contact between patient or their family and HW, 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.

Case study 5: Elizabeth's story - risk assessing in community settings

Elizabeth, a community nurse, receives a referral to provide daily wound care to Dorothy, an 84 year old lady who lives alone with no carers or family. Dorothy has chronic leg ulcers on both lower legs and has been referred by her general practitioner (GP) who took wound swabs when he visited the previous day. The GP was unable to provide Dorothy's medical history as he has just taken over this patient, however, he states Dorothy reported that she had "golden staph" in her leg ulcers a while ago, and the ulcers are getting worse again. She is now finding it very difficult to do the dressings.

On arrival, Elizabeth observes that Dorothy walks with the aid of a walking stick, and her house is extremely cluttered and unkempt. Elizabeth also observes that Dorothy's bandages are dirty and have unravelled. Her legs appear very wet from wound exudate. The house also has a malodourous smell. Dorothy leads Elizabeth into the lounge room where there doesn't appear to be anywhere suitable for Elizabeth to attend the wound care, place her equipment bag, or set up her dressing equipment.

Elizabeth needs to risk assess the situation using the 5 key actions:

1. **Establish the context**
   - Remember this is a home, not a hospital, and environmental cleaning and waste management may not be frequently attended.
   - Determine whether there are other residents in Dorothy's home.
   - Define the task: removal of the wound dressings and cleaning and redressing of the ulcer.
2. **Identify infection risks**
   - Continuing to use wet and dirty bandages will promote microbial growth and infection.
   - Because of her history of ulcers, Dorothy is susceptible to an infection in her leg.
   - Elizabeth is at risk of being exposed to pathogens and other microorganisms that are present in this environment.
3. **Assess the risk of infection**
   - There is a high risk of a severe infection for Dorothy associated with the wet and dirty wound dressings.
   - There is a moderate risk of transmission of microorganisms if Elizabeth does not comply with infection prevention and control standards when she is attending to Dorothy.
   - The most likely way that either Dorothy or Elizabeth will come in contact with microorganisms and be at risk of an infection is via contact transmission.
4. **Control the risk of infection**
   - To eliminate the risk of Dorothy acquiring an infection, Elizabeth needs to perform the following
     - Hand Hygiene as per Five Moments
     - Remove soiled dressings and dispose appropriately
     - Clean wound area
     - Apply clean dressings as per clinical care standards
     - Ensure the procedure is carried out aseptically
   - To mitigate the risk of exposure to body substances for Elizabeth, she should don appropriate PPE.
   - To prepare for an aseptic procedure it is important that Elizabeth prepare a suitable space (e.g. a coffee table that is cleared and cleaned) Elizabeth will need to perform hand hygiene and set up her aseptic field on a drape on the table.
   - Elizabeth provided education to Dorothy on the importance of hand hygiene, infection prevention and control and how to keep the wound dressing clean as possible.
   - Elizabeth provided feedback to Dorothy's GP that Dorothy may require home assistance as her leg wound is restricting her movements and she does not have any assistance.
5. **Review effectiveness of control measures**
   - Elizabeth advised Dorothy to call her if she thought the dressing was dirty or wet.
   - Ongoing follow up and review to ensure there is no signs of infection.
   - Continued wound management and education
   - Organise home assistance while her leg wound was restricting her movements.
   - Develop escalation process for Dorothy and Elizabeth if condition deteriorates

3.2.2 Ambulance settings

The principles of infection prevention and control equally applies to paramedics and ambulance settings. Where compliance to infection prevention and control principles is hindered by the risk assessment and situation at hand, steps to mitigate the risk of any potential infection are to be applied as soon as practical.

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 establish 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 a highly 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.
    - 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:** Certain equipment and stock must be used only if sterile. Maintenance of stock sterility in a crowded, mobile and temperature labile environment is difficult and this issue 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 to patients as well as HWs.

3.2.3 Patient transport settings

Communal patient transport vehicles (i.e. transports more than one patient at a time) is considered as a community setting for the purposes of this Handbook. Communal patient transport vehicles are akin to 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 Section 3.2.1*, Community settings*. For transport of patients with specific MRO should refer to Section 7.18 *Transferring or transporting a patient with a MRO*

All other patient transport vehicles should be considered as similar to an ambulance setting and risk assessed in the same way as an ambulance setting is risk assessed See Section 3.2.2*, Ambulance settings.*

3.3 Risk assessing visitors

Visitors can potentially play a role in introducing pathogens to both patients and the healthcare environment. Visitors may also be at risk of exposure to infection causing pathogens (susceptible), 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 (i.e. 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; coughing, sneezing, vomiting, diarrhoea, open wounds or visible exudate 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.

Risk minimisation strategies regarding visitors should include:

- Hand hygiene practices (see Section 4.1, *Hand hygiene*)
- Respiratory hygiene and cough etiquette (see Section 4.2, *Respiratory hygiene and cough etiquette*)
- Transmission-based precautions (see Section 5, *Risk mitigation: transmission-based precautions*)
- Delay or exclusion of the visitation (e.g. 48 hour delay of visit after cessation of gastroenteritis symptoms).

SECTION 4
RISK MITIGATION: STANDARD PRECAUTIONS

4 Standard precautions

"…. Standard precautions is the first line of defence in infection control and assumes that all blood and body fluids are potential infectious."

Sonya Osborne, 2002 (67)

ESTABLISH THE CONTEXT

IDENTIFY INFECTION RISKS

ASSESS THE RISK OF INFECTION

CONTROL THE RISK OF INFECTION

REVIEW EFFECTIVENESS OF CONTROL MEASURES

Standard precautions are the minimum precautions required when providing care to a patient at any time and in any care setting (32).

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

Hand hygiene is a major component of standard precautions and one of the most effective methods to prevent transmission of pathogens associated with health care. In addition to hand hygiene, the use of personal protective equipment (PPE) should be guided by risk assessment and the extent of contact anticipated with body substance or pathogens.

A risk management approach must be adhered to at all times to protect patients, healthcare workers and the healthcare setting more broadly.

Health Practitioner Regulation (NSW) Regulation 2010

WHO Standard precautions in healthcare

Standard precautions comprise the following measures:-

- Hand Hygiene
- Respiratory Hygiene (Cough Etiquette)
- Personal Protective Equipment (PPE)
- Aseptic Technique
- Needle-stick and Sharps Injury Prevention
- Cleaning and Disinfection
- Waste Disposal

Each of these measures will be described in this section in further detail.

Case study 6: Norman's story - when standard precautions aren't used

A 70 year old gentleman, Norman, presented to the hospital's emergency department with chest pain. An IV cannula was inserted in his right forearm for pain relief and intravenous fluids. Norman has experienced a lot of discomfort since arriving at the emergency department and he has been sweating. He is transferred to a ward bed on the same day. The ward appears to be very busy as HWs are moving from patient to patient without performing hand hygiene. The nurse caring for Norman introduces herself and checks his IV, she finds that the dressing has lifted and there is old blood around the cannula. The nurse has a new IV dressing in her pocket. She removes the old dressing and replaces with a new dressing. The nurse did not perform hand hygiene before or after the procedure nor did she put on gloves.

It is now day four of Norman's admission, he has a temperature of 38.7^{0}C and the cannula site on his right forearm is inflamed and swollen. The nurse removes the cannula. Blood cultures are collected and intravenous antibiotics are commenced. Forty eight hours later the microbiology results are available and indicate that Staphylococcus aureus had grown in the blood cultures.

What happened?
Norman developed a preventable hospital-associated inpatient infection which resulted in increasing his length of stay in hospital by ten days.

The nurse caring for Norman had not performed hand hygiene before and after touching him or before and after performing a procedure. This omission potentially resulted in transmission of microorganisms, including *S. aureus,* possibly from the nurse's unwashed hands and or poor asepsis during the procedure. The nurse also did not use gloves when in contact with the old blood around the cannula. This potentially could cause an occupational exposure. Carrying a sterile dressing in the nurse's pocket compromised the integrity of the packaging which could have contaminated the dressing. The nurse did not use aseptic technique when changing the IV dressing and therefore contaminated the IV cannula site.

How could it have been prevented?
If the nurse had performed hand hygiene in accordance with the five moments and maintained asepsis of a key site, cross transmission may have been avoided. Had the nurse applied the principles of aseptic technique and cleaned the IV site before the application of a clean and intact dressing to the IV site, in addition, it is recommended that HWs perform hand hygiene prior to contact with sterile stock, the risk of infection would have been minimised. Wearing a pair of gloves would reduce her exposure to Norman's blood.

4.1 Hand hygiene

Hand hygiene is recognised as the cornerstone of infection prevention. Hand hygiene is the act of cleaning hands with alcohol based hand rub (ABHR) in either liquid, foam or gel form; antiseptic liquid hand wash and running water; or (plain) liquid soap and running water and dry with single use towels. Wearing gloves should not be considered a substitute for hand hygiene (32).

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 3

4.1.1 Hand hygiene principles

HWs are required to perform hand hygiene:

- Before and after patient contact;
- Before and after a procedure;
- After a body fluid exposure;
- 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 HW should attend to clean sites before dirty sites);
- Before handling sterile products/packs; and
- After touching patient surroundings.

For surveillance and auditing purposes these are referred to as the **'5 Moments for Hand Hygiene'** - see **Section 10,** *Auditing for the National Hand Hygiene Initiative*

National Hand Hygiene Initiative
5 Moments for Hand Hygiene

In addition, it is recommended that HWs perform hand hygiene:

- Upon entering and leaving a ward (for example, at start of shift or going on a break);
- Before 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 (e.g. companion therapy); and
- Before and after smoking, including e-cigarettes

Australian Guidelines for the Prevention and Control of Infection in Healthcare

Effective hand hygiene relies on the following mechanisms of action (68, 69):

- The rubbing action, or friction, that enables the mechanical removal of microorganisms;
- The antimicrobial properties of the hand cleansing product (e.g. ABHR, soap) killing remaining microorganisms;
- The volume of applied ABHR needs to be adapted to hand size (70) to sufficiently cover palm and dorsum and
- The drying of hands after hand cleaning and before putting gloves on as residual moisture left on the hands may harbour bacteria (71).
- The entire surface of the hands should be covered with hand hygiene product when performing hand hygiene (72).
- Use ABHR on dry, non-soiled hands and rub hands vigorously until the ABHR has evaporated (follow manufacturers recommendation on amount); or
- Use a liquid antiseptic hand wash or plain liquid soap with running water, and dry with single use towels (paper or cloth); or

- 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

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*; and
- 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 which helps to dissolve and lift soiling (fats and proteins) from the skin (22, 73-75); and
- If soap and water are not available, ABHR should be used.

ABHR has some reported limitations in spore penetration and may be less effective against removing and killing bacterial spores e.g. *clostridium difficile* and non-enveloped viruses e.g. rotavirus, norovirus. Soap and water would be the more effective method of Hand Hygiene in these situations especially after care with symptomatic patients where hands may be visibly soiled. In these situations where soap and water is not available ABHR should be utilised.

4.1.2 Hand wash basin

- There is growing evidence around hand wash basin and sink drains increasingly implicated as potential reservoir of antibiotic resistant bacteria.
- Hand wash basins should be strategically placed to reduce the risk of splashing in areas where direct patient care is provided. Placement of hand wash basins within close proximity to a patient may potentially increase the bioburden and transmission risk.
- Hand wash basins must comply with the requirements of the Australasian Health Facility Guidelines.
- Hand wash basins in clinical areas should be dedicated for its intended purpose. Non-hand hygiene activities such as squirting used medication, empting leftover fluids or disposing NG aspirate etc. may provide a mechanism for promotion of microbial growth in the drain(76).
- Water being present around hand wash basins or sinks encourages the development of mould and bacteria in any substrate material.
- Regular cleaning and maintenance should be instigated to reduce the bioburden.

The installation and use of high speed hot air dryers is not appropriate for clinical areas of HO's as there are risks that these dryers will spread pathogens in the clinical setting and therefore increase the risk of cross transmission of organisms (77). Hot air hand dryers may be considered in non-clinical areas, such as public toilets if evidence supports their instillation.

Australasian Health Facility Guidelines
Part D Infection Control

4.1.3 Hand hygiene product selection

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

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

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

See **Section 2**, *Purchasing new equipment* for further advice on the purchase of new equipment

ABHR is more effective in reducing microbial load compared to antiseptic hand wash or soap and water when hands are not visibly soiled (78, 79). ABHR is better tolerated by hands, is quicker to use and can be placed at point -of-care locations which makes it more accessible than other hand hygiene products.

National Hand Hygiene Initiative
Product selection

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

- Alcohol solutions containing 60-80% (80) alcohol or 77%ethanol (Volume/Volume) is recommended (22);
- 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;
- Value for money; And
- Company support for instillation, resources provided and education programs.

The clinical activity to be performed should dictate the product and technique used. Table 5 provides advice on the hand hygiene product to use for common clinical activity sets

WHO
Guidelines on Hand Hygiene in Health Care

Alcohol free hand rub is not as effective as ABHR (22, 81) 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 4.1.9 Hand hygiene in Justice Health and Forensic Mental Health Network settings*.

Table 5. Hand hygiene procedures

Activity		Skin cleansing product*	Action	Duration of hand wash or handrub*
Routine (Social) situations		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 towel.	15-20 seconds
Standard patient care activities[82]	e.g. taking pulse/BP, assembly of needle and syringe , prior to collecting and opening sterile consumables or preparing an aseptic field, and after touching patient surroundings	ABHR	Dispense manufacturer's recommended amount of 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.	Until dry (usually 15-20 seconds)
		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 towel.	15-20 seconds
		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 towel.	15-20 seconds
	e.g. 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 towel.	15-20 seconds
Aseptic procedures	e.g. wound dressing, invasive device maintenance or insertion of IDC, PIVC, epidural and other procedures where maximum barrier precautions are not required	ABHR	Dispense manufacturer's recommended amount of 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.	30-60 seconds
		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 towel.	30-60 seconds

	Insertion of CVAD and other procedures where maximum barrier precautions (mask, cap, eyewear, sterile gown, sterile gloves) are required.	ABSHR (83)	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. 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 finger nails.	2 minutes
Surgical procedures	**i) Surgical pre wash** (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 finger nails. Rinse. Dry hands with single use towel.	1minute
	ii) Surgical hand scrub	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 for 2 minutes then rinse and repeat for a further 2 minutes for first scrub and 1 minute for subsequent scrubs of the list. Rinse. Dry hands with a sterile towel.	5 minutes for first operative procedure of the day 3 minutes for subsequent operative procedures
	ii) 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 amount of solution and duration

4.1.4 Jewellery and access to forearms

Several studies have shown that skin underneath rings is more heavily colonised than comparable areas of skin on fingers without rings (84).

- Hand, wrist or forearm jewellery (e.g. piercings, rings, watches, bracelets, bands, movement trackers, embedded jewellery) must not be worn by healthcare professionals in the clinical environment and where providing direct patient care, unless required for patient care (e.g. watch) or medically essential (e.g. 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 during hand hygiene.
- To allow for adequate antiseptic scrubbing of hands and forearms prior to a high risk aseptic or surgical procedure all hand, wrist and forearm jewellery must be removed.
- Long sleeve articles of clothing should not be worn in clinical environments. If worn sleeves must be rolled above the elbow during clinical/direct patient care.
- The only forearm attire permitted within the clinical area is PPE (impervious gowns, sterile gowns, gloves).

The ability to perform effective hand hygiene for the clinical care required must not be impeded by the wearing of long sleeved garments or forearm jewellery (for example religious bangles, medical bracelets or bandages). HOs should perform a case by case risk assessment in consideration to the risk to patients versus the HW.

4.1.5 Fingernails

- Artificial nails, Nail varnish, Nail art and technology must not to be worn by healthcare professionals providing direct patient care (85).
- HWs should have short fingernails

Chipped nail varnish supports the growth of larger numbers of organisms on the fingernails.
Nail art and technology and artificial nails are a potential reservoir of microorganisms may promote transmission and prevent effective hand hygiene (84-87). Recent evidence supports that shorter nail length minimises risk of potential microorganism transmission (88). 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.

4.1.6 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 product are not deactivated (80).

- ABHR should be dispensed onto dry hands while liquid soaps and antiseptics should be applied to hands already wet with water (see Table 5).
- Good skin integrity is aided by good hand hygiene technique.
- HWs 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. All broken skin should be covered with an impervious dressing.
- HW with compromised skin integrity involved in direct patient care or in the direct patient environment, should have a risk assessment to determine whether the HW 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 (see Section 2.5.1, *Risk assessing HWs*).

- Given the potential for the contamination and infection transmission, it may be inappropriate for a HW to work clinically if they require multiple impervious dressings, hand splints or are unable to wear impervious dressings for certain medical conditions and cannot perform adequate hand hygiene.
- Hand care problems such as dryness, dermatitis and/or sensitivity should be reported to the manager/supervisor for action or referral to address hand care problems (see Section 2.5, *Staff health and HAI risk*).

4.1.7 Hand hygiene in oral health settings

Oral Health settings must comply with hand hygiene during the delivery of patient care as described in Section 4.1.1, Hand hygiene principles.

If providing oral health care within an operating theatre (e.g. complex oral surgery), HWs should comply with the hand hygiene principles expected for surgical environments (see Table 5).

4.1.8 Hand hygiene in community and home settings

HWs must comply with hand hygiene during the delivery of patient care in community and home settings as described in Section 4.1.1, Hand hygiene principles.

HOs must supply HWs with adequate product to undertake appropriate hand hygiene.

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

4.1.9 Hand hygiene in Justice Health and Forensic Mental Health Network settings

NSW legislation prohibits the supply and use of alcohol-containing products in Corrective Services NSW facilities. According to legislation:

- ABHR products must not be used in any HO that operates within these facilities; and
- HOs operating within Corrective Services NSW facilities must provide an alternative hand hygiene product that is alcohol-free, non-intoxicating and non-flammable for the use of HWs, patients and visitors in this setting.

Crimes (Administration of Sentences) Regulation 2014 - Reg 148

Summary Offences Act 1988 – Sect 27B
Trafficking

NSW Justice Corrective Services
Visiting a Correctional Centre

4.1.10 Patient and visitor hand hygiene

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

- In line with Section 2.7, Consumer education, educational resources should be made available to encourage the practice and technique of hand hygiene.
- Placement of signs and posters in key locations, such as entry and exit points, to act as visual triggers for patients and visitors.
- Availability of Hand Hygiene products should be readily accessible, consistent and mutually available for patients, visitors and HWs.
- The HO should ensure that HWs have the means and resources to enable patients to perform hand hygiene (i.e. providing ABHR or hand cleaning wipe for a bed-bound patient).

HWs should also encourage patients to perform hand hygiene prior to eating, after going to the bathroom, before leaving and on entry to their room.

4.2 Respiratory hygiene and cough etiquette

To minimise the risk of transmission of infection to others, everyone entering, visiting or working within a HO presenting with the signs and symptoms of respiratory infection should practise respiratory

hygiene and cough etiquette(see Appendix 5) (89). A HO should encourage and enable patients, visitors and HWs to perform respiratory hygiene and cough etiquette and provide appropriate resources to support these behaviours (90). Specific responsibilities for the HO and individuals visiting or working within a HO are detailed in Table 6.

Refer to Appendix 5 NSW Health Respiratory Hygiene poster

Table 6. Individual and HO responsibilities for respiratory hygiene and cough etiquette

Responsibilities of the individual	Responsibilities of the HO
• Do not cough into bare hands. Instead, cough into a tissue or elbow. • Perform hand hygiene after contact with respiratory secretions and contaminated objects or materials. • If a patient is coughing or sneezing during transportation or in common waiting areas, a surgical mask should be worn if clinically possible. • If coughing, sit ≥ 1m from others in common areas. • Inform clinicians about any respiratory signs or symptoms. • HW with a persistent cough or signs and symptoms of a respiratory infection should: - seek medical advice; - practise respiratory hygiene and cough etiquette; - absent themselves from work as necessary (see Section 2, *Staff health and HAI risk*)	• Reinforce the importance of hand hygiene and provide access to hand hygiene amenities. • Display signage that instructs patients and visitors on respiratory hygiene and cough etiquette. • To minimise transmission to high risk patients, a HO may prohibit a coughing or sneezing visitor from attending certain areas of the HO. • Ensure the availability of resources to support respiratory hygiene and cough etiquette in waiting areas for patients and visitors (e.g. tissues, waste bins) • Provide surgical masks to persons who are coughing in waiting areas. • If a visitor is coughing or sneezing, the visitor should be discouraged from attending the HO or should wear a surgical mask. • Ensure that HWs have access to appropriate PPE and are provided training in the use of PPE. • Employ a risk assessment system for the management of coughing HWs, particularly those HWs working in areas with vulnerable patients, such as neonatal intensive care units (NICUs), paediatric units, transplant unit and haematology units.

4.3 Personal Protective Equipment

The type of PPE used will vary based on the level of precautions required, such as standard and contact, droplet or airborne infection prevention and control precautions. 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 and/or clothing. Selections should be guided by 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.

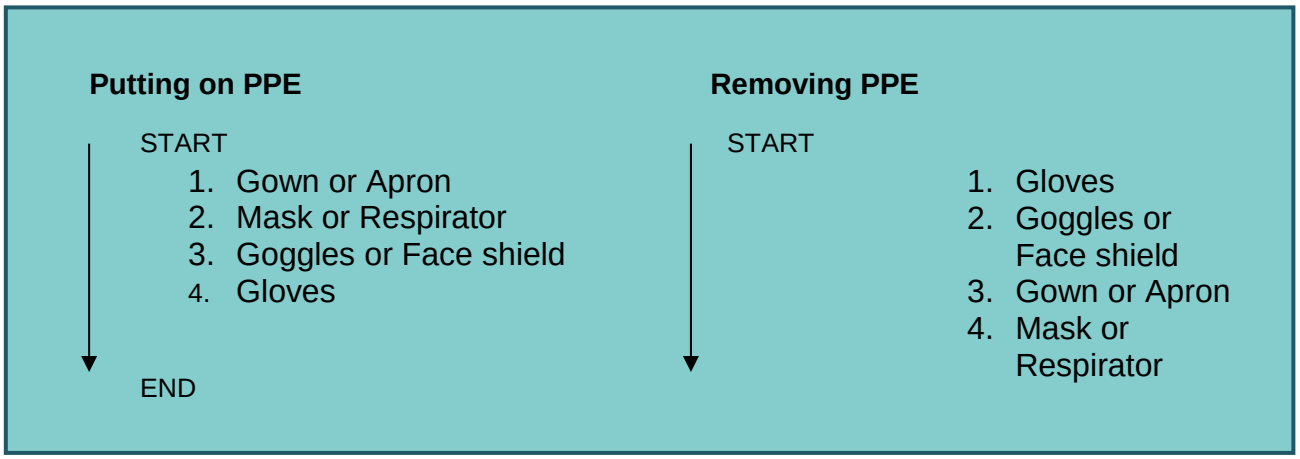
First is the type of anticipated exposure. This is determined by the type of anticipated exposure, such as touch, splashes or sprays, or large volumes of blood or body substance that might penetrate the clothing. PPE selection, in particular the combination of PPE, also is determined by the category of isolation precautions a patient is on.

Second is the durability and appropriateness of the PPE for the task. This will affect, for example, whether a gown or apron is selected for PPE, or, if a gown is selected, whether it needs to be fluid resistant, fluid proof, or neither.

Third is fit. PPE must fit the individual user, and it is up to the employer to ensure that all PPE are available in sizes appropriate for the workforce that must be protected.

The following sequences are recommended practice for putting on and removing PPE for all clinical settings outside the operating room (see Figure 2).

Figure 2. Sequence for putting on and removal of PPE



Putting on PPE

Always perform hand hygiene immediately before donning gloves, keep hands away from face after PPE donning, Limit surface touched with gloved hands, change gloves when torn or contaminated and perform hand hygiene between episodes of care.

Removing PPE

There are a variety of ways to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. See two examples below:

Example 1.

1. Gloves
2. Goggles or Face shield
3. Gown or Apron
4. Mask or Respirator

Example 2

1. Gown and Gloves
2. Goggles or Face shield
3. Mask or Respirator

PPE Sequence CDC

Australian Infection Prevention and Control Guidelines

Remove all PPE before exiting the patient room except a respirator, if worn. Remove the respirator after leaving the patient room and closing the door. Hand hygiene is to be performed if hands become contaminated at any step, and always before and after removing gloves.

Perform hand hygiene immediately after glove removal, before removing face protection and after removal of any contaminated item (1).

In certain circumstances, where there may be a heightened risk for HWs and patients (e.g. during the 2014 Ebola Virus alert), additional PPE requirements may apply (91). Where an emergency response e.g. pandemic influenza, significant outbreak situation, hospitals may receive PPE that looks or feels different from their usual supplies. The available PPE will have been assessed to meet the level of protection required.

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

At any time, if a HW's clothing becomes contaminated with body substance, the clothing should be removed as soon as possible and before the HW attends to other patients:

- If skin is contaminated with body substance, the HW must remove contaminated clothing/uniform or PPE and wash any affected skin, then perform hand hygiene;
- If broken skin has been contaminated by body substance , the occupational exposure must be reported to the HO using local procedures; and
- Each HO must procure and provide appropriately designed and sized PPE for HWs working in the HO.

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 3

NSW Health PD
HIV, Hepatitis B and Hepatitis C - Management of Healthcare Workers Potentially Exposed

NSW Health PD
Infection Prevention and Control Policy

4.3.1 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 (32). Intact gloves must be worn on both hands and must be used in situations where the HW 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;
- While handling items or surfaces that have come into contact with body substance ; and
- While performing an invasive procedure, venepuncture or a finger or heel prick.

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.
Unless exposure to blood is anticipated HWs do not need to wear gloves (82) when performing subcutaneous, intramuscular, intravenous or intradermal injections.

Gloves should not be worn as a personal safety strategy as contaminated gloves may be a significant cause of cross-contamination of pathogens in healthcare environment (92). Therefore, the way YOU use gloves 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 HWs hands. Hand hygiene must always be performed prior to donning gloves and after removal (22).

Gloves should always be put on immediately before the procedure or contact with body substance.

When wearing gloves, change or remove gloves in the following situations: during patient care if moving from a contaminated body site to another body site (including a mucous membrane, non-intact skin or a medical device within the same patient or the environment). Work from clean to dirty site i.e. touch clean body sites before you touch dirty sites or heavily contaminated areas.

Limit opportunities for 'touch contamination' i.e. surfaces such as light switches, door handles and cabinet knobs can become contaminated if touched by used or soiled gloves.

Gloves should be handled and stored to avoid contamination before use.

Both gloves must be removed and discarded:

- As soon as a tear or puncture appears or when the integrity has been otherwise compromised;
- After patient contact has been completed when performing separate procedures on the same patient;
- After completing a task not involving patients but requiring gloves;
- Before touching environmental items and surfaces;

AS/NZS 4179:2014
Single-use sterile surgical rubber gloves - Specification (ISO 10282:2014, MOD)

AS/NZS 4011.1:2014
Single-use medical examination gloves - Part 1: Specification for gloves made from rubber latex or rubber solution (ISO 11193-1:2008, MOD)

AS/NZS 4011.2:2014
Single-use medical examination gloves – Part 2: Specification for gloves made from poly(vinyl chloride) (ISO 11193-2:2006, MOD)

NSW Health PD
Infection Prevention and Control Policy

NSW Health PD
Environmental Cleaning Policy

Environmental Cleaning SOP
Module 3.2 Furnishings and Fixtures

NSW Health PD
Procurement

- 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; and
- Before writing in the medical notes, answering the telephone/pages and using a computer
- Before moving or touching equipment.

Wearing gloves does not eliminate the need for hand hygiene and in all circumstances, hand hygiene must be performed immediately (82):

- Before putting on gloves to avoid contamination of the outer surface of the gloves; and
- After removing gloves to avoid transfer of microorganisms to another person, patients environment, clinical equipment and to protect the HWs.

The type of glove selected should be appropriate to the type and risk of the procedure (see Table 7) and of a suitable size for the user (1). The HO should refer to the listed gloves on the NSW Health Procurement. Use of general purpose gloves, such as reusable washing up gloves, should be limited to kitchen areas and environmental cleaning. Within sterilization services/areas, only disposable single use gloves that have been approved should be worn e.g. gauntlet gloves that have a longer cuff. Medical examination gloves or other disposable, single use gloves are not to be reused. If gloves become soiled, HWs are to remove and discard the gloves, and perform hand hygiene. Gloves must not be washed or have ABHR applied to them in between patient contact (exception may apply during high consequence Infectious diseases removal of PPE).

Table 7. Glove selection guide for Infection Prevention and Control

Glove type (as per 2018 State Contract)	Suggested Use
Gauntlets – Examination, Powder Free, Textured	Longer cuff - midwives, sterilizing staff for reprocessing and animal research
Gloves - Latex, Non-Sterile, Examination, Powder Free, Textured	All clinical and non-clinical staff
Gloves - Non-Latex (including Polychloroprene and nitrile), Non-Sterile, Examination	All clinical and non-clinical staff with an allergy/sensitivity to latex
Gloves - Cytotoxicological Handling	Handling of cytotoxic medications NOTE: these gloves come in a range of colours
Gloves - Sterile, Surgical, Underglove, Powder Free, Pairs	Surgical staff who require a double glove
Gloves - Non-latex (including Polychloroprene, nitrile, and natural rubber latex free), Sterile, Surgeons, Pairs	Surgical and other clinical staff who perform procedures that require sterile gloves who have an allergy/sensitivity to latex
Gloves - Latex, Sterile, 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, Sterile, Powder Free, Standard Cuff	Clinical staff who perform standard aseptic procedures or examinations that require sterile gloves

4.3.2 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; and
- Fluid-resistant surgical mask

Face shield/visor or protective eyewear is to be worn:

- 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;
- For 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 and using running water;
- During cleaning of areas such as toilets/urinals/shower etc. where body fluid splash may occur.
- During procedures that induce the patient to cough e.g. chest physiotherapy; and
- When performing aerosolising generating procedures

Protective eyewear is to conform to Australian Standards and be optically clear, anti-fog, distortion free, close fitting and shielded at the sides.

- Reusable facial protection is to be worn, fitted and cleaned in accordance with the manufacturer's instructions and should be stored clean and dry.
- Any protective eyewear that is labelled 'single use' must not be reused.
- General prescription glasses alone do not comply with the relevant national standards and protective eyewear must be worn with prescription glasses if there is a risk of being splashed with body substance.
- Disposable single use facial protection must be discarded after use.

NSW Health PD
Infection Prevention and Control Policy

AS/NZS 1336:2014
Eye and face protection - Guidelines

AS/NZS 1337.1:2010
Personal eye protection - Part 1: Eye and face protectors for occupational applications

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 HWs and the patient; and
- to prevent body substance exposure to HWs and
- to protect the patient against respiratory microorganisms which may be expelled by the HW.

AS4381:2015
Single use face masks for use in healthcare

ACORN Standards 14th edition

The level of surgical mask should match the procedure performed or the level of protection required (refer to Table 9)

A fluid resistant surgical mask is to be worn by HW:

- Be fitted in accordance with the manufacturer's instructions;
- Not be touched by hands or gloves while worn;
- Cover both the mouth and nose while worn;
- Not be worn loosely or folded down around the neck; and
- Be removed and discarded immediately after leaving the patient-zone/room.
- And are not to be worn for care of consecutive patients

When the mask becomes moist from the wearer or from contamination, the barrier has been breached and the mask is no longer effective. It should then be discarded and not used again. The mask is to be removed by touching the strings/ties or loops only.

