AUSTRALIAN GUIDELINES FOR THE PREVENTION AND CONTROL OF INFECTION IN HEALTHCARE

-ASA ABRIDGED VERSION-

JULY 2010

Contents

AUDIOLOGY AUSTRALIA INTRODUCTION

Audiological Perspective

Audiology Australia recognises the need for guidelines on prevention and control of infection relating to audiological clinical practice. It is important audiologists be aware of the current evidence-base and to have a set of guidelines from which to draw one element of professional practice standards.

There is a range of employment settings and variety of workplaces in which audiologists may be based or visit:

- office based practices
- private and public hospitals;
- long term and aged care residential facilities;
- community health services;
- Aboriginal health services;
- home visit services;
- primary health and general practice clinics;
- educational settings.

Visiting services may occur in a limited choice of physical environments by necessity (eg wards and at bedside in hospitals and aged care), or in office based rooms used by other health professionals involved in invasive procedures (such as general practice, dental practitioners or podiatrists).

Audiological clinical services may be provided in hospitals while other ENT or surgical/medical procedures are in progress (eg intra-operative cranial nerve monitoring) or in parallel (eg opportunistic objective assessment under sedation or anaesthetic). Audiologists may have the opportunity to observe ENT surgical procedures.

Audiologists may provide services to people:

- known or suspected to have infectious agents that are spread:
    - by direct or indirect contact with the patient or the patient's environment,
    - by respiratory droplets or
    - by airborne route, or
- infected with a multi-resistant organism - methicillin-resistant *Staphylococcus aureus* (MRSA), multi-resistant Gram negative (MRGN), vancomycin-resistant enterococci (VRE).

Audiologists should:

- recognise the potential risk of exposure to infection in any environment they work or visit.
- focus on infection prevention through safety, quality and risk management.
- understand the personal responsibility of prevention of the spread of infection. This is not limited to the primary workplace but also to visiting locations and for individuals who may be more susceptible to infection (eg newborns, infants, individuals with chronic health disease).
- understand both standard precautions (formerly known as universal precautions) and transmission-based precautions of infection prevention and control
- be mindful of their own health and well being.
- understand the context of any existing workplace infection prevention and control policy and procedures of employers and healthcare facilities.
- discuss these guidelines to improve knowledge, practice and support of work colleagues and management.

Infection Prevention and Control Guidelines - Documents

The ***National Health and Medical Research Council (NHMRC) 2010 Australian Guidelines for the Prevention and Control of Infection in Healthcare*** (hereafter ***NHMRC IPC Guidelines***) are comprehensive across the spectrum of health care though have an important underlying focus on acute care.

Refer to the original NHMRC IPC Guidelines to read in full for:

- references and context of evidence base,
- advice on practical application of guidelines,
- relevant standards, legislation and resources, finding more information

http://www.nhmrc.gov.au/node/30290

The NHMRC IPC Guidelines are quite extensive and considerable in size. Audiology Australia has prepared:

- ***"Australian Guidelines for the Prevention and Control of Infection In Healthcare – ASA Abridged Version"*.** This presents a relatively more condensed version with reproduced content, a summary of key recommendations and the same format of the NHMRC IPC draft Guidelines. The key information is retained in the ASA abridged version for its integrity, validity and to raise awareness given the range of settings in which audiologists practise.

- **A shorter and practical *"Summary and Audiological Perspective : Australian Guidelines for the Prevention and Control of Infection In Healthcare ".***

Both documents are available to members on the website of Audiology Australia.
http://www.audiology.asn.au

Part A in the NHMRC original and ASA abridged documents presents background information that should be read by **everyone working in health car**e - **including audiology** (for example as orientation or as part of annual review) — this includes important basics of infection control, such as the main modes of transmission of infectious agents and the application of risk management principles.

Part B is specific to the practice of **healthcare workers** and **support staff,** and outlines effective work practices that minimise the risk of selection or transmission of infectious agents.

Part C describes the **responsibilities of management of healthcare facilities**, including governance structures that support the implementation, monitoring and reporting of effective work practices. Audiology Australia recommends:

- audiologists take a pro-active lead in infection prevention and control,
- audiological workplaces complete a review, discussion, risk analysis and audit of infection prevention and control procedures, and
- an improvement plan be implemented where required to bring audiological practice and workplaces into line with the current evidence-based NHMRC guidelines.

These documents may be used by members as the basis of a review or formulation of infection prevention and control policy and procedures,

BACKGROUND

Overview of NHMRC Guidelines

In 2010, the National Health and Medical Research Council (NHMRC), in partnership with the Australian Commission for Safety and Quality in Healthcare (the Commission), released the *Australian Infection Control Guidelines: preventing and managing infection in health care* (2010).

The Guidelines were developed to assist a coordinated approach to the management of health care associated infection (HAI) in Australia by supporting the Commission's other HAI priority program initiatives.

To facilitate this approach, the Guidelines were written from a care delivery perspective, focussing on safety and quality and using a risk management framework. This approach differs from the current Department of Health and Ageing (DoHA) 2004 *Infection control guidelines for the prevention of transmission of infectious diseases in the health care setting* which are disease and setting specific.

Scope of NHMRC IPC Guidelines

The NHMRC IPC Guidelines target clinicians, ancillary staff and administrators across Australia's various health care settings.

As a means of addressing this broad scope of practice, Guidelines are structured to address the 'core principles' of infection control and prevention, and the underpinning key practice principles.

The core principle of infection control is to prevent the transmission of infectious organisms and manage infections if they occur.

The underpinning key practice principles include:

1. an understanding of the modes of transmission of infectious agents and an overview of risk management;
2. effective work practices that minimise the risk of selection and transmission of infectious agents;
3. governance structures that support the implementation, monitoring and reporting of infection control work practices; and
4. compliance with legislation, regulations and standards relevant to infection control.

There may be variation in some current practices due to differences in technology, resources and systems supporting a health care facility. To address this, a risk management approach was adopted that considers how factors associated with the transmission of infectious agents can be identified and managed within various health care settings. This approach ensures that common infections such as gastrointestinal viruses and evolving infectious agents such as influenza or antibiotic resistant bacteria can be managed effectively using the principles of infection control.

Aim

By assisting healthcare workers to improve the quality of the care they deliver, these guidelines aim to promote and facilitate the overall goal of infection control:

The creation of safe healthcare environments through the implementation of practices that minimise the risk of transmission of infectious agents.

The guidelines do *not* include detailed information on infectious diseases, pandemic planning, the reprocessing of instruments, occupational health and safety, hospital laundry services or waste disposal or engineering/health facility design.

These guidelines are based on the best available evidence and knowledge of the practicalities of clinical procedures.

Structure of the guidelines

These guidelines are based around the following core principles:

- an understanding of the modes of transmission of infectious agents and an overview of risk management;
- effective work practices that minimise the risk of selection and transmission of infectious agents;
- governance structures that support the implementation, monitoring and reporting of infection control work practices; and
- compliance with legislation, regulations and standards relevant to infection control.

NHMRC SUMMARY OF RECOMMENDATIONS

Standard precautions

Hand hygiene

1 Routine hand hygiene
Hand hygiene must be performed before and after every episode of patient contact. This includes:

- before touching a patient;
- before a procedure;
- after a procedure or body fluid exposure risk;
- after touching a patient; and
- after touching a patient's surroundings.

Hand hygiene must also be performed after removal of gloves.

2 Choice of product for routine hand hygiene practices
Alcohol-based hand rubs containing at least 70% v/v ethanol or equivalent should be used for all routine hand hygiene practices in the healthcare environment.

3 Choice of hand hygiene product when hands are visibly soiled
If hands are visibly soiled, hand hygiene should be performed using soap and water.

Personal protective equipment

4 Wearing of aprons/gowns
Aprons or gowns should be appropriate to the task being undertaken. They should be worn for a single procedure or episode of patient care and removed in the area where the episode of care takes place.

5 Use of face and eye protection for procedures
A surgical mask and goggles must be worn during procedures that generate aerosols, splashes or sprays of blood, body fluids, secretions or excretions into the face and eyes.

6 Wearing of gloves
Gloves must be worn as a single-use item for:

- each invasive procedure;
- contact with sterile sites and non-intact skin or mucous membranes; and
- any activity that has been assessed as carrying a risk of exposure to blood, body fluids, secretions and excretions.

Gloves must be changed between patients and after every episode of individual patient care.

7 Sterile gloves
Sterile gloves must be used for aseptic procedures and contact with sterile sites.

Handling and disposal of sharps

8 Safe handling of sharps
Sharps must not be passed directly from hand to hand and handling should be kept to a minimum.
Needles must not be recapped, bent, broken or disassembled after use.

9 Disposal of sharps

The person who has used the sharp must be responsible for its immediate safe disposal.
Used sharps must be discarded into an approved sharps container at the point-of-use.
These must not be filled above the mark that indicates the bin is three-quarters full.

Routine environmental cleaning

10 Routine cleaning of surfaces

Clean frequently touched surfaces with detergent solution at least daily, and when visibly soiled and after every known contamination.
Clean general surfaces and fittings when visibly soiled and immediately after spillage.

11 Cleaning of shared clinical equipment

Clean touched surfaces of shared clinical equipment between patient uses, with detergent solution.
Exceptions to this should be justified by risk assessment.

12 Surface barriers

Use surface barriers to protect clinical surfaces (including equipment) that are:

- touched frequently with gloved hands during the delivery of patient care;
- likely to become contaminated with blood or body substances; or
- difficult to clean (e.g. computer keyboards).

Exceptions to this should be justified by risk assessment.

13 Site decontamination after spills of blood or other potentially infectious materials

Spills of blood or other potentially infectious materials should be promptly cleaned as follows:

- **wear utility gloves and other PPE** appropriate to the task;
- **confine and contain** spill, clean visible matter with disposable absorbent material and discard the used cleaning materials in the appropriate waste container;
- **clean** the spill area with a cloth or paper towels using detergent solution.

Use of chemical disinfectants such as sodium hypochlorite should be based on assessment of risk of transmission of infectious agents from that spill.

Transmission based precautions

Contact precautions

14 Implementation of contact precautions

In addition to standard precautions, implement contact precautions in the presence of known or suspected infectious agents that are spread by direct or indirect contact with the patient or the patient's environment.

15 Hand hygiene and personal protective equipment to prevent contact transmission

When working with patients who require contact precautions:

- perform hand hygiene;
- put on gloves and gown upon entry to the patient care area;
- ensure that clothing and skin do not contact potentially contaminated environmental surfaces; and
- remove gown and gloves and perform hand hygiene before leaving the patient care area.

16 Hand hygiene when *Clostridium difficile* is suspected or known to be present

To facilitate the mechanical removal of spores, meticulously wash hands with soap and water and pat dry with single-use towels.
Use of alcohol-based hand rubs alone may not be sufficient to reduce transmission of *Clostridium difficile.*

17 Patient care equipment for patients on contact precautions
Use patient dedicated equipment or single-use non-critical patient care equipment (e.g. blood pressure cuffs). If common use of equipment for multiple patients is unavoidable, clean the equipment and allow it to dry before use on another patient.

Droplet precautions

18 Implementation of droplet precautions
In addition to standard precautions, implement droplet precautions for patients known or suspected to be infected with agents transmitted by respiratory droplets (ie large particle droplets >5µ in size) that are generated by a patient when coughing, sneezing, talking, or during suctioning.

19 Personal protective equipment to prevent droplet transmission
When entering the patient care environment, put on a surgical mask.

20 Placement of patients requiring droplet precautions
Place patients who require droplet precautions in a single-patient room when available.

Airborne precautions

21 Implementation of airborne precautions
In addition to standard precautions, implement airborne precautions for patients known or suspected to be infected with infectious agents transmitted person-to-person by the airborne route (ie airborne droplet nuclei or particles <5µ in size).

22 Personal protective equipment to prevent airborne transmission
Wear a correctly fitted P2 (N95) respirator when entering the patient care area when an airborne-transmissible infectious agent is known or suspected.

23 Placement of patients requiring airborne precautions
Patients on airborne precautions should be placed in negative pressure rooms or in a room from which the air does not circulate to other areas.

Exceptions to this should be justified by risk assessment.

Multidrug resistant organisms

24 Implementation of core strategies in the control of multi-resistant organisms (MRSA,MRGN, VRE)
Implement transmission-based precautions for all patients colonised or infected with a multi-resistant organism, including:

- putting on gloves and gowns before entering the patient care area;
- using patient dedicated or single-use non-critical patient care equipment (e.g. blood pressure cuff, stethoscope);
- using a single-patient room or, if unavailable, cohorting patients with the same strain of multi-resistant organism in designated patient care areas; and
- ensuring consistent cleaning and disinfection of surfaces in close proximity to the patient and those likely to be touched by the patient and healthcare workers.

PART A BASICS OF INFECTION CONTROL

- Healthcare-associated infections (HAIs) can occur in any healthcare setting. While the specific risks may differ, the basic principles of infection control apply regardless of the setting.
- In order to prevent HAIs, it is important to understand how infections occur in healthcare settings and then institute ways to prevent them. Risk management is integral to this approach.
- If effectively implemented, the two-tiered approach of standard and transmission-based precautions recommended in these guidelines provides high-level protection to patients, healthcare workers and other people in healthcare settings.
- Infection control is integral to clinical care and the way in which it is provided. It is not an additional set of practices.
- Involving patients is essential to successful clinical care. This includes ensuring that patients' rights are respected at all times, that they are involved in decision-making about their care, and they are sufficiently informed to be able to participate in reducing the risk of transmission of infectious agents.

The information presented in this Part is relevant to everybody employed by a healthcare facility, including management, healthcare workers and support service staff.

A1 - INFECTION CONTROL IN THE HEALTHCARE SETTING

Summary

- Infectious agents (also called pathogens) are biological agents that cause disease or illness to their hosts. Many infectious agents are present in healthcare settings.
- Infection requires three main elements — a source of the infectious agent, a mode of transmission and a susceptible host.
- Patients and healthcare workers are most likely to be sources of infectious agents and are also the most common susceptible hosts. Other people visiting and working in health care may also be at risk of both infection and transmission. In some cases, healthcare-associated infections are serious or even life threatening.
- In healthcare settings, the main modes for transmission of infectious agents are contact (including bloodborne), droplet and airborne.

