

Chapter 3 Risk assessment framework

3.1 Risk assessment

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

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

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

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

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

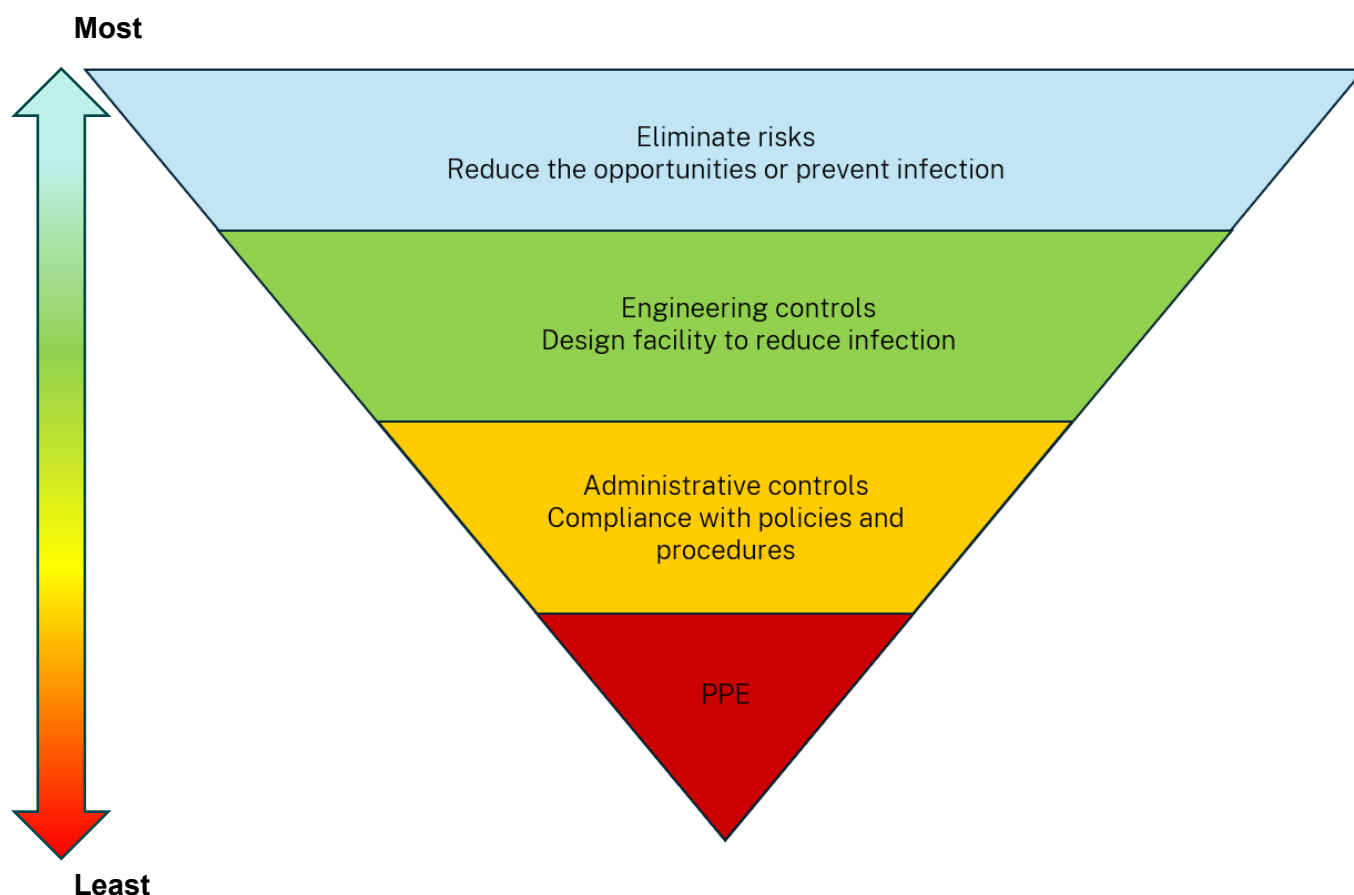
3.2 Risk management framework

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

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

For more information refer to NSW Health [Enterprise-wide Risk Management Policy Directive](#).

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



Source: Adapted from [NIOSH – CDC](#)