Use of surgical masks by patients and visitors is covered under Section 4.2, *Respiratory hygiene and cough etiquette,* and Section 5.5, *Personal Protective Equipment (PPE) requirements.*

Table 8 Type of face protection and recommended use

Type of care	Examples	Face protection required
Routine	General examination (e.g. medical, physiotherapy, nursing) Routine observations	Not required unless caring for a patient on droplet precautions
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 Nasopharyngeal suction	Protective eyewear Surgical mask

Table 9 AS 4381: 2015 Single use surgical face mask standard

AS 4381:2015 SINGLE USE FACE MASK				
Characteristics	**Level 1** **Applications**	**Level 2** **Applications**	**Level 3** **Applications**	**Test method**
	For general purpose medical procedures, where the wearer is not at risk of blood or bodily fluid splash or to protect staff and/or the patient from droplet exposure to microorganisms (e.g. 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 (e.g. endoscopy procedures)	For all surgical procedures, major trauma first aid or in any area where the health care worker is at risk of blood or bodily fluid splash (e.g. orthopaedic, cardiovascular procedures)	

	Level 1 Barrier	Level 2 Barrier	Level 3 Barrier	
	Medical face mask materials are evaluated for resistance to penetration by synthetic blood at the minimum velocity specified in row 2, bacterial filtration efficiency and differential pressure.	Medical face mask materials are evaluated for resistance to penetration by synthetic blood at the middle velocity specified in row 2, bacterial filtration efficiency and differential pressure.	Medical face mask materials are evaluated for resistance to penetration by synthetic blood at the maximum velocity specified in row 2, bacterial filtration efficiency and differential pressure.	
Bacterial Filtration Efficiency (BFE) %	≥ 95%	≥ 98%	≥ 98%	ASTM F2101-14 or EN 14683:2014
Particulate Filtration Efficiency (PFE) % (0.1 µm)	< 4.0	< 5.0	< 5.0	EN 14683:2014
Resistance to penetration by synthetic blood (fluid resistance) min pressure in mm Hg for pass result	80mm Hg	120mm Hg	160mm Hg	ASTM F1862 / F1862M-13 or ISO 22609

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

4.3.3 Gowns and aprons

A single use fluid-resistant gown, or apron, made of impervious material, provides a barrier to reduce opportunities for contact transmission in healthcare settings.

Factors influencing PPE selection

- Type of exposure anticipated
  - Splash/spray versus touch
  - Category of isolation precautions
- Durability and appropriateness for the task
- Fit

An apron or gown must be worn:

- During any procedures where there is a risk of splashes or contamination with body substances;
- As a protective layer under a permeable sterile gown when performing invasive procedures, especially if the procedure involves the likelihood of splashes or contamination with body substances; and
- Alternatively, a disposable sterile, impervious gown can be worn when performing invasive procedures.

Cloth (patient) gowns do not provide any level of protection for HWs 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 HWs 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 (see ACORN Standards for further information).

The choice and the type of apron or gown required depends on the degree of risk, including the anticipated degree of contact with infectious material and the potential for blood and body substances to penetrate through to clothes or skin. Gowns and aprons used in clinical areas should be fluid impervious (1).

- Be appropriate to the task being undertaken
- Be worn for a single procedure or episode of patient care where contamination with body substances is likely.
- The used apron/gown should be removed in the area where the episode of patient care takes place.

Table 10 Plastic aprons/gowns recommended use and characteristics

Type	Recommended use	Characteristics
Apron	Worn for general use when there is the possibility of sprays or spills or exposure to blood or body substances during low risk procedures. Worn during contact precautions when patient contact is likely.	○ Fluid impervious ○ Single-use, for one procedure or episode of patient care ○ Disposable
Gown	Worn to protect HWs exposed body areas and prevent contamination of clothing with blood, body substances, and other potentially infectious material	○ Fluid impervious ○ Single-use ○ Disposable Choice of sleeve length depends on the procedure being undertaken, the extent of risk of exposure of the healthcare worker's arms, the volume of body substances likely to be encountered, and the probable time and route of transmission of infectious agents

The Association for the Advancement of Medical Instrumentation (AAMI) standards introduced the voluntary standard ANSI/AAMI PB70:2012, Liquid Barrier Performance and Classification of Protective Apparel and Drapes Intended for Use in Health Care Facilities, to determine key identification measures for the appropriate selection of protective apparel and drapes for use in healthcare facilities. Defining the best level of protection for the standard ANSI/AAMI PB70:2012 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 6 for level of protection needed for intended task.

Table 11 AAMI Level Standards for Gowns

Barrier Performance	Barrier Protection	Resistance Measure	Description
Level 1	Minimal	Liquid penetration	Used for **MINIMA**L 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 Pressurizing 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 Pressurizing 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 a 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 (see Section 4.3, Personal protective equipment). The outer, 'contaminated', side of the apron or gown is turned inward and rolled into a bundle, and then discarded into a designated container for waste or linen to contain contamination.

Case study 7: Case study for risk assessing PPE requirement

Mr Smith a 68yr old man was admitted to a regional hospital intensive care unit (ICU) with SOB, cough and fever. Along with other treatments his treating doctor advised for chest physio with percussion and airway clearance along with sputum expectoration. The nurse contacted the physiotherapist and requested a consult. When Sally (physio) approached Mr Smith he was in great distress and needed urgent percussion to clear the sputum.

The magnitude and direction of risk of infection to a HW may be influenced by the role of the HW in the workplace, and the types of patient contact and how the HW interacts. Sally, a well experienced physio identified her risk of exposure to potential droplet and aerosol transmission of microorganisms following respiratory manoeuvres such as chest physiotherapy and spirometry etc. Sally who is new to the organisation requested the nurse to assist her in gathering the appropriate PPE for the task. Sally performed hand hygiene with ABHR and donned a surgical mask and a face shield to protect her from potential exposure to droplets and donned a pair of gloves to prevent direct contact with body substance. Sally is now equipped with her PPE to proceed with the requested procedure.

Mr Smith complied with Sally's instructions and completed the procedure without any issues.
Sally collected a sputum specimen as per doctor's request and finished her episode of care by removing gloves first followed by hand hygiene, then face shield and mask, items were disposed into general waste bin and Sally cleaned her hands with soap and water. The procedure and findings were documented in the notes and a quick handover to the nurse before Sally left the department.

4.4 Aseptic technique

Aseptic technique is a set of practices aimed at minimising contamination and is used to protect the patient from infection during procedures (1, 93). 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. Asepsis can be explained in different levels: e.g.

Standard Aseptic technique and Medical Asepsis
Reducing pathological organisms by using non-touch technique (clean technique)
Surgical Asepsis
Exclusion of all microorganisms
Standard 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

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 3

HETI online
Aseptic technique

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

The five essential principles of aseptic technique are (19):

1. **Sequencing:**
    - Performing a risk assessment
    - Pre-procedure preparation
    - Performing the procedure
    - Post procedure practices, handover and documentation

When performing a procedure steps 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.

2. **Environmental control:**
    - Prior to aseptic procedures, HWs must ensure there are no avoidable nearby environmental risk factors, 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, HW's hair should be tied back, and lanyards removed or tucked in prior to commencing the procedure.
3. **Hand hygiene:**
    - Perform hand hygiene immediately before and after a procedure or after body fluid exposure, in compliance with the *five moments for hand hygiene.*
    - Depending on the procedure about to be performed either routine or surgical hand hygiene is required.
4. **Maintenance of aseptic fields:**
    - 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 needs 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.

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

ACSQHC
Aseptic Technique Risk Matrix

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

4.4.1 Aseptic technique in oral health

The five essential principles for aseptic technique (see Section 4.4, *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.

NSW Health PD
Oral Health: Post-Operative Care for Dental Extractions

NSW Health PD
Oral Health: Cleaning, Disinfecting and Sterilizing

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 sterilized, 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.

4.4.2 Invasive devices

According to the NSW Health *Infection Prevention and Control Policy*, each HO must have written policies and/or procedures to instruct on the management of all types of invasive devices, including intravascular devices.

For specific guidance on invasive devices, HWs should consult the NSW Health *Adult Urethral Catheterisation for Acute Care Settings, the* NSW health Policy Directive Intravascular Access Devices-Infection prevention and Control, the ACI *Central Venous Access Device Post Insertion Management Guidelines.*

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 3

NSW Health PD
Intravascular Access Devices-Infection prevention and Control

NSW Health GL
Adult Urethral Catheterisation for Acute Care Settings

Documentation of procedures requiring aseptic technique should include indications for the procedure(s), any clinical misadventures that occurred during the procedure, and any follow up or review requirements.

ACI (Intensive Care NSW)
Central venous access device - Post insertion management
HETI online
Invasive Device Protocols

4.4.3 Skin antisepsis

Where skin antisepsis is required in preparation for an aseptic procedure (e.g. central line insertion, peripheral intravenous cannulation, lumbar puncture, drain insertion, surgical procedure), a single-use antiseptic skin preparation should be used (94, 95). After use, the skin preparation and any remaining contents should be discarded.
The following should be taken into consideration when applying skin antiseptics:

- Hair at the insertion site should be removed using clippers to improve adherence of the dressing.
- 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 or fan blot 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.

NSW Health Safety Information 001/13
Safe Use of Alcohol Based Skin Preparations for Surgical and Anaesthetic Procedures

Global guidelines on the prevention of surgical site infection

4.4.5 The 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 (96). Where alcohol based skin preparations are used, procedures must be in place to minimise associated risks to the patient. 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 what part of the body has been skin prepped and identify easily any pooling.
- The quantity of the flammable skin preparation used to prepare the skin should be kept to a minimum in order 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

4.4.6 Skin disinfection before Injection

Alcohol should be used to disinfect the skin prior to injections in order to prevent introduction of bacteria on the skin being injected within tissue. Alcohol has been shown to be a good disinfectant, reducing the number of bacteria on skin by 47-91%.

- At a minimum swabbing the injection site with a saturated 70% alcohol swab for 30 seconds and allow the skin to dry.
- Ensure that the skin is visibly clean before applying alcohol.

For vaccination administration refer to the Australian Immunisation Handbook

4.5 Needle-stick and sharps injury prevention

Breaches in safe injection, infusion and medication vial handling practices has resulted in transmission of HIV and viral hepatitis and in some cases caused outbreaks of disease (3, 97, 98). Standard precautions, particularly aseptic technique, form the basis of safe injection practices. This section focuses on the safe injection practices required to ensure patient and healthcare 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.
- 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 use and injections.
- Store and prepare medications and supplies 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 situation

NSW Health PD
Pharmaceuticals – Preparation in NSW Public Health Facility Pharmacy Services

NSW Health PD
Community Sharps Disposal by Area Health Services

NSW Health GL
Work Health and Safety - Blood and Body Substances Occupational Exposure Prevention

4.5.1 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 (99-105). Therefore, the use of sharps should be minimised wherever possible and, when used, be disposed of immediately after use at the point of use.

In accordance with the NSW Health *Infection Prevention and Control Policy*, each HO must have a written policy and/or procedure in place for the safe handling, transportation and reprocessing and disposal of sharps. A HO must also provide training to HWs on sharps handling, disposal and, where appropriate, cleaning and reprocessing.

Where possible, a HO should purchase and ensure the use of safety equipment for sharps handling, particularly in areas where there is high sharps use and/or in areas where there has been a number of occupational

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 3

NSW Health PD
Community Sharps Disposal by Area Health Services

Australian Guidelines for the Prevention and Control of Infection in Healthcare

exposures relating to sharps handling. Each HW is responsible for the management and safe disposal of any sharp that they use.

Re-sheathing a needle

Needles must not be re-sheathed, except in special circumstances such as dental practice where no other alternative process is available.

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'.

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

Dental facilities that use a re-usable dental aspirating syringe, with a single-use needle attached, after administering the local anaesthetic, the used needle must be removed from the reusable syringe.

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.

4.5.2 Sharps in community and home settings

In clinical community settings, such as community health centres or multi-purpose services, sharps should be handled consistent with standard precautions.

In non-clinical community settings, such as within a patient's home, used sharps generated during the provision of care must be safely disposed of into a sharps container. The container must be closed, securely stored and transported within a compartment in the car and separated from the driver's compartment, in line with work health safety requirements. The container should be transported to a hospital, community health centre or multi-purpose service for final disposal.

NSW Health PD
Community Sharps Disposal by Area Health Services

4.5.3 Blood glucose monitoring devices

The following practices are recommended when using blood glucose monitoring devices:

- When performing glucose monitoring procedures, HWs should use aseptic technique.
- The glucometer and its protective casing is 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 (98).
- 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 (see Section 4.5.1, *Safe use and disposal of sharps*).
- Where feasible patients should be encouraged and supported to undertake their own skin prick and blood glucose monitoring.

4.5.4 Intravenous solutions

The following practices are recommended in the context of intravenous solutions:

- Protective packaging should not be removed until immediately prior to use.
- Intravenous solution containers (e.g. bags or bottles) are not to be used to obtain flush solutions for more than one patient.
- Infusion supplies such as needles, syringes, flush solutions, administration sets or intravenous fluids are single use or single patient use only and not to be used on more than one patient.
- Additions to intravenous fluids should be made under controlled conditions where possible or 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.
- Check the expiry date on IV solution; do not use if it is expired.
- Disinfect IV ports using friction and 70% (v/v) alcohol, and allow to air dry prior to accessing.
- All intravenous access ports should be meticulously cleaned (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.
- If alcoholic chlorhexidine or if allergic 10% povidone-iodine is used the drying time may vary (20 second or more) depending on the product and allowed to air dry prior to accessing the system (106).
- 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, if the IV giving set is disconnected, replace the entire IV tubing.

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 4

NSW Health PD
Medication Handling in NSW Public Health Facilities

APIC Position Paper: Safe Injection, Infusion, And Medication Vial Practices In Health Care (2016)

NSW Health PD
Intravascular Access Devices (IVAD) - Infection Prevention & Control

4.5.5 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.
Flushing is recommended to promote and maintain patency and prevent the mixing of incompatible medical solutions. 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.

- Clinicians must flush catheters immediately:
  - After placement
  - Before and after each fluid infusion or injection
  - Prior to and after drawing blood
- Flush in a pulsatile (push-pause) motion.
- 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 four to six weeks.

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

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

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.

4.5.6 Medication vials and ampoules

The following practices are recommended in the context of medication vials and ampoules

- Follow the manufacturer's instructions for storage and use.
- Use single-use ampoules or single-dose vials. Always use a sterile syringe and needle/cannula when entering a vial.
- Never enter a vial with a syringe or needle/cannula that has been used on a patient.
- Cleanse 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.
- 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.
- Never store medication vials in clothing or pockets.
  - Inspect vials and discard if sterility has been compromised, or is thought to be compromised.
  - Examine the vial for any particulate matter, discoloration or turbidity. If present, do not use and discard immediately. All vials used during an emergency should be discarded as sterility cannot be guaranteed.

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 4

NSW Health PD
Medication Handling in NSW Public Health Facilities

4.5.7 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.

Multi-dose vials must only be used between multiple patients where there is no other alternative product available on the Australian market.

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 HWs fail to follow aseptic technique. An example of multi-dose vials include, insulin vials, botox, tuberculin skin test vials, 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 Policy* and NSW Health *Medication Handling in NSW Public Health Facilities* 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 (3, 98).
- 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 (e.g., nurses station), 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 (107).
- Keep multi-dose vials away from the immediate patient environment (98).
- 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.
- Date opened multi-dose vials to reflect date opened and/or date of expiration.
- An organization may choose to establish a system wide opened multi-dose discard schedule, i.e., one date a month established to discard all opened multi-dose vials no matter when the vial was opened during the month.

AHPRA Legislation

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 4

NSW Health PD
Medication Handling in NSW Public Health Facilities

NSW Health PD
Infection Prevention and Control Policy

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 should only be considered if no other alternative product is available on the Australian market.

These products and devices must be registered with the TGA and HOs must identify them and develop clear local protocols for their management.

4.6 Cleaning and Disinfection

4.6.1 Patient equipment - Reprocessing

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 3

Advice on reprocessing is provided in Section 8, *Reprocessing*. Reusable non-critical equipment used in the assessment and delivery of patient care should be reprocessed before use.

Principles of cleaning and disinfection:-

- Any reusable equipment and accessories that comes into 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 (IFU to be followed).
- HW that uses or transfers 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 is no manufacturer's IFUs available e.g. reusable tape measures, consult with local infection prevention and control team or delegate to determine required product cleaning method and frequency of cleaning.

Non-critical items such as commode chair, temperature probe etc. should be cleaned with a neutral detergent and if disinfection is required a TGA approved hospital grade disinfectant preferably with label claims against specific organisms should be used, OR a chlorine-based product such as sodium hypochlorite in accordance with manufacturer's recommendations.

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

The use of cleanable keyboard or fully washable type keyboards should be considered.

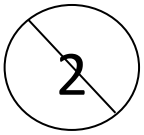
One the most important aspects regarding the effectiveness of a disinfectant is the contact time. Contact time refers to the amount of time

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.

4.6.2 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'.



Australian Regulatory Guidelines for Medical Devices Version 1.1
Part 2, Chapter 19 Single use devices (SUDs) and the reuse of SUDS

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. Cleaning and reprocessing of such devices is to be performed in accordance with the manufacturer's instructions and Section 8, *Reprocessing*. Single patient use equipment should be cleaned and stored as per the manufacturer's instructions between periods of use.

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.

4.6.3 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.

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. Refer to section 8 for further information.

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 level of any prior reprocessing.

AS/NZS 4187
Reprocessing of reusable medical devices in health service organizations

AS/NZS 4815:2006
Office-based health care facilities - Reprocessing of reusable medical and surgical instruments and equipment, and maintenance of the associated environment

See **Section 8,** *Reprocessing.*

Section 8 Figure 5 Factors affecting sterility of a reprocessed item

Storage of stock should be in receptacles that reduce the risk of dust entrapment. In the absence of these receptacles processes should be in place for their routine cleaning.

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 any use.

Decision to use or dispose the items after a potential contamination event should be based on your risk rating and the potential level of contamination. The HO 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 IFU and local procedure in between use and stored in a clean, dry place to prevent environmental contamination (1).

National Health and Medical Research Council

Australian Guidelines for the Prevention and Control of Infection in Healthcare

Table 12. Examples of items to be stored in designated clean storage rooms and dirty utility rooms

Examples of clean items to be stored in designated clean rooms or areas	Examples of clean items to be stored in designated dirty utility or clean up rooms
• Medical equipment • (e.g. infusion pumps, blood pressure machines, computer on wheels) • Medical and administrative supplies • Wheelchairs • Walking aids • Plastic bed sheets or 'blueys' (disposable water proof 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 • Surgical hair removal clippers	• 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

4.7 Clean linen

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 protective covering;
- separately from used linen; and
- in a manner that will allow for stock rotation.

Clean linen should not be stored in patient bathrooms or places where there is a potential for moisture contamination.

AS/NZS 4146:2000
Laundry practice

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 (e.g. covered trolleys).

Clean linen and used linen are not be transported together unless separated by a suitable barrier.

4.7.1 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 HW clothing (108, 109). Each HO is to have a written policy and/or procedures on the collection, transport, and storage of linen. Furthermore, a HO that processes or launders linen in-house will also have documented policies and/or procedures consistent with AS/NZS 4146:2000 Laundry Practice.

The following principles apply when handling linen used for all patients: i.e. whether or not transmission based precautions are required.

- Handle soiled laundry with minimum agitation to avoid contamination of the air, surfaces and persons (e.g., roll up).
- 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 bag handlers.
- Reusable linen bags must be laundered before re-use.
- Hand hygiene must be performed following the handling of used linen.

Used or soiled linen are **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 a patient's personal items and only one patient's personal items can be washed per cycle.

All patient care 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.

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 3

AS/NZS 4146:2000
Laundry practice

- Laundry carts 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.
- The vehicles which 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 e.g. containers with suitable closures, moisture impermeable bags that would prevent 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. Routine practices 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.
- Disposable linen is the first choice preference for patients with a high consequence infectious disease. Reusable linen should be discarded as clinical waste.

4.8 Environmental cleaning

Health care organisations are complex environments where the provision of care to large numbers of clients 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 health care-associated infection.

Each HO must use a risk management framework when considering cleaning of the health care environment. The aim of determining risk is to ensure appropriate controls are implemented due to the variety of problems that inadequate cleaning can cause.
The accountability for all aspects of cleaning lies with the HOs management.

Health facilities require a continuous comprehensive approach to monitoring the cleanliness of the healthcare environment. Internal audits of a HOs 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 problems.

At a minimum, routine environmental management in each HO should include :

- High-touch surfaces in patient zone must be cleaned and disinfected (frequency may vary depending on the functional risk rating of the area)
- Reusable non-critical devices must be cleaned and disinfected in between patient use
- Cleaning practices must be periodically monitored and audited with feedback and education (frequency may vary depending on the functional risk rating of the area)
- Ensure floors and baseboards are free of stains, visible dust, spills and streaks
- Ensure walls, ceilings and doors are free of visible dust or gross soil
- All horizontal surfaces are free of visible dust or streaks (includes furniture, window ledges, overhead lights, phones etc.)
- Bathroom fixtures including toilets, sinks, tubs and showers are free of streaks, soil, stains and soap scum.
- Mirrors and windows are free of dust and streaks.
- Dispensers are free of dust, soiling and residue and replaced/replenished when empty
- Appliances are free of dust, soiling and stains.
- 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

NSW Health PD
Environmental Cleaning Policy

- Minimal clutter in shared administrative and clinical areas, such as workstations, store rooms and utility rooms

The following principles should be followed when exploring new technologies such as hydrogen peroxide aerosols and ultraviolet (UV) lights to enhance routine cleaning:

- Cleaning robots or touchless technologies offer an alternative to overcome some challenges faced by traditional manual cleaning. However, the available evidence are modest and inconclusive and the expectation of a dramatic clinical benefit is currently not supported by available data (110).
- 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 taken into account before local decision making

4.8.1 Utility room

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 (111).

- 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
- Have a work counter and flushing-rim clinical sink (sluice sink) with a hot and cold water mixing faucet.
- 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 staff 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 table 12).
- 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 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. HWs should be made aware of the local routine cleaning program, including correct use of general cleaning products (e.g. 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 table 12).

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
- Be adjacent to usage areas and easily available to staff
- Be equipped with a work counter and dedicated hand washing basin if used for preparing patientcare items (111).

4.8.2 Patient zone privacy curtains

A HO may use privacy curtains to separate individual patients, provide an easily identifiable perimeter and play an important role in defining the patient zone. Such curtains should be installed to ensure that there is total coverage when the curtains are drawn closed (i.e. no open gaps are present). External windows or partition curtains are not recommended. Patient curtains should be washable or disposable, easy to remove and to hang, and when pulled around the bed, ensure there is room for HWs to carry out procedures.

- Patient bed curtains are outside the patient zone and are frequently contaminated with micro-organisms foreign to the patient inside.
- Touching the curtains after caring for a patient is considered to be equivalent to leaving the patient zone.
- Hand hygiene must be performed between touching the curtains and touching the patient and vice versa.

Patient zone privacy curtains are to be either made of a washable or disposable material. Washable privacy curtains should be changed and washed according to the Environmental Cleaning SOP (module 3: 2.3.10).

The frequency of washing is to be determined by applying the functional risk rating of the clinical area, as outlined in the NSW Health *Environmental Cleaning Policy Directive*. Refer to table 13 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 substance they should be replaced irrespective of the curtain expiry date.

In high risk areas washable bed curtains should be changed weekly and upon discharge, increase frequency of cleaning or change during outbreak situations, when managing patients with new and emerging pathogen (e.g. Candia auris).

Disposable privacy 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.

NSW Health PD
Environmental cleaning policy

Environmental Cleaning SOP
Module 3.2 Furnishings and Fixtures

Non-disposable privacy curtains are to be changed as part of terminal cleaning

The HO should have a process/ program in place for regular review of disposable curtains for soiling and replacement.

Table 13 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 (clostridium) Difficile New and emerging pathogens (Candida auris)	Change when visibly soiled or torn Change immediately on patient discharge	Change when visibly soiled or torn Change weekly and upon patient discharge
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 Change monthly to three monthly based on risk assessment
Significant Risk General wards	Change when visibly soiled or torn Follow manufacturer's instructions for use (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, radiography	Change when visibly soiled or torn Follow manufacturer's instructions for use (IFU)	Change when visibly soiled or torn Change three monthly to bi-annually based on risk assessment

4.8.3 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.
Blinds contained in double glazing, 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 HO should consider the cleaning requirements for these furnishings (see Section 2.4.1, *Purchasing new equipment*).

The HO must clean these furnishings in accordance with the NSW Health *Environmental Cleaning* policy.

NSW Health PD
Environmental cleaning policy

Australian Health Facility Guidelines
Part D Infection Prevention and Control

Environmental Cleaning SOP
Module 3.2 Furnishings and Fixtures

4.9 Waste disposal

Proper containment of waste can minimise the transmission of infection (112). See NSW Health *Clinical and Related Waste Management for Health Services* Policy Directive.

- 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 staff
- Anatomical waste must be refrigerated at or below 4°C of if stored for more than four days.
- Biomedical waste storage areas shall be locked, except where authorized staff 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.
- HOs should 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.

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 3

NSW Health PD
Clinical and Related Waste Management for Health Services

4.9.1 Clinical waste disposal in the community

Clinical waste should be handled in a manner consistent with standard precautions (see Section 4, *Risk mitigation: Standard precautions*).

- 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.

NSW Health PD
Clinical and Related Waste Management for Health Services

NSW Health PD
Community Sharps Disposal by Area Health Services

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.

4.9.2 Safe handling and transport of patient specimens

When transporting and handling pathology specimens, HWs should 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 (15).

National Pathology Accreditation Advisory Council
Requirements for the Packaging and Transport of Pathology Specimens and Associated Materials (Fourth Edition 2013)

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, e.g. 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; and
- do not use pneumatic tube specimen delivery systems when transporting highly pathogenic or novel infectious specimens.

In the event of a novel infectious disease, HOs should refer to specific pathology specimen handling and transporting advice provided by NSW Health or other delegate agencies (e.g. NSW Contingency Plan for Viral Haemorrhagic Fevers, The Australian Dangerous Goods Code Edition 7.5, Requirements for the Packaging and Transport of Pathology Specimens and Associated Materials (Fourth Edition 2013).

4.9.3 Transport between locations

Where a HO is required to transport specimens to a pathology laboratory by road, rail or air transport, triple packaging is to be used. Specimen packaging is to comply with the relevant standards and requirements for the mode of transport being used (refer to section 4.45)

AS 4834-2007
Packaging for surface transport of biological material that may cause disease in humans, animals and plants

Civil Aviation Safety Regulation Part 92
Consignment and carriage of dangerous goods by air

4.10 Other controls required in all patient settings

4.10.1 Food

The HO that admits patients overnight has systems for the preparation and distribution of food and fluids that include nutrition care plans based on current evidence and best practice.

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.

All HOs are regulated by the NSW Food Act 2003 and are to be licensed by the NSW Food Authority. HOs must comply with the Food Standards

Food Act 2003 No 43 (NSW)

NSW Health PD
Nutrition Care

Australia New Zealand Food Standards Code - Standard 3.3.1
Food safety programs for food service to vulnerable persons

ACI Nutrition Network
Nutrition Standards and Diet Specifications

Australia New Zealand Standard Code 3.3.1 Food Safety Programs for Food Service to Vulnerable People.

ACI Nutrition Network
Food and Nutrition in NSW Hospitals

NSW Food Authority
Guidelines for food service to vulnerable persons

NSQHS Standards
Second edition

High risk patient groups

High risk patients in healthcare facilities 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 (e.g. diabetes, immunosuppressive treatments or leukaemia). Seek dietary advice from local dietetics services prior to providing food to these individuals.

4.10.2 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; and
- 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 prohibited. Uneaten meals are to be disposed of after the meal service.
- Use enteric feeds immediately after opening. Dispose of any feeds that have been exposed to the environment (e.g. left sitting open on benchtops).
- Store hospital-provided food in a designated patient food storage refrigerator (See below for advice on storing externally brought food).
- 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, HOs should consider the need for patient and/or visitor access. For example:
    - Settings where patient access to the kitchen is imperative for their health and recovery (e.g. 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 (e.g. celebrations)
- Good hand hygiene practice should always be employed when preparing and handling food.
- 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 separately store:

- Patient food and beverages
- Staff food
- Medication and vaccines (Refrigerator should be outside of food preparation areas)
- If required, medical equipment (Refrigerator should be outside of food
- preparation areas)

- Refer to the NSW Health *Maternity - Breast Milk: Safe Management* Policy Directive for advice on the storage of breast milk.

NSW Health PD
Maternity - Breast Milk: Safe Management

4.10.3 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 (e.g. takeaway shops and convenience stores). However, HWs 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. HWs should seek dietetic advice regarding the risks associated with consuming externally brought food.

ACI Nutrition Network
Food and Nutrition in NSW Hospitals

HWs should not purchase, reheat, prepare or serve any externally brought food on behalf of patients.

4.10.4 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.

Opened 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.

4.10.5 Food consumption by HWs

HWs are not to eat or drink in clinical areas, including the perioperative settings. Food in clinical areas and the perioperative units has the potential for cross contamination between staff and may also attract vermin and insects. Food and drink should be consumed in designated staff tea rooms. Adherence to hand hygiene is important prior to any food consumption.

4.10.6 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.

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 of 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 manufactures guidance and instructions.
- A U-bend and break in the drain is desirable to prevent reflux.
- There should be adequate separation of air inlet 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.
- Ability to implement necessary maintenance schedules should be addressed during the purchasing process

The following should be considered for ongoing maintenance of ice machines (1):

- Adequate maintenance schedules should be developed, to ensure the machine can be maintained as per manufacturer's instructions and records are audited at least annually.
- HOs should develop a process on regular cleaning and monitoring of the machines

4.11 Flowers and plants

For the vast majority of patients in hospitals and other healthcare facilities, fresh flowers or potted plants do not represent a risk of infection (113).

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* sp. (114). While there is limited evidence that links the presence of these organisms to infection in these patients (113), 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 (3, 115, 116).

Poorly maintained flowers or potted plants can increase the risk of attracting insects. Widespread positioning of plants should be avoided in clinical/ support and laboratory areas.

4.12 Staff attire

HWs are to wear clean garments for each shift.

- HWs who wear long sleeved clothing should roll up long sleeves or remove long sleeved clothing during clinical procedures and must be able to perform adequate hand hygiene.
- Requests from HWs to wear long sleeved garments for religious or medical reasons (e.g. compression bandages) should be assessed by the HO on a case by case basis.
- Clinical procedures require a bare below the elbow approach to comply with asepsis and Infection Prevention and Control PD. Refer to Section 4.1.4, *Jewellery,* for information regarding jewellery.

NSW Health PD
Uniforms Policy

Hair

- Hair should be clean at all times and in the clinical environment should be contained.
- Hair below collar length should be tied back at all times 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

HWs must wear fluid repellent, fully enclosed shoes in the clinical environment.

The wearing of ties and lanyards in the clinical setting is not recommended.

Evidence suggests that ties and lanyards can be contaminated during patient care, and in turn can carry infectious material between patients (117-119).

4.12.1 Perioperative attire

HWs must replace all outer garments with the prescribed perioperative attire in the designated changing facilities before entering the semi-restricted and restricted areas.
Perioperative attire should not be worn outside of the perioperative environment (120), unless emergency attendance of a patient is required within the 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 (121, 122).

- Change into clean perioperative attire daily, or when wet or soiled. Visibly soiled scrubs are to be changed before leaving the theatre
- Ensure any body hair on the back or at the neckline is covered
- Prevent perioperative attire coming into contact with the floor when changing
- Not wear a lanyard, pouch or other potential vectors for infection
- 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 soiled

There is limited evidence for the use of shoe covers to reduce microbial load in the theatre environment (123). 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, HWs 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

4.13 Use of portable fans

In health care settings, the use of portable fans can promote the spread of dust, debris and microorganisms through the air and can pose a risk to patients, staff, and visitors. Organisms dispersed through the air can contaminate patient 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 (e.g. disturbance in negative pressure room air exchanges).

Ceiling or portable fans are not recommended in the high risk clinical settings because the indoor air can be an important vehicle for a variety of human pathogens and the bioaerosol deposition can be a potential source of hospital-acquired infections(124, 125).

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 in bladeless fans and the air flows through the channel in the pedestal through the curved path, the surrounding air become drawn into the fan from multiple areas around the fan(125). 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 use of portable fans has not been proven to transmit infection, lack of appropriate cleaning procedures for portable fans, are 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.