A1.1 RISKS OF CONTRACTING A HEALTHCARE ASSOCIATED INFECTION

Most infectious agents are microorganisms. These exist naturally everywhere in the environment, and not all cause infection (e.g. 'good' bacteria present in the body's normal flora). Several classes of microorganism — including bacteria, viruses, fungi, parasites and prions — can be involved in either colonisation or infection, depending on the susceptibility of the host:

- With *colonisation*, there is a sustained presence of replicating infectious agents on or in the body, without the production of an immune response or disease.
- With *infection,* invasion of infectious agents into the body results in an immune response, with or without symptomatic disease.

Transmission of infectious agents within a healthcare setting requires the following elements:

- a source or reservoir of infectious agents, including a portal of exit from that source;
- a mode of transmission; and

- a susceptible host, including a portal of entry into that host.

Infectious agents transmitted during health care come primarily from human sources, including patients, healthcare workers and visitors. Source individuals may be actively ill, may have no symptoms but be in the incubation period of a disease, or may be temporary or chronic carriers of an infectious agent with or without symptoms. Other sources of transmission include:

- endogenous flora of patients (e.g. bacteria residing in the respiratory or gastrointestinal tract); and
- environmental sources such as air, water, medications or medical equipment and devices that have become contaminated.

Infection is the result of a complex interrelationship between a host and an infectious agent and people vary in their response to exposure to an infectious agent:

- some people exposed to infectious agents never develop symptomatic disease while others become severely ill and may die;
- some individuals may become temporarily or permanently colonised but remain asymptomatic; and
- others progress from colonisation to symptomatic disease either soon after exposure, or following a period of asymptomatic colonisation.

Important predictors of an individual's outcome after exposure include his or her:

- immune status at the time of exposure (including whether immune status is compromised by medical treatment such as immunosuppressive agents or irradiation);
- age (e.g. neonates and elderly patients are more susceptible);
- health status (e.g. other underlying disease);
- the virulence of the agent; and
- other factors that increase the risk of transmission of infection (e.g. undergoing surgery, requiring an indwelling device such as a catheter, or remaining in hospital for lengthy periods).

In healthcare settings, the most common susceptible hosts are patients and healthcare workers:

- Patients may be exposed to infectious agents from themselves (endogenous infection) or from other people, instruments and equipment, or the environment (exogenous infection). The level of risk relates to the healthcare setting (specifically, the presence or absence of infectious agents), the type of healthcare procedures performed and the susceptibility of the patient.
- Healthcare workers may be exposed to infectious agents from infected or colonised patients, instruments and equipment, or the environment. The level of risk relates to the type of clinical contact healthcare workers have with potentially infected or colonised patient groups, instruments or environments, and the health status of the healthcare worker (e.g. immunised or immunocompromised).

In healthcare settings, the main modes of transmission of infectious agents are contact (including bloodborne), droplet and airborne. The modes of transmission vary by type of organism. In some cases the same organism may be transmitted by more than one route (e.g. norovirus, influenza and respiratory syncytial virus [RSV] can be transmitted by contact and droplet routes).

A1.1.1 Routes of transmission

Contact transmission

Contact is the most common mode of transmission, and usually involves transmission by hand or via contact with blood or body substances. Contact may be direct or indirect.

- *Direct transmission* occurs when infectious agents are transferred from one person to another — for example, a patient's blood entering a healthcare worker's body through an unprotected cut in the skin.
- *Indirect transmission* involves the transfer of an infectious agent through a contaminated intermediate object or person — for example, a healthcare worker's hands transmitting infectious agents after touching an infected body site on one patient and not performing hand hygiene before touching another patient, or a healthcare worker coming into contact with fomites (e.g. bedding) or faeces and then with a patient.

Examples of infectious agents transmitted by contact include multi-resistant organisms (MROs), *Clostridium difficile*, norovirus and highly contagious skin infections/infestations (e.g. impetigo, scabies).

Droplet transmission

Droplet transmission can occur when an infected person coughs, sneezes or talks, and during certain procedures such as suctioning. Droplets are infectious particles larger than 5 microns in size. Respiratory droplets transmit infection when they travel directly from the respiratory tract of the infected person to susceptible mucosal surfaces (nasal, conjunctivae or oral) of another person, generally over short distances. Droplet distribution is limited by the force of expulsion and gravity and is usually 1 metre or less. However, droplets can also be transmitted indirectly to mucosal surfaces (e.g. via hands).

Examples of infectious agents that are transmitted via droplets include influenza virus and meningococcus.

Airborne transmission

Airborne dissemination may occur via aerosols (small airborne droplets less than 5µ in size) containing infectious agents that remain infective over time and distance. Aerosols can be generated by coughing and sneezing and certain procedures, particularly those that induce coughing, can promote airborne transmission. These include procedures such as diagnostic sputum induction, bronchoscopy, airway suctioning, endotracheal intubation, positive pressure ventilation via face mask and high-frequency oscillatory ventilation. Aerosols containing infectious agents can be dispersed over long distances by air currents (e.g. ventilation or air conditioning systems) and inhaled by susceptible individuals who have not had any contact with the infectious person. These small particles can transmit infection into small airways of the respiratory tract.

Examples of infectious agents that are transmitted via the airborne route include measles (rubeola) virus, varicella virus and *M. tuberculosis*.

Other modes of transmission

Transmission of infection can also occur via common sources such as contaminated food, water, medications, devices or equipment.

A1.2 STANDARD AND TRANSMISSION BASED PRECAUTIONS

Successful infection control involves implementing work practices that prevent the transmission of infectious agents through a two-tiered approach including:

- routinely applying basic infection control strategies to minimise risk to both patients and healthcare workers, such as hand hygiene, personal protective equipment, cleaning and appropriate handling and disposal of sharps (*standard precautions*); and
- effectively managing infectious agents where standard precautions may not be sufficient on their own. These specific interventions control infection by interrupting the mode of transmission (*transmission-based precautions*; formerly referred to as *additional precautions*).

If successfully implemented, standard and transmission-based precautions prevent any type of infectious agent from being transmitted.

A1.2.1 Standard precautions

All people potentially harbour infectious agents. Work practices to ensure a basic level of infection control, covered by the term 'standard precautions', are applied to everyone, regardless of their perceived or confirmed infectious status. Implementing standard precautions as a first-line approach to infection control in the healthcare environment minimises the risk of transmission of infectious agents from person to person, even in high-risk situations.

Standard precautions are used by healthcare workers to prevent or reduce the likelihood of transmission of infectious agents from one person or place to another, and to render and maintain objects and areas as free

as possible from infectious agents.

Guidance on how to implement standard precautions is given in Section B1.

Table A1.1: How standard precautions are implemented

Personal hygiene practices, particularly hand hygiene and cough etiquette, aim to reduce the risk of cross-transmission and cross-infection of infectious agents
The use of **personal protective equipment**, which may include gloves, gowns, plastic aprons, masks/face-shields and eye protection, aims to prevent exposure of the healthcare worker to infectious agents
Appropriate **handling and disposal of sharps** assist in preventing transmission of blood-borne diseases to healthcare workers
Environmental controls, including cleaning and spills management, assist in preventing transmission of infectious agents from the environment to patients
Appropriate **reprocessing of reusable equipment and instruments**, including appropriate use of disinfectants, aims to prevent patient-to-patient transmission of infectious agents
The appropriate use of **aseptic** and **sterile techniques** prevents contamination of wounds and other susceptible sites by infectious agents **(see Glossary).**

A1.2.2 Transmission-based precautions

Any infection control strategy should be based on the use of standard precautions as a minimum level of control. Transmission-based precautions are recommended as extra work practices in situations where standard precautions alone may be insufficient to prevent transmission. Transmission-based precautions are also used in the event of an outbreak (e.g. gastroenteritis), to assist in containing the outbreak and preventing further infection.

Transmission-based precautions should be tailored to the particular infectious agent involved and its mode of transmission. This may involve a combination of practices.

Guidance on when and how to implement transmission-based precautions is given in Sections B2 and B3.

Table A1.2: Strategies for implementing transmission-based precautions

Transmission-based precautions may include one or any combination of the following: • **allocating a single room to an infected patient (isolation);** • **placing patients colonised or infected with the same infectious agent in a room together (cohorting);** • **wearing specific personal protective equipment;** • **providing dedicated patient equipment;** • **using disinfectants effective against the specific infectious agent;** • **providing a dedicated toilet;** • **use of specific air handling techniques; and** • **restricting movement both of patients and healthcare workers.**
Contact precautions are used when there is known or suspected risk of transmission of infectious agents by direct or indirect contact.
Droplet precautions are used for patients known or suspected to be infected with agents transmitted by respiratory droplets.
Airborne precautions are used for patients known or suspected to be infected with agents transmitted person-to-person by the airborne route.

A2 - OVERVIEW OF RISK MANAGEMENT IN INFECTION PREVENTION AND CONTROL

Summary

- Identifying and analysing risks associated with health care is an integral part of successful infection control.
- Adopting a risk management approach at all levels of the facility is necessary. This task requires the full support of the facility's management as well as cooperation between management, healthcare workers and support staff.

A2.1 RISK MANAGEMENT BASICS

In the context of these guidelines, 'risk' is defined as the possibility of colonisation or infection of patients or healthcare workers arising from activities within a healthcare facility. Risk management is the basis for preventing and reducing harms arising from healthcare-associated infection. 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 and 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 mask fit training).

The International Standard on Risk Management ISO31000-2009 outlines a stepwise approach to risk management that allows continuous quality improvement and involves:

- *establishing context* — identifying the basic parameters in which risk must be managed (e.g. the type of health facility, the extent of and support for the facility's infection control program);
- *avoiding risk* —establishing whether there is a risk and whether potential risk can be averted (e.g. by questioning whether a procedure is necessary);
- *identifying risks* — a systematic and comprehensive process that ensures that no potential risk is excluded from further analysis and treatment (e.g. using root cause analysis);
- *analysing risks* — considering the sources of risk, their consequences, the likelihood that those consequences may occur, and factors that affect consequences and likelihood (e.g. existing controls) (see risk analysis matrix below);
- *evaluating risks* — comparing the level of risk found during the analysis process with previously established risk criteria, resulting in a prioritised list of risks for further action; and
- *treating risks* — selecting and implementing appropriate management options for dealing with identified risk (e.g. modifying procedures, protocols or work practices; providing education; and monitoring compliance with infection control procedures).

Table A2.1: Risk analysis matrix

Likelihood	Consequences				
	Negligible	Minor	Moderate	Major	Extreme
Rare	Low	Low	Low	Medium	High
Unlikely	Low	Medium	Medium	High	Very high
Possible	Low	Medium	High	Very high	Very high
Likely	Medium	High	Very high	Very high	Extreme
Almost certain	Medium	Very high	Very high	Extreme	Extreme
Low risk	Manage by routine procedures.				
Medium risk	Manage by specific monitoring or audit procedures.				
High risk Very high risk Extreme risk	This is serious and must be addressed immediately. The magnitude of the consequences of an event, should it occur, and the likelihood of that event occurring, are assessed in the context of the effectiveness of existing strategies and controls.				

Monitoring and review is an essential component of the risk management process. This ensures that:

- new risks are identified;
- analysis of risk is verified against real data, if possible; and
- risk treatment is implemented effectively.

Communication and consultation are also key elements of clinical risk management. An interactive exchange of information between management, healthcare workers, patients and other stakeholders provides the basis for increased awareness of the importance of infection prevention and control, identification of risks before they arise and prompt management of risks as they occur.

The following flowchart outlines key considerations during the process of risk management in the context of infection control in the healthcare setting.

RISK MANAGEMENT CHART

Communicate and consult	**Avoid risk** Are there alternative processes or procedures that would eliminate the risk? **If a risk cannot be eliminated then it must be managed**		**Monitor and review**
	Identify risks **What** infectious agent is involved? **How** is it transmitted? **Who** is at risk (patient and/or healthcare worker)?		
	Treat risks **What** will be done to address risk? **Who** takes responsibility? **How** will change be monitored and reviewed?	**Analyse risks** **Why** can it happen (activities, processes)? **How** often could it happen? **What** are likely consequences?	
	Evaluate risks **What** can be done to reduce or eliminate the risk? **How** could this be applied in this situation (staff, resources)?		

A3 - A PATIENT-CENTRED APPROACH

Summary

- A patient-centred health system is known to be associated with safer and higher quality care.
- A two-way approach that encourages patient participation is essential to successful infection prevention and control.

A3.1 PATIENT-CENTRED HEALTH CARE

People receiving healthcare increasingly expect to be given information about their condition and treatment options and this extends to their rights and responsibilities as users of healthcare services. Although patient satisfaction with health services in Australia is generally high, patients' experiences are not always valued and their expectations are not always met. While this does not necessarily lead to poor outcomes for the individuals concerned, the best possible outcomes are more likely where patient-centred health care is a priority of the healthcare facility and a strong and consistent effort is made to respect patients' rights and expectations.

The ACSQHC has developed an *Australian Charter of Healthcare Rights*, which recognises that people receiving care and people providing care all have important parts to play in achieving healthcare rights. The Charter allows patients, families, carers and services providing health care to share an understanding of the rights of people receiving health care. The Charter stipulates that all Australians have the right to:

- access services that address their healthcare needs;
- receive safe and high quality health services, provided with professional care, skill and competence;
- receive care that shows respect to them and their culture, beliefs, values and personal characteristics;
- receive open, timely and appropriate communication about their health care in a way they can understand;
- join in making decisions and choices about their care and about health service planning;
- have their personal privacy and personal health and other information properly handled; and
- comment on or complain about their care and have their concerns dealt with properly and promptly.

Patient-centred care cannot just be 'added on' to usual care. The rights, experiences and views of patients should be at the centre of the care process and drive the way in which care is delivered. In most healthcare facilities, a significant culture change is necessary to embed patient-centred care principles into the philosophy and practices of the organisation. Healthcare workers and organisations need to acknowledge and understand the Charter of Healthcare Rights and work to ensure that patients' rights are integral to the care process.

A3.2 HOW DOES PATIENT-CENTRED CARE RELATE TO INFECTION CONTROL?

Infection control is ultimately about people. Effective infection control is central to providing high quality, patient-centred health care.