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

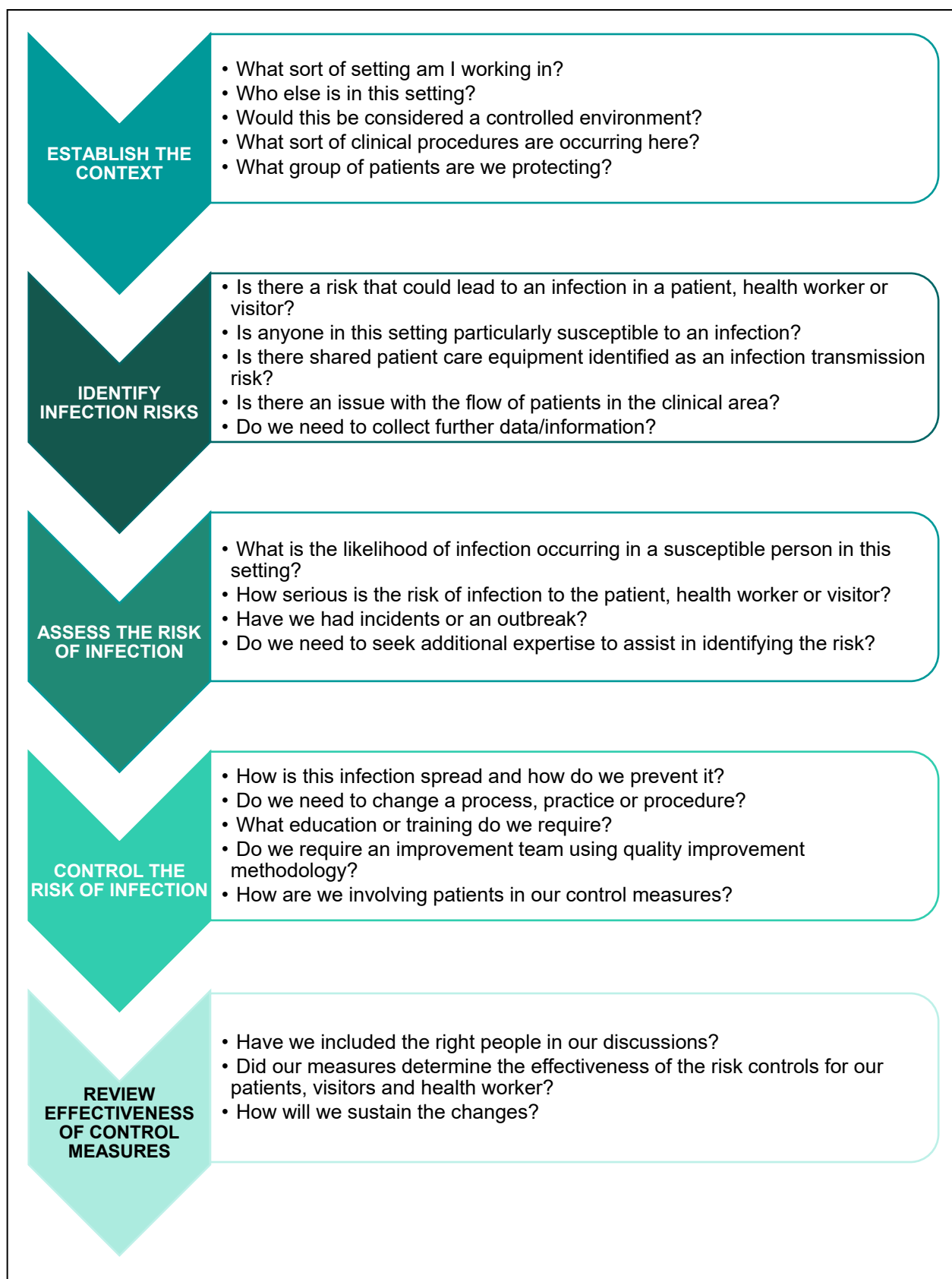
A successful approach to risk management occurs on many levels within a healthcare facility:

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

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

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

Figure 7 Steps of risk management framework



Source: [NSQHS Standards Risk management approach](#)

What are the principles of risk management?

The 5 fundamental principles of risk management are to:

1. Avoid risk

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

2. Identify risk

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

3. Analyse risk

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

4. Evaluate risk

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

5. Treat risks

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

3.3 Risk assessing the healthcare delivery

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

Table 4 Questions to consider when risk assessing

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

3.4 Principles of risk assessment in the context of PPE selection

Identify the risk

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

Identifying likely transmission route(s)

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

Quantify the impact

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

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

3.5 Risk assessing visitation

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

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

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

Table 5 An example of visitation risk assessment

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

3.6 Risk assessing the patient

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

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

Consider the following factors when risk assessing a patient.

The patient may be:

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

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

Infectious diseases and the risks:

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

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

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

Table 6 Patient risk assessment

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

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

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

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

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

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

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

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

*According to local risk assessment and priorities

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

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

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

3.7 Risk assessing the functional area

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

Functional areas are categorised according to risk.

Extreme

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

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

High

Areas where infection transmission risk is high as:

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

Medium

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

Low

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

Additional considerations for risk assessment

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

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

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

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

Refer to [Cleaning of the Healthcare Environment policy directive](#) for more information on functional areas.

3.8 Preventative maintenance and asset management

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

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

For more information refer to NSW Health [Engineering Services Guide](#), NSW Health Infrastructure [Asset Management](#) and NSW Health [Asset Management policy directive](#).

3.9 Purchasing new equipment

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

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

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

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

3.10 Review and maintenance of existing equipment

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

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

3.11 Building, demolition, refurbishment and construction

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

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

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

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

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

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

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

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

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

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

3.11.1 Infection prevention and control considerations on facility design

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

Key design considerations for minimising transmission of infection include:

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

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

3.11.2 Control of surface contamination through material selection

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

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

3.11.3 Flooring

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

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

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

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

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

3.11.4 Furnishings

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

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

3.11.5 Water supply system

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

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

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

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

3.11.6 Water features

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

Drinking water dispensers

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

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

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

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

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

3.11.7 Fish tanks/aquariums

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

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

3.12 Staff health and HAI risk

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

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

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

Refer to NSW Health [Code of Conduct policy directive](#) for more information.