IPC recommendations for use of fans in patient care areas:

Healthcare staff should perform a risk assessment before using fans in patient rooms on a case-by-case basis.

- 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 IPC for use of fans for patients on additional isolation precautions other than airborne isolation precautions (e.g. contact or droplet precautions).
- Consult IPC 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 medical procedure is being performed (such as a wound dressing change).
- When a procedure is performed that might generate a splashing of body fluids, fluid aspiration, emptying urinary catheter etc.

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

- Weekly cleaning according to manufacturer's IFU and local procedure or as required.
- HO should develop a written schedule that documents when the device is cleaned and by whom.
- Portable fans when not in use must be stored covered post cleaning.

Fans must not be used in:

- Rooms/areas with directed airflow.
- Rooms with patients on airborne precautions or where there is a risk of airborne transmission such as 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 (ICU)
- Operating Room (OR)
- Dialysis Unit
- Endoscopy Suite
- Laboratory
- Oncology Unit
- Haematology Units
- Transplant units

SECTION 5
RISK MITIGATION: TRANSMISSION-BASED PRECAUTIONS

5 Transmission-based precautions

"Since the infecting agent often is not known at the time of admission to a healthcare facility, Transmission-Based Precautions are used empirically, according to the clinical syndrome and the likely etiologic agents at the time, and then modified when the pathogen is identified or a transmissible infectious etiology is ruled out."

Siegel et al, 2007 (3)

Transmission-based precautions should be used when standard precautions alone are insufficient to interrupt the transmission of a microorganism. **Transmission-based precautions are to be applied in addition to standard precautions.** There are three types of transmission-based precautions, tailored to the different forms of transmission:

- Contact precautions;
- Droplet precautions; and
- Airborne precautions.

NSQHS – Version 2 3.5

Section 4
Risk Mitigation: Standard Precautions

To support the requirements of transmission-based precautions, a HO is responsible for providing its staff, patients and visitors with hand hygiene opportunities and recommended PPE. The HO should also provide suitable accommodation and patient care equipment and ensure that health workers (HWs) are trained in the use of PPE and patient care equipment.

Work Health and Safety Regulation 2011

If an infectious disease is suspected, HWs should apply appropriate transmission-based precautions as soon as possible and maintain these precautions until a definitive diagnosis (including pathology results) has ruled out the possibility of an infectious disease or until effective treatment has been commenced and continued for the appropriate period of time.

HWs should be aware that there will be, however, certain instances where it may not be possible to identify all patients for whom contact, droplet and airborne precautions are required. For example, the risk of a transmission may be present before symptomatic illness is observed or a definitive diagnosis can be made (126, 127).

Emerging and novel pathogens require enhanced precautions, management and escalation to control and contain during the investigative period until prevention and control recommendations are understood.

NSW Health GL
NSW Contingency Plan for Viral Haemorrhagic Fevers
WHO
Haemorrhagic fevers, Viral
Centers for Disease Control and Prevention
Viral Haemorrhagic Fevers

Any triaging of patients suspected of an infectious disease should occur in a manner that prevents contamination of the environment and transmission in waiting rooms.

Patients suspected of having a communicable/infectious disease should be moved from public waiting rooms to a single patient accommodation or cohort area while awaiting treatment. If transfer or transport of the patient is required, transferring/transport agency should be informed of the transmission-based precautions on booking.

NSQHS – Version 2 Standard 3

Visitors to patients with highly communicable diseases should be restricted and each HO should address the need for visitor restrictions.
At a minimum (12):

- Visitors are encouraged to practise hand hygiene. Visitors are not routinely required to don PPE, unless exposure to body substance is anticipated.
- Any visitor attending a patient in Transmission based precautions are to be advised that they should not subsequently visit any other patient in the hospital during the same visit; and
- Parents should be advised to refrain from taking infants in to visit patients who are being cared for in Transmission based precautions.

If variation from these requirements is necessary, the local infection prevention and control unit should be consulted prior to the visit.

NSQHS – Version 2 Standard 3

5.1 Contact precautions

Contact precautions, when used with standard precautions, are designed to reduce the risk of transmission of microorganisms by direct and/or indirect contact. Perform a risk assessment based on patients' communicability or risk of organism dispersal that can lead to high risk of contamination and subsequent spread of organisms to patients, HWs and others.

Contact precautions should be considered for patients colonised or infected with a multidrug-resistant organism (MRO) where there is significant patient and/or environmental contact (32).

Assessment of the patient's risk factors that potentially contribute to the spread of organisms in addition to local epidemiology will guide clinicians to whether patients require contact precautions with isolation, cohorting or management using standard precautions (128).

Section 1.2.1
Contact Transmission Routes

Conditions that potentially increase the risk of organism dispersal includes:

- diarrhoea, incontinence or uncontained wounds (wet patients). These patients may need contact precautions in a single room, dedicated toilet where single rooms not available, appropriate PPE based on the type of care you are providing.

Conditions with a low risk of organism dispersal includes;

- continent, contained wounds (dry patients) standard precautions may be appropriate.

Local epidemiology should be considered when deciding on how these organisms may be managed at local facilities.

Specific requirements for contact precautions (high risk patients):

- Preferably, patients should be placed in a single room with ensuite bathroom. If not possible, patients could be cohorted with patients infected or colonised with the same microorganism and have access to a designated bathroom. The decision to cohort should be done in conjunction with the local infection prevention and control team.
- HWs to conduct a risk assessment on the requirement on type of PPE based on the episode care and anticipated contact with the patient and patient zone. All staff must risk assess before entering the patient care zone and deciding on application on appropriate PPE (128).
- If the care involves body substance contact based on individual risk assessment an apron/gown should be donned to protect HWs uniform/personal clothing. PPE should be applied based on anticipated level of contact with the patient and or their environment
- Facial and eye protection should be selected according to standard precautions.
- HWs must perform hand hygiene, put on an impervious apron/gown on entering the patient zone based on anticipated contact with body substance.
- The gloves are always the last PPE item to apply. They are put on inside the room directly before having contact with the patient where exposure to body substances is anticipated and after hand hygiene is performed (129).
- Compliance with hand hygiene inside the patient care zone must continue regardless of glove use.
- For high consequence diseases (e.g. Viral haemorrhagic fever (VHF), Middle East respiratory syndrome (MERS) and emerging infectious diseases contact precautions and application of

PPE may differ according to the risk of transmission and may require to be applied before entering the isolation or biocontainment area.

- Certain situations may require contact precautions to be maintained for the duration of the illness because there may not be treatment available.
- Depending on the microorganism, terminal cleaning with a disinfectant may be required.
- Use contact precautions signage at entrance of patient's zone to alert/inform HWs on patient status.
- Reusable shared patient equipment must be cleaned and disinfected in between use regardless of patients MRO status.
- Computer on wheels/workstation on wheels should only be accessed by clean hands. These items must be cleaned in between use. Establish a work process to manage these items (mitigate contamination risk) if taken into isolation rooms. Where work processes cannot be established these items should not be taken into these rooms.
- 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 infected or colonised 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 common environmental surfaces. Educate patients on the importance of hand hygiene.

Figure 3 Contact Precautions

Contact precautions consist of:
Before entering room
Perform hand hygiene
Perform a risk assessment on the need for apron/gown i.e. type of patient contact or contact with body substance, type of MRO (i.e. new or emerging), patient status (wet or dry)
After entering room
Perform hand hygiene
Perform a risk assessment on the need for gloves i.e. contact with body substance
Change or remove glove (if worn) and perform hand hygiene in between dirty and clean task
On leaving
Remove and dispose gloves (if worn)
Perform hand hygiene
Dispose apron/gown (if worn)
Perform hand hygiene
Clean 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
Use a single-patient room or, if unavailable, cohorting 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 surfaces in close proximity to the patient and those likely to be touched by the patient and healthcare workers.

Adapted from (128)

Case study 8: Naomi's story - a lesson in contact precautions

Naomi is a 25 year old woman who presented to the local hospital's maternity unit with labour pain. Information regarding her medical history, antenatal care, previous pregnancies and birth was gathered and the midwife reviewed Naomi's file.

During a recent antenatal assessment Naomi disclosed that she had some boils under her arm that were quite painful and have not healed. The midwife noted that an axillae swab taken during this previous visit returned positive for methicillin-resistant Staphylococcus aureus (MRSA). The midwife explained that MRSA can be acquired by either your own intrinsic factors or contact with someone with MRSA or MRSA-contaminated items and surfaces. The midwife also explained to Naomi that to reduce the risk of transferring MRSA to other patients, she will be nursed where possible in isolation and that any HW in direct contact with her will be wearing gowns/apron, and gloves if they need to do procedures or they are in contact with her body fluids. The importance of personal hand hygiene for patients, visitors and when caring for her baby is explained to Naomi and the midwife gives her an information factsheet about MRSA. The midwife also informs Naomi that an infection prevention and control nurse can be called to answer any further questions for her or her family. She then continues her assessment adhering to contact precautions. The midwife also arranges for a medical consult to review Naomi's MRSA treatment options.

Naomi's labour progressed and a baby boy was delivered via vaginal birth later that day.

What happened?
Upon transfer to the post-natal ward, Naomi was placed in a single room with a contact precautions sign on the door. Her son was not placed in the nursery but shared the room with her. Naomi followed the advice of her healthcare team and used ABHR before and after contact with her baby and regularly throughout her stay. She was also compliant with hand hygiene before leaving the room during her admission so as not to spread the bacteria further within the hospital. Naomi's medical consult provided some treatment options and a recommendation for GP follow-up after discharge.

What is the lesson to be learnt?
The timely identification and risk assessment of Naomi's MRSA facilitated control and containment eliminating risk of transmission to others. Compliance with hand hygiene and transmission based precautions reduces the further risk of transmission. Naomi's healthcare team initiated early information-sharing on how to manage MRSA at home with her baby and her partner when discharged, and discussed options for treatment. Provision of an information sheet for patient and family for future reference.

5.1 Contact precautions in specific settings

5.1.1 Neonatology Units:

Neonates, especially premature neonates are extremely vulnerable to infections, whether by vertical transmission or healthcare acquired infection. HWs need to be aware of appropriate interventions to minimise the possibility of cross transmission and infections. The process detailed throughout this document equally applies to these settings. Unit should comply with restrictions and exclusions based on the disease and cross transmission/communicability risk. Refer to Infectious disease table in Section 11 Outbreak management.

5.1.2 Community-based settings:

Contact precautions for the management of MRO colonised or infected patients may not be indicated based on the associated reduced risk of transmission in this environment.

Section 7
Risk mitigation: precautions for multi-resistant organisms and *Clostridium difficile*

5.2 Droplet precautions

Droplet precautions should be employed in addition to standard precautions when caring for any patient known to be or suspected of being infected with a microorganism that can be transmitted by the respiratory droplet transmission route.

Section 1.2.2
Droplet transmission route

Specific requirements for droplet precautions are:

Preferentially, the patient should be placed in a single room with ensuite bathroom. If not possible, the patient should be cohorted with patients infected or colonised with same microorganism and have access to a designated bathroom (130).

Maintain a spatial separation of greater than 2.4 m between bed central lines in cohorted patients (2, 3) or draw bed curtains between patients to impede the direct spread of droplets and space beds at least 2.4m apart (127).

HWs are to wear a disposable fluid repellent level 1 or level 2 surgical mask (see table 13). Masks should be removed and disposed of on leaving the patient's zone (e.g. at the door, curtain or the anteroom) and perform hand hygiene (131).

Protective eyewear (goggles or face shield) is to be worn as part of standard precautions if working within 2m of the patient

Australasian Health Facility Guidelines
Part B - Health Facility Briefing and Planning - Inpatient Accommodation Unit

AS 4381:2015
Single use surgical face mask standard

If a patient who is being cared for under droplet precautions requires an aerosol generating procedure (AGP), this procedure should be undertaken in a dedicated treatment room away from other patients. If aerosol generating-procedures are anticipated, a P2/N95 mask should be worn by attending HWs. Protective eyewear should be worn as part of standard precautions.

- Transfer or transport of patient 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) (130, 132-134). Refer to Section 5.5.1, *surgical masks*.
- Depending on the microorganism, disinfection may be required in addition to cleaning.
- Visitors are recommended to wear a surgical mask if within 1m of patient and practice hand hygiene.
- Use droplet precautions signage at entrance of patient's zone.

Given that droplets do not remain suspended in the air, special air handling and ventilation is not required under droplet precautions.

Table 14. AS 4381: 2015 Single use surgical face mask standard

AS 4381:2015 SINGLE USE FACE MASK				
Characteristics	Level 1	Level 2	Level 3	Test method
	APPLICATIONS: For general purpose medical procedures, where the wearer is not at risk of blood or bodily fluid splash or to protect staff and/or the patient from droplet exposure to microorganisms (e.g. patient with upper respiratory tract infection visits GP)	**APPLICATIONS:** For use in emergency departments, dentistry, changing dressings on small or healing wounds where minimal blood droplet exposure may possibly occur (e.g. endoscopy procedures)	**APPLICATIONS:** For all surgical procedures, major trauma first aid or in any area where the health care worker is at risk of blood or bodily fluid splash (e.g. orthopaedic, cardiovascular procedures)	
	Level 1 barrier Medical face mask materials are evaluated for resistance to penetration b synthetic blood at the minimum velocity specified in row 2, bacterial filtration efficiency and differential pressure.	**Level 2 barrier** Medical face mask materials are evaluated for resistance to penetration by synthetic blood at the middle velocity specified in row 2, bacterial filtration efficiency and differential pressure.	**Level 3 barrier** Medical face mask materials are evaluated for resistance to penetration by synthetic blood at the maximum velocity specified in row 2, bacterial filtration efficiency and differential pressure.	
Bacterial Filtration Efficiency (BFE) %	≥ 95%	≥ 98%	≥ 98%	ASTM F2101-14 or EN 14683:2014
Particulate Filtration Efficiency (PFE) % (0.1 µm)	< 4.0	< 5.0	< 5.0	EN 14683:2014
Resistance to penetration by synthetic blood (fluid resistance) min pressure in mm Hg for pass result	80mm Hg	120mm Hg	160mm Hg	ASTM F1862 / F1862M-13 or ISO 22609

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

5.3 Airborne precautions

Airborne precautions are designed to interrupt the airborne transmission route. Airborne precautions should be employed in addition to standard precautions when caring for patients who are known or suspected to be infected with a microorganism that can be transmitted by the airborne route.

Section 1.2.3
Airborne Transmission Routes

Specific requirements for airborne precautions are:

- The patient should be placed in a negatively pressurised single room with ensuite bathroom.
- If isolation in a negative pressure room is not available, place the patient in a single room where the door should be closed at all times.
  - Without a central ventilation system, opening the door may cause aerosols to move out of the room and into any adjacent areas, opening a window where able may assist in aerosol control and improve the air exchange reducing this risk. This option is only advised usually in non-conventional settings
  - Where the patient is not in a negative pressure isolation room, the patient should have access to an ensuite or designated bathroom.
- HWs are to wear a P2/N95 mask (section 5.4.2) on entering the patient's zone. P2/N95 masks require a proper seal to the face and all HWs are to be instructed on fit check of a P2/N95 mask. Masks should be removed and disposed in the anteroom or outside the patient's room.
- Visitors are recommended to wear a surgical mask. P2/N95 respirators may be an alternative, but must be accompanied with training and fit checking by a HW. P2/N95 mask requires 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 a P2/N95 respirator because the P2/N95 respirator can make it more difficult for the wearer to breathe (135).
- Consideration should be given to limit visitation for those visitors requiring high levels of protection.
- Patients in airborne precautions are to be transported or transferred on their own
- 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) (130, 132-134). Refer to Section 5.4.1. Patients on oxygen therapy are to change to nasal prongs and have a surgical mask over the top of the nasal prongs for transport (if medical condition allows). P2/N95 mask is not recommended for patient use.
- Depending on the microorganism, disinfection may be required in addition to cleaning.
- Use airborne precautions signage at entrance of patient's zone. If aerosol-generating procedures are to be performed in a suitable environment
- Ensure all HWs involved in the procedure have performed a fit check of their P2/N95 masks.
- Protective eyewear should be worn as part of standard precautions
- The standard minimum air changes per hour for a negative pressure room is ≥12§ which requires a period of 35 minutes for 99.9% air removal between room occupancy (refer table 15).
- P2/N95 mask should be worn by all HWs entering these rooms until terminal cleaning is completed and the time period has lapsed (136).
- Adequate time must be allowed after patient discharge or transfer for removal of at least 99% of airborne contaminants(137). This time period will vary; depending on the amount of air exhausted from the room, room air mixing, and the size of the room (see table below)

Table 15. Reference guide - Air changes per hour (ACH) and time required for removal efficiencies of airborne contaminants

ACH §	Time (mins.) required for 99% efficiency	Time (mins.) required for 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

Note: + Denotes frequently cited ACH for patient-care areas
§ Values were derived from the formula: t2 – t1 = – [ln (C2 / C1) / (Q / V)] X 60, with t1 = 0

t1 = initial time point in minutes

t2 = final time point in minutes

C1 = initial concentration of contaminant

C2 = final concentration of contaminant

C2 / C1 = 1 – (removal efficiency / 100)

Q = air flow rate in cubic feet/hour

V = room volume in cubic feet

Q / V = ACH

Adapted from CDC Guidelines for Environmental Infection Control in Health-Care Facilities (2003)

5.3.1

Airborne precautions in specific settings

Requirements for airborne precautions in specific settings are detailed below:

- If a sputum-inducing procedure is being performed, such as sputum induction, chest physiotherapy or bronchoscopy, then all HWs in the room should don P2/N95 masks and use standard precautions, including protective eyewear.
- Sputum inducing procedures should be performed in a Type 5/Class N (respiratory isolation) room (or sputum induction booth). The patient should be left in the Type 5/Class N room or booth until coughing subsides. Other patients and staff not wearing P2/N95 mask should not enter the Type 5/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 (Table 5.3.1 for ACH). Consult with facility engineers to determine the air changes per hour for each room/booth.
- Type 5/Class N air handling requirements provide negative pressure relative to the corridor and adjacent areas. Ideally (and for all new buildings), air from Type 5/Class N rooms should not be reticulated via, or to, any other ventilation system, i.e. it should be a single pass system. The discharge points should be located as far as possible from air-intakes, persons and animals.

NSW Health GL
Tuberculosis - Sputum Induction Guidelines

HB 260-2003c
Hospital acquired infections - Engineering down the risk

Australasian Health Facility Guidelines
Part D Infection Control

- Where existing facilities do not allow external exhausting, air that is to be recirculated should be directed through high efficiency particulate air (HEPA) filters.
- The door to the room must remain closed at all times.
- For Type 5/Class N rooms, air change rates greater than or equal to twelve changes per hour with a minimum of two air changes per hour of outside air, whichever results in the greater air quantity, should be achievable when the filters have reached their maximum pressure drop.

Case study 9 - Mathew's story - It's all about the timing!

A 42 year old gentleman, Mathew, presented to the emergency department at 1000 hrs with fever, cough and rash; he had been unwell for 5 days. On examination he had a fever of 38.9^{o}C, a rash to his face and trunk with some vesicles on his arms, and signs of bilateral pneumonia. He was commenced on IV antibiotics for pneumonia. A note was made in the medical record that the rash may be viral and that this was to be investigated. After being in the emergency department for 8 hours, Mathew was transferred to a 4 bed room on the medical unit. The next day (Day 2) the doctor documented a possible diagnosis of chickenpox but was awaiting laboratory confirmation. Nursing staff noted the entry and waited for the laboratory result.

At 1200 hrs on Day 3 Infection Prevention and Control was notified of a positive Varicella Zoster Virus (VZV) polymerase chain reaction (PCR) result for Mathew; this was the first notification to Infection Control regarding this patient. IPC immediately contacted the medical ward to determine what precautions were in place and to provide direction for what was needed. The ward's NUM reported that Mathew had been in a 4 bed room with standard precautions. IPC advised that Mathew needed to be managed using contact and airborne precautions. IPC undertook a risk assessment to identify patient, visitor and HW contacts and follow up was required in both the emergency department and in the medical ward.

What happened?

Chickenpox is a highly infectious virus that is transmitted by contact and airborne routes. Because the appropriate transmission-based precautions were not implemented at the time of suspicion, on Day 1 after examination, many patients and HWs were exposed to the chickenpox virus. Patients, visitors and HWs who had been in the same room as Mathew for at least 1 hour (138), in the emergency department or medical ward, had to be checked for their chickenpox immunity. Patients who were not immune and remained in hospital had to be accommodated in a single room with negative pressure during the period of incubation, day 10 after exposure to day 21.

How could it have been prevented?

The presence of fever and a vesicular rash is grounds for suspicion of chickenpox (Varicella) or disseminated shingles (VZV). Had triage or other HWs caring for Matthew recognised a vesicular rash and transmission based precautions (contact and airborne precautions) had been implemented when a viral cause was suspected, there would have only been a small number of patients and HWs exposed in the emergency department. Had the triage recognised the presence of a rash and fever as trigger to implement precautions until a complete diagnosis was made, Mathew would have had a surgical mask put on and moved immediately to a single room? HWs would then have commenced contact and airborne precautions from the initial consult.
Had the doctor on Day 2 or the medical ward nursing staff notified IPC when a possible diagnosis of chickenpox was made, and implemented appropriate precautions that would have prevented at least 24 hours of exposure to patients, visitors and HWs?

5.4 Management of patients presumptive or confirmed infectious Tuberculosis (TB) in healthcare settings [139]

Mycobacterium tuberculosis (MTB) is the infectious pathogen that causes tuberculosis (TB) disease. Each year, there are over 500 cases of active TB diagnosed in New South Wales (140).

TB 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.

TB is transmitted via airborne particles expelled when a person with infectious pulmonary TB coughs, sneezes, sings, or otherwise forcibly exhales. High risk diagnostic procedures include coughing to produce a sputum specimen, or having an induced sputum sample collected or bronchoscopy performed. There is also a risk of aerosolisation of TB bacilli during surgical procedures involving diseased tissue, abscess drainage or wound irrigation.

Airborne droplet nuclei remain suspended in the air for prolonged periods and can be inhaled by another person. The risk is increased in settings with poor ventilation. Once inhaled, the droplet nuclei can lodge in the lung and cause TB infection, which may progress to active disease at a later time point.

NSW Health PD
Principles for the Management of Tuberculosis in New South Wales

NSW Health GL
Tuberculosis Contact Investigations

5.4.1 TB infection without active TB disease

People with TB infection, diagnosed by a tuberculin skin test (TST) or blood test (IGRA or QuantiFERON TB Gold®) should be assessed for signs and symptoms of active TB disease and a plain chest X-ray ordered to exclude TB disease. People with TB infection (without active disease) are not infectious and pose no infection risk to others.

In the circumstance where a person with TB infection without active TB disease requires care in a healthcare setting, there is no indication to isolate or otherwise implement infection control precautions.

5.4.2 Infection control precautions for people with presumptive active TB disease

The time prior to diagnosis is particularly important for TB infection control – transmission of TB is much more likely when the diagnosis is not considered, or where appropriate precautions have not been implemented from the beginning of people's encounter with the healthcare system.

The diagnosis of TB should be considered by healthcare workers assessing patients with respiratory symptoms who present with radiographic features consistent with TB (such as pulmonary cavities or upper zone lung infiltrates), especially if they have risk factors for TB (including birth in, or travel to, countries with a high incidence of TB). Prompt isolation of patients with presumed active TB disease in Emergency Department settings is an important administrative strategy to reduce hospital transmission of TB.

People with presumptive pulmonary TB should be asked to wear a surgical mask until an appropriate isolation room is available. Patients are not required to wear a mask whilst in appropriate isolation rooms. For their own protection, visitors and carers should wear a properly fitted P2/N95 mask whilst in the room – see Section 5.5.2 P2/N95 Masks.

People with presumptive or confirmed pulmonary TB should be taught appropriate cough etiquette – see Section 4.2 NSW Health Respiratory Hygiene poster

People with presumptive extra-pulmonary TB should be assumed to also have pulmonary involvement until this has been excluded, and should be isolated accordingly.

5.4.3 De-isolation of presumptive TB cases where the diagnosis has been excluded or are considered highly unlikely (141).

People with presumptive TB may be removed from isolation (either in hospital or at home) when infectious TB disease is considered clinically unlikely, and one or more of the following criteria are met (142):

- The patient has had at least two (2) expectorated and/or induced sputum specimens (collected during the one procedure) assessed and/or one (1) bronchial lavage specimen which have all been found to be negative on Acid Fast Bacilli (AFB) smear and PCR negative (N.B. PCR tests for *Mycobacterium tuberculosis* should be requested on at least one sample), AND/OR
- An alternative diagnosis has been established.

The decision to de-isolate a patient should be documented in the clinical record.

5.4.4 Infection control precautions for people with confirmed TB

An infectious risk assessment should be conducted using clinical, laboratory and radiological findings to inform the isolation precautions needed, whether in hospital or in the local community (143, 144).

Unless there are clinical or public health concerns, all patients with a confirmed diagnosis of active TB disease should be considered for isolation and management in their home, as long as the home situation is assessed as appropriate in consultation with the local TB Coordinator, i.e.

- There are no children under 5 years of age or immunocompromised adults living in the household, or, if there are, they have been commenced on TB preventive therapy;
- The local TB service has the capacity to deliver or coordinate the required care and treatment and monitor the patients' progress in the local community.

When admission to hospital is deemed necessary, the following guidelines should inform the level of airborne precautions to be implemented:

- TB patients with AFB positive sputum or bronchial washings/ lavage smears, laryngeal involvement and/or cavitating lesions on chest X-ray are considered highly infectious. If hospitalised, these patients should be managed in airborne precautions in a negative pressure room (if available in the facility) or, at a minimum, in airborne precautions in a single room with the door closed. These patients should not be co-located with other patients until deemed no longer infectious.
- TB patients with negative AFB sputum smears, but who have a positive sputum or bronchial washings/lavage PCR and/or a positive culture for *M. tuberculosis* are moderately infectious, and may still carry a substantial risk of TB transmission. If hospitalised, these patients should be managed in airborne precautions in a negative pressure room (if available in the facility) or in a single room with the door closed and should not be co-located with other patients until deemed no longer infectious (145).

- Patients with extra-pulmonary TB require airborne precautions when:
    - infectious pulmonary involvement has not been actively excluded (clear chest x-ray; at least 2 negative sputum AFB smears and negative PCR if the chest x-ray is abnormal); or
    - a procedure is being performed that may result in aerosolisation of infected tissue is possible e.g. surgery to drain/debride abscesses caused by *M. tuberculosis* or irrigation of wounds (e.g. a tuberculous peri-anal abscess, scrofula)

Patients in isolation may leave their room for short periods of time as long as they wear a surgical mask covering both nose and mouth. Examples are: to attend investigations in other departments, to go for a walk or go outside.

If the clinical condition of an inpatient has recovered sufficiently, the option of discharge to 'home isolation' should be considered, in consultation with the local TB Coordinator/ TB Service. The least restrictive form of isolation is preferred, to reduce negative psychological consequences of isolation for the patient.

5.4.5 De-isolation of confirmed TB cases

For patients with confirmed pulmonary TB that are in isolation in hospital or in the community, decisions regarding de-isolation should be guided by the following:

- there is no indication of drug resistance to the prescribed treatment; AND
- the patient is adherent to and tolerant of the prescribed treatment; AND
- effective treatment* has been given for two weeks or more; AND
- clinical improvement is observed, or the patient continues to be asymptomatic; AND
- there is evidence of a mycobacteriological response to treatment (i.e. if the patient was initially smear positive, a reduction in the quantity of acid fast bacilli visualised on subsequent smear microscopy)

* Effective treatment is defined as a course of anti-tuberculosis medications appropriate for the drug susceptibility profile (if available) and site of disease that results in a clinical response.

Patients with confirmed extra-pulmonary TB disease are not considered infectious and airborne precautions can be discontinued once:

- Pulmonary TB has been actively excluded by a clear chest x-ray (or at least 2 negative sputum smears for AFB and a negative PCR if the chest x-ray is abnormal); and
- Procedures involving aerosolisation of infected tissue (e.g. surgery to drain/debride abscesses or irrigation of wounds) are not required / no longer being performed.

The decision to de-isolate a patient should be documented in the clinical record.

5.4.6 Management of patients with presumptive or confirmed TB in operating theatres and bronchoscopy suites

Where possible, patients with presumptive or confirmed TB should be scheduled last on a procedure list and the room decontaminated before next use – see below.

5.4.7 Decontamination of isolation rooms following occupation by a confirmed TB case

Isolation rooms may be used by an infectious TB patient, then the patient transferred to another isolation room, e.g. isolated in ED, then transferred to a ward or discharged to home isolation.

The time that the room should be left empty to ensure all pathogens are no longer airborne is determined by the exhaust system in the room, referred to as the air changes per hour (ACH).

Please check with your local Engineering Department to confirm the ACH for the isolation room in question.

See Table 5.3.1. For US CDC recommended guidelines on room decontamination.

5.4.8 Patients with confirmed TB requiring hospitalisation after commencing TB treatment

It is not uncommon for patients recently commenced on TB treatment to require hospitalisation due to an adverse drug reaction or other complication.

Where TB treatment is interrupted for prolonged periods (e.g. due to adverse drug reaction), a patient's infectivity can recur.

Whether to isolate a patient with TB on treatment requiring hospitalisation is determined in consultation with the treating TB physician, with reference to the above de-isolation criteria.

5.4.9 Non-tuberculous mycobacterial infections

Non-tuberculous mycobacteria (NTM) are not transmissible from person to person in most circumstances. However, there is emerging evidence regarding the transmission of *Mycobacterium abscessus complex* between patients with Cystic Fibrosis (CF). Infection control requirements for CF patients with *M. abscessus complex* should be determined by local experts involved in CF care and Infection Prevention and Control Units.

5.4.10 Contact tracing in hospitals

Contact tracing in hospitals should be undertaken in accordance with the NSW Health Tuberculosis Contact Investigation Guidelines or subsequent iterations.

Healthcare facilities should ensure that roles and responsibilities between themselves and the local TB Coordinator / TB Services are clearly defined in regards to contact identification and screening following a TB exposure within the facility.

The role and responsibilities of the healthcare facility is to determine:

- the position or unit designated with the responsibility to collate a list of contacts of the TB case including staff, patients and visitors;
- a mechanism to assess and screen staff who were contacts of a TB case during the course of their employment – this may be via the staff health unit or the local TB Service;
- the position or unit designated with the responsibility to document the outcomes of TB screening for individual staff as per the NSW Health Policy Directive Occupational Assessment, Screening and Vaccination Against Specified Infectious Diseases or subsequent iterations.

The role and responsibilities of the local TB Service include:

- being the designated contact for notification of confirmed TB cases;
- notifying Hospital Executive, the local Public Health Unit and NSW TB Program as indicated in the NSW Health Tuberculosis Contact Investigation Guidelines or subsequent iterations
- risk assessing identified contacts and determining risk categories;
- coordinating the assessment and screening of identified high-risk contacts and other lower-risk contacts as appropriate; and
- documenting and reporting the outcomes of a contact screening investigation.

5.5 Personal Protective Equipment (PPE) requirements

Surgical and P2/N95 masks are to be used in accordance with manufacturer's IFU and local procedures. HWs should perform a risk assessment prior to the healthcare interaction expected with their patient before deciding on what PPE they should be donning. The choice of impervious apron or gown depends on the degree of risk, including the anticipated degree of contact with infectious material, mode of transmission and the potential for body substances to contaminate your clothes. HWs should rationalise the need for gloves by performing their own risk assessment of each care activity.

Considerations when using a Surgical or P2/N95 mask include:

- masks should not be touched while being worn
- masks should be changed when they become moist
- masks should never be reapplied after they have been removed
- masks should not be left hanging around the neck; and
- hand hygiene should be performed upon touching or disposing of a used mask

5.5.1 Surgical masks

HWs should wear a fluid resistant surgical mask within the operating room or during aseptic procedures, such as lumbar punctures, intra-articular joints, injections or insertion of a central line, as part of standard precautions. However, in transmission-based precautions the surgical mask is used to:

(i) Protect the wearer against transmission of disease
(ii) Protect others in the environment from the patient's infection. If a patient is clinically able to do so, the patient under droplet or airborne precautions should wear surgical masks if outside of their patient zone. If a patient is being cared for under droplet or airborne precautions and requires oxygen therapy, nasal prongs should be used and a surgical mask should be worn over the top of the nasal prongs during any patient transport (if the medical condition allows).