Putting patients at the centre of infection control and enabling them to participate in the care process is not just about explaining the risks of treatments, but involves considering patients' needs at every level. This ranges from designing the facility to maximise patient comfort and safety to having a range of processes to engage patients in their care and listen and act on their feedback as well as providing the patient with education and support so that they can be involved in looking after themselves.

To support a two-way approach to infection prevention and control and encourage the patient participation

required to prevent infection and minimise cross-infection, it is important to:

- take patients' perspectives into account when developing policies and programs;
- familiarise patients with the infection prevention and control strategies that are employed in healthcare facilities to protect them, the people caring for them and the healthcare environment, and procedures for dealing with infection control breaches;
- discuss with patients the specific risks associated with their medical and/or surgical treatment;
- encourage patients to disclose their health or risk status if there is a potential risk or source of infection to healthcare workers or others within the healthcare facility;
- provide opportunities for patients to identify and communicate risks and encourage them to use feedback procedures for any concerns that they have about infection prevention and control procedures;
- provide educational materials about infection prevention and control using a variety of media, including posters in waiting rooms, printed material and educational videos; and
- inform patients about the protocols for protecting their privacy and confidentiality.

PART B - STANDARD AND TRANSMISSION-BASED PRECAUTIONS

- The use of standard precautions is the primary strategy for minimising the transmission of healthcare associated infections.
- Transmission-based precautions are used in addition to standard precautions, where the suspected or known presence of infectious agents represents an increased risk of transmission.
- The application of transmission-based precautions is particularly important in containing multi-resistant organisms (MROs) and in outbreak management.
- Medical and dental procedures increase the risk of transmission of infectious agents. Effective work practices to minimise risk of transmission of infection related to procedures require consideration of the specific situation, as well as appropriate use of standard and transmission-based precautions.
- Appropriate use of aseptic technique also lowers the risk of infection risk by minimising the number of infectious agents to which patients are exposed. This comprises 'clean technique' (standard precautions such as hand hygiene, reprocessing of equipment between patients, environmental cleaning) as a minimum, as well as 'sterile technique' to prevent infectious agents from entering a patient's bloodstream (e.g. use of sterile instruments, dressing materials and gloves, skin antisepsis, and creation of a 'sterile field' within which to operate).

The information presented in this Part is particularly relevant to healthcare workers and support staff. It outlines effective work practices that minimise the risk of transmission of infectious agents.

In applying standard and transmission based infection controls as part of day to day practice, healthcare workers should ensure that their patients understand why certain practices are being undertaken, and that these practices are in place to protect everyone from infection. In this way, patients can take part in minimising risks and question aspects of their care if necessary.

B1 - STANDARD PRECAUTIONS

Summary

It is essential that standard precautions are applied at all times. This is because:

- people may be placed at risk of infection from others who carry infectious agents;
- people may be infectious before signs or symptoms of disease are recognised or detected, or before laboratory tests are confirmed in time to contribute to care;
- people may be at risk from infectious agents present in the surrounding environment including environmental surfaces or from equipment; and
- there may be an increased risk of transmission associated with specific procedures and practices.

Standard precautions consist of the appropriate use of four distinct interventions:

- hand hygiene and cough etiquette;
- the use of personal protective equipment;
- the safe use and disposal of sharps; and
- routine environmental cleaning.

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Hand hygiene practices are recommended before and after every episode of patient contact. Standard precautions should be used in the handling of:

- blood (including dried blood);
- all other body fluids, secretions and excretions (excluding sweat), regardless of whether they contain visible blood;
- non-intact skin; and
- mucous membranes.

Appropriate disposal of hazardous materials (i.e. waste and linen) is a further important aspect of infection control. This is outside the scope of these guidelines and practice in these areas should adhere to relevant Australian standards.

B1.1 HAND HYGIENE AND COUGH ETIQUETTE

B1.1.1 What are the risks?

Any infectious agent transmitted by the contact or droplet route can potentially be transmitted by touch. Microorganisms are either present on the hands most of the time (resident flora) or acquired during activities such as healthcare (transient flora). Hands can also become contaminated through contact with respiratory secretions when coughing or sneezing. Contaminated hands can lead to cross-transmission of infectious agents in non-outbreak situations and contribute to outbreaks involving organisms such as methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococci (VRE) and multi-resistant Gram-negative (MRGN) microorganisms, such as *Acinetobacter* spp.

Improved hand hygiene practices have been associated with:

- sustained decreases in the incidence of infections caused by MRSA and VRE
- reductions in healthcare-associated infections of up to 45% in a range of healthcare settings and
- greater than 50% reduction in the rates of nosocomial disease associated with MRSA and other multiresistant organisms, after 1–2 years.

Hand hygiene practices alone are not sufficient to prevent and control infection and need to be used as part of a multifactorial approach to infection control.

B1.1.2 When should hand hygiene be performed?

Hands can become contaminated with infectious agents through contact with a patient, patient surroundings, the environment, or other healthcare workers. Cross contamination can occur from one site to another in the same patient, between healthcare worker and patient, between patient or healthcare worker and the environment, or between healthcare workers. Practicing hand hygiene *before* every episode of patient contact (including between caring for different patients and between different care activities for the same patient) and *after* any activity or contact that potentially results in hands becoming contaminated (including removal of gloves) reduces the risk of cross-contamination.

The 5 moments of hand hygiene

The '5 moments of hand hygiene' developed by the World Health Organization and adopted by Hand Hygiene Australia:

- protect patients against acquiring infectious agents from the hands of the health care worker;
- help to protect patients from infectious agents (including their own) entering their bodies during procedures; and
- protect health care workers and the healthcare surroundings from acquiring patients' infectious agents.

RECOMMENDATION

1 Routine hand hygiene (5 moments of hand hygiene)

Hand hygiene must be performed before and after every episode of patient contact. This includes:

- before touching a patient;
- before a procedure;
- after a procedure or body fluid exposure risk;
- after touching a patient; and
- after touching a patient's surroundings.

Hand hygiene is also performed after the removal of gloves.

Cough etiquette

Covering sneezes and coughs prevents infected persons from dispersing respiratory secretions into the air. Practising hand hygiene after contact with respiratory secretions and contaminated objects or materials is an essential element of cough etiquette.

Cough etiquette is particularly important for patients on droplet precautions (see Section B2.3).

Table B1.1: Steps in cough etiquette

Anyone with signs and symptoms of a respiratory infection, regardless of the cause, should follow or be instructed to follow cough etiquette as follows:
• Cover the nose/mouth when coughing or sneezing
• Use tissues to contain respiratory secretions
• Dispose of tissues in the nearest waste receptacle after use
• If no tissues are available, cough or sneeze into the inner elbow rather than the hand
• Practice hand hygiene after contact with respiratory secretions and contaminated objects/materials

B1.1.3 What product should be used?

Recent systematic reviews and existing guidelines and other available review articles agree that hand hygiene using alcohol-based hand rubs is more effective against the majority of common infectious agents on hands than hand hygiene with plain or antiseptic soap and water.

Alcohol-based hand rubs (liquid or gel) are easily accessible at point-of-care and have:

- excellent antimicrobial activity against Gram-positive and Gram-negative vegetative bacteria, *Mycobacterium*
- *tuberculosis* and a wide range of fungi;

- generally good antimicrobial activity against enveloped viruses;
- lesser and/or variable antimicrobial activity against non-enveloped viruses (such as norovirus); and
- no activity against protozoan oocysts and bacterial spores (such as *C. difficile*)

The range of antimicrobial activity in alcohol-based hand rubs varies with the alcohol compound (ethanol, isopropanol or n-propanol) used. Alcohol-based hand rubs that have 70% by volume (v/v) ethanol or equivalent have significantly greater antimicrobial activity against common infectious agents than those below 70% v/v ethanol.

The addition of a low concentration of chlorhexidine to an alcohol-based hand rub enhances residual activity but has been associated with skin sensitivity.

Alcohol-based hand rubs do not remove dirt or other organic material, and continued use may lead to product build-up that leaves a residue, requiring hand hygiene with liquid soap and water.

Plain soaps act by mechanical removal of microorganisms and have no antimicrobial activity. They are sufficient for general social contact and for cleansing of visibly soiled hands. There is a tendency for antimicrobial soaps to be more effective than plain soaps, although the evidence around this is inconsistent. Antimicrobial soap is associated with skin care issues and it is not necessary for use in everyday clinical practice.

RECOMMENDATIONS

2 Choice of product for routine hand hygiene practices
Alcohol-based hand rubs containing at least 70% v/v ethanol or equivalent should be used for all routine hand hygiene practices in the healthcare environment.

3 Choice of hand hygiene product when hands are visibly soiled
If hands are visibly soiled, hand hygiene should be performed using soap and water.

Technique

Effective hand hygiene relies on appropriate technique as much as on selection of the correct product. Key factors in effective hand hygiene and maintaining skin integrity include:

- the duration of hand hygiene measures;
- the exposure of all surfaces of hands and wrists to the preparation used;
- the use of vigorous rubbing to create friction; and
- ensuring that hands are completely dry.

Table B1.2: Use of alcohol-based hand rub

• Apply the amount of alcohol-based hand rub recommended by the manufacturer to dry hands.
• Rub hands vigorously together so that the solution comes into contact with all surfaces of the hand, paying particular attention to the tips of the fingers, the thumbs and the areas between the fingers.
• Continue rubbing until the solution has evaporated and the hands are dry.

Table B1.3: Using soap (including antimicrobial soap) and water

• Wet hands under tepid running water and apply the recommended amount of liquid soap.
• Rub hands vigorously together for a minimum of 15 seconds so that the solution comes into contact with all surfaces of the hand, paying particular attention to the tips of the fingers, the thumbs and the areas between the fingers.
• Rinse hands thoroughly under running water, then pat dry with single-use towels.

B1.1.4 Other aspects of hand hygiene

As intact skin is a natural defence against infection, cuts and abrasions reduce the effectiveness of hand hygiene practices. Breaks or lesions of the skin are possible sources of entry for infectious agents and may also

be a source of them. To reduce the risk of cross-transmission of infectious agents, cuts and abrasions should be covered with waterproof dressings.

The type and length of fingernails can have an impact on the effectiveness of hand hygiene. Artificial nails have been associated with higher levels of infectious agents, especially Gramnegative bacilli and yeasts, than natural nails. Fingernails should therefore be kept short and clean and artificial fingernails should not be worn.

Although there is less evidence concerning the impact of jewellery on the effectiveness of hand hygiene, rings can interfere with the technique used to perform hand hygiene resulting in higher total bacterial counts. Hand contamination with infectious agents is increased with ring wearing, although no studies have related this practice to healthcare worker-to-patient transmission. Wearing of jewellery in clinical areas should therefore be limited to a plain band (e.g. wedding ring) and this should be moved about on the finger during hand hygiene practices. In high-risk settings such as operating suites/rooms the wearing of any jewellery, even a plain band, is not recommended.

B1.1.5 Hand care

The main type of skin reaction associated with hand hygiene, irritant contact dermatitis, includes symptoms such as dryness, irritation, itching and sometimes cracking and bleeding. Allergic contact dermatitis is rare and represents an allergy, which may be to some ingredient in a hand hygiene product.

Generally, alcohol-based hand rubs cause significantly less skin damage than hand hygiene with plain or antiseptic soaps.

Expert opinion concludes that:

- skin damage is generally associated with the detergent base of the preparation, poor hand hygiene technique and/or frequent use of alcohol-based hand rub immediately before or after performing hand hygiene with soap;
- frequent use of hand hygiene agents may cause damage to the skin and alter normal hand flora;
- excoriated hands are associated with increased colonisation by potentially infectious agents;
- the irritant and drying effects of hand preparations are one reason why healthcare workers fail to adhere to hand hygiene guidelines; and
- appropriate use of hand lotion or moisturisers added to hand hygiene preparations is an important factor in maintaining skin integrity, encouraging adherence to hand hygiene practices and assuring the health and safety of healthcare workers.

Use of hand cream

An emollient hand cream should be applied regularly, such as after performing hand hygiene before a break or going off duty, or when off duty. Hand hygiene technique should be reviewed if skin irritation occurs. If the irritation persists or if it caused by a particular soap, antiseptic agent or alcohol-based product, the person with designated responsibility for infection control or occupational health should be consulted.

It is important to ensure that the selected alcohol-based hand rubs, soaps and moisturising lotions are chemically compatible, to minimise skin reactions and ensure that the decontaminating properties of the hand hygiene product are not deactivated. Often, healthcare facilities purchase hand hygiene and hand care products from a range made by a single manufacturer, as this helps to ensure compatibility between the products.

B1.1.6 Putting it into practice

Individual actions for reducing the risk

Follow the 5 moments of hand hygiene, even when it seems that there is insufficient time
Follow cough etiquette
Become familiar with your facility policy on hand hygiene and follow it
Use the appropriate product for the situation and use it as directed
Follow facility policy on cuts and abrasions, fingernails and jewellery
Use hand care products provided by your organisation; your own products may not be compatible with the

hand hygiene products provided
Minimise physical contact with patient surroundings
Lead by example and champion hand hygiene in your setting
Attend hand hygiene education sessions regularly to refresh your knowledge and skills
Contact the person with designated responsibility for occupational health or infection control if you have a reaction to hand hygiene and hand care products used in your setting
If alcohol-based hand rub is not readily accessible at key points of care in a patient care area, consider approaching management

Involving patients in hand hygiene

The following information may be provided to patients to assist them in becoming involved in identifying and reducing risks related to poor hand hygiene.

Hand hygiene is the most important aspect of reducing the risk of infection — this applies to everyone including healthcare workers, patients and visitors
The '5 moments of hand hygiene' tell healthcare workers, patients and visitors when hand hygiene should be performed to reduce the risk of infection
'Cough etiquette' is an important part of reducing the risk of infection to others. This includes covering the mouth with a tissue when coughing or sneezing, disposing of the tissue in the nearest waste receptacle and performing hand hygiene
Healthcare workers generally use alcohol-based hand rub as it is effective and easy to use but, if their hands are visibly dirty, they need to use soap and water first
Performing hand hygiene regularly reduces the risk of infection to you and others. If in hospital, remind your visitors to use alcohol-based hand rub when they come into the ward and before they leave
No matter what product you use to clean your hands, the solution should come into contact with all surfaces
After hand hygiene, the hands should be dry. If alcohol-based hand rub is used, the solution will dry on the hands. After hand hygiene with soap and water, hands should be patted dry
Healthcare workers should have short, clean fingernails and not wear artificial fingernails
It's okay to question healthcare workers about their hand hygiene practices

B1.2 PERSONAL PROTECTIVE EQUIPMENT

B1.2.1 What are the risks?