3.12.1 Risk assessing health workers

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

Table 8 Health worker risk assessment

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

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

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

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

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

3.12.2 Managing health workers

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

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

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

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

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

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

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

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

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

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

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

3.12.3 Management of health workers with an occupational exposure

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

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

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

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

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

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

Where such an exposure occurs, the following principles apply:

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

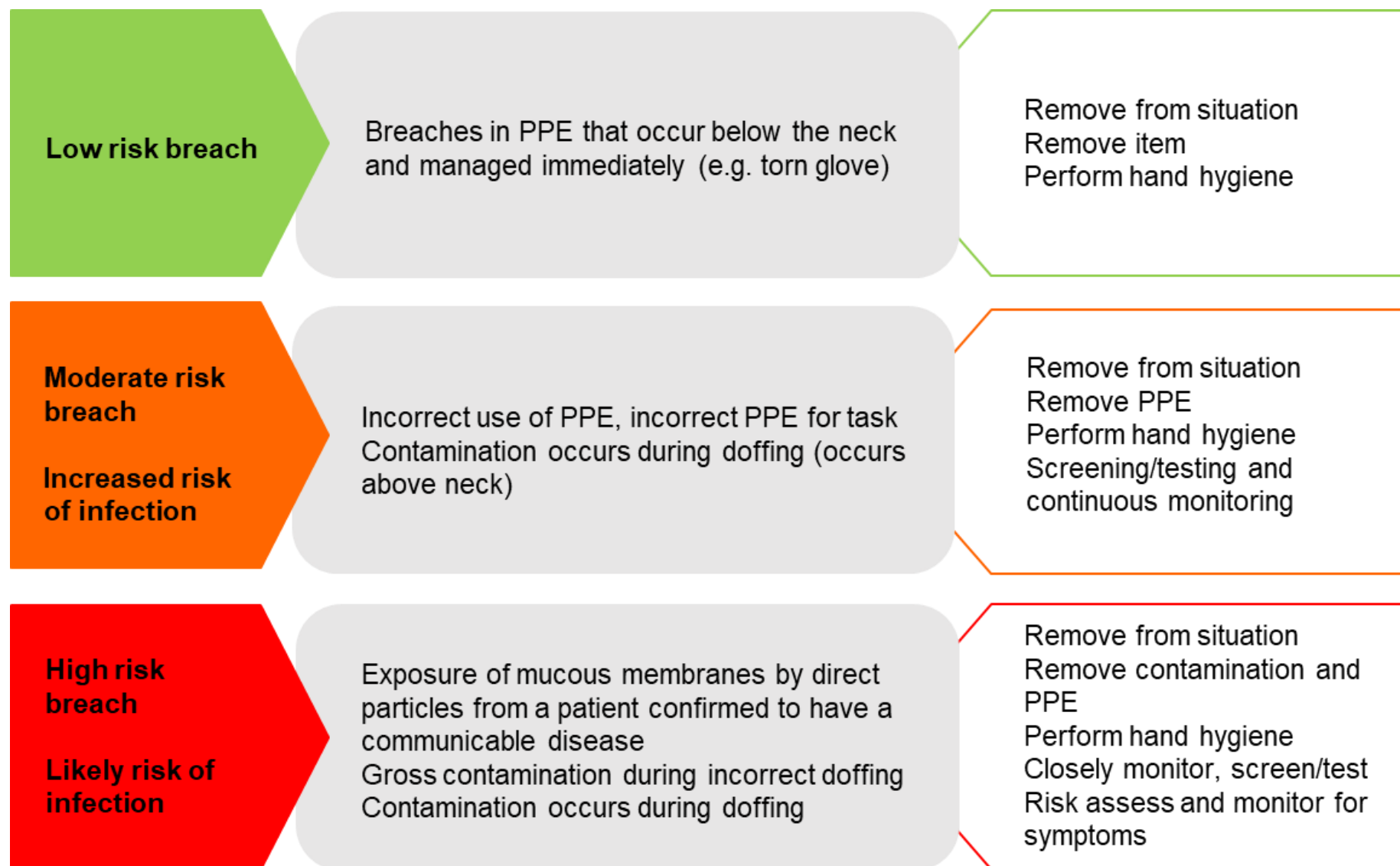
3.12.4 PPE breach risk assessment principles

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

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

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

Figure 8 PPE breach risk assessment principle – examples



3.13 Exposure prone procedures

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

Key practice points:

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

For more information refer to:

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

3.14 Health worker screening and vaccination

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

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

3.15 Health workers with cystic fibrosis

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

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

3.16 Health workers with herpes simplex virus

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

- Neonates
- Newborns
- Patients in delivery suites

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

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

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

3.17 Health workers with other infectious diseases

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