AS 4381:2015
Single use face masks for use in healthcare

HWs should still wear correct facial protection even if a patient is wearing a surgical or oxygen mask.

Note that surgical masks are also known as procedural masks in some settings.

5.5.2 P2/N95 masks

HWs are to wear a P2/N95mask when airborne precautions are required and if aerosol generating procedures are anticipated. Protective eyewear should be worn as part of standard precautions.

Fit testing is a complex process that provides an opportunity for HWs to correctly identify which size and style is suitable for them and allows them to be trained in the correct use of the mask.

HWs are to perform a fit check each time a P2/N95 mask is used and prior to undertaking any clinical activity in which a P2/N95 mask is required. Fit checks ensure that the mask is sealed over the bridge of the nose and mouth and that there are no gaps in the seal between the mask and the face. HOs are to ensure that all HWs are informed how to perform a fit check.

AS/NZS 1716:2012
Respiratory protective devices

The procedure for conducting a fit check is (1):

1. Place mask on the face;
2. Place the headband or ties over the head and at the base of the neck;
3. Compress the mask against the face to ensure a seal across the bridge of the nose;
4. Compress the mask to ensure a seal across the cheeks and the face; and
5. Check the negative pressure seal of the mask by gently inhaling. If the mask is not drawn in towards the face, or air leaks around the face seal, readjust the mask and repeat process or check for defects in the mask or review the correct size of the P2 /N95 mask

HWs who have facial hair (including a ≤2-day beard growth) should be made aware that an adequate seal cannot be guaranteed between the P2/N95 mask and the wearer's face.

5.5.3 Powered-air purifying respirators

A HO is only to provide HWs with powered-air purifying respirator devices that comply with the relevant Australian Standards. The HO is to ensure use of these devices is limited to HWs who are trained in their use, have maintained their skills and that manufacturer's instructions for cleaning, decontamination and maintenance are followed. These devices may be suitable for HWs with facial hair (1).

AS/NZS 1715:2009
Selection, use and maintenance of respiratory protective equipment

AS/NZS 1716:2012
Respiratory protective devices

5.6 Transmission-based precautions in oral health settings (146)

Compliance with standard 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 multidrug-resistant organisms. The HO should ensure that patients and carers have access to hand hygiene resources and are enabled to clean their hands before and after appointments.

Contact precautions

If a patient discloses a history of a transmissible infection or colonisation that can be spread by the contact route it is not necessary to place a 'Contact Precautions' sign on the door in an ambulatory or day-surgery oral health facility. Single-use personal protective equipment, cleaning of shared equipment, environmental cleaning and hand hygiene should be practiced

Droplet precautions

Routine oral health treatment should be deferred until the patient is no longer coughing or sneezing and can breathe easily. This will minimise the need for exercising droplet precautions and will also reduce patient discomfort and the risk of intra-oral injury from sharp instruments.

If a patient requires *urgent* dental care and droplet precautions are necessary, a risk assessment is to be undertaken and documented.

Airborne precautions

Routine oral health treatment should be deferred until airborne precautions are no longer required.

If a patient requires *urgent* dental care and airborne precautions are necessary, a risk assessment is to be undertaken and documented. If the procedure is to go ahead on the basis of the risk assessment, the following should be adhered to:

- If possible, schedule patient at the end of the day
- Attend to patient in a single room with the door closed and, if available, negative-pressure ventilation
- HWs to wear a P2/N95 mask before they enter the room and until they leave the room
- HWs who are considered protected from vaccine preventable communicable diseases e.g. measles and VZV (see Section 2.5, *Staff health and HAI risk*) are to provide care for patients with these disease.
- Use of pre-procedural mouth rinses and rubber dams will limit the spread of aerosol.

SECTION 6
RISK MITIGATION: PATIENT PLACEMENT

6 Risk assessing for patient placement

"If you are transferring patients lots of times you are moving bugs around the hospital"
Nursing Times, 2010 (147)

ESTABLISH THE CONTEXT

IDENTIFY INFECTION RISKS

ASSESS THE RISK OF INFECTION

CONTROL THE RISK OF INFECTION

REVIEW EFFECTIVENESS OF CONTROL MEASURES

To ensure the safe and timely placement of a patient with a known or suspected transmissible infection (including multidrug-resistant organism colonisation or infection), patient placement decisions should be made in conjunction with the patient flow team and local Infection Prevention and Control (IPC) service wherever possible. After hours management of patients should be determined by local procedures. The decision needs to consider the prioritisation of isolation or single rooms or dedicated areas for other important uses beyond the management of infectious diseases, such as providing end-of-life care, falls risk or ensuring appropriate patient security and safety. The decision to place a patient in isolation should be determined by the following principles:

- Route(s) of transmission of the known or suspected microorganism
- Risk factors for transmission in the infected patient
- Risk factors for adverse outcomes resulting from a HAI in other patients
- Availability of single rooms

Section 7.4.1
Patient placement (MRO)

Where a patients' presentation involves vomiting, diarrhoea or other high levels of body substance exposure, in the absence of a proven infective process should be considered for an isolation room with dedicated bathroom facilities as priority over other patients that may be considered as lower risk of transmission.

When single rooms with dedicated toilet is not available a dedicated commode should be assigned. Cleaning and disinfection of patient care items and surfaces is especially important in this scenario.

The need for isolation (30) should be reassessed based on transmission period and clinical signs and symptoms of patient.

Table 16. Isolation Room Types

AusHFG	As detailed in HB260 (Standards Australia 2003c)
Class S - Standard	Standard isolation – Type 4
Class P- Positive pressure	Patient protection - Type 3
Class N- Negative pressure	Respiratory isolation – Type 5
Class Q- Quarantine	Quarantine isolation – Type 5 plus airlock

Guidance on the factors to consider when making patient placement decisions is included in Table 16.

Table 17. Risk assessment guide outlining infection prevention and control considerations for patient placement

RISK FACTORS TO CONSIDER	Source and modes of disease transmission	Clinical predictors of disease transmission	Clinical impact of transmission	Room availability
QUESTIONS TO ASK	• Is the disease known to spread from a single source? • Is the disease known to spread person to person? • Is the transmission route known? • Is the disease known to spread via multiple transmission routes? • Has the patient recently travelled overseas and/or received medical care overseas?	• Does the colonised/ infected patient present with any clinical factors that would increase the likelihood of transmission?	• If transmitted, will disease cause significant clinical impact to a high risk patient?	• Are single/isolation rooms required for the clinical management of other patients? • Are single rooms with designated toilet facilities available? • Are there other patients infected or colonised with the same species and strain? • Is this an extreme risk rated area*?
THINGS TO LOOK OUT FOR	• Suspected or confirmed acute respiratory infection • Public health notification • Diarrhoea • Vomiting • Fever • Rash	• Wandering • Cognitive impairment • Incontinence • Diarrhoea • Broken skin • Open wound • Invasive devices	• Neutropenic patients • Transplant recipients • Immunosuppressed	• Patients requiring high security or one on one observation • Patients requiring end-of-life care • Existing cohorts

*See NSW Health PD Environmental Cleaning Policy for functional area risk ratings

6.1 Patient placement in a single or isolation room

The benefits of single-bed rooms for patient isolation, in terms of minimising transmission of infection are well described in the literature. Local risk assessment should determine the appropriate room placement in light of any and all other patient safety risks (e.g. falls risk, other co-morbidities, mental health) (1).

NHMRC

Australian Guidelines for the Prevention and Control of Infection in Healthcare

Putting a patient in isolation may increase the risk of stress, depression and anxiety (148, 149) and 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 with consultation among treating clinicians and the IPC service and/or an ID team. Isolation of a patient should not compromise clinical care. An information sheet should be made available to patients. Extended periods of isolation require regular assessment by teams involved in patient care. The reason for isolation must be documented in the patient's healthcare records and reviewed by the IPC service.

The following order of prioritisation should be considered with all patient allocations:

FIRST: Airborne precautions - negative pressure room first priority or single room with door closed and dedicated bathroom facilities
SECOND: Droplet Precautions – transmission risk assessment to be conducted.
THIRD: Contact Precautions – transmission risk assessment to be conducted

Table 8 provides a suggested priority list on how to place patients where there are competing priorities for isolation or isolation rooms. This list should be reviewed with the local IPC service or Infectious Diseases (ID) service and, where necessary, adapted according to local needs. More detailed guidance can be found at Clinical Excellence Commissions Infection Prevention and Control Considerations for Patient Placement.

If multiple cases of the same priority level are present, consult with the IPC service and/or the ID service where possible, as guidance may be provided based on seasonal outbreaks.

NHS Ayrshire & Arran: Isolation Prioritisation Scoring System

NHS Greater Glasgow & Clyde: Infection Prevention & Control Priority for Isolation Protocol

Centers for Disease Control and Prevention: 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings

Table 18. Suggested prioritisation of resources based on infection risk

Note: Patients with significant neutropenia and transplant recipients may require protective isolation - see Section 9.1, *Immunocompromised patients*. For patients with cystic fibrosis, see Section 9.2, *Cystic Fibrosis*.

Priority#	Disease or presentation* (in alphabetical order)	Precautions**
FIRST	Chickenpox/disseminated varicella zoster virus	Airborne + contact
	Measles	Airborne
	Pulmonary tuberculosis	Airborne
	Respiratory viruses of concern e.g. Middle East respiratory syndrome coronavirus (MERS-CoV), pandemic influenza	Airborne + contact + droplet
	Viral haemorrhagic fever	Airborne + contact + droplet
SECOND	*C. difficile* infection	Contact
	Carbapenem-resistant organisms (e.g. carbapenem-resistant Enterobacterales)	Contact
	Infectious diarrhoea†, vomiting including norovirus	Contact + droplet
	Influenza	Contact + droplet
	Meningococcal disease	Droplet
	Mumps	Droplet
	Pertussis	Droplet
	Respiratory syncytial virus (RSV)	Droplet
THIRD	Other multi-resistant organisms as designated by your facility (e.g. MRSA, VRE)	Contact
	Scabies	Contact
	Shingles (localised & uncovered)	Contact

May not be applicable to all facilities - check with your local infection prevention and control service.

* Not an exhaustive list. Contact your local infection prevention and control unit for guidance on other diseases/presentations.

** For precautions recommended for other diseases/presentations, refer to the NHMRC Australian Guidelines for the Prevention and Control of Infection in Healthcare (2010).

† Some types of infectious diarrhoea only require contact precautions.

6.2 Patient placement in a cohort or mixed inpatient area

Where single rooms are not available in a high risk clinical area, cohorting patients with the same confirmed infectious agent may need to occur. A decision to cohort patients should be made carefully with consultation between treating clinicians and the IPC service and/or an ID physician. Refer to Table 8 as a guide. If placement in mixed gender accommodation is being considered, refer to the NSW Health PD *Same Gender Accommodation*.

In lower risk areas such as rehabilitation units, long term care settings, outpatient day treatment settings or patient transport services, a risk analysis should be undertaken to establish the level of risk and benefit to patient treatment (1).

NSW Health PD
Same Gender Accommodation

Section 7
Risk mitigation: Precautions for multi-resistant organisms and *Clostridium difficile*

NHMRC
Australian Guidelines for the Prevention and Control of Infection in Healthcare

Based on local infection prevention and control needs, a HO may consider using a designated area and equipment to accommodate an infected/colonised cohort in a mixed ward. Identification of a designated area may assist HWs in maintaining standard precautions and transmission-based precautions, as required when caring for patients suspected or confirmed with a communicable disease.

6.3 Staffing

Risk assessment should consider the appropriate allocation of HW. This may involve dedicating HWs to specific patients or cohort groups as able.

Where this is not possible, adherence to hand hygiene, standard and transmission based precautions is essential to reduce the risk of any cross transmission.

HW should be excluded from clinical areas or removed from the facility as appropriate if suspected or proven communicable disease present or exhibiting signs and symptoms indicating potential infective process.

Refer to Infectious diseases table in Section 11 Appendix 1: Common and important infectious diseases requiring isolation in hospitals

SECTION 7
RISK MITIGATION: PRECAUTIONS FOR MULTIDRUG-RESISTANT ORGANISMS AND *CLOSTRIDIUM DIFFICILE*

7 Multidrug-resistant organisms

"A guiding tenet of infection control is to ensure that a patient is never denied quality care as a result of harbouring a resistant pathogen."

Harris, Paterson & Rogers, 2015(150)

Patients infected with a multidrug-resistant organism (MRO) may be at an increased risk of morbidity and mortality and often require increased length of stay in hospital along with additional diagnostic testing and treatment. Because of these reasons, a HAI caused by a MRO often results in an additional cost for the patient and the healthcare system.

To minimise MRO transmission and infection, HWs must ensure that infection prevention and control principles, such as standard and transmission based precautions and antimicrobial stewardship are practised during all patient care. In addition, local risk assessments should be conducted to assess the risk to inform the requirements of specific infection prevention measures for the management of MRO colonised or infected patients.

MROs are microorganisms that are resistant to multiple antimicrobial classes. These include but are not limited to: methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *enterococci* (VRE), carbapenemase-producing *Enterobacterales* (CPE), carbapenemase-producing *Pseudomonas aeruginosa*, Candida *auris etc.*

Extended-spectrum beta lactamase-producing enteric gram-negative bacillus (Enterobacterales) are known as ESBLs (151, 152). The risks of nosocomial transmission from ESBL *E.coli* are

considered to be low however other ESBLs should be managed using contact precautions based on local risk assessment (153, 154).

The recommendations described in this section are applicable to both inpatient and outpatient (e.g. clinic) settings. The recommendations are suitable for routine care, however additional measures may be required in the event of a MRO outbreak.

Knowledge Box : The prevalence and effect of MRSA

In a study of over 300,000 hospital inpatients in the United States, 1% of patients negative for MRSA on admission returned later cultures positive for MRSA, indicating acquisition of MRSA during their hospitalisations. Authors from this study reported that post discharge mortality of this group at one year was 10% higher compared with a carefully matched cohort who had not acquired MRSA (155).

7.1 Clostridioides difficile (formerly known as *Clostridium difficile*)

C. difficile is a spore-forming microorganism. The spore is resistant to many disinfectants and antimicrobial agents that are often used in healthcare settings. *C. difficile* often produces toxins that may cause mild to severe gastrointestinal symptoms. *C. difficile* is not a MRO, however, given that the risks associated with *C. difficile* are similar to MROs, *C. difficile* will also be considered within the scope of this section.

7.2 Antimicrobial stewardship

A HO is required to have an antimicrobial stewardship program consisting of a range of strategies and appropriate governance to meet the NSQHS – version 2 National Standards Preventing and Controlling Healthcare-Associated Infection Standard (12).

NSQHS – VERSION 2 STANDARDS 3
Safe and appropriate antimicrobial prescribing is a strategic goal of the clinical governance system

Promotion of the following principles may be helpful in developing strategies and systems to optimise antimicrobial use:

- Select correct patients for antimicrobial treatment, avoiding use where there is no evidence of benefit.
- Prescribe antimicrobials (type and dose) as specified by locally-endorsed guidelines or national antimicrobial prescribing guidelines (if locally-endorsed guidelines are not available).
- Document reason for outpatient or inpatient treatment with antimicrobials against every prescription.
- Ensure patients with presumptive severe sepsis or septic shock receive treatment within 60 minutes of triage/time of diagnosis.
- Specify a review date for each antimicrobial course.
- In almost all situations, confine use of surgical antibiotic prophylaxis to a single perioperative dose in accordance with indications specified by national antimicrobial prescribing guidelines (156).

Restriction of selected antimicrobials is one method of ensuring judicious antimicrobial use (157). The Clinical Excellence Commission's *List of Recommended Antimicrobial Restrictions* (158) and fact sheets on managing antimicrobial restrictions in small to medium-sized hospitals (159) or medium to large-sized hospitals (160) are useful starting points for HOs that are considering this strategy.

It is recommended that HOs that lack local antimicrobial stewardship expertise develop strategies to upskill staff. Investing in training, establishing relationships with other HOs and providing support networks for staff may support the development of antimicrobial stewardship expertise. The effectiveness of this strategy should be reviewed periodically by the multi-disciplinary committee that oversees antimicrobial stewardship in the HO.

Clinical Excellence Commission
List of Recommended Antimicrobial Restrictions

Clinical Excellence Commission
Antimicrobial restrictions in small to medium-sized hospitals

Clinical Excellence Commission
Antimicrobial restrictions in medium to large-sized hospitals

7.3 MRO screening and surveillance

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 MSSA is recommended for elective procedures such as coronary artery bypass graft (CABGs) and joint replacements (Total Hip Replacement and Total Knee Replacements).

A major risk factor for acquiring an MRO is overseas travel, especially when medical care or treatment in a health care facility is involved. A risk assessment should be conducted at admission to identify people who require screening for specific MROs.

NSQHS - VERSION 2 NATIONAL STANDARDS Standard

7.4 MRO admission screening

There are certain risk factors which promote the transmission of MROs in the healthcare environment. Admission screening for extreme risk rated clinical inpatient areas, such as a NICU, renal dialysis, Haematology, oncology and transplant units should depend on local demonstrated MRO epidemiology.

CPE screening should be conducted for patients who received care/treatment in overseas facilities e.g. IVF.
Candida auris screening should be conducted for patients who received care in overseas facilities.

ACSQHC
Recommendations for the control of Multi-drug resistant Gram-negatives: carbapenem resistant Enterobacteriales

NSW Health GL
Surveillance & Response for Carbapenemase-Producing Enterobacterales (CPE) in NSW Health Facilities

Refer to CPE and *Candida auris* guidelines for more information on surveillance and management of CPE and *Candida auris* in NSW health facilities.

Table 19 outlines these risk factors and requirements for admission screening.

Standardised diagnostic methods are to be used when screening for MROs. These methods should be consistent with the international standards for microbiological investigations (1).

Table 19. Specific MRO transmission risks

MRO transmission risk	Is admission screening needed?			
	MRSA	CPE	VRE	Candida auris
Repatriation from any overseas hospital admitted to an inpatient area	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 Residential Age care facility (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*	NO
Transfers from units in other NSW hospitals or residential care settings	Depends on local infection rate			
Admission to or transfer from a facility (e.g. NICU) with known prevalence or MRO outbreak	Screening for outbreak MRO			
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

7.5 MRO screening specimens

Admission screening for MROs requires the collection of at least one swab set. Swab set requirements are included in Table 20. Seek advice from your local microbiology/laboratory service prior to sampling.

Table 20. Guide to swab set requirements (discuss with laboratory)

Microorganism	Specimen(s) Required
CPE	Rectal* (preferred) or faeces and any wound, ulcer, transcutaneous exit site(s) or urine (if indwelling or suprapubic catheter is present)
MRAB	Rectal* (preferred) or faeces and throat or sputum ± wound, ulcer, transcutaneous exit site(s) or urine (if indwelling or suprapubic catheter is present)
VRE	Rectal* (preferred) or faeces 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
Candida auris	Bilateral axilla and groin, blood or other body fluids
Other gram negatives e.g. ESBL	Rectal* (preferred) or faeces and any wound, ulcer, transcutaneous exit site(s) or urine (if indwelling or suprapubic catheter is present)
C. difficile	If diarrhoea is present Faecal sample (only loose stool will be tested)

*There must be faeces visible on the rectal swab

7.6 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 (161, 162) but has been reported in the literature locally and when occurs can cause catastrophic impacts on the recipient (163, 164). Transmission to the organ recipient is more likely to occur if the donor presents with symptomatic illness at the time of the procedure (161) and a MRO is involved (165).

In addition to donor screening requirements outlined in NSW Health *Organ Donation After Circulatory Death: NSW Guidelines*, the donor is to also be screened for MRSA, VRE, CPE, and any other known MROs in local circulation (e.g. carbapenem-resistant *A. baumanii*, multidrug-resistant *P. aeruginosa)* (166).

Blood cultures should also be collected and screened if the donor is febrile. Screening should be done prior to the pronouncement of death 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.

NSW Health GL
Organ Donation After Circulatory Death: NSW Guidelines

Therapeutic Guidelines
Prevention of Infection: Immunosuppressed patients

Transplant teams and infectious diseases physicians should consider the following when interpreting donor screening results (167):

- 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 still be a candidate for organ donation if infection is still sensitive to carbapenem (i.e. 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; and
    - The need to initiate appropriate antimicrobial prophylaxis to the recipient perio-peratively.
- Any bacteraemia precludes organ donation.

7.7 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 CDI, and other non-infectious indications. The donor blood and serum screening protocol has been adapted from guidelines for blood transfusion (168). HOs performing FMT should have comprehensive protocols for screening donors. For more information refer to Australian Therapeutic Goods Administration-Faecal Microbiota Transplant (FMT) product regulation.

7.8 Healthcare worker MRO screening

Routine screenings of HWs for MRO colonisation is not recommended. HWs who are identified, via screening or diagnostic testing, as being colonised or infected with a MRO should be referred to staff health or infection prevention and control for assessment, treatment and management, as per local protocols (12).

NSW Health PD
NSW Health Code of Conduct

NSQHS – version 2 Standard 3
Promoting collaboration with occupational health and safety programs to decrease the risk of infection or injury to healthcare workers.

7.9 Ongoing MRO screening in extreme risk rated areas

Ongoing MRO screening may be necessary in clinical areas where there may be a high risk of transmission or where the clinical impact of MRO transmission would be severe (e.g. dialysis units, haematology units, oncology units, NICUS, ICUs).

NSW Health PD
Infection Prevention and Control Policy

What to screen for should be guided by the same principles as those indicated for admission screening and local infection prevention risk assessments and emerging concerns (see Section 7.4, *MRO admission screening*).

Where a patient is confirmed to be colonised or infected with a MRO, no further surveillance screening (except for clearance screening) is required for that MRO.

7.10 MRO screening in non-extreme risk rated areas

Routine MRO screening should only be done before defined surgical procedures (Section 7.4). Outside of extreme risk rated 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.

7.11 MRSA clearance screening

Clearance screening for MRSA may be considered if all of the following criteria have been met:

- The patient has not used any antibiotics or antiseptics specific to the MRO in last three months;
- It has been at least six months since the patient has returned a positive MRO specimen; and
- Patient is no longer receiving care in an extreme risk clinical area (See Table 19, *Specific MRO transmission risks* and also Section 3*, Hospital environments*).

For patients in general wards, outpatients and community settings, clearance of a MRO is when a patient returns at least two negative swabs sets, collected from the same body sites, on the same day at different times or on separate days (i.e. the two swabs sets are "separated by time"). Only the ICP or ICP designated HW is to update any infection control alerts in patients' medical record.

Additional practice points to consider:

- For MRSA, clearance can be determined if > 6 months after the last positive MRSA culture.
- Subsequent relapse of MRSA carriage after initial clearance may occur at a later time, either due to re-acquisition or resurgence of carriage to a detectable level.
- Clearance screening may be performed after re-admission or as an outpatient provided that the patient has not recently used either an antiseptic body wash or antibiotic that is active against MRSA.
- The presence of any indwelling device or non-intact skin is no longer a contraindication for clearance screening. However, clearance screening should include specimens from these sites if required.

For CPE, Candida auris and ESBL colonised patients, there is limited published scientific evidence defining clear guidance for clearance. A local management plan is suggested to be developed with IPC and ID teams based on the risk assessment and local epidemiology.

7.12 VRE clearance screening

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 (169).

VRE clearance is controversial and is dependent on institutional policies (170). In the event that VRE clearance is deemed possible a patient could be consider cleared of VRE for the purposes of cessation of contact precautions if ALL the following criteria are met (171):

- any infection caused by VRE has resolved
- more than three months have elapsed since the last positive specimen
- three consecutive VRE negative faecal samples obtained at least one week apart
- the patient must have ceased all antibiotics (intravenous or oral) for at least two weeks before specimens are collected
- 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

Patients presenting to hospital who do not meet these criteria (should be considered VRE positive for that admission) with negative screening adding to the criteria for clearance (see above).

7.13 Alerting and removing alerts (De-flagging)

Alerting or removing an MRO flag/alert in a patient's healthcare record should only be done by the local infection prevention and control unit or by other HWs designated by the local infection prevention and control unit. The minimum requirements for alerting and removing alerts for the various MROs, in both inpatient and community settings, are described in Table 21.

Where patients have met the required criteria for clearance, any flags in the system should be removed (de-flagged).

The flag should be reinstated as per any MRO positive culture and as risk assessed by the infection prevention and control team.

Table 21. Requirements for MRO alerting and removing alerts

MRO	Alerting	Removing Alerts
MRSA	Yes	Yes
Candida auris	Yes	Determine locally*
CPE	Yes	Determine locally*
VRE	Yes	Determine locally*
Carbapenemase-producing *Gram-negatives*	Yes	Determine locally*
C. difficile	Determine locally*	Determine locally*
Clinically significant MRO	Yes	Determine locally*
ESBL	Determine locally*	Determine locally*

* Determine based on local prevalence

7.13.1 Recommendations for removing alerts

- A MRO alert should be removed only if the patient meets the criteria for MRO clearance (see Section 7.11, *Clearance screening).*
- If a patient is cleared of a MRO, there is still potential for a patient to be recolonised with a 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 HO may consider removing alerts on these patients 48 hours after the return of a normal stool pattern. Refer to the national case definition for clarification on what constitutes an acute CDI episode (172).

ACSQHC
Clostridium difficile infection
A model to improve the management and control of Clostridium difficile in Australia

7.14 Audit and validation of screening programs

- HO should consider point prevalence survey of the MRO screening program to test the compliance rate towards the screening program
- Consider single or periodic point prevalence survey to validate the screening programs in high risk units.
- Recommendation: annual review within facility

7.15 Precautions

In extreme risk rated settings, patients with a MRO, should be cared for under standard and contact precautions (See Section 5*, Contact precautions in specific settings*).

If any of the risk factors described under Section 7.4*, MRO admission screening,* are present: A risk assessment should be conducted to employ additional infection prevention and control strategies.

- Patient placement -preferably accommodate the patient in a single room with ensuite
- If patient is to leave their room, the patient should perform hand hygiene before leaving are

In the absence of the risk factors described under Section 7.4, *MRO admission screening,* a patient in a low risk rated setting (e.g. mental health, rehabilitation) can be cared for under standard precautions plus:

- Patients may use the therapy pool using standard and transmission based precautions provided they comply with respiratory etiquette and hand hygiene, have no diarrhoea, uncontrolled faecal incontinence, or wounds that cannot be contained by a waterproof dressing.
- It is suggested to contact the IPC team to discuss management options for each client.

Aquatic Physiotherapy Group Australian guidelines for aquatic physiotherapists working in and/or managing Hydrotherapy pools.

- Can be cohorted with other patients that have the same MRO.
- Patient can freely visit hospital courtyards and coffee shops.
- Patient can use gym and therapy areas at any time, ensuring hand hygiene before and after contact with gym equipment. Reusable equipment is to be cleaned after every patient use.
- Patient's visitors should comply with hand hygiene requirements and not assist or visit other patients during current visit.
- Visitors are not routinely required to don PPE, unless exposure to body substance is anticipated.
- Education must be provided to visitors on donning, doffing, disposal of PPE and hand hygiene if visitors are required to wear PPE.

Each MRO patient should, where geographically possible and practical, use a separate toilet facility, and the need for additional environmental cleaning should be assessed.

NSW Health PD
Environmental Cleaning Policy

7.16 Patient placement

Unless otherwise advised by the local infection prevention and control service, the placement of a patient with a MRO should be done in line with Section 6, *Risk mitigation: patient placement*. See Table 22 Patient placement priority guide for guidance.

Section 6
Patient placement

Specific risk factors that influence MRO patient placement decisions are:

- Is the patient capable of maintaining their own personal hygiene?
- Does the patient have any discharging wounds that cannot be adequately covered?
- Has the patient had diarrhoea in the past 48 hours?
- Is the patient faecally incontinent?
- Is the patient incontinent of urine and has MRO colonisation of the urinary tract?
- For VRE placements, does the patient have any enterostomies or faecally incontinent?

Table 22. Patient placement priority guide

Priority level for single room allocation	Route of transmission	Isolation Management	Examples
High – Must be placed in single room with bathroom	**Airborne**	**DO NOT COHORT** **Airborne Precautions**	Measles Pulmonary tuberculosis Chickenpox
High– Must be placed in single room	**Droplet**	**DO NOT COHORT** Single room Droplet precautions	Pertussis (Whooping cough) Meningococcal disease (< 24 hours after antibiotics commenced) Rubella (German Measles) Mumps
Medium – single room where available	**Droplet**	Influenza-like illness (ILI – seasonal Influenza) Risk assess clinical symptoms for the duration of isolation	Other respiratory viral illnesses such as adenovirus, human metapneumonvirus, parainfluenza, RSV,
High– Must be placed in single room	**Contact**	Single room with ensuite or dedicated bathroom facility Contact precautions **DO NOT COHORT ACUTE DIARRHOEA, CPE or CANDIDA AURIS**	Order of priority for single room allocation: 1. CPE 2. Acute diarrhoea (3 or more loose stools within 24 hours. Risk assess clinical symptoms for the duration of isolation)
Medium – single room where available	**Contact**	Cohorting can occur in this category (VRE, MRSA). Risk assess for prioritisation Contact precautions Single room with ensuite or dedicated bathroom facility or designated commode	3. MRSA 4. ESBLs 5. VRE 6. Shingles

7.17 Precautions for community health settings

The precautions required to prevent MRO transmission in a community health setting should be based on a risk assessment which should address the following:

Section 5
Contact precautions in specific settings

- Are invasive procedures performed?
- Is direct physical contact with blood, body substances, tissue, infectious materials or surfaces/equipment anticipated?
- Patient has open wounds or invasive devices or is immunocompromised?

Refer to Figure 4 for additional advice on risk assessing for MRO transmission in community settings.

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

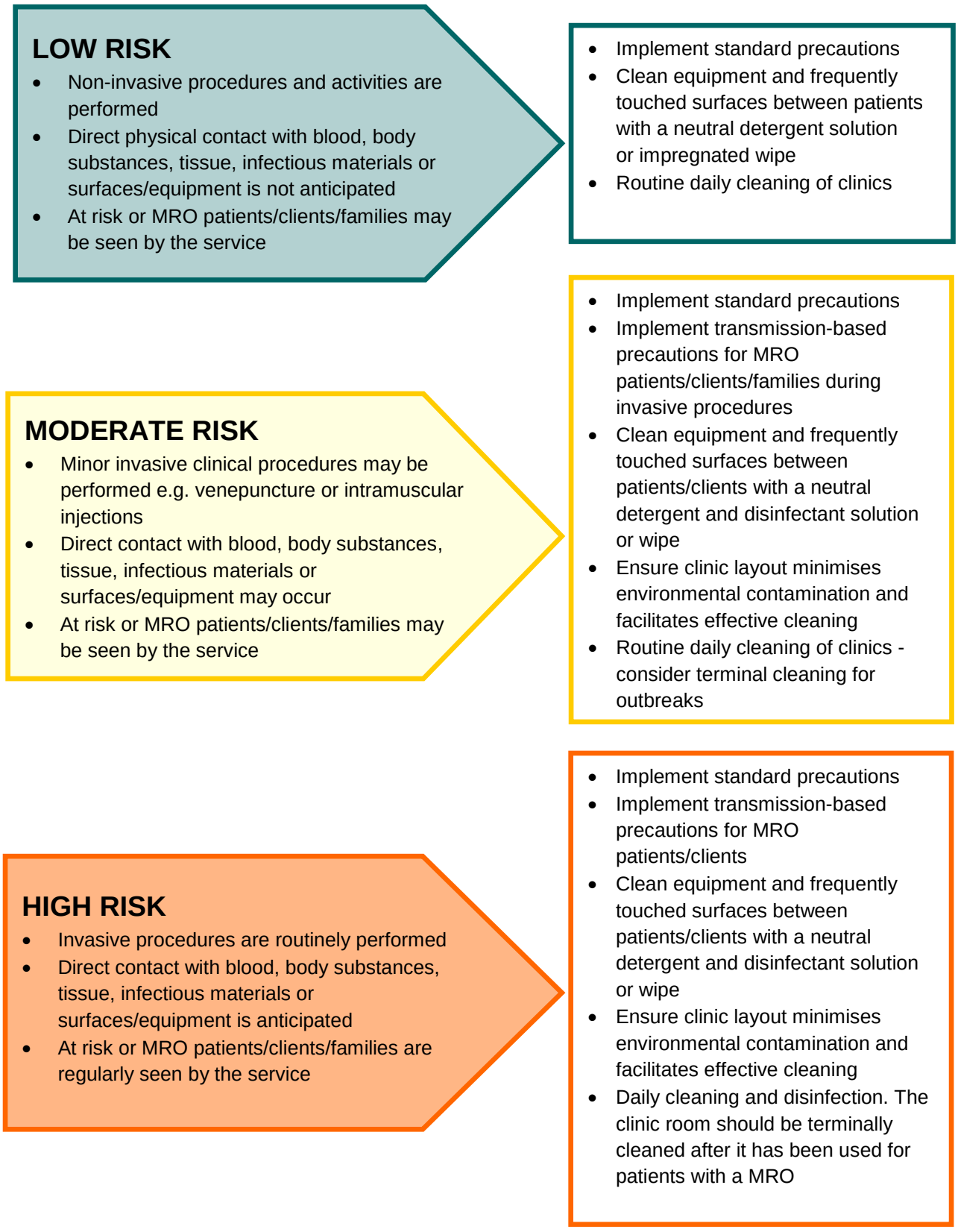
or outbreak incidents may impact on the level of risk and should be considered when conducting a risk assessment.