Any infectious agent transmitted by the contact or droplet route can potentially be transmitted by contamination of healthcare workers' hands, skin or clothing. Cross contamination can then occur between the healthcare worker and other patients or healthcare workers, or between the healthcare worker and the environment. Infectious agents transmitted through droplets can also come into contact with the mucous membranes of the healthcare worker.

Personal protective equipment (PPE) refers to a variety of barriers, used alone or in combination, to protect mucous membranes, airways, skin and clothing from contact with infectious agents. PPE used as part of standard precautions includes aprons, gowns, gloves, surgical masks, eye protection and face shields. Selection of PPE is based on the type of patient interaction, known or possible infectious agents, and/or the likely mode(s) of transmission.

There have been few controlled clinical studies evaluating the relationship between the use of PPE and risk of healthcare-associated infections. However, the use of barriers reduces opportunities for transmission of infectious agents. PPE also protects patients from exposure to infectious agents carried by health care workers.

This section discusses the routine use of PPE as part of standard precautions. Specific PPE used when transmission-based precautions are applied is discussed in Section B2.1. The use of PPE during specific

procedures is discussed in Section B4.

B1.2.2 Decision-making about personal protective equipment

The decision to use PPE is based on an assessment of the level of risk associated with a specific patient care activity or intervention and should take account of local policies and current health and safety legislation. Selection of protective equipment must be based on assessment of the risk of transmission of infectious agents to the patient or carer, and the risk of contamination of the clothing or skin of healthcare workers or other staff by patients' blood, body fluids, secretions or excretions.
Factors to be considered are:

- probability of exposure to blood and body fluids;
- type of body fluid involved; and
- probable type and probable route of transmission of infectious agents.

Appropriate sequences and procedures for putting on and removing PPE are shown in Section B1.2.7.

Where to wear PPE

PPE is designed and issued for a particular purpose in a protected environment and should not be worn outside that area. Protective clothing provided for staff in areas where there is high risk of contamination (e.g. operating suite/room) must be removed before leaving the area. Even where there is a lower risk of contamination, clothing that has been in contact with patients should not be worn outside the patient care area. Inappropriate wearing of PPE (e.g. wearing operating suite/room attire in the public areas of a hospital or wearing such attire outside the facility) may also lead to a public perception of poor practice within the facility.

B1.2.3 Aprons and gowns

International guidelines recommend that protective clothing be worn by all health care workers when:

- close contact with the patient, materials or equipment may lead to contamination of skin, uniforms or other clothing with infectious agents; or
- there is a risk of contamination with blood, body fluids, secretions, or excretions (except sweat).

Clinical and laboratory coats or jackets worn over personal clothing for comfort and/or purposes of identity are not considered to be PPE.

Plastic aprons

Single-use plastic aprons are recommended for general use when there is the possibility of sprays or spills, to protect clothes that cannot be taken off. Unused aprons should be stored in an appropriate area away from potential contamination.

Full body gowns

Full body gowns are used to protect the healthcare worker's arms and exposed body areas and prevent contamination of clothing with blood, body fluids, and other potentially infectious material. The need for and type of full body gown selected is based on:

- the nature of the patient interaction, including the anticipated degree of contact with infectious material; and
- the potential for blood and body fluids to penetrate through to clothes or skin.

Full body gowns are always worn in combination with gloves, and with other PPE when indicated. Full coverage of the arms and body front, from neck to the mid-thigh or below ensures that clothing and exposed upper body areas are protected.

Fluid-resistant aprons/gowns should be worn when there is a risk that clothing may become contaminated with blood, body fluids, secretions or excretions (except sweat).

Table B1.4: Characteristics of aprons/gowns

Plastic apron	• **Single use**

	• **Recommended for general use (when helping patients to shower or eat), to protect the healthcare worker's skin and clothes from being sprayed with fluids**
Full body gown	• Fully covers arms, exposed body areas and protects clothes from contamination • Used when there is a possibility of splashing of blood, body fluids, secretions or excretions (except sweat) • Should be fluid repellent • Recommended for use in situations where a high degree of environmental exposure (e.g. to unprotected arms or sleeves) or close care (e.g. in paediatrics) is anticipated

Removing aprons and gowns

Removal of aprons and gowns before leaving the patient care area (e.g. in the room or anteroom) prevents possible contamination of the environment outside the patient's room. Aprons and gowns should be removed in a manner that prevents contamination of clothing or skin. The outer, 'contaminated', side of the gown is turned inward and rolled into a bundle, and then discarded into a designated container for waste or linen to contain contamination.

Aprons/gowns are routinely used upon entering the room of a patient requiring contact precautions.

RECOMMENDATIONS

4 Wearing of aprons/gowns

Aprons or gowns should be appropriate to the task being undertaken. They should be worn for a single procedure or episode of patient care and removed in the area where the episode of care takes place.

B1.2.4 Face and eye protection

The mucous membranes of the mouth, nose and eyes are portals of entry for infectious agents, as are other skin surfaces if skin integrity is compromised (e.g. by acne, dermatitis).

Face and eye protection reduces the risk of exposure of healthcare workers to splashes or sprays of blood, body fluids, secretions or excretions and is an important part of standard precautions. Procedures that generate splashes or sprays of blood, body fluids, secretions or excretions require either a face shield or a mask worn with goggles.

Table B1.5: Use of face and eye protection as part of standard precautions

Type of care	Examples	Face and eye protection required
Routine care	General medical examination Routine observations	Not required unless caring for patients on droplet precautions (surgical mask) or on airborne precautions (P2 [N95] respirator)
Procedures that generate splashes or sprays	Dental procedures Nasopharyngeal aspiration Emptying wound or catheter bag	Mask and goggles
Procedures involving the respiratory tract (including the mouth)	Routine dental practices/dental surgery Respiratory procedure	Face shield that fully covers the front and sides of the face OR Mask with attached shield OR Mask and goggles/safety glasses

Surgical masks

Surgical masks are loose-fitting, single-use items that cover the nose and mouth. They are used as part of standard precautions to keep splashes or sprays from reaching the mouth and nose of the person wearing them. They also provide some protection from respiratory secretions and are worn when caring for patients on droplet precautions. Surgical masks differ from P2 (N95) respirators (refer to full NHMRC guidelines for Table B1.6 with more details of properties)

Masks or respirators can also be placed on coughing patients to limit potential dissemination of infectious respiratory secretions from the patient to others.

Considerations when using a surgical mask include:

- masks should be changed when they become soiled or wet;
- masks should never be reapplied after they have been removed;
- masks should not be left dangling around the neck;
- touching the front of the mask while wearing it should be avoided; and
- hand hygiene should be performed upon touching or discarding a used mask.

Eye protection

Indirectly vented goggles with a manufacturer's anti-fog coating may provide the most reliable practical eye protection from splashes, sprays, and respiratory droplets from multiple angles. Newer styles of goggles fit adequately over prescription glasses with minimal gaps (to be efficacious, goggles must fit snugly, particularly from the corners of the eye across the brow). While effective as eye protection, goggles do not provide splash or spray protection to other parts of the face.

Safety glasses provide impact protection and are suitable for general workshop or laboratory use. They do not provide the same level of splash or droplet protection as goggles.

Personal eyeglasses and contact lenses are not considered adequate eye protection.

Face shields

Single-use or reusable face shields may be used as an alternative to mask and goggles. Compared with goggles, a face shield can provide protection to other parts of the face as well as the eyes. Face shields extending from chin to crown provide better face and eye protection from splashes and sprays; face shields that wrap around the sides may reduce splashes around the edge of the shield.

Removing face and eye protection

Removal of a face shield, protective eyewear and mask can be performed safely after gloves have been removed and hand hygiene performed. The ties, earpieces and/or headband used to secure the equipment to the head are considered "clean" and therefore safe to touch with bare hands. The front of a mask, goggles or face shield is considered contaminated.

Cleaning reusable face and eye protection

Reusable face shields and goggles should be cleaned according to the manufacturer's instructions, generally with detergent solution, and be completely dry before being stored.

RECOMMENDATION

5 Use of face and eye protection for procedures

A surgical mask and goggles must be worn during procedures that generate aerosols, splashes or sprays of blood, body fluids, secretions or excretions into the face and eyes.

B1.2.5 Gloves

Gloves can protect both patients and healthcare workers from exposure to infectious agents that may be carried on hands. As part of standard precautions, they are used to prevent contamination of healthcare workers' hands when:

- anticipating direct contact with blood or body fluids, mucous membranes, non-intact skin and other potentially infectious material; and
- handling or touching visibly or potentially contaminated patient care equipment and environmental surfaces.

Gloves are an essential component of contact precautions (in particular for patients with MROs) and may also be used as part of droplet precautions, to prevent indirect transmission of infectious agents by the hands.

The capacity of gloves to protect healthcare workers from transmission of bloodborne infectious agents following a needlestick or other puncture that penetrates the glove barrier has not been determined.

When should gloves be worn?

As with all PPE, the need for gloves is based on careful assessment of the task to be carried out and its related risks to patients and health care workers. Risk assessment includes consideration of:

- who is at risk (whether it is the patient or the healthcare worker) and whether sterile or non-sterile gloves are required;
- the potential for exposure to blood, body fluids, secretions and excretions;
- contact with non-intact skin or mucous membranes during general care and invasive procedures; and
- whether contaminated instruments will be handled.

When gloves are worn in combination with other PPE, they are put on last.

When should gloves be changed?

International guidance suggests that changing of gloves is necessary:

- between episodes of care for different patients, to prevent transmission of infectious material;
- during the care of a single patient, to prevent cross-contamination of body sites; and
- if the patient interaction involves touching portable computer keyboards or other mobile equipment that is transported from room to room.

Prolonged and indiscriminate use of gloves should be avoided as it may cause adverse reactions and skin sensitivity.

RECOMMENDATIONS

6 Wearing of gloves

Gloves must be worn as a single-use item for:

- invasive procedures;
- contact with sterile sites and non-intact skin or mucous membranes; and
- activity that has been assessed as carrying a risk of exposure to blood, body fluids, secretions and excretions.

Gloves must be changed between patients and after every episode of individual patient care.

7 Sterile gloves

Sterile gloves must be used for aseptic procedures and contact with sterile sites.

What type of gloves should be worn?

Non-sterile single-use medical gloves are available in a variety of materials, the most common being natural rubber latex (NRL) and synthetic materials (e.g. nitrile, vinyl). NRL remains the material of choice due to its efficacy in protecting against bloodborne viruses and properties that enable the wearer to maintain dexterity. However, sensitivity to NRL in patients, carers and health care workers must be documented and alternatives provided.

The selection of glove type for non-surgical use is based on a number of factors:

- the task to be performed;
- anticipated contact with chemicals and chemotherapeutic agents; and
- personal factors, such as latex sensitivity and size.

Table B1.7: Selection of glove type

Glove	Use	Examples
Non-sterile gloves	Procedures/activities that do not require a sterile technique.	Emptying a urinary catheter bag Naso-gastric aspiration

		Tracheal suctioning
Sterile gloves	Sterile procedures	Urinary catheter insertion Complex dressings Central venous line insertion site dressing
Utility gloves	Cleaning	General cleaning duties Instrument cleaning in sterilising services unit

Gloves suitable for clinical use	
NRL (latex) gloves	• Preferable for clinical procedures that require manual dexterity and/or will involve more than brief patient contact • Latex sensitivity may be an issue
Nitrile gloves	• Suitable alternative to latex, provided there are no sensitivity issues
Vinyl gloves	• Have a higher failure rates than latex or nitrile gloves when tested under simulated and actual clinical conditions

Gloves not suitable for clinical use	
Re-usable utility gloves	• Indicated for non-patient care activities, such as handling or cleaning contaminated equipment, instruments or surfaces
Polythene gloves	• Permeable, tend to damage easily
Powdered gloves	• Cause inflammation and granuloma formation • Promote latex allergy

Removing and disposing of gloves

Gloves (other than utility gloves) should be treated as single-use items. They should be put on immediately before a procedure and removed as soon as the procedure is completed.

When removing gloves, care should be taken not to contaminate the hands. After gloves have been removed, hand hygiene should be performed in case infectious agents have penetrated through unrecognised tears or have contaminated the hands during glove removal.

Gloves must not be washed for subsequent re-use — infectious agents cannot be removed reliably from glove surfaces and continued glove integrity cannot be ensured. Glove re-use has been associated with transmission of MRSA and Gram-negative bacilli.

Gloves should be disposed of as soon as they are removed, with disposal complying with local policies and standards.

B1.2.6 Other items of clothing

Footwear

Footwear suitable for the duties being undertaken must be worn. Footwear should minimise the risk of sharps injury.

Uniforms

In areas of clinical practice where there is a high risk of repeated exposure to blood and other body fluids it is recommended that uniforms be worn as well as the appropriate PPE.

While some studies show that uniforms and white coats become progressively contaminated during clinical care, no studies have demonstrated that uniforms transmit infectious agents or lead to HAI.

Uniforms should be washed daily. There is no evidence to suggest that home laundering is inferior to commercial processing of uniforms.

B1.2.7 Sequence for putting on and removing PPE

To reduce the risk of transmission of infectious agents, PPE must be used appropriately. The following table

outlines sequences and procedures for putting on and removing PPE. Steps 2 and 3 of removing are interchangeable as long as general principles are applied.

Hand hygiene must be performed between each step and immediately after removing all PPE.

Table B1.8: Putting on and removing PPE

SEQUENCE FOR PUTTING ON PPE
1. GOWN • Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back • Fasten in back of neck and waist
2. MASK • Secure ties or elastic bands at middle of head and neck
3. GOGGLES OR FACE SHIELD • Place over face and eyes and adjust to fit
4. GLOVES • Extend to cover wrist of isolation gown
SEQUENCE FOR REMOVING PPE **Remove PPE at doorway or in anteroom.**
1. GOWN • Gown front and sleeves are contaminated! • Unfasten ties • Pull away from neck and shoulders, touching inside of gown only • Turn gown inside out • Fold or roll into a bundle and discard
2. GLOVES • Outside of gloves is contaminated! • Grasp outside of glove with opposite gloved hand; peel off • Hold removed glove in gloved hand • Slide fingers of ungloved hand under remaining glove at wrist • Peel glove off over first glove • Discard gloves in waste container
3. GOGGLES OR FACE SHIELD • Outside of goggles or face shield is contaminated! • To remove, handle by head band or ear pieces • Place in designated receptacle for reprocessing or in waste container
4. MASK • Front of mask is contaminated — DO NOT TOUCH! • Grasp bottom, then top ties or elastics and remove • Discard in waste container
PERFORM HAND HYGIENE IMMEDIATELY AFTER REMOVING ALL PPE

Source: Adapted from www.cdc.gov.

B1.2.8 Putting it into practice

Individual actions for reducing the risk

Before putting on PPE explain to the patient that it is a routine part of infection prevention and control

Assess the risk of spraying or splashing in the specific situation and choose PPE accordingly

If you have an infection, or you might have one, think about whether you should be at work and wear a mask to protect your patients

Follow appropriate sequence and procedure for putting on and removing PPE as outlined above

Remove PPE before leaving the patient care area and following the sequence and procedure outlined above

Lead by example and champion the appropriate use of PPE in your setting

Involving patients in their care

The following information may be provided to patients to assist them in becoming involved in identifying and reducing risks related to the use of PPE.

The wearing of PPE such as gowns, masks and gloves is a routine part of infection prevention and control in healthcare— it is used for everybody's safety

The use of PPE alone is not enough — healthcare workers should perform hand hygiene after removing the protective items

PPE is used in the patient care area only — healthcare workers remove the equipment before they leave the area to reduce the risk of spreading infection

Gowns or aprons are used so that the healthcare worker's clothing or skin does not become contaminated

Healthcare workers wear a mask if there is risk of them inhaling an infectious agent

For some infections, the patient also needs to wear a mask so that they do not infect others (for example when they are sneezing or coughing), especially if they are moving between patient care areas.

Goggles or faceshields are worn by a healthcare worker in situations where the patient's body fluids may splash onto his or her face

Healthcare workers wear gloves when they will have direct hand contact with blood or body fluids, mucous membranes or wounds or if there is a chance that touching the patient could transmit infection.

It's okay to question a healthcare worker about whether they should be using protective personal equipment or whether they are using it properly

B1.3 HANDLING AND DISPOSING OF SHARPS

B1.3.1 What are the risks?

The use of sharp devices exposes healthcare workers to the risk of injury and potential exposure to bloodborne infectious agents, including hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV).

Sharps injuries can occur in any healthcare setting, including non-hospital settings such as in office-based practices, home health care and long-term care facilities. Injuries most often occur after use and before disposal of a sharp device (40%), during use of a sharp device on a patient (41%), and during or after disposal (15%). There are many possible mechanisms of injury during each of these periods.

Hollow-bore needles are of particular concern, especially those used for blood collection or intravascular catheter insertion, as they are likely to contain residual blood and are associated with an increased risk for bloodborne virus transmission. Glass vials and butterfly needles have also been involved in sharps incidents.

Despite systems approaches to improving safety and the growing availability of safety devices, healthcare workers are still exposed to bloodborne virus infections. For example, a survey of occupational exposures in Australian nurses found that in the 12 months prior to the survey, 11.2% of nurses had sustained at least one needlestick or other sharps injury.

Assessing and managing the risks associated with the use of sharps is paramount. As well as individual actions, safe systems of work and engineering controls must be in place to minimise any identified risks.

B1.3.2 Handling of sharps

All healthcare workers should take precautions to prevent injuries caused by needles, scalpels and other sharp instruments or devices during procedures; when cleaning used instruments; during disposal of used needles; and when handling sharp instruments after procedures.

Standard measures to avoid sharps injuries include handling sharp devices in a way that prevents injury to the user and to others who may encounter the device during or after a procedure. Examples include:

- using instruments, rather than fingers, to grasp needles, retract tissue, and load/unload needles and scalpels;
- giving verbal announcements when passing sharps;
- avoiding hand-to-hand passage of sharp instruments by using a basin or neutral zone;
- using alternative cutting methods such as blunt electrocautery and laser devices when appropriate;
- substituting endoscopic surgery for open surgery when possible;
- using round-tipped scalpel blades instead of pointed sharp-tipped blades; and
- double gloving.

RECOMMENDATION

8 Safe handling of sharps

Sharps must not be passed directly from hand to hand and handling should be kept to a minimum.
Needles must not be recapped, bent, broken or disassembled after use.

Table B1.9: Reducing risks if a sharps injury is sustained

Seek care immediately if you sustain a sharps injury
If skin is penetrated, wash the affected area immediately with soap and water.
Report the incident immediately to your supervisor.
Ask about follow-up care, including post-exposure prophylaxis, which is most effective if implemented soon after the incident.
Complete an accident / incident report form, including the date and time of the exposure, how it happened, and name of the source individual (if known).
If a sharps injury happens to you, you can be reassured that only a small proportion of accidental exposures result in infection. Taking immediate action will lower the risk even further.

B1.3.3 Disposal of sharps

After they are used, single-use syringes and needles, scalpel blades, and other sharp items should be placed in containers approved by an appropriate regulatory authority for disposal of sharps. The containers should be located at the point of use or, if this is not possible, as close as practical to the use area. Approved containers are generally specifically labelled, puncture resistant and tamper proof.

RECOMMENDATION

9 Disposal of sharps

The person who has used the sharp must be responsible for its immediate safe disposal. Used sharps must be discarded into an approved sharps container at the point-of-use. These must not be filled above the mark that indicates the bin is three quarters full.

B1.3.4 Safety devices

(For further information on needleless and retractable devices refer to NHMRC full guidelines)

B1.3.5 Putting it into practice

Individual actions for reducing the risk

Explain to patients the risks to healthcare workers and others involved in the use and disposal of sharps and the measures taken to reduce these
Become familiar with facility protocols on handling and disposal of sharps
Use the appropriate product for the situation and use it as directed
Avoid using needles where safe and effective alternatives are available
If using needles, plan for their safe handling and disposal before using them
Make sure every used needle is disposed of properly in puncture-resistant sharps containers
Report any needlestick or sharps-related injuries promptly as relevant (e.g. to infection control or occupational health and safety professional, management, insurer) and ensure that you receive appropriate follow-up care.
Ensure you are vaccinated for hepatitis B
Participate in education sessions and professional development sessions on handling sharps, as well as those on new safety devices and how to use them

Involving patients in their care

The following information may be provided to patients to assist them in becoming involved in identifying and reducing risks related to the handling and disposal of sharps.

Healthcare workers are at risk of injury and infection when using sharp equipment such as needles and scalpels
Healthcare workers take measures to handle sharp devices in a way that prevents injury to the user and to others who may encounter the device during or after a procedure
Special containers are used for the disposal of sharp devices
It's okay to question a healthcare worker about the way in which they are handling or disposing of sharp devices

Eliminating risks

Although the risk of injury varies for different healthcare team members, it is never zero and must be and managed.

B1.4 ROUTINE MANAGEMENT OF THE PHYSICAL ENVIRONMENT

B1.4.1 What are the risks?

Infectious agents can be widely found in healthcare settings and there is a body of clinical evidence, derived from case reports and outbreak investigations, suggesting an association between poor environmental hygiene and the transmission of infectious agents in healthcare settings. Transmission of infectious agents from the environment to patients may occur through direct contact with contaminated equipment, or indirectly, for example, via hands that have touched contaminated equipment or the environment and then touch a patient.

Environmental surfaces can be safely decontaminated using less rigorous methods than those used on medical instruments and devices. The level of cleaning required depends on the objects involved and the risk of contamination — for example, surfaces that are likely to be contaminated with infectious agents (e.g. shared clinical equipment) require cleaning between patient uses, which is more often than general surfaces and fittings. However, all surfaces require regular cleaning. Thorough cleaning of all surfaces is necessary after spills and between patient uses of a room or patient care area.

Intensive care units and isolation areas require additional levels of cleaning, especially where there is a risk of MRO transmission.

B1.4.2 Routine environmental cleaning

General surfaces can be divided into two groups —

- those with minimal hand-contact (e.g. floors and ceilings) and
- those with frequent skin-contact ('frequently touched' or 'high risk' surfaces).

The methods, thoroughness and frequency of cleaning and the products used are determined by healthcare facility policy.

Frequently touched surfaces in patient care areas should be cleaned using a detergent solution and more frequently than surfaces with minimal hand contact. Infection control practitioners typically use a risk assessment approach to identify frequently touched surfaces and then coordinate an appropriately thorough cleaning strategy and schedule with the housekeeping staff.

When MROs may be present, routine cleaning is intensified — the use of a detergent solution is followed by the use of a disinfectant so that surfaces are cleaned twice.

Figure B1.3: Processes for routine cleaning

Minimally touched surfaces	**Frequently touched/ high risk surfaces**	
↓	↓	
MRO or other infectious agent requiring transmission-based precautions		
↓	↓	
No	**Yes**	
↓	↓	↓
	Non-acute setting	Acute setting
	↓	↓
Use detergent solution	Consider detergent solution followed by disinfectant	Detergent solution followed by disinfectant

Refer to full NHMRC Guidelines for outlines of the recommended frequencies for minimum routine cleaning of various items in healthcare facilities. The appendix of full NHMRC guidelines provides guidance specific to various levels of risk (e.g. for high risk areas such as intensive care and for lower risk areas such as office-based practice).

As an example,

Very high risk	Outbreak in high risk area
High risk	Intensive care unit, high dependency unit, burns unit
Significant risk	General wards
Low risk	Rehabilitation, aged / residential care, office based
1	Detergent or suitable cleaning product (for areas such as windows or items that have specific manufacturer's cleaning instructions)
2	Refers to multi-resistant organisms or infectious agents requiring transmission-based precautions —refer to Sections B2 and B3.

Element	**Minimum cleaning frequency**				**Method**
	Very high risk	**High risk**	**Significant risk**	**Low risk**	
Medical equipment (e.g. IV infusion pumps, pulse oximeters) NOT connected to a patient	One full clean daily & between patient use	One full clean daily & between patient use	One full clean daily & between patient use	One full clean weekly & between patient use	Detergent [1] Detergent + disinfectant for MRO [2]

Minimal touch surfaces

A detergent solution (diluted as per manufacturer's instructions) is adequate for cleaning general surfaces (e.g. floors, tabletops), as well as non-patient care areas (e.g. administrative offices). Damp mopping is preferable to dry mopping for routine cleaning.

Walls and blinds in patient care areas should be cleaned when they are visibly dusty or soiled, with detergent solution. Window curtains should be regularly changed in addition to being cleaned when soiled or exposed to MROs. Sinks and washbasins should be cleaned with a detergent solution on a regular basis as set by facility policy.

Frequently touched surfaces

Surfaces that are in close proximity to the patient and frequently touched surfaces in the patient care areas should be cleaned more frequently than minimal touch surfaces. Examples include doorknobs, bedrails, over-bed tables, light switches, and wall areas around the toilet in the patient's room.

Frequently touched surfaces can be cleaned with a detergent solution designed for general purpose cleaning. The exact choice of detergent will depend on the nature of the surface and the likely degree of contamination. Detergent-impregnated wipes may be used to clean single pieces of equipment and small surface areas. This method is not normally used for general ward cleaning and should not be considered a replacement for clean cloths, water and detergent.

RECOMMENDATION

10 Routine cleaning of surfaces
Clean frequently touched surfaces with detergent solution at least daily, and when visibly soiled and after every known contamination.
Clean general surfaces and fittings when visibly soiled and immediately after spillage.

Use of disinfectants

In acute patient care areas where there is uncertainty about the nature of soiling on the surface (e.g. blood or body fluid contamination versus routine dust or dirt) or the presence of MROs (including *C. difficile*) or other infectious agents requiring transmission-based precautions (e.g. pulmonary tuberculosis) is suspected, surfaces should be cleaned with a detergent solution, then a disinfectant. In office-based practice and less acute patient care areas (e.g. long-term care facilities), the risk of contamination, mode of transmission and risk to others should be used to determine whether disinfectants are required.

High-level disinfectants or liquid chemical sterilants are not appropriate for general cleaning; such use is counter to manufacturers' instructions for these toxic chemicals. Alcohol should not be used to disinfect large environmental surfaces.

Table B1.10: Characteristics of disinfectants

Hypochlorite (chlorine)	• Effective at a range from 100ppm (0.01%) to 52,000ppm (or 5.25%), depending of the organism and exposure time • 1000ppm is a recommended concentration based on practical application
Hydrogen peroxide	• Can be utilised in both liquid and mist form
Alcohol	• Ethanol and isopropyl alcohol have some antibacterial and antiviral effects • A concentration of 70% isopropyl (or equivalent) alcohol is recommended

Source: Adapted from Grampians Region Infection Control Group (2006) The Little Yellow Infection Control Book.
http://www.health.vic.gov.au/__data/assets/pdf_file/0018/37350/lyicb_original.pdf

Shared clinical equipment

While shared clinical equipment comes into contact with intact skin only and is therefore unlikely to introduce infection, it can act as a vehicle by which infectious agents are transferred between patients. Examples of possible contaminated surfaces on shared medical equipment include knobs or handles on haemodialysis machines, x-ray machines, instrument trolleys and dental units.

Surface barriers (e.g. clear plastic wrap, bags, sheets, tubing or other materials impervious to moisture) help prevent contamination of surfaces and equipment. Surface barriers on equipment (e.g. air water syringes, bedboards, computer keyboards) need to be placed carefully to ensure that they protect the surfaces underneath and should be changed between patients.

RECOMMENDATIONS

11 Cleaning of shared clinical equipment

Clean touched surfaces of shared clinical equipment between patient uses, with detergent solution. Exceptions to this should be justified by risk assessment.

12 Surface barriers

Use surface barriers to protect clinical surfaces (including equipment) that are:

- touched frequently with gloved hands during the delivery of patient care;
- likely to become contaminated with blood or body substances; or
- difficult to clean (e.g. computer keyboards).