Hand hygiene is to be adhered to by all HWs who have contact with the patient or patient's surroundings. HWs should encourage all patients/clients and carers to perform hand hygiene when they attend community health outpatient clinics to minimise environmental contamination.

Standard precautions (see Section 4, *Risk mitigation: standard precautions*) are adequate for activities where HW contact with the patient is minimal (i.e. only social contact is anticipated) and the risk of MRO transmission is low. Standard and transmission-based precautions (see Section 5, *Risk mitigation: transmission-based precautions*) should be implemented if there is a high risk of MRO transmission. For example, an Occupational Therapist assessing a patient's home who is known to have VRE and is incontinent of faeces; MRO infected patients/clients attending nursing procedural clinics for wound management.

Reusable/shared clinical equipment and frequently touched surfaces are to be cleaned between patients/clients with neutral detergent. The cleaning process should be as per local protocols and be based on the risk assessment below [Figure 4]. In medium and high risk community settings this may include the additional action of disinfection with hospital-grade disinfectant for reusable or shared clinical equipment and frequently touched surfaces that are in contact with an MRO patient/client.

Figure 4. Risk assessment for community health outpatient settings



For clinics where invasive procedures are performed, it is essential that the layout minimises environmental contamination and facilitates cleaning. This may include:

- Keep clinic surfaces such as desks and floors clear of clutter
- Utilise wall displays or posters that are washable
- Maintain minimal patient care stock in clinic rooms
- Store patient care stock in cleanable containers or cupboards after use

At a minimum, all community health clinics are to be cleaned daily when in use. Clinical staff are responsible for cleaning of the patient equipment and high touch surfaces, including examination chair/bed and examination light between each patient. An additional terminal cleaning may be required between patients or prior to the start of the next clinic session to minimise the potential for MRO transmission.

7.18 Transferring or transporting a patient with a MRO

The transfer and transport of a patient within a hospital or between hospitals is not to be delayed by MRO colonisation or infection and should be guided by clinical need and urgency. Only a minority of patients who are colonised with a MRO will have been identified by screening or a previous infection. Therefore, theoretically, any patient could be colonised.

Transfer or transport agencies are to, as a minimum, exercise standard precautions and, where possible, contact precautions during the transfer and transport of a MRO patient based on risk assessment. If this is not possible, refer to local procedures and/or seek advice from the local infection prevention and control unit for alternative arrangements.

It is critical that the transfer/transport agency adheres to all elements of standard precautions, particularly hand hygiene and environmental cleaning, and implements measures to increase the spatial distance between patients during transport/transfer.

The facility booking the transfer or transport is to notify all agencies involved in the transfer or transport, including the receiving HO, of the patient's MRO status and type of colonising MRO prior to the patient being transferred or transported. The HO booking the transfer should assist the patient with hand hygiene.

The following general principles should be followed while transporting a patient with a known MRO status:

- Patient treatment or transport should not be delayed as a consequence of MRO status.
- Non-infected patients and patients with an MRO may travel in the same vehicle, provided;
- Patient Transport Service employees maintain standard precautions and, where possible, contact precautions during the transport if required.
- Patients perform hand hygiene with an alcohol based hand rub when they enter and leave the transport vehicle.
- Patients have the capacity to abide by instructions to reduce chances of physical contact between patients
- Patients identified at the time of booking as having an increased risk of transmission (e.g. incontinent, uncontained wound) must not be transported in a mixed Patient Transport vehicle. These patients are usually considered high shedders, causing greater risk of transmission of organisms.

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 3

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 3

NSW Health PD
Service Specifications for Transport Providers, Patient Transport Service

7.19 MRSA decolonisation

For some patients, reducing the skin burden of MRSA reduces the risk of post-operative infection. 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 (e.g. cardiothoracic, joint replacement) whereas decolonisation should be used to reduce the risk of recurrent skin infection.

Despite the commencement or completion of any load reduction or decolonisation regimen, a patient is to be considered as colonised and appropriate precautions to counter further transmission are to be maintained until clearance has been microbiologically determined and documented in the patient's health care records.

7.19.1 MRSA pre-operative decolonisation

Clinicians should strongly consider the initiation of a pre-operative load reduction regimen for MRSA colonised patients undergoing elective cardiothoracic, orthopaedic (total joint replacements), infrarenal vascular and haemodialysis procedures, particularly in units known to have moderate to high levels of MRSA in circulation (173)**.** A pre-operative load reduction should be initiated within a sufficient timeframe to optimise efficacy.

This usually requires the regimen to be initiated at least five days prior to surgery. An example regime (Table 23) is included in the next Knowledge Box. However it remains effective if commenced at least one day prior to surgery. Any MRSA pre-operative load reduction regimen should consider local antibiotic formulary restrictions and should be determined in consultation with a clinical microbiologist and/or infectious diseases physician and/or the local infection prevention and control unit. Load reduction can also be performed for MSSA colonised patients; use local protocols for this.

Table 23. MRSA Decolonisation Regime

Knowledge Box : Example of a preoperative MRSA decolonisation regime (to be undertaken in the hospital and home environment)

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.

Pre-operative load reduction for adults positive for MRSA:

- *Hair and body:* Use antimicrobial body wash (2% aqueous chlorhexidine or 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.

- *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 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:* Freshly cleaned clothing and clean footwear should be worn after showering.
- *Frequently touched surfaces:* Wipe surfaces such as bed rails and bedside equipment daily using a clean cloth and detergent. Discard the cloth after use.

This protocol has been adapted from the following sources:

Hunter New England Local Health District, *Policy Compliance Procedure – Management of Multi-resistant Organisms and Clostridium difficile (2014).*

7.19.2 MRSA decolonisation for ongoing carriage

MRSA decolonisation should be limited to the 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 regime.

MRSA decolonisation **should be considered** only if **all** of the following criteria are met:

- The individual has not used any antibiotics or antiseptics in last two weeks;
- The isolate is susceptible to the decolonisation regimen;
- The individual does not have any invasive devices present;
- All wounds or ulcers have healed;
- The individual does not have any exfoliative skin conditions;
- The individual is cooperative, cognisant and able to follow MRSA decolonisation regimen where required; and
- The patient has completed treatment for MRSA symptomatic infection and decolonisation is expected to prevent recurrent infection.

An example regime is included in the next Knowledge Box (Table 24). Current evidence indicates that MRSA decolonisation regimens have variable efficacy for long term elimination of MRSA and efficacy is dependent on a number of patient factors (174). 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.

NSQHS - UPDATE TO VERSION 2 NATIONAL STANDARDS Standard 3

World Health Organization
Global Guidelines
For The Prevention Of
Surgical Site Infection

After the decolonisation regime 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; and
- If a HW, 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 clinical microbiologist or an infectious diseases physician should be sought if MRSA colonisation persists after two attempts at decolonisation.

Table 24. MRSA decolonisation regime for ongoing carriage

Knowledge Box : Example of a MRSA Decolonisation Regime

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.
- 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 hair brushes and combs, nail files, plastic toys, and clippers in the dishwasher or discard.

Treatment for adults positive for MRSA (and their household contacts):

- *Hair and body:* Treat with 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 first week and then 2-3 times a week afterwards. Apply inside nostril with cotton bud or swab. Discard cotton bud after use. Repeat with new cotton bud or swab for 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 clinical 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.

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 an alcohol-based cleanser (large alcohol-containing wipes) several times during the decolonisation period.
- Clean and disinfect the shower floor and/or bath tub daily with a 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.

This protocol has been adapted from the following source:
Hunter New England Health Pathways. Recurrent Staphylococcal Infections. [Online] 2015.

7.19.3 Decolonisation of other MROs

To date, there is a lack of evidence to support using a decolonisation regimen for the long-term elimination of any other MRO. This section will be updated when reliable and valid evidence emerges to support such regimens.

7.20 Communication about MROs

7.20.1 Communicating with patients and carers

Each HO 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.

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 3

Where screening or clinical diagnostic testing has indicated MRO colonisation or infection, the treating medical officer, or their designate, is to advise the patient of this result. This will provide an 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 HO should ensure that MRO colonised patients are provided with easy-to-understand written and verbal information on the MRO. At a minimum, this should contain the following information:

- What is a MRO?
- What is the MRO that has colonised the patient?
- 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 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 HWs?
- What infection prevention and control precautions are required after discharge (i.e. at home)?
- Who the patient should tell about their MRO colonisation and/or infection (e.g. other healthcare providers including transport agencies).

The Clinical Excellence Commission provides a number of resources for patients and clinicians. For MRSA (175), VRE (176) and *C. difficile* (177) the National Health and Medical Research Council (NHMRC) has produced patient information brochures. For CPE, the Australian Commission on Safety and Quality in Health Care (ACSQHC) has produced a patient factsheet (178). It is sufficient to use these brochures and fact sheets for patient communication. Where a HO has specific local MRO concerns, the HO may prefer to publish and distribute their own patient information. In the event of an outbreak or increasing endemicity, a HO must provide rapid response communication and feedback to colonised patients and their carers.

7.20.2 Communicating with other hospitals

As described in Section 7.18, *Transferring or transporting a patient with a MRO,* the facility booking a transfer must notify the transport agency and receiving HO of the patient's MRO status and type of colonising MRO prior to the patient being transferred. If screening or diagnostic results were not available before the transfer, and the presence of a MRO is identified by the booking HO after the transfer, the booking HO is responsible for informing the receiving HO of this new information. The receiving facility is responsible for conveying this new information to the patient and their family or carer.

7.21 MRO outbreak management

The outbreak management principles outlined in Section 11, *Outbreak management,* should be adhered to if an MRO outbreak occurs.

SECTION 8
RISK MITIGATION: REPROCESSING

8 Reprocessing of reusable equipment and reusable medical devices

"Each medical device may be used on hundreds or thousands of patients each year. As such, if there is a problem with the specific medical device that leads to infection transmission, there potentially can be a large number of patients affected."

Michelle Alfa, 2013 (179)

Reusable medical devices (RMDs) are used for diagnostic and/or treatment purpose for multiple patients and are intended by the device manufacturer for reprocessing and reuse.

This section should be read in conjunction with *Australian/ New Zealand Standard 4187:2014 Reprocessing of reusable medical devices in health service organizations* and manufacturer's instructions for intended device.

Prevention of health care associated infections (HAIs) in patients undergoing dental, medical or surgical procedures is an essential component of patient safety in the delivery of high quality health care. This section provides guidance on processes needed to effectively clean, disinfect and sterilize RMDs prior to and between patient uses. Non-RMDs e.g. toys or bedpans do have to comply with reprocessing as described in Spaulding's classification and manufacturer's instructions for use (IFU) but not as described in AS/4187.

Health Organisations (HO) are to ensure that the RMDs must be used for intended purpose or as designated by their manufacturer as suitable for reprocessing and reuse.

AS/NZS 4187
Reprocessing of reusable medical devices in health service organizations

NHMRC
Australian Guidelines for the Prevention and Control of Infection in Healthcare

Reprocessing refers to the activities required to ensure that a 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 requires specific reprocessing steps or techniques appropriate for that device and many variables can impact the effectiveness of reprocessing. Factors such as device design, reprocessing methodology and methods for validating cleaning and high level disinfection or sterilization may affect the quality of reprocessing.

RMD technology is constantly evolving and reprocessing requires precision, as well as ongoing training to assure reprocessing staff competence.

- HOs should have in place quality management systems in accordance with AS/NZS 4187 (Section 2, Quality Management), Australian Commissions Safety Advisory notices and NSW policies, guidelines and Standard Operating Procedures.
- HOs should ensure that staff responsible for the reprocessing of RMDs within a facility have relevant qualifications and experience in reprocessing.
- HOs should ensure that they have the facilities, equipment, and easy access to manufacturer-specified cleaning, disinfection/ sterilization agents.
- HOs are to ensure that the manufacturers' IFUs and local procedures are followed.
- The reprocessing agents should be checked for their microbicidal effectiveness and compatibility with the device, and this should be validated.
- Appropriate PPE is to be worn by HWs when reprocessing RMDs
- HOs should only use RMDs, reprocessing agents including hospital grade disinfectants, instrument grade chemical disinfectants, sterilizing products and technologies that are listed on the Australian Register of Therapeutic Goods (ARTG) for reprocessing RMDs.
- Disinfectants and sterilizing products should only be used for their approved purpose.
- Health workers (HWs) involved in the purchase or use of disinfectants or sterilizing products should, prior to purchase, obtain a copy of the TGA listing or registration certificate (Refer to NSW Health Procurement Policy Directive).
- After reprocessing RMDs should be stored in accordance with Australian/ New Zealand Standard 4187 Section 9.5 *Handling, transport and storage of released reprocessed RMDs.*

Therapeutic Goods Order No. 54 - Standard for Disinfectants and Sterilant

Australian Register of Therapeutic Goods

HOs should have appropriate governance around the management of RMDs, suitably qualified HWs and regular audits for quality assurance to ensure risk minimisation and patient safety.

8.1 Reprocessing categories

The Spaulding classification system (180) classifies a medical device as critical, semi-critical or non-critical on the basis of risk to patient safety from contamination on a device. 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 15 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, RMD to be reprocessed at the point of use.

Whatever the reprocessing method may be, appropriate validation, control and monitoring of cleaning, disinfecting, sterilization and packaging 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, e.g. provision and validation of water and steam quality; trained and competent sterilizing technicians; and defined and documented work procedures.

Table 25. Reprocessing categories and processes

Level of Risk	Process	Examples of items (Lists are not exhaustive)
Critical		
A medical device that comes into 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		
A medical device that comes into 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 using a high level instrument grade chemical disinfectant.	One-way breathing valves, pneumotachograph screens, mouth shutters, respiratory/sleep therapy equipment, laryngoscope blades, vaginal ultrasound transducers, colonoscopes, gastroscopes, nasoendoscopes and specula.
Non-critical		
A medical device that only comes into 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.

8.2 Reprocessing methods

In accordance with AS/NZS 4187, 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:** Reduction of the number of viable microorganisms on a product or item to a level previously specified as appropriate for its intended further handling or use.
- **Sterilization:** A validated process used to render a product free from viable microorganisms.

8.2.1 Cleaning

Reprocessing begins with processing at the point of use i.e., close 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 soil and contaminants in and on the device.

Thorough cleaning and removal of visible soil by manual or automated systems is essential for both disinfection (thermal or chemical) and sterilization of RMDs, as residual soil (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 and the requirements set by AS/NZS 4187 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 HWs performing these tasks. For easy access to information diagrams, photographs, illustrations and/or videos on manufacturer's IFU are recommended. In addition, the instructions should indicate the location where this step should be performed (e.g., 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. The HWs performing these tasks must be trained and qualified in the processing of RMDs. 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 (e.g. 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 the amount of 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.

8.2.2 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 i.e. 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.

NSW Health Safety Notice 001/14
Use of Impregnated Chemical Disinfectant Wipe Systems for Reusable Medical Devices

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 inactivates some viruses.
- Intermediate-level disinfectants: kill vegetative bacteria including mycobacterium species, viruses and all fungi and inactivates most viruses but do not kill bacterial spores.

Therapeutic Goods Order No. 54 - Standard for Disinfectants and Sterilant

World Health Organization Laboratory Biosafety Manual 3rd edition, 2004

- High-level disinfectants: kill all microorganisms with the exception of 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 requires exposure to a disinfecting process must have been categorised as semi-critical or non-critical according to Spaulding classification (AS/NZS 4187).

  - Semi-critical RMDs must be sterilized by either validated moist heat or low temperature sterilizing process between uses on individual patients unless RMD is not compatible with these processes.
  - Semi-critical RMD that is 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
  - Semi-critical RMD that cannot withstand thermal disinfection process must be subject to a validated high level chemical disinfecting process between uses on individual patients.

8.2.3 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 sterilizing process, a suitable and alternative validated process will be necessary.

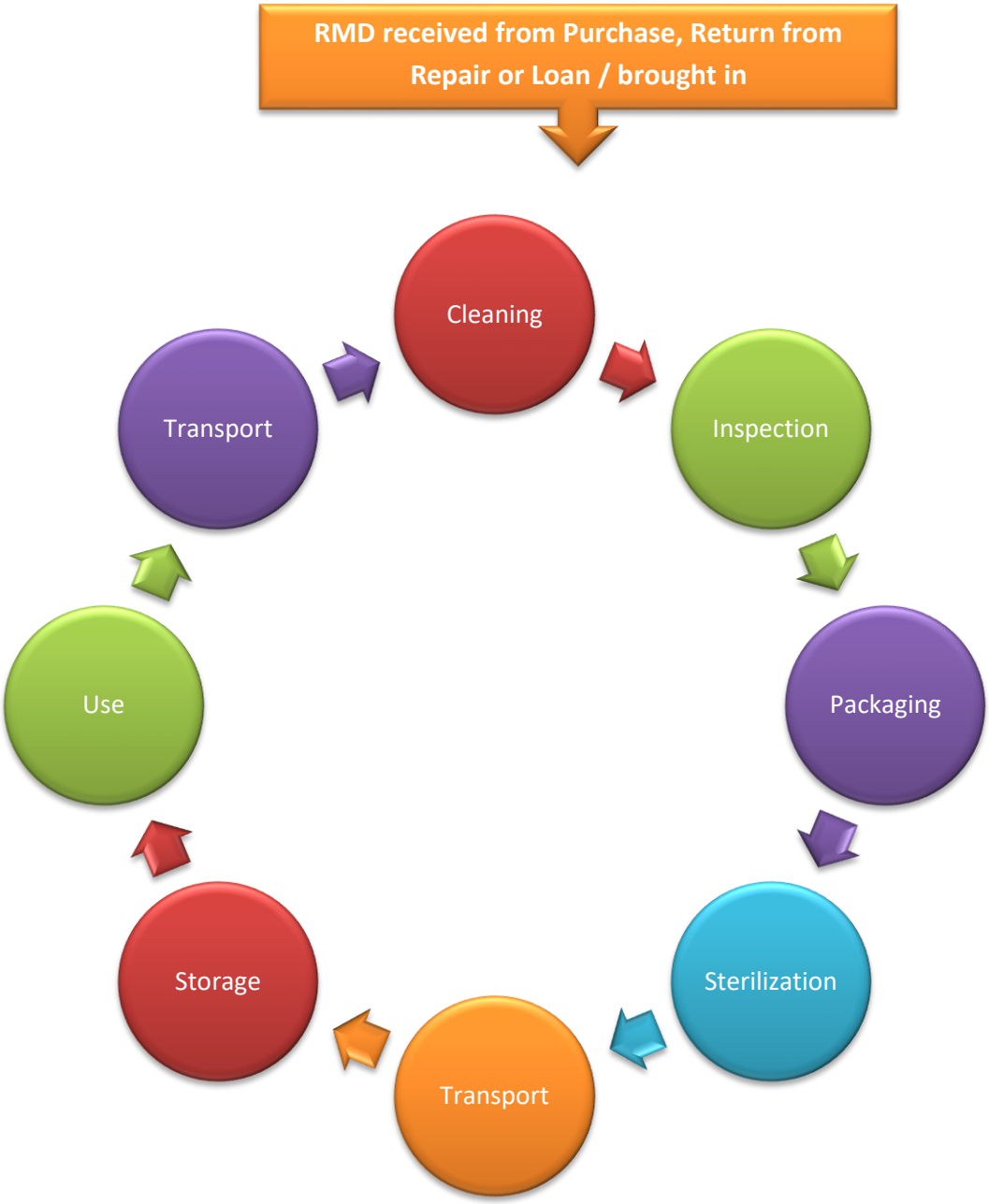
An alternative form of sterilization may be a low temperature gas, plasma or liquid chemical sterilizing process and may also depend on resources available within the HO.

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 and quantity, and the appropriateness of the cycle for the load contents, and other aspects of device reprocessing.

Ensuring consistency of sterilization practices requires a comprehensive program by HOs that ensures operator competence and proper methods of cleaning and wrapping instruments, loading the sterilizer, operating the sterilizer, and monitoring of the entire process.

8.3 Reprocessing critical items

Figure 5 Reprocessing of a critical RMD should involve the following steps:



Note: Follow Instruction for Use as per supplier specifications at each step

8.4 RMDs on loan on brought by clinicians

With the ever increasing complexity and cost of medical procedures and surgical instruments in general, it has become impossible for every facility to own every type of equipment. Loan sets have become an integral part in the care of patients requiring surgical intervention, as public health organisations, rather than purchasing instrument sets, increasingly utilise loan sets of instruments.

In the decision making process regarding use of loan sets, privately owned RMDs and/or RMDs brought in by clinicians, HOs 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,
- HOs must always check for approval for use in Australia, ARTG certificate, manufacturers IFU, local procurement processes and biomedical engineering requirements

- The supply, packaging, transportation, handling and processing of loan sets must be undertaken in a manner that ensures the safety of patients and HWs involved and comply with occupational health and safety regulations.
- All loan transport containers must comply with WorkCover regulations and should be maintained by the supplier in a clean, dry state. In addition, should be in good working order. The HO needs to have a system in place for handling loan equipment that complies with WorkCover regulations[i].
- The medical team should provide the designated HWs with a full description of the RMDs required to be ordered on loan
- HWs must provide all instructions necessary for the provider to supply the loan sets in a manner that is safe and timely, and allows for sufficient time for reprocessing the loan instruments.
- 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.
- 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 e.g. 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 HWs 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 (i.e. tray lists) is present. HW must also check that the manufacturer's IFU and local procedures for reprocessing are provided and followed.
- Suppliers must send disassembling, cleaning and sterilization/disinfection instructions for multi-component instruments and these instructions should be followed.
- HW must ensure that the reprocessed loan sets are delivered for use on time and with all required documentation. Perceived lack of time should not permit the cleaning process to be bypassed.
- After use, and before being returned, loan sets must be cleaned and disinfected, sterilized or thermally disinfected as per 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 Incident Management Policy.
- Reusable loan set instruments used on humans must never be used on animals, or for necropsy or autopsy.

Where a HO is expected to reprocess clinician owned RMDs or loan sets, the HO'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 HO, 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 HO, the local reprocessing unit should examine the integrity of the container. If the integrity of the container has been compromised, then 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.

Work Health and Safety Regulation 2011
Management of Instruments, Accountable Items and Other Items used for Surgery or Procedures
NSW Health Incident Management Policy

8.5 Implantable devices

- Devices or items intended for human implantation must not be reprocessed or reused after patient use.
- Implantable devices must not be 'flash' sterilized.
- Implantable devices used for orthopaedic and dental surgery that are received packaged and sterilized with identification from the manufacturer, should not be opened and used to restock racks or trays.
- The implantable devices manufacturers to provide validated cleaning instructions that clearly state whether implantable screws and plates can be reprocessed or not (181).
- The implantable devices labelled as "single use" are not to be reprocessed.
- Complete documentation as per NSW Health Care Records - Documentation and Management

Health Care Records - Documentation and Management

8.6 Management of incidents

HOs that undertake reprocessing of RMDs must have an established system in place to manage incidents of real or suspect cleaning, disinfection or sterilization failure.

If any item(s) used on a patient are subsequently found to be unsterile or inadequately disinfected, the health organisation must determine the extent of the problem. A risk assessment framework must be used to determine infection control breaches related to sterilization or disinfection failure. Processing failures relating to items used in patient care must be investigated and managed in

accordance with current AS/NZS 4187, Infection Prevention and Control Policy Directive section 4 and Incident Management Policy Directive.

Effective management of the recall process requires the traceability of RMDs to patient records by either electronic or manual system.

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.

8.7 Management of complex and difficult to reprocess RMDs

Reusable RMDs are designated as difficult to reprocess when the effectiveness of the cleaning, disinfection or sterilization process cannot be guaranteed.

- To guarantee effective cleaning, the design of the device must allow friction to be applied to all surfaces either by brushing or ultrasonic action and also allow visual inspection of those surfaces.
- Dead-ended lumens must be considered as difficult to clean RMDs,
- Reprocessing facilities, perioperative services and facilities with procedure rooms should work towards replacing all complex and difficult to reprocess RMDs with items that can be dismantled for ease of cleaning and reprocessing.
- Keep a list of RMDs that are difficult to reprocess and document in the risk register.

HOs must 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. Refer to Figure 6 and table 26 for further details on risk assessment.

ISO 17664:2017
Processing of health care products — Information to be provided by the medical device manufacturer for the processing **of medical devices**

Figure 6. Risk assessment Flow Chart

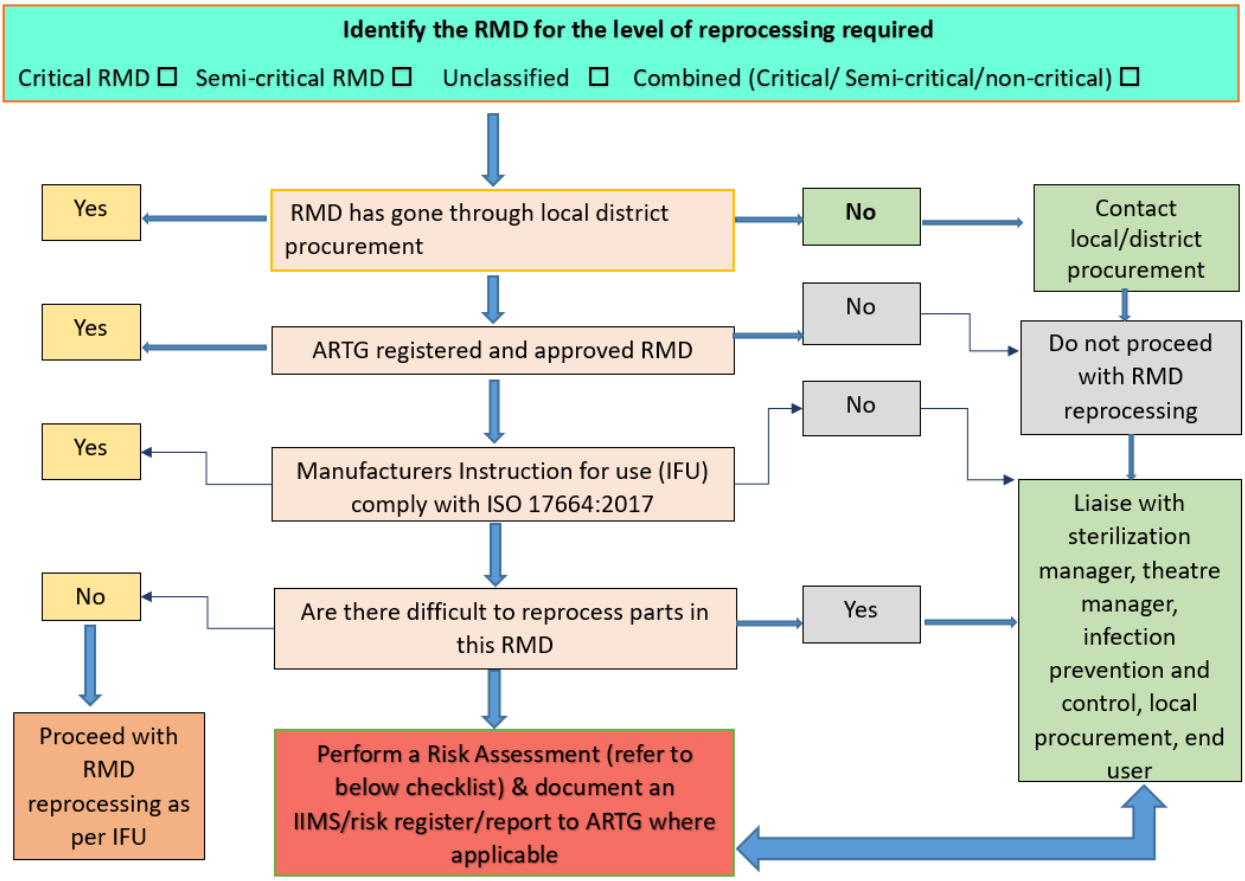


Table 26: Risk Assessment Checklist for RMDs when IFU does not comply with 4187 or RMD identified as difficult to clean

☐ IFU does not comply with 4187 ☐ 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 team

☐ Procurement (local/district) ☐ End users (e.g. surgeon, Theatre manager)

☐ Other (……)

	Yes	No	N/A
Are there alternative methods available for the RMDs to be reprocessed according to AS/NZ 4187: 2014 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 there a single use option available for this RMD?			
Is the use of this RMD necessary at the facility?			
Is the non-use of this RMD life threatening to the patient?			
Review the device's IFU to identify: ○ Is it a complex item? ○ Is there correct tools available to assemble/reassemble this RMD? ○ Is 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 sterilized?			
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 control risks to patients?			
Staff responsible for reprocessing RMDs are trained to perform all reprocessing steps as per the device's IFU			
Is 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 ……..

Date of assessment…… Signature ……

8.8 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 6 and table 26 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
  - 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 HO's product selection committee or equivalent.

Section 2.4.1
Purchasing new equipment

When new instrumentation is purchased, the HO should ensure that the manufacturer or their representative provides initial training to HO staff. Once initial training has been provided, local trainers are responsible for providing education to other staff members, including new staff.

8.9 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(1). These and other dental materials may be difficult to remove if allowed to dry.

Australian Dental Association
ADA Infection Control Guidelines

NSQHS Standards Guide for Dental Practices and Services

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 (Figure 6) Table 26 for further information on risk assessment on difficult to reprocess RMDs.

Oral health services utilising a steam sterilizer to sterilise dental equipment within their unit are to follow the requirements for testing, documentation and quality control as specified by AS/NZS 4187.

The Dental Board stipulates the expectations for infection prevention and control based on the current edition of the ADA's Guidelines for Infection Control and NHMRC Guidelines, plus current versions of either AS/NZS 4815 or AS/NZS 4187 for instrument reprocessing. Where AS/NZS 4815 is applied units are to detail rational and compliance for the standard and would benefit on conducting GAP analysis between AS4815 and AS4187.

When RMDs are being reprocessed outside of the oral health service unit, contaminated RMDs are to maintain moisture to prevent from possible debris drying on instruments. These items must be contained within a puncture-proof and lidded container for transportation and the transport vehicle should be temperature controlled. HOs must have a formalised and documented process for delivery and pick-up of instruments.

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 e.g. 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. HOs must not use other surface barriers on that specialised equipment.

HOs should have a local policy that describes their specialised equipment and its specific reprocessing.

8.10 Maintenance and repair

RMDs that are to be sent for maintenance or repair must, prior to dispatch be cleaned and disinfected or sterilized in accordance with the manufacturer's IFU.