Exceptions to this should be justified by risk assessment.

Cleaning implements and solutions

Part of the cleaning strategy is to minimise contamination of cleaning solutions and cleaning tools. Proper procedures for effective use of mops, cloths, and solutions should be followed:

- prepare cleaning solutions daily or as needed, and replace with fresh solution frequently according to facility policy;
- change the mop head at the beginning of each day and also as required by facility policy, or after cleaning up large spills of blood or other body substances; and
- clean mops and cloths after use and allow to dry before reuse, or use single-use mop heads and cloths.

Carpet

Carpets in public areas and in general patient care areas should be vacuumed daily with well-maintained equipment fitted with high efficiency particulate air (HEPA) filters to minimise dust dispersion. After a spill has been removed as much as possible, the carpet should be steam cleaned.

Carpets should undergo thorough steam cleaning on a regular basis as set by facility policy, using a method that minimises the production of aerosols and leaves little or no residue.

Checking, auditing and environmental sampling

Healthcare facilities use a variety of systems to ensure that cleaning standards are met. These include checklists, colour coding to reduce the chance of cross infection, cleaning manuals, model cleaning contracts, infection control guidance, and monitoring strategies. Some states and territories have cleaning standards that are applied to healthcare facilities regardless of whether cleaning services are contracted or performed in-house.

Auditing of cleaning is mostly done through visual checking; however, this does not recognise that microorganisms are invisible to the naked eye. More objective methods of assessing surface cleanliness and benchmarking are being investigated.

B1.4.3 Management of blood and body substance spills

Prompt removal of spots and spills and cleaning and disinfection of the area contaminated by blood or body substances are sound infection control practices and occupational health and safety requirements.

Process of spills management

Strategies for decontaminating spills of blood and other body fluids (e.g. vomit, urine) differ based on the setting in which they occur and the volume of the spill:

- in patient care areas, healthcare workers can manage small spills by cleaning with detergent solution;
- for spills containing large amounts of blood or other body substances, workers should contain and confine the spill by:
  - removing visible organic matter with absorbent material (e.g. disposable paper towels);
  - removing any broken glass or sharp material with forceps; and
  - soaking up excess liquid using an absorbent clumping agent (e.g. kitty litter).

The following table may assist in following appropriate processes when managing spills. Appropriate PPE should be worn at all times.

Table B1.11: Management of blood or body substance spills

Spot cleaning	• Wipe up spot immediately with a damp cloth, tissue or paper towel • Discard contaminated materials • Perform hand hygiene
Small spills (up to10cm diameter)	• Wipe up spill immediately with absorbent material • Place contaminated absorbent material into impervious container or plastic bag for disposal • Clean the area with warm detergent solution, using disposable cloth or sponge • Wipe the area with sodium hypochlorite and allow to dry • Perform hand hygiene
Large spills (greater than 10cm diameter)	• Cover area of the spill with an absorbent clumping agent and allow to absorb • Use disposable scraper and pan to scoop up absorbent material and any unabsorbed blood or body substances • Place all contaminated items into impervious container or plastic bag for disposal • Discard contaminated materials • Mop the area with detergent solution • Wipe the area with sodium hypochlorite and allow to dry • Perform hand hygiene

Spill kit

A spill kit should be readily available in each clinical area and should include a scoop and scraper, single use gloves, protective apron, face mask and eye protection, absorbent agent, clinical waste bags and ties, and detergent. All parts should be disposable to ensure that cross-contamination does not occur.

RECOMMENDATION

13 Site decontamination after spills of blood or other potentially infectious materials

Spills of blood or other potentially infectious materials should be promptly cleaned as follows:

- **wear utility gloves and other PPE** appropriate to the task;
- **confine and contain** spill, clean visible matter with disposable absorbent material and discard the used cleaning materials in the appropriate waste container;
- **clean** the spill area with a cloth or paper towels using detergent solution, wipe with appropriately diluted sodium hypochlorite and allow the surface to dry.

B1.4.4 Putting it into practice

Individual actions for reducing the risk

- Make sure you are familiar with facility policies on routine cleaning
- Familiarise yourself with the cleaning frequencies (see full NHMRC Guidelines for detailed information).
- Report any concerns you have about hygiene
- Consider ways to involve patients in monitoring the cleanliness of the patient care area (e.g. through comments books on the ward, or a short questionnaire to be filled in before discharge)

Involving patients in their care

Patients are an integral part of the risk management process. Following are points of advice to assist patients in becoming involved in identifying and reducing risks related to routine hospital hygiene.

- All surfaces and equipment in the patient care environment are regularly cleaned to prevent transmission of infection. Equipment is cleaned immediately after use (i.e. between patients).
- Surfaces that are touched often (such as doorknobs, bedrails, over-bed tables, light switches) and floors are cleaned daily, while surfaces that are touched less often (such as ceilings) are cleaned less frequently.
- Blood or other body substances (such as urine or vomit) increase the risk of transmission of infection so they are cleaned away promptly
- It's okay to say something if you think there is a problem with hygiene

B1.5 REPROCESSING OF INSTRUMENTS AND EQUIPMENT

B1.5.1 What are the risks?

Any infectious agents introduced into the body can establish infection. In all healthcare settings, instruments and equipment should be handled in a manner that will prevent patient, healthcare worker and environmental contact with potentially infectious material. Equipment and instruments must be cleaned and maintained in compliance with guidelines and any state/territory regulations, and taking into account manufacturers' instructions.

B1.5.2 Assessing the degree of risk

Any instrument or piece of equipment that is to be reused requires processing — cleaning, disinfection and/or sterilisation. The minimum level of processing required for reusable instruments and equipment depends on the individual situation (i.e. the body site where the instrument will be used).

The rational approach to disinfection and sterilisation of patient care items and equipment devised by Spaulding over 30 years ago has been retained and refined and is still successfully used by infection control practitioners and others when planning methods for disinfection or sterilisation. The system is based on instruments and items for patient care being categorised into critical, semicritical and noncritical, according to the degree of risk for infection involved in use of the items.

Table B1.13: Categories of items for patient care

Critical	These items confer a high risk for infection if they are contaminated with any microorganism and must be sterile at the time of use. This includes any objects that enter sterile tissue or the vascular system, because any microbial contamination could transmit disease.
Semi-critical	These items contact mucous membranes or non-intact skin, and should be single use or sterilised after each use. If this is not possible, high-level disinfection is the minimum level of

	reprocessing that is acceptable.
Non-critical	These items come in contact with intact skin but not mucous membranes. Thorough cleaning is sufficient for most non-critical items after each individual use, although either intermediate or low-level disinfection may be appropriate in specific circumstances.

Computers and personal digital assistants used in patient care should be included in policies for cleaning and disinfecting non-critical items. Although keyboard covers and washable keyboards that can be easily disinfected are in use, the infection control benefit of those items and optimal management have not been determined.

B1.5.3 Cleaning

Cleaning is the removal of foreign material (e.g. soil and organic material) from objects and is normally accomplished using detergent solution.

Cleaning to remove organic material must always precede high-level disinfection and sterilisation of critical and semi-critical instruments and devices because residual proteinaceous material reduces the effectiveness of the disinfection and sterilisation processes. If an item cannot be cleaned, it cannot be disinfected or sterilised.

Instruments should be cleaned as soon as practical after use (e.g. preferably at the point of use) before soiled materials become dried onto the instruments. Dried or baked materials on the instrument make the removal process more difficult and the disinfection or sterilisation process less effective or ineffective.

Methods of cleaning

Automated

Automated cleaners (ultrasonic cleaners and washer-disinfectors) reduce the handling of instruments and are recommended for cleaning basic instruments that can withstand the process.

- Ultrasonic cleaners work by subjecting instruments to high frequency, high-energy sound waves, thereby loosening and dislodging dirt.
- Washer-disinfectors use detergent solutions at high temperatures to wash instruments. When a washerdisinfector is used, care should be taken in loading instruments: hinged instruments should be opened fully to allow adequate contact with the detergent solution; stacking of instruments in washers should be avoided; and instruments should be disassembled as much as possible.

Manual

Cleaning is done manually for fragile or difficult-to-clean instruments and in areas without automatic units.

The two essential components of manual cleaning are:

- friction — rubbing/scrubbing the soiled area with a soft brush; and
- fluidics — use of fluids to remove soil and debris from internal channels after brushing and when the design does not allow passage of a brush through a channel.

Healthcare workers should wear appropriate PPE for the task — plastic apron, utility gloves and face protection (protective eyewear and mask or face shield). Care should be taken to prevent splashing of mucous membranes or penetration of the skin by sharp instruments.

Cleaning agents

For instrument cleaning, a neutral or near-neutral pH detergent solution is commonly used as such solutions generally provide the best material compatibility profile and good soil removal and mildly acidic solutions may damage instruments.

Enzymes, usually proteases, are sometimes added to neutral pH solutions to assist in removing organic material such as blood and pus. Cleaning solutions can also contain lipases (enzymes active on fats) and

amylases (enzymes active on starches). Enzymatic cleaners are not disinfectants, and proteinaceous enzymes can be inactivated by germicides.

As with all chemicals, enzymes must be rinsed from the equipment or adverse reactions could result.

Checking effectiveness of cleaning

During the past few years, data have been published describing use of an artificial soil, protein, endotoxin, X-ray contrast medium, or blood, to verify manual or automated cleaning processes and adenosine triphosphate bioluminescence and microbiologic sampling to evaluate the effectiveness of environmental surface cleaning. However, these are not used routinely in most health care facilities.

At a minimum, all instruments should be individually inspected (with magnification where possible) and be visibly clean.

B1.5.4 Disinfection

Disinfection is a process that inactivates non-sporing infectious agents, using either thermal (moist or dry heat) or chemical means. Items need to be cleaned before being disinfected.

Instruments should be removed from the disinfectant after reprocessing and stored dry. To preserve the surfaces of the instruments, dissimilar metals should be separated before cleaning.

- *Thermal disinfection* — if items can withstand heat and moisture and do not require sterilisation, thermal disinfection using heat and water, at temperatures that destroy infectious agents, is the simplest, most efficient and cost-effective method of disinfection. It can be achieved in an automated thermal washerdisinfector by choosing the appropriate cycle.

- *Chemical disinfection* can be achieved with a compatible Therapeutic Goods Administration (TGA)-registered instrument-grade disinfectant of the required level, used alone or together with an automated washer-disinfector. Chemical disinfectants include alcohols, chlorine and chlorine compounds, formaldehyde, hydrogen peroxide, phenolics and quaternary ammonium compounds. Commercial formulations based on these chemicals are considered unique products and must be registered with TGA. In most instances, each product is designed for a specific purpose; therefore, users should read labels carefully to ensure the correct product is selected for the intended use and applied efficiently.

There are three levels of disinfection, depending on the intended use of the instruments.

Disinfection is not a sterilising process. Wherever possible, sterilise items to be used in semi-critical sites, or employ single use items.

B1.5.5 Sterilisation

Sterilisation destroys all microorganisms on the surface of an instrument or device, to prevent disease transmission associated with the use of that item. While the use of inadequately sterilised critical items represents a high risk of transmitting infectious agents, documented transmission associated with an inadequately sterilised critical item is rare. This is probably due to the wide safety margin associated with the sterilisation processes used in healthcare facilities.

- If critical items are heat resistant, the recommended sterilisation process is steam sterilisation, because it has the largest margin of safety due to its reliability, consistency and lethality.

- Reprocessing heat and moisture-sensitive items requires use of a low-temperature sterilisation technology (e.g. ethylene oxide, hydrogen peroxide plasma, peracetic acid).

Sterilisation methods are designed to give a sterility assurance level (SAL) of at least 10^{-6}, provided the sterilisation process is validated by the user. Records of sterilisation must also be kept; these enable items to

be traced to an individual patient (e.g. in case of a recall or sterilisation breach identified after the case). Details of the documentation required can be found in Australian Standards AS/NZS 4187 and AS/NZS 4815.

In this rapidly changing area, processing standards should evolve to accommodate changes in equipment design and emerging technologies in sterilisation.

B1.5.6 Storage and maintenance

All items must be stored in a way that that maintains their level of processing (e.g. sterile, high level disinfected). Dry, sterile, packaged instruments and equipment should be stored in a clean, dry environment and protected from sharp objects that may damage the packaging. This is essential for instruments and equipment that are intended for use on critical sites and that must be sterile.

Equipment and instrument surfaces should be regularly examined for breaks in integrity that would impair either cleaning or disinfection/sterilisation. Equipment that no longer functions as intended or cannot be properly cleaned and disinfected or sterilised should be repaired or discarded.

Table B1.14: General criteria for reprocessing and storage of equipment and instruments in healthcare settings

Level of risk	Process	Example	Storage
***Critical** Entry or penetration into sterile tissue, cavity or blood stream	• Clean thoroughly as soon as possible after using • Sterilise after cleaning by steam under pressure • If heat or moisture sensitive, sterilise through an automated low temperature chemical sterilant system, other liquid chemical sterilants or ethylene oxide sterilisation	• Invasive surgical and dental equipment e.g. surgical oral instruments, arthroscopes, laparoscopes, rigid and flexible bronchoscopes, heat stable scopes • Cardiac and urinary catheters, implants and ultrasound probes used in sterile body cavities	Sterility must be maintained: • packaged items must go through a drying cycle and then be checked to ensure drying has taken place before use or storage • the integrity of the wrap must be maintained • wraps should act as an effective biobarrier during storage • unpackaged sterile items must be used immediately (without contamination in transfer from steriliser to site of use) or resterilised
Semi-critical Contact with intact mucous membranes or non- intact skin	• Clean thoroughly as soon as possible after using • Steam sterilisation is preferable • If the equipment will not tolerate steam use a high level chemical or thermal disinfectant	• Respiratory therapy and anaesthesia equipment, some endoscopes, vaginal speculae, laryngoscope blades, oesophageal manometry probes, cystoscopes, anorectal manometry catheters, diaphragm fitting rings, routine dental instruments	• Store to prevent environmental contamination
Non-critical Contact with intact skin	• Clean as necessary with detergent solution • If decontamination necessary, disinfect	• Stethoscopes, sphygmomanometers, blood pressure cuffs, mercury thermometers, non-invasive ultrasound	• Store in a clean dry place to prevent environmental contamination

	with compatible low or intermediate level TGA registered disinfectant after cleaning	probes • Commodes, intravenous pumps and ventilators	

Notes: Critical items, particularly endoscopes, must be sterilised between patient uses.
An invasive procedure is defined as entry into tissues, cavities or organs or repair of traumatic injuries.
Source: CDC (2008) *Guideline for the Disinfection and Sterilization in Healthcare Facilities 2008*.

Further considerations:

Steam sterilisation and the other methods listed above are not sufficient for reprocessing items potentially contaminated with certain types of infectious agents. This includes prions, such as classical Creuzfeldt-Jakob disease (cCJD), for which single use items should be used wherever possible and subsequently destroyed by incineration. Other items should be quarantined or kept for exclusive use on an individual patient and:

- immersed in a dedicated container containing sterile water until reprocessed;
- cleaned in anionic detergent solution prior to further reprocessing; and
- reprocessed using steam sterilisation at 134°C for 3 minutes.

For further information on infection control relating to cCJD, refer to
http://www.health.gov.au/internet/main/publishing.nsf/Content/icg-guidelines-index.htm

B1.5.7 Putting it into practice

Individual actions for reducing risk

Become familiar with standards and facility protocols on cleaning, disinfecting and sterilising
Use the appropriate product for the situation and use it as directed
Participate in education sessions and professional development sessions on reprocessing instruments and equipment, particularly when new sterilising or disinfecting equipment is introduced.

Involving patients in their care

The following information may be provided to patients to assist them in becoming involved in identifying and reducing risks related to processing of instruments and equipment.

Many instruments and equipment in the hospital are reusable
All reusable instruments and equipment are cleaned thoroughly and then either disinfected or sterilised before being used on the next patient.
The system for cleaning, disinfecting and sterilising instruments and equipment protects patients and health care workers from contact with potentially infectious material.
Any instrument that enters a part of the body (e.g. in surgery) is sterilised and completely free of all potentially harmful organisms
Any instrument that goes inside the nose, mouth or other orifice, or touches broken skin, is either sterilised or disinfected to a high level.
Any equipment that touches the patient or is touched by the patient, is cleaned thoroughly and if necessary disinfected.
It's okay to ask about the cleaning and sterilising practices in the hospital

B2 - TRANSMISSION-BASED PRECAUTIONS

Summary

- The aim of instituting early transmission-based precautions is to reduce further transmission opportunities that may arise due to the specific route of transmission of a particular pathogen.
- While it is not possible to prospectively identify all patients needing transmission-based precautions, in certain settings, recognising an increased risk warrants their use while confirmatory tests are pending (Refer full NHMRC Guidelines Table B5.2, p 165)
- Transmission-based precautions are applied in addition to standard precautions.

Recommended precautions for specific infectious agents are outlined in full NHMRC Guidelines – Refer Table B5.2 (see page 165).
http://www.nhmrc.gov.au/node/30290

When transmission-based precautions are applied during the care of an individual patient, there is potential for adverse effects such as anxiety, mood disturbances, perceptions of stigma and reduced contact with clinical staff. Clearly explaining to patients why these precautions are necessary may help to alleviate these effects.

B2.1 APPLICATION OF TRANSMISSION BASED PRECAUTIONS

B2.1.1 What are the risks?

Transmission of infectious agents can occur in a number of ways.

- Indirect or direct *contact transmission,* when healthcare worker hands or clothing become contaminated, patient care devices are shared between patients, infectious patients have contact with other patients, or environmental surfaces are not regularly decontaminated.

- *Droplet transmission,* when healthcare workers' hands become contaminated with respiratory droplets and are transferred to susceptible mucosal surfaces such as the eyes, when infectious respiratory droplets are expelled by coughing, sneezing or talking, and are either inhaled or come into contact with another's mucosa (eyes, nose or mouth), either directly into or via contaminated hands.

- *Airborne transmission,* when attending healthcare workers or others inhale small particles that contain infectious agents.

Transmission-based precautions involve the use of the following measures to prevent transmission of the infectious agent:

- use of personal protective equipment (including gloves, apron or gowns, and surgical or P2 (N95) respirators, visors or protective goggles);
- dedicated patient equipment;
- allocation of single rooms or cohorting of patients;
- appropriate air handling requirements;
- enhanced cleaning and disinfecting of the patient environment; and
- restricted transfer of patients within and between facilities.

For diseases that have multiple routes of transmission, more than one transmission-based precaution category is applied. Whether used singly or in combination, transmission-based precautions are always applied in addition to standard precautions. Transmission-based precautions remain in effect for limited periods of time until signs and symptoms of the infection have resolved or according to recommendations

from infection control practitioners specific to the infectious agent (see full NHMRC Guidelines) Table B5.2, page 165).
http://www.nhmrc.gov.au/node/30290

B2.2 CONTACT PRECAUTIONS

B2.2.1 What are the risks?

There is clear evidence that certain infectious agents are transmitted by direct or indirect contact during patient care.

Direct transmission occurs when infectious agents are transferred from one person to another person without a contaminated intermediate object or person. For example, blood or other body fluids from an infectious person may come into contact with a mucous membrane or breaks in the skin of another person.

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

- when clothing becomes contaminated after care of a patient colonised or infected with an infectious agent, which can then be transmitted to subsequent patients;
- when contaminated patient-care devices are shared between patients without cleaning and disinfecting between patients; and
- when environmental surfaces become contaminated.

B2.2.2 When should contact precautions be implemented?

Contact precautions are intended to prevent transmission of infectious agents that are spread by direct or indirect contact with the patient or the patient's environment (such as resistant bacteria [see Section B3.1], *C. difficile*, or highly contagious skin infections/infestations [e.g. impetigo, scabies]). Contact precautions are also applied when the presence of excessive wound drainage, faecal incontinence, or other bodily discharge suggests an increased potential for environmental contamination and risk of transmission.

See full NHMRC IPC Guidelines for:

- requirements for contact precautions (summarised on page 165 of full NHMRC IPC Guidelines)
- conditions warranting transmission-based precautions in addition to standard precautions, pending confirmation of diagnosis (Table B5.2, page 165)
- Information about which precautions to apply for specific conditions is given in Table B5.2, page 165.

RECOMMENDATION

14 Implementation of contact precautions
In addition to standard precautions, implement contact precautions in the presence of known or suspected infectious agents that are spread by direct or indirect contact with the patient or the patient's environment.

B2.2.3 How should contact precautions be applied?

The key aspects of applying contact precautions relate to:

- hand hygiene and use of appropriate PPE;
- special handling of equipment;
- patient placement; and
- minimising patient transfer or transport.

Hand hygiene and PPE

Effective hand hygiene is particularly important in preventing contact transmission and the 5 moments of hand hygiene outlined in Section B1.1.2 should be followed at all times.

Putting on both gloves and gown upon entering the patient care area helps to contain infectious agents, especially those that have been implicated in transmission through environmental contamination (e.g. VRE, *C. difficile*, norovirus and other intestinal tract pathogens, respiratory syncytial virus).

If there is potential for body fluids of a patient on contact precautions to splash onto the healthcare worker's face, face protection (including protective eyewear) should also be worn.

RECOMMENDATIONS

15 Hand hygiene and personal protective equipment to prevent contact transmission
When working with patients who require contact precautions:

- perform hand hygiene;
- put on gloves and gown upon entry to the patient care area;
- ensure that clothing and skin do not contact potentially contaminated environmental surfaces; and
- remove gown and gloves and perform hand hygiene before leaving the patient care area.

16 Hand hygiene when *Clostridium difficile* is suspected or known to be present
To facilitate the mechanical removal of spores, meticulously wash hands with soap and water and pat dry with single-use towels.
Use of alcohol-based hand rubs alone may not be sufficient to reduce transmission of Clostridium difficile.

Single-use or dedicated patient care equipment

Standard precautions concerning patient care equipment (see Section B1.5) are very important in the care of patients on contact precautions. If patient care devices (e.g. blood pressure cuffs, nebulisers, mobility aids) are shared between patients without being reprocessed between uses, they may transmit infectious agents.

RECOMMENDATION

17 Patient care equipment for patients on contact precautions
Use patient dedicated equipment or single-use non-critical patient care equipment (e.g. blood pressure cuffs). If common use of equipment for multiple patients is unavoidable, clean the equipment and allow it to dry before use on another patient.

Patient placement

A single-patient room is recommended for patients who require contact precautions. When a single-patient room is not available, consultation with infection control practitioners is recommended to assess the various risks associated with other patient placement options (e.g. cohorting).

If it is necessary to place a patient who requires contact precautions in a room with a patient who is not infected or colonised:

- avoid placing these patients with patients who are at increased risk of an adverse outcome from infection (e.g. patients who are immunocompromised, have open wounds or have anticipated prolonged lengths of stay); and
- change protective attire and perform hand hygiene between contact with patients in the same room, regardless of whether one or both patients are on contact precautions.

Transfer of patients

Limiting transfer of a patient on contact precautions reduces the risk of environmental contamination. If transfer within or between facilities is necessary, it is important to ensure that infected or colonised areas of the patient's body are contained and covered. Contaminated PPE should be removed and disposed of and hand hygiene performed before the patient is moved. Clean PPE should be put on before the patient is handled at the destination.

B2.3 DROPLET PRECAUTIONS

B2.3.1 What are the risks?

A number of infectious agents are transmitted through respiratory droplets (i.e. large-particle droplets >5 microns in size) that are generated by a patient who is coughing, sneezing or talking or during suctioning or bronchoscopy. Transmission via large droplets requires close contact as the droplets do not remain suspended in the air and generally only travel short distances (usually 1 metre or less). As well, any infectious agent transmitted by the droplet route can potentially be transmitted by touch.

Droplet precautions are based on evidence that shows that:

- hand hygiene is effective in preventing transmission of viruses and reducing the incidence of respiratory infections both within and outside healthcare settings
- physical interventions are highly effective against the spread of a broad range of respiratory viruses;
- surgical masks protect the wearer from droplet contamination of the nasal or oral mucosa;
- physical proximity of less than one metre has long been associated with an increased risk for transmission of infections via the droplet route; and
- placing masks on coughing patients is a proven means of preventing infected patients from dispersing respiratory secretions into the air.

B2.3.2 When should droplet precautions be implemented?

Droplet precautions are intended to prevent transmission of infectious agents spread through close respiratory or mucous membrane contact with respiratory secretions. Because these microorganisms do not travel over long distances, special air handling and ventilation are not required.

Infectious agents for which droplet precautions are indicated include respiratory syncytial virus and meningococcus (see full NHRMC guideline appendices for more information).

The requirements for droplet precautions are summarised on page 97 of full guidelines.
Table B5.2 (see page 165 full guidelines) lists conditions warranting transmission-based precautions in addition to standard precautions, pending confirmation of diagnosis.
Information about which precautions to apply for specific conditions is given in Table B5.2 (see page 165).
http://www.nhmrc.gov.au/node/30290

RECOMMENDATION

18 Implementation of droplet precautions
In addition to standard precautions, implement droplet precautions for patients known or suspected to be infected with agents transmitted by respiratory droplets (i.e. large-particle droplets >5µ in size) that are generated by a patient when coughing, sneezing, talking, or during suctioning.

B2.3.3 How should droplet precautions be applied?

The key aspects of applying droplet precautions relate to:

- hand hygiene and use of personal protective equipment;
- special handling of equipment;
- patient placement; and
- minimising patient transfer or transport.

Hand hygiene and personal protective equipment

Droplet transmission is, technically, a form of contact transmission and some infectious agents transmitted by the droplet route may also be transmitted by contact. Hand hygiene is therefore an important aspect of droplet precautions and the 5 moments of hand hygiene outlined in Section B should be followed.

Although surgical masks do not protect the wearer from infectious agents that are transmitted via the airborne route, masks that meet Australian Standards are fluid resistant and protect the wearer from droplet contamination of the nasal or oral mucosa. The mask is generally put on upon room entry.

There is insufficient evidence to support the use of P2 (N95) respirators for reducing the risk of infections transmitted by the droplet route.

Indirectly vented goggles provide the most eye protection from respiratory droplets from multiple angles.

RECOMMENDATION

19 Personal protective equipment to prevent droplet transmission
When entering the patient care environment, put on a surgical mask.

Placement of patients on droplet precautions

Placing patients on droplet precautions in a single-patient room reduces the risk of patient-to-patient transmission. When single-patient rooms are in short supply, the following principles apply in decision-making on patient placement:

- prioritise patients who have excessive cough and sputum production for single-patient room placement; and
- place together in the same room (cohort) patients who are infected with the same pathogen and are suitable roommates.

If it becomes necessary to place patients who require droplet precautions in a room with a patient who does not have the same infection:

- avoid placing patients on droplet precautions in the same room with patients who have conditions that may increase the risk of adverse outcome from infection or that may facilitate transmission (e.g. those who are immunocompromised, have or have anticipated prolonged lengths of stay); and
- ensure that patients are physically separated (> 1 metre apart) from each other and draw the privacy curtain between beds to minimise opportunities for close contact.

In all cases, the importance of cough etiquette should be explained to patients on droplet precautions.

RECOMMENDATION

20 Placement of patients requiring droplet precautions
Place patients who require droplet precautions in a single-patient room when available.

Transport of patients on droplet precautions

When transfer of a patient on droplet precautions within or between facilities is necessary, there is the potential for other patients and healthcare workers to come in contact with infectious agents when the patient coughs or sneezes. This can be addressed by asking the patient to wear a mask while they are being transferred and to follow cough etiquette.

B2.4 AIRBORNE PRECAUTIONS

B2.4.1 Why are airborne precautions important?

Certain infectious agents are disseminated through airborne droplet nuclei or small particles in the respirable size range that remain infective over time and distance.

Airborne precautions are based on evidence that shows that:

- the use of P2 (N95) respirators prevents the inhalation by the wearer of small particles that may contain infectious agents transmitted via the airborne route;
- the use of negative pressure rooms may also reduce the transmission of infection; and

- wearing of correctly-fitted masks by coughing patients prevents dispersal of respiratory secretions into the air.

B2.4.2 When should airborne precautions be implemented?