On return prior to placing back into circulation for use, these items must be reprocessed in accordance with manufacturer's IFU and facility procedures.

8.11 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.

8.12 Reprocessing semi-critical items

8.12.1 Intracavity ultrasounds

Intracavity ultrasound transducers (e.g. transvaginal, trans-rectal/TRUSS or intraoperative) are to be reprocessed in accordance with the manufacturer's IFU and AS/NZS4187. If an intracavity ultrasound transducer cannot be sterilized, thermal or high level chemical disinfection is required to minimise the risk of cross contamination and ensure patient safety (182). Additionally, automation, validation, and traceability of disinfection systems for ultrasound probes are recommended.

Sterile gel and sterile probe covers should be used.

NSW Health Safety Information 001/14
Correct Usage of Fume/Vapour Soaking Stations

ASUM-ACIPC
Guidelines for Reprocessing Ultrasound Transducers 2017

The use of disposable/sterile covers are not used as a substitute for cleaning, disinfection or sterilization.

Fume extraction cabinets may be required while using the recommended chemical disinfectant.

Specialised requirements are to be followed when disposing of chemical disinfectants.

Approved spill kits are to be available in the reprocessing area in case of spillage of the chemical disinfectant.

Appropriate PPE is to be worn by HWs when reprocessing ultrasound transducers.

Reprocessing cycle records are to be maintained by the HO with the following information as a minimum:

- transducer serial number;
- date and staff members responsible for reprocessing;
- method of disinfection; disinfection cycle or load number;
- name and signature of the person releasing the transducer for use.

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 HW 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.
- 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 sterilized or disinfected ultrasound transducer is to have an indicator attached to confirm that appropriate reprocessing methods have been followed.

8.12.2 Reprocessing flexible endoscopes

Flexible endoscopes invariably become contaminated with microorganisms during clinical use. With more widespread use of flexible endoscopes cross infection involving oesophago-gastroduodenoscopy, colonoscopy, endoscopic retrograde cholangiopancreaticography (ERCP), or bronchoscopy have been observed and described in many countries.

Despite the use of standard cleaning and disinfection techniques required to decontaminate endoscopes, infection prevention and control breaches have been reported. This is mainly due to the complex design of channels and valve systems within endoscope. Therefore, HOs should have a reliable, high-quality system for endoscope reprocessing to minimise transmission of pathogens to patients during endoscopic procedures. Likewise, HOs should have an infrastructure that supports training and competencies, quality measurement and management program for endoscope reprocessing.

HOs should ensure the following critical steps are followed when reprocessing flexible endoscopes:

- Identify brand and model for each endoscope.
- Obtain the manufacturer's IFU for all brands and models.
- Understand the manufacturer's IFU for cleaning each endoscope.
- Be aware of the number of channels and valves within the endoscope.
- Adhere to the manufacturer's IFU for reprocessing.
- Check compatibility of scope IFU and automated Endoscope Reprocessor (AER) IFU.
- Evaluate the reprocessing procedures.
- Document the process to enable traceability.

GESA
Position Statement – March 2017: Infection Control in Endoscopy

NSW Health Safety Notice SN: 002/06
Cleaning of flexible endoscopes (reprocessing)

8.12.3 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 sterilized between patients.

Chemical disinfection must only be used on equipment that is designated to and reused by one baby.

Prior to transfer, staff should provide guidance to parents or carers about cleaning and disinfecting feeding equipment that is appropriate for the home setting.

8.13 External ultrasounds

RMD, including bladder scanners, ultrasound machines and transducers may act as both a source and a vector of potential cross contamination.

Under certain unfavourable circumstances ultrasound gel can also become contaminated with a variety of microorganisms and can cause infection.

An ultrasound probe used on intact skin is classified as non-critical equipment. After use it requires cleaning, as per the manufacturer's IFU and depending on the outcome of a risk assessment, low level disinfection with an approved and compatible disinfectant.

8.13.1 Surface probes used on intact skin and bladder scanners

Following a non-invasive procedure, e.g. 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 comes in contact with blood and/or body fluids, first clean with a neutral detergent and then disinfect with an appropriate disinfectant in compliance with the manufacturer's IFU and TGA regulations.

8.13.2 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 come into contact with a sterile drape, e.g. 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. After use it requires cleaning, 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

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/NZS4187 and manufacturers IFU to ensure a system of traceability is in place to enable recall procedures to be followed in case of decontamination failure.

8.13.3 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. An Advisory (A19/02) was released by the Australian Government, Department of Health: Diagnostic Imaging Accreditation Scheme in 2019 to provide guidance on the requirements for using this type of disinfection method. Before purchasing light based disinfection systems for ultrasound probes, the following is recommended:

- Determination if the device (e.g. ultrasound probe) is compatible with the light based disinfection system (LBDS).
- Determination if the LBDS is registered with TGA.
- The manufacturer of LBDS provides evidence for microbial reduction/antimicrobial efficacy.
- The manufacturer provides device specific IFU.
- Determination of any treatment of RMD that is required prior to exposure to the process to ensure its effectiveness.
- Determination of any restrictions or limitations relating to the size, mass, configuration, or loading orientation of RMDs being processed.
- Review of current evidence related to the light based disinfection systems.
- Risk assessment of physical location for the LBDS to determine reprocessing workflow, storage requirements and maintenance
- Determination on how the ultrasound probes will be tracked, location of the record storage and in the patients record.
- Documented procedure for reprocessing, including PPE requirements.
- Approval to purchase and use the LBDS by local Infection Prevention and Control team and Central Sterilizing Manager and local procurement.
- Program for staff training and competency assessment for reprocessing ultrasounds.

- Will you be able to validate the LBDS to comply with AS/NZS4187?
- How will this improve the current system for reprocessing of ultrasounds?
- What is the Spaulding classification level for the ultrasound to be reprocessed and will this system provide the correct classification
- Will there be additional consumables and costs associated with using this system?
- What will the routine monitoring include and who will have responsibility for completing and documenting this?
- Will using this system impact on any other workflow or service provision?
- Has the risk verses' benefit been determined for patient safety?

8.14 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 (183). Evidence suggests that stethoscopes are potential vectors for microorganism transmission between patients (184, 185). *S. aureus* has been identified surviving on ear pieces of stethoscopes for longer than 18 hours (186). All parts of the stethoscope that have been in direct contact with skin (patient's or clinician's) should be cleaned before reuse. In extreme risk clinical areas, or during outbreaks, HWs should consider using Single Patient Use stethoscopes (183).

8.15 Toys

Toys are potential vectors for fomite transmission and are reservoirs for microorganisms (187, 188). Toys and items that are handled, placed in children's mouths or used in baths are to be washable, quick drying and easy to clean. HO should not 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 HO by the patient or their visitors, use should be limited to a single patient only.

NHMRC
Staying Healthy: Preventing infectious diseases in early childhood education and care services
(5th edition)

Used toys and therapeutic aids should be cleaned between each patient with a neutral detergent. 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.

8.16 Cleaning and reprocessing of items used in community and home settings

Where possible, a HO should provide HWs with disposable sterile equipment as this will minimise the need to transport contaminated equipment and subsequent reprocessing. Disposable single-use equipment should be disposed of after use.

Reusable equipment that can be reprocessed must be reprocessed in accordance with the manufacturer's IFU and local policy.

8.17 Reusable Portable equipment

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 HW.
- Portable reusable materials and equipment e.g. equipment bags, weight scale, chair pads, examination mattresses, laptops or IV volumetric pump/pole, used in the provision of patient care are to be:
  - easily cleanable
  - 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:
  - Do not take unnecessary equipment into the area, or
  - Use a protective sheet between the equipment and the surface
  - Clean and, if necessary, disinfect equipment on removal from the room
- Equipment provided to clients for use at home e.g. commodes, chairs, heel protectors, pressure relieving cushions, are to be:
  - Non-porous, fluid repellant and fully washable, or
  - Single patient use
- The HO is to have a program for ensuring that loaned equipment is cleaned and, if necessary, disinfected when it is returned from clients' homes.

8.18 Transport of RMDs and Equipment

RMDs should be transported in designated transport system/containers that are of adequate size to contain the RMDs safely and are to be securely closed and the containers can be easily cleaned and disinfected.

The transport system/containers should be clearly labelled to identify the contents and should be disposed of when no longer serviceable.

If transporting contaminated semi-critical or critical RMDs is necessary, the RMDs are to be confined and contained within single use a 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. The RMD and equipment should be reprocessed in accordance with IFU and local facility guidelines.

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.
- The use of sealed dust covers for transportation of all sterile stock.
- Minimum requirements for the fit out of transport vehicles i.e. physical separation of sterile and dirty stock etc.

- Transport vehicle guideline in regard to breaches in parameters in transit/ in the event of an accident where stock has been compromised.
- Ensuring there is insurance in place if the transport vehicle is involving in an accident destroying the load

Where problems have been encountered during transport and storage of a reprocessed and released RMD recall and risk assessment of the RMD is necessary.

8.19 Stock room for RMDs/ sterile equipment or consumables

Sterile items including RMDs sterilized in the healthcare facility 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. A dedicated and controlled storage area shall be provided for the storage of RMDs and sterile consumables (30).

- 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, non-sheading, water resistant and robust enough to withstand frequent cleaning
- The floor surface should be impervious, have adequate drainage and be easy to clean.
- Lighting should be fitted flush into ceiling to reduce dust entrapment
- Bulk storage area should be located on the periphery of the unit so that deliveries of commercially prepared sterile stock is deboxed from outer store/transportation packaging before being brought into the sterile stock storage area. Space is needed to unpack cartons.
- Sterile storage area is not to be used as a shared equipment storage space (e.g. wheelchairs etc.)
- Sterile stock storage area should be constructed to ensure there is no risk of sterile stock coming into contact with water.
- In storage areas, temperatures should be controlled within the range of 18^0C to 25^0C and supplies should be protected from direct sunlight.
- Appropriate air handling systems and heat / moisture management with a relative humidity of 35% to 70% is recommended.
- All items stored on open shelving units should be stored at least 250 mm off the floor and 440 mm from the ceiling
- Once RMD have been reprocessed, items should be returned to the point of use.
- Sterile RMD and sterile consumables should be stored on or in designated shelving or containers.
- Access to the storage area must be restricted to staff that have received training and are deemed competent in handling RMDs
- 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

8.20 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.

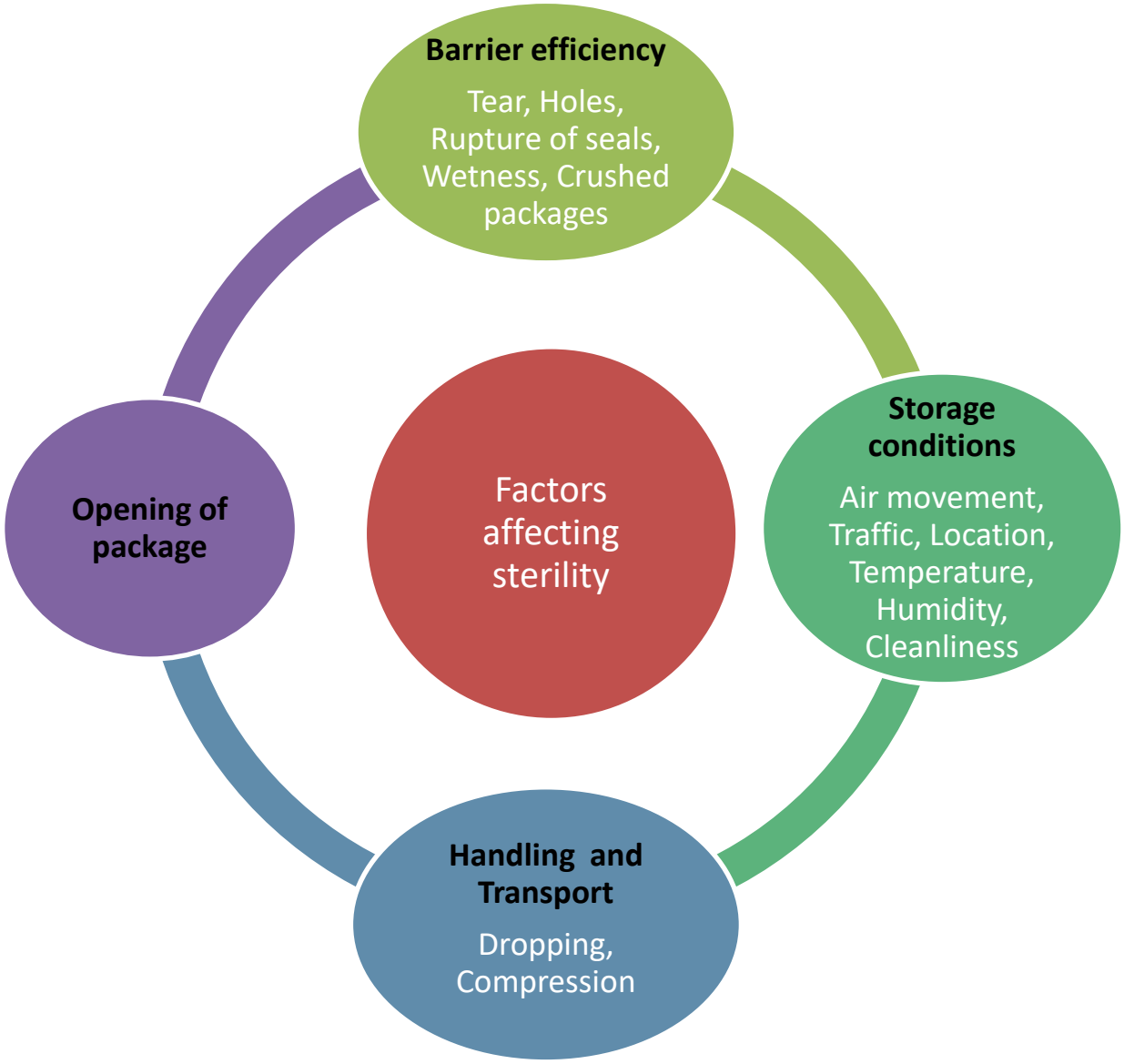
Association for the Advancement of Medical Instrumentation (AAMI) ST79 Section 10.3.3 states that event-related dating can be used unless the product has an identifiable expiration date because of the degradation of the product based on information from the device manufacturer. The wraps and pouches manufactures should provide evidence to confirm the duration of product integrity and product specific expiry date and the IFU should be referenced as per AS 4187.

To practice event-related sterility, a healthcare organisation needs to control handling from the time the item is removed from the sterilizer to transportation, storage and patient use.

- HOs should have written procedures for how shelf-life is determined and risk assessment approach should be applied in the event of a potential breach.
- HOs 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.

Figure 7 should be used as a guide to determine the event related sterility of an item.

Figure 7 Factors affecting sterility of a reprocessed item



8.20.1 Risk assessment in the event of sterility compromise

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. An isolated one of 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 HOs should conduct a risk assessment to assure the sterility of the stock (event related sterility principles apply; refer Fig 7):

- 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, HWs 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.

SECTION 9
RISK MITIGATION: SPECIALISED SETTINGS

ESTABLISH THE CONTEXT

IDENTIFY INFECTION RISKS

ASSESS THE RISK OF INFECTION

CONTROL THE RISK OF INFECTION

REVIEW EFFECTIVENESS OF CONTROL MEASURES

As a direct effect of their impaired immune defences, immunocompromised patients have an increased risk of infections and are at risk of incurring severe morbidity and mortality. This risk is compounded by the frequent requirement for indwelling vascular devices for the delivery of therapy e.g. dialysis and transfusion support, the high requirements for antibiotics, and frequent hospitalisations, which increase the potential for exposure to and/or acquisition of multidrug resistant microorganism or healthcare associated infections. In addition, impaired immunity may lead to increased shedding of microorganisms, resulting in increased potential for disease transmission (189).

A HO 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 quality levels, or nosocomial transmission of infection 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 TB, hepatitis B and C and multi-drug resistant organisms may be particularly relevant for those undergoing intensive immunosuppressive regimens or high-risk procedures (190, 191).

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 3

NSW Health PD
Tuberculosis Management of People Knowingly Placing Others at Risk of Infection

Respiratory viruses and other pathogens circulating in the community may be introduced into healthcare facilities by visitors (particularly young children) and HWs. Each HO is to implement local policies for leave or deployment of unwell HWs working in extreme risk areas, such as ICU, oncology, transplant units, NICUs and delivery suites, and for the exclusion of unwell visitors and young children from these clinical areas (192-195).

Annual influenza vaccination of HWs, 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.

NSW Health PD
Occupational Assessment, Screening and Vaccination Against Specified Infectious Diseases

NSW Health PD
Leave Matters for the NSW Health Service

NSW Health PD
Environmental Cleaning Policy for functional area risk ratings

9.1 Neutropenia

For patients who are predicted to have prolonged and profound neutropenia, such as allogeneic stem cell transplant recipients, protective isolation should be considered to reduce potential exposure to HAIs and fungal spores, especially *Aspergillus.* Prohibiting plants, flowers or other organic debris may also further reduce environmental exposure to potentially pathogenic fungi (115, 195).

9.2 During construction

Construction activity can disturb fungal reservoirs, leading to aerosolisation of fungal spores throughout the healthcare facility. Aspergillus*. fumigatus*, a common pathogenic fungal mould that produces airborne spores, is often in circulation during construction activities in hospital (196). Fungal spores are resistant to drying, are able to remain suspended in the air for long periods and can travel substantial distances from the source of generation. Exposure to a low spore load can result in infection in immunocompromised individuals. Prior to any construction or maintenance activity, a HO is to undertake a risk assessment and implement a risk management strategy to minimise the risk of infection in immunocompromised individuals (30).

Australasian Health Facility Guidelines
Part D Infection Control

- All construction, renovation, installation, and maintenance (construction) activities must have a formal infection control risk assessment undertaken, and mitigation strategies planned and approved, prior to the commencement of any works.
- Engineering controls for risk mitigation must be articulated in contracts agreed between the health service and external contractors.
- A risk assessment of the patient population group within the construction/renovation site must be undertaken and appropriate controls to minimise individual risk implemented.
- Patients who are at most risk of infection are those receiving bone marrow transplant, solid organ transplant, haematology, oncology and those receiving immunosuppressive medication. Additional measures may be required to minimise the risk of infection to these patient groups during construction e.g. air sampling, provision of P2/N95 masks to high risks patients to wear if transit near construction zone is unavoidable.
- HO planning to undertake renovation or construction activities should liaise with the infection prevention and control department, executive and the project team / engineering and maintenance in conjunction with Work Health and Safety Co-ordinator.

The following points must be considered during planning:

- Design and function of the new structure or area
- Assessment of the infection risk from environmental organisms
- Strategies to minimise the risk of construction associated infection e.g. dust control
- Monitoring requirements indicated during the project including costs of monitoring
- If risk changes during project, and unforeseen risks occurs i.e. additional dust monitors needed, contracts can be updated to include that additional expenses will be incurred by contractor

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 HOs should develop a local procedure based on risk assessment of the area involved and the patient groups will be affected. HO are to provide patient and carer information.

9.3 Cystic fibrosis

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. 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 without 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.

9.3.1 Infection prevention and control principles

When caring for any patient (inpatient or outpatient) with CF, HWs are to employ:

- **Standard precautions**, particularly:
    - Hand hygiene before and after patient contact
    - Use of PPE i.e. gloves, apron/gown and mask, for handling body substances/sputum, chest physiotherapy or if there is an increased risk of contamination to the HW
    - 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 in CF clinics must be cleaned and disinfected with approved agents (as per manufacturers IFU) before entry and on removal.
- Respiratory hygiene
    - Patient (inpatient or outpatient) with CF are to wear a fluid resistant surgical mask (not a P2 Mask) 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; or
    - 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 27 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):

- Outpatients with CF should not sit in the waiting area, but be shown straight into a consulting room. The room must be cleaned and left for a sufficient period of time 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);
- Outpatients with CF should be advised not to wait in other communal areas, such as the pharmacy waiting area, in order to reduce risk of contact with other patients with CF. Where this is unavoidable ensure the CF patient is wearing a fluid resistant/surgical mask.
- Patients known to have *B. 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 form 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 of time 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).

Table 27. Levels of precautions for CF patients

* Familial cohorting is permitted, as the risk of transmission is comparable to the home environment

Risk level	Risk criteria	Inpatient management	Outpatient management
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, patient 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 cleaned by staff prior to next patient

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
	  • CPE
		• For MRSA, VRE, etc. precautions are based on local risk assessment
		• Droplet precautions
		• Isolate in single room with ensuite*
			• Droplet precautions (in addition to standard and contact precautions)
			• Own room with door closed
			• Room to be cleaned and disinfected by cleaning services after use
			• HWs to wear gowns and gloves during consult
			• Lung function equipment cleaned and disinfected as per manufactures' IFU after use

3	Any patient with a diagnosis of CF (suppurative lung disease) and: • *Burkholderia cepacia* complex • *Mycobacterium abscessus* • *Mycobacteria Avium* • Other (unusual resistant organisms)	• Standard, contact and droplet precautions • Isolate in single room with ensuite* • Patients known to have *B. cepacia* complex/*M. abscessus* should be admitted to a single room with an ensuite on a different ward to other patients with CF. If two or more patients with *B. cepacia* complex */M. abscessus* are admitted they must be accommodated in single rooms on separate medical wards. • In facilities with paediatric units where patients can only be accommodated in the paediatric ward, patients with *B. cepacia* complex should not be cared for by the same nursing staff as those caring for patients with *M. abscessus*	• Droplet precautions (in addition to standard and contact precautions) • Own room with door closed • Room to be cleaned and disinfected by cleaning services after use • HWs to wear gowns and gloves during consult • Lung function equipment cleaned and disinfected as per manufactures' IFU after use

HWs should apply additional precautions with discretion. HWs should ensure that the patient and their family/carer are provided with information on why any additional precautions are required and any actions that the patient or their family/carer are required to undertake.

9.3.2 Clearance

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, with consideration being given to aetiology, epidemiology and other key clinical factors.

9.4 Haemodialysis

Haemodialysis has been associated with transmission of MROs. The routine management of these MROs has been addressed throughout this manual and haemodialysis is like any risk area.

This section specifically addresses the high risk concern of blood borne viruses (BBV) in haemodialysis. BBV infection may occur from contamination during the haemodialysis procedure (e.g. during venous access) or via the dialysis system (e.g. extra-corporeal circuit), from breaks in established procedures, due to lack of monitoring for contaminants, due to reprocessing failures or inadequately trained/educated staff (197, 198). Although outbreaks of HCV have been reported in haemodialysis patients, the efficiency of transmission appears low. The risk of blood borne infection in the haemodialysis setting may be reduced by:

- adherence to standard precautions, including routine cleaning and reprocessing of patient equipment;
- adherence to procedures for cleaning, disinfection and maintenance of equipment according to manufacturer's instructions;
- a patient education program that includes teaching patients, their visitors and families on their role in the prevention of infections;
- routine monitoring and follow up of patients undergoing haemodialysis in relation to blood borne viral status;
- hepatitis B vaccination for all susceptible haemodialysis patients and HWs;
- redeploying HWs who have increased susceptibility to hepatitis B, medically assessed on case-by-case basis.

NSQHS - VERSION 2 NATIONAL STANDARDS

NSW Health PD
HIV, Hepatitis B and Hepatitis C - Management of Healthcare Workers Potentially Exposed

Patients that are HBsAg positive should be treated in a separate room (or another area away from seronegative patients, if room is not available) with dedicated equipment and, where possible, nursing staff (199) .

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 (200).

There is insufficient evidence to justify the routine isolation of dialysis patients positive for HCV or HIV (201). Isolation should be considered if high prevalence (>30%) of HCV is observed (202).

9.5 Tuberculosis

The NSW Tuberculosis (TB) program is the provider of specialised services for the prevention and control of TB in NSW. In the event of a case of TB in a patient, HW or visitor, the infection prevention and control team and the TB coordinator in the local health district/network should be notified. The TB coordinator, in conjunction with the TB Program, will work with the HO to identify contacts, prepare a management plan and arrange screening and follow-up for patients, HWs and others contacts as required.

NSW TB Program

NSW Health PD
Tuberculosis Management of People Knowingly Placing Others at Risk of Infection

Patients with TB are to be cared for according to relevant NSW Health policies and guidelines, available at: http://www.health.nsw.gov.au/Infectious/tuberculosis/Pages/Policies.aspx.

NSW Health PD
Principles for the Management of Tuberculosis in NSW

NSW Health GL
Tuberculosis Contact Investigations

9.5.1 Transplant screening for tuberculosis

All patients on the active transplant list for solid organ transplantation and bone marrow transplant must be assessed for their risk of previous exposure to TB and should be screened as part of the transplant workup. This can be by tuberculin skin test or blood test, if immunocompromised, as per local protocol.

9.6 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.

9.6.1 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 and dirty procedures (203)

9.6.2 IR equipment

See Section 8, *Risk mitigation: Reprocessing* for general principles and advice on single-use and reprocessed equipment.

Many procedures are performed under ultrasound guidance, including the insertion of central venous access devices. While mainly surface probes are used, it is possible that intra-cavity probes may be used (e.g. during transrectal prostate biopsies). Disposable sterile probe sleeves should be applied and these should be disposed of in accordance with Section 4.9, Waste disposal. Regardless of the use of probe sleeves, the probes must be reprocessed appropriately between patient uses as per manufacturers IFU (see Section 8.12.1, *Intracavity ultrasounds*). Follow manufacturers IFUs for cleaning and storage. Any disposable sheaths are compatible and approved to be used with the ultrasound.

NSW Health PD
Intravascular Access Device Insertion and Post Insertion Care

NSW Health PD
Environmental Cleaning Policy

Environmental Cleaning SOP

9.6.3 IR environment

Installation of positive pressure air change ventilation should be considered when planning new IR facilities (see Section 2.4.1, *Purchasing new equipment*).

There is evidence to suggest that the number of viable airborne bacteria 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 proper 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 surgical site infections.

- 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
- Hair coverings to be worn while in the suite and masks when open instruments/trays are present
- Sterile gowns and gloves for those participating in the sterile field
- The use of sterile drapes in a manner that allows generous coverage of the sterile field
- 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 appropriateness of the level of infection 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 a high risk rated functional area, therefore environmental cleaning is important in the prevention of cross infection (See Section 4.6, *Environmental Cleaning*).

Cleaning in IR settings should be in line with the NSW Health *Environmental Cleaning Policy* for high risk functional areas. Particular attention should be made to the cleaning of arm boards and ceiling mounted equipment. The IR procedure suite and work surfaces should be properly cleaned and disinfected (as appropriate) after every procedure to decrease the amount of dust and microorganisms.

NSW Health PD
Environmental Cleaning Policy

Joint Practice Guideline for Sterile Technique during Vascular and Interventional Radiology Procedures 2012

9.6.4 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 related to personnel attire, proper hand hygiene, gowning, gloving, preparing, draping, maintaining a sterile field, and cleaning of the IR suite. The responsibility for reducing the number of microorganisms in 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 (i.e. >0.5% chlorhexidine gluconate with 70% alcohol). If there is a contraindication to chlorhexidine, a suitable alternative should be used (e.g. 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 (see Section 4.12, *Staff attire*).
- 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.

9.7 Respiratory and sleep settings

9.7.1 Nebulisers

There is some evidence that suggests nebulisation, combined with disease symptomatology such as coughing, may have been a risk for the aerosolised spread of certain transmissible diseases (204, 205). 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 (206).

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. HWs attending to a patient using a nebuliser should wear a P2/N95 mask.

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.

9.7.2 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.

9.7.3 Resuscitation devices

HWs 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 (207). A HO 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 HO should include instruction on the use of all resuscitation devices.

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 3

9.7.4 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 sterilized between each patient use according to manufacturer's IFU to prevent and minimise the occurrence or transmission of infection.

9.8 Maternity settings

9.8.1 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. HO should have a referral process in place for mothers with BBVs to ensure they are referred to appropriate clinical services during 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.

Antenatal Testing and Blood-Borne Viruses (Bbvs)

RACGP
National guide to a preventive health assessment for Aboriginal and Torres Strait Islander people
ASHM
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:

- 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 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.

9.8.2 Prevention of blood-borne virus exposure

After birth, initial skin-to-skin contact and the first breastfeed are important and are a priority. This should occur prior to cleansing the baby of blood

NSW Health PD
Incident Management

and body substances (208). Blood and other body substances must be removed from the baby's skin and eyes as soon as practicable. Standard precautions must be adhere to by all HWs, visitors and family (except the mother) when handling the baby until the baby has been bathed (208). Additional considerations are needed when cleaning baths 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 hospital grade neutral detergent and disinfectant
4. Important to allow the required contact time as recommended by manufacturers recommendations before rinsing bath with water
5. When cleaning baths in birthing suite replace the bath plug regularly and ensure the plug is included in the cleaning process

Australasian Health Facility Guidelines
Part D Infection Control (Bath and Showers)

Environmental Cleaning SOP
Module 3 Hand basin/bath cleaning

9.9 Mental health, drug and alcohol settings

The infection prevention and control program is 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 control equipment, such as trolleys for PPE and brackets for alcohol-based hand rub, that is left in areas accessible to patients needs to be carefully reviewed for safety e.g. ligature risk.

HOs and HWs 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 HWs with safe access to hand hygiene facilities
- encourage and facilitate patients to maintain their personal hygiene

9.10 Residential, rehabilitation and long term care settings

Infectious diseases have the potential to spread readily in residential, rehabilitation and long term care settings, as residents live in close proximity, typically with communal facilities e.g. dining rooms and lounges.

NHMRC
Infection prevention and control in residential and community aged care

Residents may be susceptible to infection because of health conditions that impair immunity. Common clinical risks include the prevalence of MROs, urinary tract infections, influenza and the incidence of diarrhoea in patients and prevalence of wounds.

In residential, rehabilitation and long term care settings, the infection control program is adapted according to the patient's physical health status, mental acuity, requirement for a home-like environment and the facilities/layout of the premises.

Vaccination is an effective way to stop people from acquiring vaccine preventable diseases that can be prevented. Refer to the Australian Immunisation Handbook for further advice on use of vaccines

The Australian Immunisation Handbook

Quality of Care Principles 2014
Part 1

In the aged care context, the infection control program must also address the Australian Aged Care Quality Agency Accreditation Standards (Standard 4.7).

Australian Aged Care Quality Agency
Tools

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 (e.g. patient assessment, rehydration and ongoing monitoring on site) in these settings (see Section 9.10.1 *Using extended paramedic services in residential and long term care facilities)*. Similar services may be available within some NSW LHDs/SHNs.

9.10.1 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 (e.g. patient assessment, rehydration and ongoing monitoring as needed) on site and avoid or reduce the need to transfer patients to other health care facilities.

9.11 Ambulatory care settings

Each HO 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 (see Section 9.3 on *Cystic fibrosis*).
- Day surgery
- High Risk Foot Services/Clinics
- Day Rehabilitation

Centers for Disease Control and Prevention
Basic Infection Control and Prevention Plan for Outpatient Oncology Settings

NHMRC Australian Guidelines for the Prevention and Control of Infection in Healthcare 2019

Each setting requires:

- A risk management plan in place that identifies potential infection risks for outpatient settings, including an environmental assessment, and details appropriate 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.
- HWs 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.

Centers for Disease Control and Prevention
Guide to Infection Prevention for Outpatient Settings:

Minimum Expectations for Safe Care

- Promotion of hand hygiene, respiratory hygiene and cough etiquette to patients and their companions and the provision of resources e.g. alcohol-based hand rub, tissues and rubbish bins.

Infections are an important cause of morbidity and mortality in many of the patients who requires frequent services from these clinics and units, particularly those that are immunocompromised, thus infection prevention 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.

9.12 Oral health settings

HWs 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 Policy Directive *Oral Health: Cleaning, Disinfecting and Sterilizing* Policy Directive and the NSW Health *Oral Health: Post-Operative Care for Dental Extractions* Policy Directive and current NSW Health infection prevention and control policies.

NSW Health PD
Oral Health: Cleaning, Disinfecting and Sterilizing

NSW Health PD
Oral Health: Post-Operative Care for Dental Extractions

9.13 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. Refer to Infection control guidelines for optometrists 2016 for more information (209). 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.

NSQHS - VERSION 2 NATIONAL STANDARDS

9.14 Community and home settings

A HO may provide care to patients in a range of settings outside hospitals, including private homes and community health centres. The HO responsible for providing these services is to ensure that appropriate infection prevention and control resources, such as hand hygiene products, disposable paper towels, equipment cleaning solutions or wipes, PPE and sharps containers, are available to HWs working in these settings. The HO and its HWs should also ensure that the risk of infection transmission within the community is minimised by education of patients on hand hygiene, personal hygiene, cleaning and healthy life style.

At the minimum HWs working in these settings are to adhere to standard precautions (Section *Risk mitigation: Standard precautions*) and transmission-based precautions (Section *Risk mitigation: Transmission-*

Section
Hand hygiene in community and home settings

Section
Sharps in community and home settings

Section
Waste disposal in community health settings

Section
Precautions for community health settings (MROs)

Section

based precautions). HWs working in home and community settings may experience difficulties in accessing facilities and resources typically found in a hospital. Due to these constraints, the HO 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.

Cleaning and reprocessing in community and home settings

9.15 Ambulance and patient transport settings

The transfer and transport of patients within and between HOs should always be guided by clinical need and urgency, not by their infection status. All agencies involved in patient transfer and transport are to, at the minimum, exercise standard precautions during the transfer and transport of any patient. This includes ensuring that the transport vehicle and equipment is cleaned and disinfected as appropriate between each patient.

NSQHS - UPDATE TO VERSION 2 NATIONAL STANDARDS

The HO booking the transfer or transport should notify all agencies involved in the transfer or transport of any patient with an identified infection risk prior to the transfer or transport of the patient. Refer to section *Transferring or transporting a patient with a MRO*. The HO booking the transfer should ensure the patient performs appropriate personal hygiene prior to transfer or transport, where possible. This may include hand hygiene, showering and use of clean clothing prior to transfer or transport.

See **Section** *Transferring or transporting a patient with a MRO,* for advice on transferring or transporting patients with a MRO

It is the responsibility of the transfer or transporting agency to ensure transfer and transport staff have undertaken appropriate training and education to enable them to employ the appropriate transmission-based precautions as per Section *Risk mitigation: transmission-based precautions*, in addition to standard precautions, during transfer or transport. A recommended framework for training is outlined in the national unit of competency *HLTINF001 - Comply with infection prevention and control policies and procedures*.

training.gov.au
HLTINF001
Comply with infection prevention and control policies and procedures

9.16 Mortuary and care of the deceased

9.16.1 Post-mortem care

When handling the bodies of deceased persons, or when undertaking a post-mortem examination, standard precautions are required at all times.

Depending on the known or suspected infection status of the body, transmission-based precautions may also be required and should be maintained until the body has been completely enclosed for transport. If transmission-based precautions were required prior to death, these precautions must be continued when handling the deceased. 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 2012* (Extract ss49-93): Part 8 Disposal of bodies.

According to the *Public Health Regulation 2012*:

(1) A person must, when carrying out any procedure on a body, comply with the guidelines specified in the *Australian Guidelines for the Prevention and Control of Infection in Healthcare* published by the NHMRC.
(2) A person must, when placing a body in a bag or wrapping a body, comply with the document entitled Infection Prevention and Control Policy published by the Ministry of Health.

NSQHS - UPDATE TO VERSION 2 NATIONAL STANDARDS

NSW Health PD
Coroners Cases and the Coroner's Act 2009

NHMRC
Australian Guidelines for the Prevention and Control of Infection in Healthcare

Public Health Act 2010

Public Health Regulation 2012
Part 8, Disposal of Bodies

Prescribed infectious diseases

Additional handling and labelling requirements apply to the bodies of deceased persons with *prescribed infectious diseases*. These are outlined in the *Public Health Regulation 2012*. *Prescribed infectious diseases* means any of the following diseases:

(a) Avian influenza in humans
(b) Diphtheria
(c) Plague
(d) Respiratory anthrax
(e) Severe Acute Respiratory Syndrome
(f) Smallpox
(g) Tuberculosis
(h) Viral haemorrhagic fever (including Lassa, Marburg, Ebola and Crimean-Congo fevers)

In accordance with the Public Health Regulation 2012, section 57: If the person responsible for removing the body of the deceased has reason to believe that the body is infected with a prescribed infectious disease, the bag or wrapping is to be clearly and indelibly marked with the words “PRESCRIBED INFECTIOUS DISEASE - HANDLE WITH CARE”.

9.16.2 Post-mortem examination

Practices used for post-mortem examinations are to minimise the risk of exposure of HWs to infectious diseases and minimise the risk of infection being passed from the autopsy room to other areas in the healthcare facility. Standard precautions are required at all times and, depending on the known or suspected infection status of the body, transmission-based precautions may also be required.

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 Section *Risk mitigation: Reprocessing*;
- instruments and equipment used on cases of Creutzfeldt-Jakob disease should be handled in accordance with national guidelines for infection prevention and control (210);
- 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 (211); and
- employing airborne precautions when performing aerosolising procedures during post- mortem.

9.17 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 immersion in liquid nitrogen (212). 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 sterilized 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.

9.18 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.

A HO 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 t the Companion Animals (Outdoor Dining Areas) Act 2010 No 33. Consideration should be given to Hygiene requirements.

NSW Health PD
Animal Visits and Interventions in Public and Private Health Services in NSW

Companion Animals Act 1998

Companion Animals Regulation 2008

The implementation of therapy dogs and animal visitations need careful consideration to address potential risks of zoonotic transmission to patients and HWs when pets are present within a HO.

Potentially 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:

- HO should develop a policy for assistance animals that complies with Commonwealth, State and local council legislation. All HOs that have facility pet/s or personal pet visitations should develop a policy that complies with Commonwealth, State and local council legislation.
- The HOs infection control professional is notified when a patient is admitted with an accredited assistance animal to establish any specific requirements.
- All HOs with animal assisted therapy programs and animal assisted activities should develop a policy which, in addition to compliance with State and local council legislation, should include types of animals allowed for these activities, certification of animals and their trainers/handlers, education of HOs staff, and education of animal trainers/handlers regarding organisational policies and procedures, animal hygiene, patient hygiene, and animal access.
- All animals visiting or permanently residing in HOs are screened for parasites, and skin problems and are fully vaccinated (a veterinary immunisation certificate should be provided).
- All animals are restricted from entering operating theatres, sterilising departments, intensive care areas and food preparation areas.
- Animal access for isolated patients and immuno-suppressed patients is negotiated based on individual patient/client requirements.

When considering animal visitation HOs should consider the following infection and injury risk management strategies:

- Careful selection of animals, if it is own pet then no need
- 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 etc.
- 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 stay with the visiting animal at all times
- 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

9.18.1 Animals as patients

Animals may be present within HOs 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 HO (32). In particular, the risk of cross-contamination between animal and human is to be assessed when the facilities of a HO are being used for the clinical treatment of an animal. For those HOs 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; and
- which disinfecting or sterilizing 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.

NSW Health PD
Infection Prevention and Control Policy

10 Surveillance, auditing and notification

10.1 Role of surveillance

Each year, a large number of hospital patients in Australia experience a healthcare complication in the form of a hospital-acquired infection. By the provision of patient care that mitigates avoidable risks all healthcare acquired complications (HACs) can be prevented or reduced (213). The HAC includes the following diagnosis:

Urinary tract infection (UTI)

Surgical site infection (SSI)

Pneumonia

Blood stream infection (BSI)

Central and peripheral line associated blood stream infection

Multidrug resistant organism

Infection associated with prosthetics/implantable devices

Gastrointestinal infection

Healthcare associated infection surveillance programs enable healthcare organisations (HO) to monitor the outcomes of current practice and provide timely feedback to clinicians to ensure practice improvement and better patient outcomes. 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 quality and safety of patient care (214, 215).

The primary purpose of surveillance in infection prevention and control is to monitor for sentinel events, and to monitor healthcare associated infections (HAIs) and to report to the relevant stakeholders including Infection Prevention and Control Service. Significant incidents such as outbreaks or clusters of HAIs, multidrug-resistant organisms (MROs) and/or non-MROs should be escalated to the health service or LHD management as soon as possible to determine ongoing action. Refer to NSW Health guideline Triggers for Escalation Following Detection of Infection Outbreaks or Clusters.

In NSW, a number of mandatory HAI clinical indicators have been established for state-wide HAI surveillance purposes. When the HO submits data on any clinical indicators a suitably qualified or experienced health worker (HW), who is able to 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 a sudden increase in cases?*
- Setting - *will all departments be surveyed or only specific ones?*
- Capacity to undertake surveillance - *is 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 and appropriate
- undertake regular data collection in line with reporting requirements
- establish baseline rates and continue surveillance over time (or as long as required)

Australian Guidelines for the Prevention and Control of Infection in Healthcare - 2019

ACSQHC

National definition and calculation of HAI *Staphylococcus aureus* bacteraemia

CDI Surveillance Implementation Guide

National definition and calculation of Hospital identified *Clostridium difficile* infection

National definition and calculation of central line Associated Blood Stream Infection

Surveillance Validation Guide for healthcare associated *Staphylococcus aureus* bloodstream infection

SAB Surveillance Implementation Guide

Implementation Guide for Surveillance of Central Line Associated Bloodstream Infection

NSW Health HAI Clinical Indicator Manual

It is imperative to only collect data that is useful and directly related to the prevention and control of HAI. If there is no useful outcome for data collection (i.e. intervention is not possible, and/or improvement cannot be achieved) then surveillance objectives should be re-assessed.

10.1.1 Mandatory HAI surveillance in NSW

The NSW HAI Clinical Indicator Manual outlines the minimum level of mandatory HAI surveillance that all NSW HOs are to undertake. These are outlined in Table 28.

Table 28. NSW HAI clinical indicators

Clinical Indicator	Rationale
MRSA acquired in ICUs	Patients admitted to ICU are at a higher risk of acquiring MRSA. ICU MRSA acquisition rates include both colonisation and infection.
CLABSI	Patients in ICU are at high risk of HAI through invasive central line insertion (centrally and peripherally) and post insertion management.
Staphylococcus aureus bacteraemia (SAB)	SAB infections are associated with increased patient morbidity and mortality and are seen as potentially preventable.
Vancomycin-resistant enterococcus (VRE) blood stream infection including VAN A and VAN B types	Bacteraemia with VRE are associated with increased length of stay and has a negative impact on patients' survival and leads to higher health care costs.
Carbapenemase-producing *Enterobacterales* (CPE) blood stream infection	CPEs are resistant to carbapenem antibiotics, by means of an acquired carbapenemase gene, therefore often difficult to treat, leaving very few therapeutic options.
Surgical site infections (SSIs) (hip & knee arthroplasties, coronary artery bypass grafts)	SSI account for around 70% of all HAIs in hospitalised patients (216).
Clostridioides difficile infection	CDI has been identified as the most common cause of antibiotic associated diarrhoea in hospitalised patients. HAIs involving CDI are considered indicators of poor antimicrobial stewardship.

The Clinical Excellence Commission revised clinical indicators will add the following:

- *Vancomycin resistant enterococci bacteraemia* - Bloodstream infections caused by VRE have been associated with significant mortality for critically ill and immunocompromised patients.
- *CPE bacteraemia:* Higher rates of mortality have been attributed to patients with CPE bacteraemia than patients with a bacteraemia from non-resistant strains of similar infections.
- CPE clinical isolate: A positive CPE isolate obtained from either a normally sterile site such as CSF OR a non-sterile site when clinically associated with infection (e.g. urinary tract infection, wound infection or pneumonia)
- CPE screening/colonisation isolate: A positive rectal swab or other site such as skin or wound swab AND there is no evidence of infection (the patient does not receive antibiotics active against CPE) OR the patient is known to have been screened for CPE.

HOs should have systems in place to ensure staff whose role is to conduct mandatory surveillance can receive all reports, documents and results that are necessary to conduct HAI surveillance. This would include microbiology reports, access to medical records systems, and theatre management systems.

The CEC's Quality Improvement Data System (QIDS) provides support to local health districts and speciality health networks (LHD/SNs) 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 'one stop shop' 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/SNs 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/SNs. 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.

10.1.2 Reporting of notifiable disease

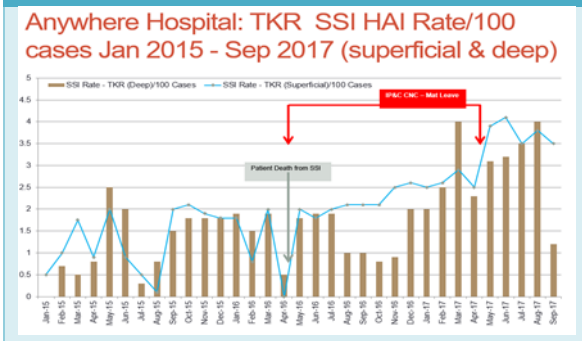
Medical practitioners and hospitals are required to report notifiable conditions to their local PHUs on the basis of reasonable clinical suspicion.

Section 11
Outbreak Management

Case notification should be initiated within 24 hours of diagnosis either by telephone or in writing. Information for each notifiable disease and condition is available from the following link:

Disease notification

Table 29. Clinical scenarios

Scenario 1: Anywhere in Acute Hospital	Answer the following questions based on the scenarios
 360 beds-Major rural hospital IP&C – reports to DDON. IP&C has been on Mat Leave Apr 16 – Apr 17. Backfilled with inexperienced but enthusiastic RN. ○ Clinical Microbiologist available for consultation ○ IP&C Committee meets every 2 months ○ No medical representation ○ Bi-monthly reports on HAI Surveillance are submitted – no trend data ○ No permanent NUM in OR – difficult to recruit. Multiple acting NUMs over 2 years	1. At what point would you consider an investigation? 2. What do you do immediately (response and escalation)? E.g. communication, documentation, meeting. 3. What is included in your investigation plan? 4. How will you evaluate your response and escalation plan?

Risk Scenario 1 – Investigating increasing healthcare associated infections in an Acute Hospital	
At what point would you consider an investigation?	As soon as the rate increases – must have statistical significance Look for other trigger points A death is a certain trigger for an internal review and a reportable Incident brief (RIB): Review the cause of death When there are 3 points above the baseline When there is a sustained increase
Investigation Method	IIMs or relevant system for case reviews M&Ms for case reviews Root Cause Analysis (RCA), London Protocol or Detailed Clinical Reviews. Ensure an infection prevention and control person is on the team
What do you do immediately?	Definition: confirm the case definition Plan for an interim report within 48 hours to guide further communication Determine who collects the data – consistency Treat like an outbreak and use same methodology (refer chapter 11 Outbreak management) **DOCUMENTATION** ○ IIMs or other relevant system ○ Surveillance program ○ Team meeting notes ○ Record of communication and escalation **DATA** Check the data. Review the numerator and denominator (confirm they are accurate) Check if there have been any changes in the review or validation process Risk stratify – separate deep and superficial – graph these separately Check if the increase in HAI is linked to increased surgical or hospital activity **PROCESS/COMMONALITIES** ○ Look for immediate commonalities e.g. same surgeon/anaesthetist/other medical staff/scrub or scout nurse/operating theatre ○ Same or similar organisms + discussion with clinical microbiologist ○ Same day onset for HAI e.g. all day 3 ○ Ask doctors to review and confirm each case with the ICP **COMMUNICATION** Speak to the surgeon(s) to confirm SSIs Escalate - communicate the increase to surgeons, other relevant stakeholders such as Operating Theatre, General Manager, DON, DMS, Specialty Head of Department, Infectious Diseases, Orthopaedic Ward NUM, patient safety/quality managers. Refer to NSW health Triggers for Escalation Following Detection of Infection Outbreaks or Clusters for more information. Determine who are the stakeholders to ensure that all required people/teams receive the information ○ Who it should be escalated to immediately ○ Who it should be communicated to when further information is available ○ Who is should be communicated to when the investigation is completed • Check if Open Disclosure has occurred with the affected patients

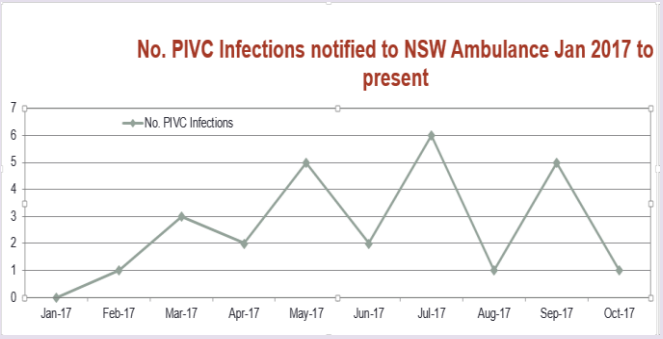
What is included in your investigation plan?	Lookback process with other SSIs Review of microbiology reports Develop a checklist to assist with the lookback and investigation Detail: where, when, who, what, how with a timeline Full review of cases within the defined period Determine who will be part of the investigation team e.g. IP&C, OT, surgical ward, medical staff, Clinical Governance Unit (CGU) or patient safety, microbiology 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
RECOVERY ROOM (RR) Time in recovery room Wound care Develop an action plan from recommendations. Make sure there are people assigned to actions with a timeframe Review governance structure Any changes to management or education programs within the peri-operative setting **INPATIENT WARD** Inpatient ward or ICU – perform a ward round Wound care Nursing ratios Nursing skill mix Observe hand hygiene, use of Standard Precautions Environmental cleaning audit results Look at other process measures e.g. surgical prophylaxis Review all audit and risk assessment outcomes/results Review other services that are involved in the care/treatment of surgical patients e.g. rehabilitation Education	**PRE-OPERATIVE MANAGEMENT** Review of pre-operative assessments Review of MRO screening practices Pre-operative care e.g. chronic wounds Admission timeframes from pre-operative assessment to admission for surgery, timeframe from hospital admission to surgery Review of pre-operative washes e.g. if they are performed, type of antiseptic, number performed, patient education, MRSA/MSSA decolonisation **PATIENT FACTORS** • Review of patient risk factors e.g. obesity, diabetes, nutrition, smoking, Staph aureus carriage **SURGICAL/ANAESTHETIC PROCEDURE** • Surgical teams – is there a common person/group • Common operating theatre • Check changes in practice within operating theatre e.g. draping method or type, new equipment, performing skin prep before scrubbing • Check surgery type e.g. elective v's 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 aseptic technique competence 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 e.g. usual cleaner on leave • Check practices within sterilization department e.g. changes to the procedure, equipment used or changes in chemicals, changes to staffing • Review hand hygiene performance • Review sterile stock storage • Any building/refurbishment work in close proximity to operating theatre • HEPA filters changed in operating theatre

	• Any problems or changes to the air handling systems in operating theatre **WORKFORCE** • Staffing and skill mix in operating theatre • Has a culture survey been performed in the operating theatre and issues identified with patient safety
How will you evaluate your response and escalation plan?	Team to perform the evaluation Evaluate all the known gaps and check progress on actions Escalate data to all key stakeholders Monitor data trend o Benchmark with other sites o Set measurable goals Determine what audits needs to have continuous monitoring (the timeframes for these may be changed as HAIs reduce) Determine if an independent review is to be undertaken
Report findings to:	• Surgical teams • M&M Meetings • Clinical Governance Unit • Infection Prevention and Control Committee • Peak Quality/Patient Safety Committee • Follow up meeting(s) - Present investigation and outcomes as a case study – what were the learnings - Develop a regular feedback mechanism e.g. monthly 1 page summary that includes action plan achievements, surveillance data - Continue to have a visual presence in the clinical areas e.g. operating theatre, surgical wards - Provide education, feedback and resources to clinical staff as appropriate - Review the infection prevention and control meetings to determine 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 e.g. capability of relief for Infection Prevention and Control staff

Scenario 2 Risk Assessment- Investigating increasing healthcare associated infections Paediatric Hospital

Scenario 2: Anywhere in Paediatric Hospital	Answer the following questions based on the scenarios
• 260 beds • At the last Paediatric Surgery M&M Meeting, the surgeons discussed the number of post-discharged patients with SSI. • The SSIs are from patients who underwent emergency laparoscopic Appendectomy within the last 3 months.	1. At what point would you consider an investigation? 2. What do you do immediately (response and escalation)? e.g. communication, documentation, meeting 3. What is included in your investigation plan? 4. How will you evaluate your response and escalation plan?

• You do not currently perform surveillance on patients undergoing this surgery • The Chair of the M&M Meeting tells you that approximately 7 patients have had a SSI (2 surgeons)	
At what point would you consider an investigation?	As soon as the rate increases – must have statistical significance Look for other trigger points A death is a certain trigger for an internal investigation and a RIB. Review cause of death patient o When there are 3 points above the baseline o When there is a sustained increase
Investigation Method	IIMs for case reviews M&Ms for case reviews RCA, London Protocol or Detailed Clinical Reviews
What do you do immediately? **Communication**	Ensure the increased incidence of SSIs is entered into the IIMs/relevant reporting system o Check complaints o Check clinical notifications Develop an action plan for the investigation Escalate to key stakeholders o Direct Line Manager o Infectious Diseases Team o Quality and Safety o Clinical Governance Unit o Brief to General Manager/CE Meet with surgical teams
What is included in your investigation plan?	Risk assessment for each child. Include past medical history What is the current benchmark? o Within surgical teams o Within hospital o Within other hospitals What is the organism(s)? o Same o Different Similar e.g. all gram +ve
How will you evaluate your response and escalation plan? **Report findings to:**	Determine process of reporting e.g. readability, succinct, graphical displays • Surgical teams • M&M Meetings • Clinical Governance Unit • Infection Prevention and Control Committee • Peak Quality/Patient Safety Committee Determine if the risk is either declining or ceased • Ongoing monitoring

Scenario 3 Risk Assessment- Investigating increasing healthcare associated infections Ambulance Service	
Scenario 3: Anywhere in Ambulance service	**Answer the following questions based the scenarios**
Increase in PIVC site infections related to Emergency IV insertions. • There have been a number of reports from several hospitals (multiple LHDs) to multiple people within the NSW Ambulance Service • These notifications have been occurring over the last 10 months. At a meeting, the topic is discussed. When the notifications are graphed, these are the results:  	1. At what point would you consider an investigation? 2. What do you do immediately (response and escalation)? e.g. communication, documentation, meeting 3. What is included in your investigation plan? 4. How will you evaluate your response and escalation plan?
At what point would you consider an investigation?	Immediately when the notification occurs
What do you do immediately? Communication	Perform a documentation review ○ IIMs ○ eMR Establish an actual event Briefing to relevant people • Chief Executive (CE) • Director of Clinical Governance (DCG) • Clinical Governance Unit (CGU) • Education • Service delivery • CEC – via DCG and CGU
What is included in your investigation plan? **Use of A Checklist for Investigation**	Assessment of clinical reason for insertion of cannula • HW level of experience • HW geographical location • Emergency v's on-emergency insertion • Determine if dwell time can be established • Number of attempts • Insertion site • Use of correct equipment • Use of stickers (Emergency Insertion) • Time of days for insertion/shift duration • Usual technique compared with skill level • Evaluate the outcomes

How will you evaluate your response and escalation plan?	Increase in surveillance from other LHDs Engineer a system of regular notification Notify the incident to relevant source health facility or ambulance service Perform snapshot auditing e.g. cannula, PIVC emergency insertion stickers, duration of PIVC

10.1.3 Suggested 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.

The Australian Council on Healthcare Standards
Clinical Indicator manuals for oral health and hospital in the home (Password required)

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
  - Unplanned readmissions to hospital due to an infection related complication
  - Infection rates associated with peripherally inserted intravenous cannulas, the management of central venous access devices and urinary catheterisation.

Collection and reporting of occupational exposures to blood and/or body fluids are mandatory for all public facilities, including (32):

- Community Acute without surgery;
- Community Non-Acute;
- Nursing Homes;
- Multi-Purpose Services; and
- Hospices.

NSW Health PD
Infection Prevention and Control Policy

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 HO. Adaptations of standardised clinical indicators or locally developed clinical indicators should be reviewed by a suitably qualified HW with experience in data collection and analysis prior to implementation.

10.1.4 Antimicrobial resistance surveillance methods

To meet the Australian National Standards, a HO must 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.

NSQHS - NATIONAL STANDARDS VERSION 2

The Antimicrobial Use and Resistance in Australia (AURA) Surveillance System, coordinated by the Australian Commission on Safety and Quality in Health Care (the Commission), 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.

Antimicrobial Use and Resistance in Australia Surveillance System

ACSQHC, 2013
Specification for Hospital Cumulative Antibiogram

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) at the Commission 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 ACSQHC 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 (2015) which provides a framework to guide actions on preventing the development and spread of antimicrobial resistance.

National Antimicrobial Resistance Strategy (2015-2019)

For smaller HOs 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 HO, 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.

NATIONAL STANDARDS VERSION 2 Standards for community health services

At the time of writing, dental services were not required to monitor antimicrobial resistance. However, in keeping with antimicrobial stewardship principles, any information available on antimicrobial resistance in the patient population being treated could be used to ensure appropriate antibiotics are recommended and prescribed in the service.

NSQHS - NATIONAL STANDARDS VERSION 2 Standards Guide for Dental Practices and Services

10.2 Auditing

10.2.1 Auditing principles

In the context of infection prevention and control, performance measures or auditing is a process aimed at measuring the quality of care HOs provide against relevant standards to reduce clinical variation with specific infection prevention or control strategies. If HOs fail to meet a set of agreed standards or benchmarks, the performance measure will assist HOs and IPAC Units 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 (217).
An infection prevention and control performance measures/ audit should focus on a specific topic, be repeatable and preferably involve the use of a standardised tool if benchmarking is required (218). 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 measure 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 (1). Performance measure 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; or
- fingernail and/or hand/wrist jewellery of the HW

NSQHS - NATIONAL STANDARDS VERSION 2

Australian Guidelines for the Prevention and Control of Infection in Healthcare

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);
- properly documented invasive device insertion or removal;
- screening swabs on admission/ discharge (e.g. MRO, wound swabs); or
- HW uptake of immunisation.

Infection Prevention and Control performance measure identifies areas for improvement and areas of exemplary practice in relation to quality and safety. 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 Version 2 (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.

Case study 10: Poppy's story - Auditing for change

In the surgical ward where Poppy, an RN, works there has been feedback from the Nurse Unit Manager (NUM) about a recent incident concerning a patient's infected cannula site. A look through the patient's progress notes established that the likely contributing factor for the infection was the cannula had been left in situ for 6 days. Looking to improve patient safety in the ward, the NUM asks Poppy to conduct an audit of staff adherence to the *Intravascular Access Devices (IVAD) - Infection Prevention & Control* Policy Directive (PD).

After consultation with the IPC, Poppy is given an audit tool that specifically refers to cannula management based on the PD from the NSW Ministry of Health. The audit is brief, easy to follow and can be completed by any clinical staff with the relevant experience.

Poppy completes the audit and now has data from 16 patients with PIVC from her ward.

She notes that generally PIVC are managed as per the PD, however she discovers that one patient has a cannula site with phlebitis and another two have no documentation surrounding cannula insertion. Poppy reports this information back to her NUM who immediately schedules a ward meeting to share this information with all her staff. The meeting is intended to improve staff compliance with PIVC management, therefore improving patient safety.

The patient with phlebitis has his cannula reviewed and removed. An incident report was completed by the patient's nurse and the incident number was recorded in the patient's healthcare record for future reference and the patient was notified of the incident. A review of the other two patients' notes identified the staff members that looked after them over the last few days and, through discussion with them, the NUM was able to discover when the cannula was inserted. The NUM has asked Poppy to complete another audit in a fortnight's time to measure any improvement.

Performance measure should focus on the HO's governance processes for quality and safety 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 patient. Outcomes of audits can be evaluated through a combination of self-assessment and/or independent verification processes to assess improved patient care.

10.2.2 Auditing for the National Hand Hygiene Initiative

In alignment with NSQHS – National Standards Version 2, NSW HOs must regularly audit the hand hygiene compliance of its workforce.

To do this, NSW HOs should use a method consistent with the National Hand Hygiene Initiative's for Hand Hygiene standard.

This approach allows comparison of

- hand hygiene compliance within healthcare facilities and between professional groups at a facility level and
- comparison of hand hygiene compliance between facilities and local health districts and speciality health networks at a state level.

NSW HOs should refer to the Commissions National Hand Hygiene Australia (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.

NSQHS - NATIONAL STANDARDS VERSION 2

Australian Guidelines for the Prevention and Control of Infection in Healthcare

National Hand Hygiene Initiative

Hand hygiene compliance data from HOs is added to the national database once validated by regional and state jurisdictional officers.

Hand hygiene compliance data is also published on websites such as Quality Improvement Data System (QIDS) where a HO's aggregate hand hygiene compliance rate will be compared to the national interim benchmark.

QIDS
Quality Improvement Data System Clinical Excellence Commission

Results from hand hygiene auditing should be discussed in a relevant and timely fashion. Therefore it is imperative that a HO's hand hygiene compliance report is generated locally and received by everyone, from the HO senior executive team through to the healthcare 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'.

Healthcare facilities may wish to track their progress in hand hygiene resources, promotion, and activities, plan their actions, and aim for improvement and sustainability through the use of the WHO Hand Hygiene Self-Assessment Framework.

The WHO Hand Hygiene 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.

WHO, 2010
Hand Hygiene Self-Assessment Framework

10.3 Incident Management and Notification

This section of the handbook refers specifically to the management of infection control critical incidents and the reporting of notifiable conditions and diseases.

An incident can be described as any unplanned event resulting in, or with the potential for, injury, damage or other loss.
Immediate local goals of incident management should be to identify, contain and document the incident. This includes:

- Advising line manager (who, in turn should ensure that the HO's general manager and chief executive are advised of the incident);
- Preventing a repeat of the incident;
- Identifying the extent of the problem; and
- Completing notification in the Incident Management system.

NSQHS –NATIONAL STANDARDS VERSION 2

NSW Health PD
Incident Management Policy

NSW Health GL
Triggers for Escalation Following Detection of Infection Outbreaks or Clusters

10.3.1 Clinical Incident

In infection prevention and control, a clinical incident is concerned with the transmission or risk of transmission of microorganisms to an individual or group of patients and/or an individual or group of HWs in the healthcare setting (32). 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 HWs 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 HO or
- Patient-to-patient transmission of communicable disease or MROs
- Transmission of microorganisms from the environment or a HWs to a patient.

NSW Health PD
Infection Prevention and Control Policy

10.3.2 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 control, an assessment should be made as to whether patients may be of risk of cross infection, and if so, whether those patients should notified of the incident and actions to take.

Assessment is needed on a case by case basis. Where a patient notification exercise is thought necessary, a risk-based approach should be considered i.e. those persons who are at highest risk of infection should be assessed first.

NSW Health PD
Infection Prevention and Control Policy

NSW Health PD
Lookback Policy

Lookback involves:

- Forming a local committee including infectious disease, 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; and,
- Evaluation or review of the Lookback process.

The HO Chief Executive is responsible for initiation of the Lookback process. Timely and appropriate management of the critical incident should begin within 24 hours of the incident being notified. An effective Lookback procedure requires effective communication at all levels and include Public health Units (PHUs).

A HO must, as mandated by the NSW Health *Lookback Policy Directive* undertake a Lookback should one the following HAI critical incidents occur:

- HW exposure to a blood borne virus
- Contamination of breast milk or administration to the wrong infant.

Other HAI critical incidents that may require the HO to undertake Lookback include incidents that involve inadequately reprocessed equipment and/or instruments.

NSW Health PD
Maternity - Breast Milk: Safe Management

NSW Health Safety Advocate 7
Self-Management of Breastmilk

NSW Health PD
HIV, Hepatitis B and Hepatitis C – Management of Health Care Workers Potentially Exposed

The NSW Blood borne Advisory Panel is a group of clinicians who provide advice to HOs on a number of matters including sterilization breaches and incidents as well as patients who have been exposed to staff members' body fluids. For advice from the NSW Blood Borne Advisory Panel contact the Health Protection Unit in the NSW Ministry of Health.

10.3.3 Open disclosure

Open disclosure is a process for ensuring that open, honest, empathic and timely discussions occur between patients and/or their support person(s) and HO staff following a patient safety incident.

The open disclosure PD sets out the minimum requirements for a consistent open disclosure process within NSW HOs, 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.

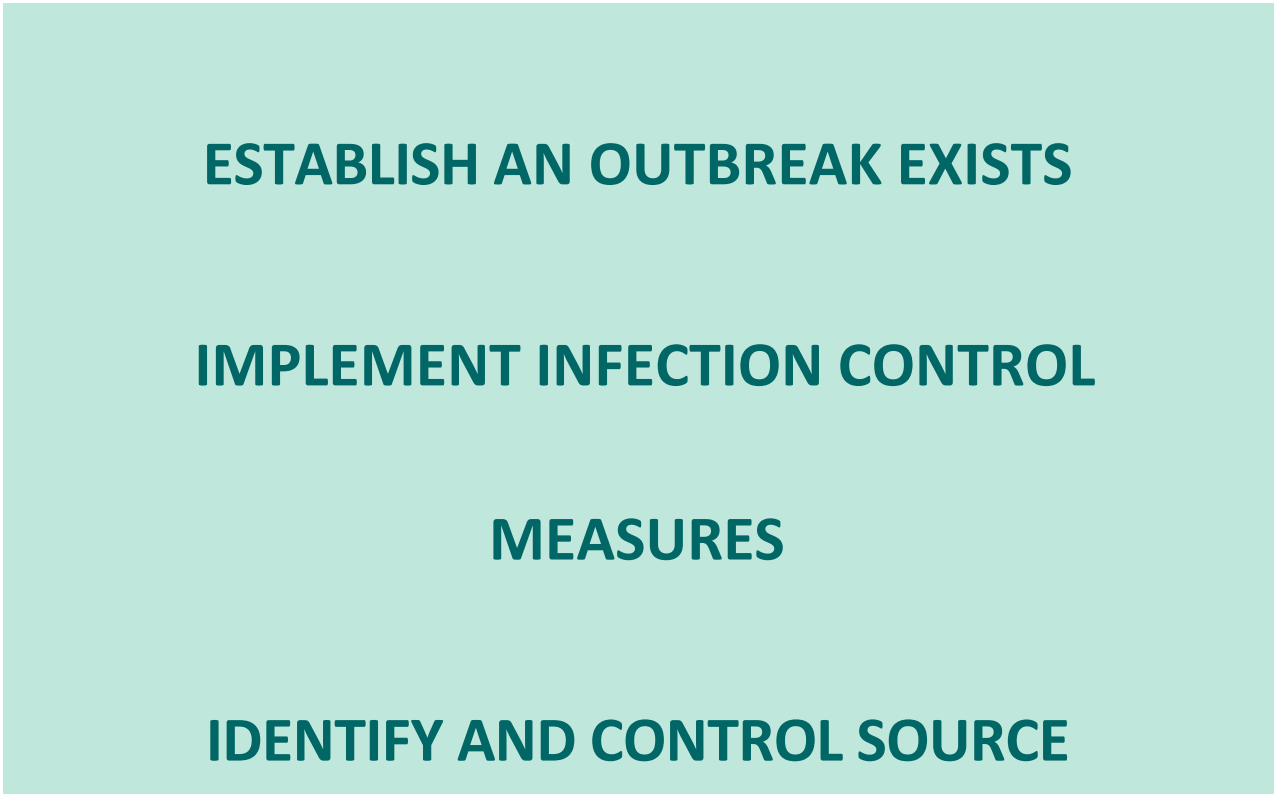
NSW Health PD

Open Disclosure Policy

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

SECTION 11
OUTBREAK MANAGEMENT



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 in Australia or those that have been eliminated from Australia, such as measles.

11.1 Outbreak investigation and management

The objective of outbreak management of communicable diseases 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 control measures to prevent further transmission
- Identifying and controlling the source of the outbreak
- Effective communication, education and reporting of the outbreak
- Debriefing and dissemination of findings to prevent recurrence.

11.2 Outbreak response procedures in healthcare facilities

Each local health district should have a local outbreak plan which has been developed in consultation with Public Health Units and other key stakeholders. This plan should be reviewed periodically but at least every two years and after an outbreak. The local outbreak response plan should be implemented in an outbreak.

Outbreak response procedures may include and identify the following:

Outbreak preparation

- A description of the roles and the responsibilities and accountabilities of each of the organisations and individuals
- An up-to-date list of stakeholder 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 major disease 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
    - Training for all staff involved in investigating communicable disease outbreaks.
- Surveillance systems for outbreak detection

Outbreak response

- Outbreak identification including guidance on the definition of an outbreak
- 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

11.3 Outbreak management team

An OMT is a multi-disciplinary group who work together to investigate and manage an outbreak. The core team is responsible for planning and coordinating the investigation.

11.3.1 Factors to consider in convening an outbreak management team

The decision to convene an OMT will be made by relevant personnel, such as the chairperson of the infection prevention and control committee or the LHD Chief Executive (CE) or their delegate. Not all outbreaks will 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

11.3.2 Outbreak management team - membership

An OMT may include expertise from the groups listed below. Where not available locally, the health care facility may contact the CEC to identify expert assistance as required.

- 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 staff 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

11.3.3 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.

Operations

- 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
- Create a line list containing information on each case including 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 their 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
- Evaluate the response to the outbreak and implement changes in OMT procedures as indicated

Communications

- Develop and maintain communication processes with key stakeholders e.g. situation reports
- Disseminate minutes and actions for each OMT meeting
- Keep relevant outside agencies, the general public and media appropriately informed

Logistics

- Conduct formal outbreak control meetings on a regular basis
- Ensure adequate staff and resources are available for outbreak management, seek assistance from Hos 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 staff training opportunities generated by the outbreak

A checklist of important tasks for OMTs can be found in appendix 3.

An outbreak management checklist which could be used by OMTs or ICPs can be found in appendix 4.

11.3.4 Outbreak management team - communication requirements

The OMT should determine communication requirements locally and develop a communication plan accordingly. *The '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 within NSW (e.g. NICUs, Spinal and Burns units) have the potential to adversely affect service delivery and require immediate escalation locally and to other 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.

11.4 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.

11.4.1 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.

11.4.2 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 etc.)
- Clinical information (date/time of onset, place of onset, signs and symptoms, death, hospitalisation, treatment, etc.)
- Laboratory information
- Potential risk factors (contact with known case, or individuals with similar symptoms, recent travel, immunosuppression, environmental exposure, other co-morbidities etc.)

The most common way this information is collated is by using a line list. An example line list form can be found in appendix 2.

Other information which may assist in identifying the source include:

- Patient health records
- Environmental assessment (e.g. identification of contaminated food or food handling equipment, infection control breaches, cleaning, environmental sampling)
- Analysis of epidemiological data (e.g. movements and contacts of cases)
- Laboratory data (e.g. 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 constitute a contact. Contact tracing of staff and other individuals exposed within a healthcare organisations should be carried out by that HO. 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 e.g. 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.

11.4.3 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. Appendix 1 lists recommended precautions for some common and important infectious diseases.

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.

11.4.4 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 resources, guidelines, questionnaires, databases, etc.)
- 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

11.5 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 to the local PHU to determine the need and scale of the response required for each outbreak depending on the situation.

11.6 Emerging infectious diseases

11.6.1 Respiratory viruses

The threat of emerging respiratory viruses such as pandemic influenza, novel Coronavirus, SARS-CoV and MERS-CoV are a potential cause of concern for the health system. The difficulty about the emergence of these viral infections is that no one can predict where and when the next epidemic or pandemic will occur.

HOs should follow the disease specific NSW Health control guidelines in the event of a respiratory virus outbreak.

NSW Health control guidelines:
Influenza control
MERS-CoV
SARS-CoV

NSW Health
Human Influenza Pandemic Plan

Australian Guidelines for the Prevention and Control of Infection in Healthcare

11.6.2 Viral haemorrhagic fevers

Viral haemorrhagic fevers (VHFs) refer to a group of illnesses that are caused by several distinct families of viruses. VHFs are severe and life-threatening viral diseases that are endemic to parts of Africa, the Middle East, Eastern Europe and Asia. VHFs are not indigenous to Australia and environmental conditions here are unlikely to support the natural reservoirs and vectors of any of the haemorrhagic fever viruses.

NSW Health GL
NSW Contingency Plan for Viral Haemorrhagic Fevers

NSW Health
Viral Haemorrhagic Fevers

VHFs are caused by viruses of four distinct families:

1. Arenaviruses: Lassa Fever, Junin and Machupo
2. Filoviruses: Ebola and Marburg
3. Bunyaviruses: Crimean-Congo haemorrhagic fever, Rift Valley Fever, Hantaan haemorrhagic fevers; and
4. Flaviviruses: Yellow fever, Dengue, Omsk haemorrhagic fever, Kyasanur Forest disease.

VHFs are of particular public health importance because:

- they can spread via human-to-human contact
- they present a particular transmission risk within a hospital setting
- they are often associated with a high case fatality rate
- they can have a long asymptomatic incubation phase
- there is no clear differential symptomatology for these infections
- they are difficult to test for
- there are few if any effective treatments

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.

NSW Health Public Health Act 2010

Biosecurity Act

NSW Health GL
NSW Contingency Plan for Viral Haemorrhagic Fevers
NSW Health Ebola virus disease control guideline

HOs should follow the NSW VHF Contingency Plan for Viral Haemorrhagic Fevers which addresses both suspected and confirmed VHF cases.

Appendix 1: 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
Gastroenteritis – Bacterial and Parasitic e.g.: Campylobacter. Salmonella, Giardia, Shigella, and E. coli	Ingestion of contaminated food & 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* **Communicable Diseases Network Australia (CDNA)** Guidelines for the public health management of gastroenteritis outbreaks due to norovirus or suspected viral agents in Australia **NSW Health:** Gastro Pack for Hospitals Gastroenteritis in an institution control guideline Foodborne illness outbreak guideline Campylobacteriosis control guideline Giardiasis control guideline Rotovirus control guideline Salmonellosis control guideline Shigellosis control guideline Shiga toxigenic E. Coli control guideline
Gastroenteritis – Viral e.g.: Rotavirus, Norovirus	Ingestion of contaminated food & w ater Exposure to faecal and vomit aerosols	√	√	√		
Haemophilius influenzae type B	Respiratory droplets Contaminated fomites/environment	√	√	√		Can cease precautions after 24-48 hours of effective antibiotic treatment Children and immune compromised persons 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 control guideline**: Haemophilus influenzae type b (Hib)
Hand, foot and mouth disease – Coxsackie virus and other enteroviruses	Contact w ith fluid in blisters or faeces Inhalation of respiratory secretions	√	√	√		**NSW Health**: HFMD factsheet Enteroviruses and human parechoviruses - information for clinicians
Herpes simplex virus - Disseminated	Contact w ith 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

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 Control Guideline:** Hepatitis A
Hepatitis B **Hepatitis C** **Hepatitis D**	Blood-Bourne	√				Immunise & test all HCW (Hepatitis B) Occupational exposure protocol for blood-borne viruses **NSW Health Control Guidelines:** Hepatitis B Hepatitis C Hepatitis D
Hepatitis E	Faecal/oral	√	√			Infectious for 14 days after onset of symptoms An ensuite bathroom or dedicated toilet is required **NSW Health Control Guideline**: Hepatitis E
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 receiving anti-influenza medication. Ant-influenza medications may be indicated for treatment of cases and prophylaxis of high risk contacts and for outbreak management. **Communicable Diseases Network Australia (CDNA)** Guidelines for the Prevention, Control and Public Health Management of Influenza Outbreaks in Residential Care Facilities in Australia **NSW Health Control Guideline:** Influenza
Lice – Head and body	Close person to person contact	√	√			Patient is 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 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 HCWs is required **NSW Health Control Guideline:** Measles

Disease	Transmission Route	Type of Precautions				Comments and additional guidance
		Standard	Contact	Droplet	Airborne	
Meningococcal disease – Neisseria meningitis (bacterial)	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 Control Guideline:** Meningococcal Disease
Multi-resistant organisms – MRSA, VRE, CPE, Candida auris	Contact with skin or secretions HCW unwashed hands Indirectly from contaminated fomites/environment	√	√			Refer to your local guidelines and risk assess for patient placement and PPE requirements **NSW Health Control Guidelines:** MRSA in the Community **CEC Guidelines:** Surveillance and Response for Carbapenemase-producing Enterobacterales (CPE) 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 HCWs is required **NSW Health Control Guideline**: Mumps
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 i.e. lower infectivity&/or lesion drainage has ceased. Negative pressure room. Patient to 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 Control Guideline**: Tuberculosis
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)
Pertussis – Whooping Cough	Respiratory Droplets	√		√		Infectious until completion of 5 days of appropriate antibiotics. If no antibiotic treatment has been commenced they are infectious for 21 days from onset of symptoms **NSW Health Control Guideline:** Pertussis
Emerging Respiratory coronaviruses – MERS and SARS etc.	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 Control Guidelines:** MERS- Coronavirus Control Guidelines 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 HCWs is required NSW Health Control Guideline: Rubella

Disease	Transmission Route	Type of Precautions				Comments and additional guidance
		Standard	Contact	Droplet	Airborne	
Scabies	Skin to skin contact Indirectly from contaminated fomites/environment	√	√			Treatment and isolation of cases should occur concurrently Isolate for 24 hours after first treatment **NSW Health factsheet:** Scabies
Typhoid fever – Salmonella Typhi/paratyphi	Faecal/oral	√	√			Infectious for duration of illness Dedicate toilet for duration of hospitalisation **NSW Health Control Guideline:** Typhoid
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 HCWs is required Post exposure prophylaxis for non- immune HCWs recommended **The Australian Immunisation Handbook:** Varicella
Viral Haem orrhagic fevers	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 people with VHF	See NSW Contingency Plan for Viral Haemorrhagic Fevers 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. Ebola Virus Disease control guideline				

Appendix 2: 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:_____ Telephone No:_____ Fax No:_____ Email:_____

PHU Notified ☐ *(tick)* Date Reported to PHU:_____ Date First Case:_____ Unique name/number for outbreak (PHU to fill in):_

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**

Appendix 2: Line Listing for Outbreaks in a Hospital (page 1)

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)

Please use the same Line Listing for new cases – do not start a new one each day

Appendix 3: Checklist for outbreak management team tasks

The principal aim of the outbreak management team (OMT) is to investigate the cause of the outbreak and to implement action to identify and remove the source, 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 preparation

☐	consider whether or not cases have the same illness and establish a tentative case definition
☐	establish epidemiology to determine if there is a real outbreak
☐	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
☐	Consult with local PHU

Outbreak investigation

☐	identify population at risk (e.g. healthcare workers, patients, visitors)
☐	identify persons posing a risk of further transmission
☐	initiate immediate control measures
☐	assess the availability of adequate resources to manage the outbreak
☐	notify the local Public Health Unit, Chief Health Officer (CHO) or Director General (DG) via the Executive Director of Communicable Diseases Branch (CDB) if required where the outbreak involves a notifiable disease or gives rise to broader public interest or is of state significance.
☐	establish a case definition (clinical and/or microbiological)
☐	identify other cases
☐	collect and collate data from affected and unaffected persons
☐	conduct appropriate environmental investigation including inspection of involved or implicated premises
☐	describe cases by time, place and person
☐	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) treatment of cases to reduce infectious period, where possible (e.g. antivirals) c) screening and monitoring of contacts

	d) protection of contacts by immunisation or chemo-prophylaxis e) enhanced infection control practices by staff and visitors including environmental cleaning, equipment decontamination procedures and hand hygiene f) closure of wards/beds
☐	monitor control measures by continued surveillance for disease
☐	declare the outbreak over

Communication

☐	daily situation updates to the HO 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 help-lines
☐	review the triggers for escalation of outbreaks document 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 (refer Section 11.3.4 *Outbreak management team - communication requirements* for items to include in the report)
☐	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 Section 11.4.4 *Evaluation of Outbreak Response* for possible criteria).

Appendix 4. Outbreak management checklist

Type of outbreak e.g. MRO, gastroenteritis, respiratory illness:

Date outbreak was reported to infection 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
Do you have an outbreak? i.e. a higher than expected number of cases of infection/infectious diseases, MROs with the same causative micro-organism (if known in the early stages of the outbreak)	○	○
Has the source of the outbreak been identified?	○	○
Do you need to convene the outbreak control team? • refer to section 11.3.1 11.3.1 *Factors to consider in convening an outbreak management team*	○	○
Inform staff • inform all staff that a possible outbreak is occurring including advice regarding infection control − include supply staff and operational staff in correspondence − consider the need to inform visitors and patients • inform senior nursing and medical staff on duty • inform your local microbiology unit of any additional specimen requirements	○ ○ ○	○ ○ ○
Implement infection control measures • ensure sufficient supplies of appropriate personnel protective equipment (PPE) is available in the affected areas e.g. mask, gloves, gowns, aprons, eyewear, as indicated by mode of transmission • isolate affected patients in single rooms or cohort • display signage regarding necessary additional precautions • reinforce hand hygiene practices as appropriate − alcohol-based hand hygiene products may not be suitable for certain micro-organisms e.g. Clostridium difficile, Norovirus	○ ○ ○ ○	○ ○ ○ ○
Stop or limit further spread • consider the need to dedicate staff to affected patients • consider the need to cohort patients with the same infection • 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 staff	○	○
Document the outbreak • list all know cases and update information daily • include details of affected patients and staff • include details of onset date of symptoms/diagnosis for each case	 ○ ○ ○	 ○ ○ ○
Notify authorities if applicable • review the triggers for escalation of outbreaks document to determine the need for further escalation)	○	○
Collect specimens • observe standard and transmission based precautions when collecting relevant specimens • collect appropriate specimens - liaise with infectious diseases physician or microbiology to determine collection method and specimen types • ensure specimens are labelled appropriately	 ○ ○ ○	 ○ ○ ○
Review and up-date outbreak management plan • regularly during the outbreak • following resolution of outbreak	○ ○	○ ○
Outbreak management report • complete outbreak management report highlighting recommendations for preventing	○	○

Appendix 5: NSW Health Respiratory Hygiene Poster

Appendix 6: Case studies

Case study 11: An outbreak in Ward 3B se study 10 - An outbreak in Ward Case Study 12: Lily's story – outbreak in the field
Case study 13: Risk Scenario – Investigating CPE outbreak

Case study 11 - An outbreak in Ward 3B

On a cold Monday morning in July, Ward 3B rang Infection Prevention and Control to notify three patients who had all started having vomiting and diarrhoea symptoms over the weekend. The ward was advised to implement contact precautions, isolate or cohort the patients away from other patients on the ward, collect stool samples to send for testing and ensure the staff use PPE when caring for these patients. The infection prevention and control CNC visited Ward B at around midday and it was noted that the ward had put up signs to alert visitors that they were currently experiencing a gastroenteritis outbreak and to re-consider the need to visit at this time. Fact sheets on viral gastroenteritis were made available to HWs, patients and visitors, and there was extra PPE outside the rooms of patients affected for HWs to use. The environmental cleaning team was notified and requested to increase the frequency of cleaning and disinfection. HWs were asked to notify their manager if they develop symptoms of gastroenteritis and no to return to work until symptom free for 48 hours.

A line list of cases was started to report to the local PHU in accordance with NSW Health Control Guidelines. The line list detailed the cases' onset dates, symptoms and specimen details. Click here for NSW Health line listing template.

NSW HEALTH

NSW Health Hospital Gastro Pack Section 5: Line Listing for Gastroenteritis in a Hospital (page 1)

Name of Hospital:_____Sunshine Hospital___Name of ward/s or unit/s:_3B____No patients on ward/unit:____35_____No. of staff:_____30_____
Contact Person:_____Position Title:_____Telephone No:_____Fax No:_____Email:_____
PHU Notified ☐ *(tick)* Date Reported to PHU:_____Date First Case:_____Unique name/number for outbreak (PHU to fill in):_____

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)
1	William Black 225334	23/09/43	M	P	Bed 12	4/07	9am	48hrs	D, V	Y	06/07		
2	Gary Brown 2233221	04/08/45	M	P	Bed 13	5/07	2am	3 days	D, V, F	Y	06/07		
3	Bob Smith 7766224	05/02/60	M	P	Bed 11	5/07	6am	2 days	D,V	Y	06/07		

Symptoms Key: V=Vomiting D=Diarrhoea BD=Bloody Diarrhoea F=Fever>38.5C AC=Abdominal Cramps N=Nausea

Please use the same Line Listing for new cases – do not start a new one each day
Please arrange stool samples (specimens) from affected persons

Information Pack for Gastroenteritis in a Hospital December 2010

The formation of an outbreak team in the hospital was not considered necessary as the outbreak was small and being managed appropriately by Ward B.

On Tuesday one more patient and two HWs reported symptoms. The patient was isolated and the HWs were advised to remain off work until 48 hours after their symptoms had ceased. All details were added to the line list and faxed to the public health unit.

NSW HEALTH

NSW Health Hospital Gastro Pack Section 5: Line Listing for Gastroenteritis in a Hospital (page 1)

Name of Hospital: Sunshine Hospital Name of ward/s or unit/s: 3B No patients on ward/unit: 35 No. of staff: 30
Contact Person: Position Title: Telephone No: Fax No: Email:
PHU Notified ☐ *(tick)* Date Reported to PHU: Date First Case: Unique name/number for outbreak (PHU to fill in):

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)
1	William Black 225334	23/09/43	M	P	Bed 12	4/07	9am	48hrs	D, V	Y	06/07		
2	Gary Brown 2233221	04/08/45	M	P	Bed 13	5/07	2am	3 days	D, V, F	Y	06/07		
3	Bob Smith 7766224	05/02/60	M	P	Bed 11	5/07	6am	2 days	D,V	Y	06/07		
4	Mary Burke	05/09/85	F	S		6/07	11am	2 days	D,V	N			
5	Tim Styles	25/06/90	M	S		6/07	6pm	1 day	D	Y	07/07		
6	John Ward 7766553	5/08/55	M	P	Bed 10	6/07	9pm	3 days	D, V	N			

Symptoms Key: V=Vomiting D=Diarrhoea BD=Bloody Diarrhoea F=Fever>38.5C AC=Abdominal Cramps N=Nausea

Please use the same Line Listing for new cases – do not start a new one each day
Please arrange stool samples (specimens) from affected persons

On Wednesday three stool samples came back positive for norovirus and one was positive for norovirus and *C. difficile*. The *C. difficile* was considered an incidental finding and the outbreak was reported as being caused by norovirus.

By Thursday afternoon there had been no more cases reported for more than 24 hours. After discussion with the outbreak team the outbreak was considered over. Patients were released from isolation, terminal cleaning was performed and work on Ward B returned to normal. A final line list completed with all stool sample results was faxed to the PHU.

NSW HEALTH

NSW Health Hospital Gastro Pack Section 5: Line Listing for Gastroenteritis in a Hospital (page 1)

Name of Hospital: Sunshine Hospital Name of ward/s or unit/s: 3B No patients on ward/unit: 35 No. of staff: 30
Contact Person: Position Title: Telephone No: Fax No: Email:
PHU Notified ☐ *(tick)* Date Reported to PHU: Date First Case: Unique name/number for outbreak (PHU to fill in):

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)
1	William Black 225334	23/09/43	M	P	Bed 12	4/07	9am	48hrs	D, V	Y	06/07	norovirus	R
2	Gary Brown 2233221	04/08/45	M	P	Bed 13	5/07	2am	3 days	D, V, F	Y	06/07	Norovirus c.difficile	R
3	Bob Smith 7766224	05/02/60	M	P	Bed 11	5/07	6am	2 days	D,V	Y	06/07	norovirus	R
4	Mary Burke	05/09/85	F	S		6/07	11am	2 days	D,V	N			R
5	Tim Styles	25/06/90	M	S		6/07	6pm	1 day	D	Y	07/07	Norovirus	R
6	John Ward 7766553	5/08/55	M	P	Bed 10	6/07	9pm	3 days	D, V	N			R

Symptoms Key: V=Vomiting D=Diarrhoea BD=Bloody Diarrhoea F=Fever>38.5C AC=Abdominal Cramps N=Nausea

Please use the same Line Listing for new cases – do not start a new one each day
Please arrange stool samples (specimens) from affected persons

Information Pack for Gastroenteritis in a Hospital December 2010

Case Study 12: Lily's story - Outbreaks in the field

Lily is a Child and Family Health Nurse who developed respiratory symptoms including a persistent paroxysmal cough. Five years ago, Lily was vaccinated for pertussis.

A week after the onset of her symptoms, Lily's cough had not improved so Lily made an appointment to see her GP. A nasopharyngeal swab was collected and sent to the laboratory for nucleic acid testing, also known as PCR. Two days later Lily was notified by her GP that she returned a positive swab result for pertussis and was commenced on Azithromycin.

Lily notified her Nursing Unit Manager who informed the local infection prevention and control service. An Infection Prevention and Control nurse contacted Lily to obtain a history, verify the diagnosis and compile a list of contacts in consultation with the local PHU in accordance with the NSW Health Control Guideline for Pertussis.

In accordance with this guideline, five babies were identified as close contacts because they:

a) had contact of less than 1metre with Lily during the infectious period for more than one hour; and
b) were under six months of age.

Four HWs, regardless of their vaccination status, were defined as close contacts because they:

a) had contact of less than 1metre with Lily during the infectious period for more than one hour; and
b) worked with infants who were less than six months of age.

No pregnant contacts in the last month of pregnancy were identified.

All high risk contacts were contacted by the PHU and advised to attend a predetermined clinic organised by the PHU for assessment and antibiotic prophylaxis. Those who could not attend the clinic were advised to contact their GP for antibiotic prophylaxis.

The event was used to review HWs' vaccination status and update where required.

The executive management for the community health service were notified and a Brief regarding action taken was later forwarded.

Case study 13: Risk Scenario – Investigating CPE outbreak

Scenarios developed for acute hospitals, ambulance and a paediatric hospital. Each answered the following questions:

1. What is your response?
2. What does your communication plan look like?
3. What potential barriers will you face? What are some solutions for these barriers?
4. How will you evaluate the effectiveness of your response?
5. What could you do to help prevent this from happening in the future?

Scenario:

Anthony Fowler- 39yo Male, 24/07/1978, NKA

Anthony was BIBA to ED with surgical wound infections to left wrist and right knee.

Presented with history of:

- Motor Vehicle Accident 14 days ago
- Multiple cuts and abrasions requiring suturing
- # Wrist (left) requiring of open reduction and internal fixation (ORIF) surgery. Right knee required debridement and suturing.

Admitted to the **Orthopaedic ward**

- Placed in 4-bed room with shared bathroom facilities
- Wash out of wrist and knee wounds in operating theatre
- Wound swabs collected
- Cefazolin commenced

It is now **day 4** and pathology results are in....

Pathology Results

- Positive for CPE
- Klebsiella Pneumonia

Antimicrobial susceptibility testing of KPC-2-producing *K. pneumoniae*[a]

Antibiotic(s)	MIC (µg/ml)	Interpretation
Ampicillin	≥32	Resistant
Ciprofloxacin	≥4	Resistant
Ceftriaxone	≥64	Resistant
Cefepime	32	Resistant
Meropenem	≥16	Resistant
Imipenem	32	Resistant
Gentamicin	≥16	Resistant
Amikacin	32	Intermediate
Colistin	0.5	Susceptible
Nitrofurantoin	256	Resistant
Piperacillin-tazobactam	≥128/4	Resistant
Fosfomycin	32	Susceptible

Team Review 5pm: Team asks if there is any history of overseas travel in last 6mths:

- MVA happened in Greece 15 days ago
- Surgery was performed in a Greek Hospital
  - Anthony was a patient for 4 days post-op before returning to Australia

The next day: Bob White- patient currently in ICU tests positive for the same strain of CPE.

- Bob shared the 4-bed room and bathroom facilities with Anthony on the Orthopaedics ward
- Further testing revealed the 2 cases of CPE are related

Suggestions from the workshop to assist with each type of investigation

What is your response?

- Notify the lab of the suspected outbreak and request to expedite testing
- Notify, NUM, treating MO, HO exec, patients, Infection prevention and control team/infectious diseases
  - Isolate patients
  - Contact precautions
  - Document in the medical record positive result, flag/alert and need for contact precautions
  - Staff education (including HealthShare staff
- Contact tracing (ward, ICU, theatre)
  - Manage contacts (cohort)
- Enhanced environmental and shared equipment cleaning
- Patient, family/visitors and staff education/ notification
- ED education admission risk assessment- travel history/ risk assessment
- Outbreak management team if needed
- Investigate why patient was missed on screening
- Empower staff to understand and manage CPE
- Follow local reporting process for incidents such as missed screening etc.
- Communication, executive briefing, ward for isolation
  - Discussions with key stakeholders
  - Speak with at-risk patients
  - Notify treating teams/ management/ patient flow
  - MO at rural facility- ID consult re patient management
  - Talk to the lab to expedite testing

What does your communication plan look like?

- Brief to CEO and Communication's unit (PR)
- Identify key stakeholder (Ambulance/ ID/ Micro/ Pt Flow, clinical governance, medical services, infection control, patient safety,
- Identify roles and responsibilities of staff
- Email- After hours nurse managers, patient flow, ward NUMs, environmental cleaners, treating teams, PR
- Patient notes (education/ communication), electronic flagging of patients and contacts
- Infectious Diseases team- support over the weekend
- Talk to patient/ contacts, provide information sheet
- Staff education (all)
- Discharge summary- notify discharge site, GPs
- Outbreak management team
  - Resources

○ Visitors and patient ○ Review clinical products/ stock levels ○ Other facilities ○ Media information sharing	
What potential barriers will you face? What are some solutions for these barriers?	
Barriers	**Solutions**
• Lack of knowledge and education: ward staff, medical staff, cleaning/ food services • Resources: information/ factsheets, contact tracing/ pathology, extra cleaning staff • Escalation Plan: lack of coordinator, person who knows how to manage an outbreak (e.g. ICP) • Infrastructure: lack of isolation rooms, aging facilities, ward layout • Lack of antimicrobial stewardship • Staff anxiety, inconsistent communication, compliance • Infection Control Practitioner time and availability, resource • Executive support and money • After hours support • Contact tracing: time consuming and resource intensive • Additional cleaning resources, negotiating time, accountability and lines of communication • Time, resources, availability of isolation rooms, cost of PPE, increased LOS, patient flow • Delayed pathology results • Media Hysteria • Difficult to get advice from ID (rural) • Laboratory- timing of notification, WGS testing, accuracy and sensitivity of screening	• Supportive executive team • Have resources readily available • Have a clearly articulated action plan • Identify and implement strategies/actions • Communication, clear and concise • Good relationships with your network • Ask other facilities for PPE if required • Robust screening policy, education for ED HWs • Risk assessment- patient condition, comorbidities • Cohort staff and patients • Education and training of patient and staff • Quarantine contacts, involve patient flow, increased cleaning • Alert pathology (finalised <4days) • Enhance resource (program, manpower) • AHNM & IPC Resource Nurses • Education, simplified instruction (1 page/ tick box)
What could you do to help prevent this from happening in the future?	
• Screening of at-risk patients • Process to identify patient risk factors on admission • Good environmental cleaning • Appropriate cleaning of shared equipment • Maintenance of equipment/ HCF • Remove carpet/ install cleanable flooring • Up to date resources- evidence based • Good standard precautions • Ongoing education of staff • Ongoing auditing and compliance to PPE, standard precautions, cleaning, hand hygiene, bare below the elbow, product availability etc. • Learn from experience • Screen overseas patients • Education- HWs, patient, family/visitors • On admission travel history assessment • Contact precautions for all cases of diarrhoea	• Times cleaners are available • Increased awareness • Screening • AMS • Standard precautions • Cleaning- environment and shared equipment • Education • Rapid testing • Increased IPC resources • Reporting and surveillance • Research project • Identify high risk patients • Risk asses patient placement on admission • Reporting to wards • Education and training- lessons learnt • National reporting • Constant screening process

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