Airborne precautions prevent transmission of microorganisms that remain infectious over time and distance when suspended in the air. These agents may be inhaled by susceptible individuals who have not had face-to-face contact with (or been in the same room as) the infectious individual.

Infectious agents for which airborne precautions are indicated include rubeola virus (measles), varicella virus (chickenpox) and *M. tuberculosis*.

See full NHMRC IPC Guidelines:

- The requirements for airborne precautions are summarised on page 91.
- Table B5.2 lists conditions warranting transmission-based precautions in addition to standard precautions, pending confirmation of diagnosis.
- Information about which precautions to apply for specific conditions is given in Table B5.2 (see page 165). http://www.nhmrc.gov.au/node/30290

RECOMMENDATION

21 Implementation of airborne precautions

In addition to standard precautions, implement airborne precautions for patients known or suspected to be infected with infectious agents transmitted person-to-person by the airborne route (i.e. airborne droplet nuclei or particles <5µ in size).

B2.4.3 How should airborne precautions be applied?

The key aspects of applying airborne precautions relate to:

- hand hygiene and cough etiquette (see Section B1.1);
- use of appropriate personal protective equipment (particularly correctly-fitted masks); and
- minimising exposure of other patients and staff members to the infectious agent.

Personal protective equipment

When there is a high probability of airborne transmission due to the infectious agent or procedure, sound scientific principles support the use of P2 (N95) respirators to prevent transmission. Respirators are designed to help reduce the wearer's respiratory exposure to airborne contaminants such as particles, gases or vapours. 'N95' refers to the respirator being certified to exclude 95% of non-oil based sodium chloride particles, sized at 0.3 microns in diameter. To be effective P2 (N95) respirators must fit so that inhaled and exhaled air travels through the filter medium.

The need for personal protective equipment varies with the condition in question and the immune status of the healthcare worker. For example, if it is confirmed that a patient has measles and the healthcare worker is has known antibodies against measles then use of a P2 (N95) respirator is not required. For high-risk procedures such as bronchoscopy where the risk of droplet and airborne infection is high, a P2(N95) respirator should be worn if the infectious status of the patient is unknown or unconfirmed.

Considerations when using P2 (N95) respirator include:

- if a good facial seal cannot be achieved (e.g. the intended wearer has a beard or long moustache), an alternative respirator such as a powered air-purifying respirator (PAPR) should be used;
- respirators should not be touched while being worn;
- respirators should be changed when they become moist;
- respirators should never be reapplied after they have been removed;
- respirators should not be left dangling around the neck; and
- hand hygiene should be performed upon touching or discarding a used respirator.

RECOMMENDATION

22 Personal protective equipment to prevent airborne transmission
Wear a correctly fitted P2 (N95) respirator when entering the patient care area when an airborne transmissible infectious agent is known or suspected.

Patient placement

When patients have a confirmed or suspected airborne-transmissible condition or if nebulisation is to be performed, it is important to place them in an area that can be contained (e.g. placing them in a single room and, providing it is tolerated, asking them to wear a surgical mask while not in a single room, until advised to remove it by attending staff). It is important that the door to the room remains closed and that, where possible, only staff or visitors who are immune to the specific infectious agent enter the room or are provided with appropriate PPE. While there is a paucity of evidence to confirm their effectiveness, the use of negative pressure rooms may reduce the transmission of airborne infection within health care settings.

RECOMMENDATION

23 Placement of patients requiring airborne precautions
Patients on airborne precautions should be placed in negative pressure rooms or in a room from which the air does not circulate to other areas.
Exceptions to this should be justified by risk assessment.

Transfer of patients

If transfer of the patient outside the negative pressure room is necessary, asking the patient to wear a correctly fitted surgical mask while they are being transferred and to follow cough etiquette, as well as covering of any skin lesions associated with the condition (e.g. varicella) will reduce the risk of cross-transmission.

PUTTING IT INTO PRACTICE

Individual actions for reducing risk

Consult with infection control practitioners to ensure that appropriate transmission-based precautions are applied and that they remain in place until the risk of transmission of the infectious agent has passed.
Remember that transmission-based precautions are applied AS WELL as standard precautions.
Advise patients why particular measures are needed to control infection (see above).
Become familiar with local policy on appropriate personal protective equipment, and when it should be donned and doffed, when attending patients on transmission-based precautions.
Make sure you know which type of mask is needed in different situations and how to check that they are properly fitted.
Always contain or cover the infected or colonised areas of a patient on contact precautions before moving them from one patient care area to another.
Ask patients on droplet or airborne precautions to wear a mask if they are being moved from one patient care area to another.
If patients are moved to a single-patient room (contact or droplet precautions) or negative pressure room (airborne precautions) explain why this is necessary to prevent transmission of infection.
Make sure you are fully immunised against vaccine-preventable diseases as recommended in the *Australian Immunisation Handbook.*

Involving patients in their care

The following information may be provided to patients to assist them in becoming involved in identifying and reducing risks.

When a patient has a condition that can easily be transmitted to others, extra measures beyond normal practices to prevent and control infection are needed — these are for everybody's safety.
Hand hygiene is the most important aspect of preventing the spread of infection. This means everyone, including visitors, should perform hand hygiene after any contact with the patient or environment that could lead to contamination.
Hand hygiene is also important for the patient, especially after activities when hands come in contact with possible sources of infection (such as blowing your nose, going to the toilet, touching infected wounds).
Healthcare workers wear gloves and gowns when there is a chance that touching the patient could transmit infection.
For some infections, the patient needs to wear a mask so that they do not infect others (for example when they are sneezing or coughing), especially if they are moving between patient care areas.
Regular cleaning of the patient's room and objects around them helps to prevent the spread of infection.
If a healthcare worker might be splashed by the patient's body fluids, he or she should wear face protection.
Any piece of equipment that might come in contact with infectious agents is thrown away or cleaned and disinfected before it is used again.
For some types of infection, it is necessary to place patients in a single room or to keep them more than a metre away from other patients. Sometimes patients with the same infection are placed in a room together.
It's okay to question a healthcare worker about whether they have taken measures to prevent infection (like performing hand hygiene, wearing a gown or mask or using clean equipment).

Refer to full NHMRC Guidelines for:
Summary and examples of "Application of transmission-based precautions".

Examples of infectious agents and routes of transmission:

Contact transmission	**MROs, *C. difficile*, intestinal tract pathogens (e.g. norovirus), RSV, highly contagious skin infections**
Droplet transmission	Influenza, RSV, norovirus, pertussis (whooping cough), meningococcus
Airborne transmission	Pulmonary TB, chickenpox, measles, SARS.

Table B2.2: Infections warranting transmission-based precautions before laboratory confirmation of infection

Infection	Type	Transmission
Chickenpox and shingles (varicella-zoster)	Viral	Airborne Contact
Creutzfeldt–Jakob disease	Prion	Contact (CNS instruments)
Gastroenteritis	Bacterial	Contact (faecal-oral)
Gastroenteritis	Viral	Airborne
Hepatitis A	Viral	Contact (faecal-oral)
Influenza(during outbreaks)	Viral	Droplet
Measles	Viral	Airborne Contact
Meningococcal infection	Bacterial	Droplet Contact
Norovirus	Viral	Contact Droplet (aerosolized vomitus)
Parvovirus B19	Viral	Droplet
Respiratory syncytial virus	Viral	Contact (oral, fomites) Droplet
Rotavirus	Viral	Contact (faecal-oral)
Rubella	Viral	Droplet Contact
SARS	Viral	Droplet Contact
Staphylococcal infection	Bacterial	Contact Droplet
Tuberculosis	Bacterial	Airborne
Viral haemorrhagic fevers	Viral	Contact
Whooping cough (pertussis)	Bacterial	Droplet

Refer to full NHMRC IPC Guidelines "Table B5.2: Type and duration of precautions for specific infections and conditions" http://www.nhmrc.gov.au/node/30290

B3 - MANAGEMENT OF RESISTANT ORGANISMS AND OUTBREAK SITUATIONS

Summary

- Effective hand hygiene is the most important measure to prevent and control the spread of multi-resistant organisms (MROs). Rigorous adherence to hand hygiene is also integral to any outbreak control and management program.
- The application of transmission-based precautions is particularly important in containing MROs such as methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococci (VRE), and multiresistant Gram-negative bacteria (MRGN) (see Section B3.1).
- Transmission-based precautions are also an integral part of outbreak management (see Section B3.2).
- Specific precautions required for each infectious agent are listed in Table B5.2 (see page 165).

When a patient is infected or colonised with an MRO or involved in an outbreak there is potential for adverse effects such as anxiety mood disturbances perceptions of stigma and reduced contact with clinical staff. Clearly explaining to patients the measures being undertaken and why they are necessary may help to alleviate these effects.

Evidence supporting practice

The majority of the recommendations in this section have been adapted from United States Centers for Disease Control and Prevention (CDC) *Management of Multidrug-Resistant Organisms in Healthcare Settings* (2006).

Further review of the evidence concerning the management of MROs allowed the development of recommendations and good practice points specific to the Australian context. Literature reviews conducted as part of the development of these guidelines or that were released during the guideline development process identified the following:

- good quality evidence on the use of alcohol-based hand rubs in reducing transmission of MROs;
- a paucity of evidence regarding the use of PPE for preventing the transmission of MRSA and VRE;
- a paucity of prospectively designed experimental studies into the effectiveness of patient isolation in reducing transmission of MROs;
- lack of evidence regarding the value of screening for MROs in the absence of implementation of other infection control measures; and
- a paucity of evidence concerning routine screening of healthcare workers for MRSA colonisation.

B3.1 MANAGEMENT OF MULTI RESISTANT ORGANISMS

B3.1.1 What are the risks?

MROs, which are predominantly bacteria, are resistant to multiple classes of antimicrobial agents. Antibiotic resistance increases the morbidity and mortality associated with infections, and contributes to increased costs of care due to prolonged hospital stays and other factors, including the need for more expensive drugs. A major cause of antibiotic resistance is the exposure of a high-density, high-acuity patient population in frequent contact with health care workers to extensive antibiotic use, along with the attendant risk of cross-infection.

For the purpose of these guidelines, MROs are taken to include:

- **all methicillin-resistant *Staphylococcus aureus*** — MRSAs cause up to a third of hospital-acquired bloodstream infections, with mortality from BSI ranging from 10% to 50% according to the setting;

- **all vancomycin-resistant enterococci** with mobile resistance determinants (e.g. VanA, VanB) — the ratio of invasive VRE infection to colonisation appears to be proportionately lower than that of MRSAs.

- **a range of Gram-negative bacteria** with multiple classes of drug resistance or resistant mechanisms to critically important antibiotics — highly transmissible resistance is a particular feature of antibiotic resistance among the Gram-negative bacteria, especially the Enterobacteriaceae. Multi-drug resistance is also common and increasing among non-fermenting Gram-negative bacteria (e.g. *Pseudomonas aeruginosa* and *Acinetobacter baumannii*) and a number of strains have now been identified that exhibit resistance to essentially all commonly used antibiotics. These organisms are associated with treatment failure and increased morbidity.

A two-level approach is necessary for the prevention and control of MROs. This involves implementation of:

- core strategies for MRO prevention and control in any situation where MRO infection or colonisation is suspected or identified; and
- organism-based or resistance mechanism-based approaches if incidence or prevalence of MROs are not decreasing despite implementation of the core strategies.

In the event of an MRO outbreak, investigation and control/containment should be conducted as outlined in Section B3.2.

B3.1.2 Core strategies for MRO prevention and control

Successful control of MROs is based on a combination of interventions. These involve continued rigorous adherence to hand hygiene, appropriate use of personal protective equipment and implementation of specific transmission-based precautions (isolation of infected or colonised patients, increased environmental cleaning and dedicated patient equipment) until patients are culture-negative for a target MRO or have been discharged from the facility.

In non-acute healthcare settings, general measures of infection control (particularly hand hygiene by both patients and healthcare workers) may be enough to prevent transmission. However, contact precautions, such as gowns and gloves, may be necessary if the index patient is heavily colonised or there is known continuing transmission. Local guidelines and circumstances should determine practice in settings where the patient population is vulnerable.

Organisational measures — such as staff education on prevention and management of MRO transmission, antibiotic stewardship program, and appropriate response to active surveillance cultures — are discussed in Part C. (Refer full guidelines for comprehensive discussion).

Hand hygiene

MROs can be carried from one person to another via the hands of a healthcare worker. Contamination can occur during patient care or from contact with environmental surfaces in close proximity to the patient, particularly when patients have diarrhoea and the reservoir of the MRO is the gastrointestinal tract. Effective hand hygiene is therefore the most important measure to prevent and control the spread of MROs. Alcohol based hand rub of at least 70% v/v ethanol or equivalent has been shown to be effective against MRSA and VRE and is recommended for all routine hand hygiene practices in the healthcare environment.

Personal protective equipment

Both direct patient contact (e.g. routine patient care) and less direct contact (e.g. involving environmental contamination) can lead to contamination of the healthcare worker's hands and clothing. Appropriate use of gloves has been found to be as effective a strategy as patient isolation in containing MROs, particularly when isolation may not be feasible. Glove use is more effective when combined with wearing of gowns.

Isolation

Placing colonised or infected carriers in single rooms, cohort rooms or cohort areas as a component of a multifaceted infection control policy can reduce acquisition rate and infection with MROs in acute care settings. Cohorting patients with the same strain of MRO has been used extensively for managing outbreaks of specific MROs, including MRSA, VRE, extended spectrum beta-lactamase (ESBL)-producing bacteria, and *Pseudomonas aeruginosa*. However, it is not always appropriate to cohort patients with the same MRO species if they have a different resistance mechanism or phenotype (e.g. if one has a community-acquired strain of likely PVL-positive MRSA and the other has a hospital-acquired strain of MRSA).

In long-term care facilities, isolation and cohorting may not be possible, so hand hygiene with appropriate routine use of gloves for individual resident and environmental contact is preferred.

Environmental cleaning

When patients are infected or colonised with MROs, environmental cleaning of patient-care areas should be prioritised and particular attention paid to cleaning and disinfection of frequently touched surfaces (e.g. bedrails, trolleys, bedside commodes, bed rails, doorknobs, light switches or tap handles, en-suite facilities). Cleaning with detergent solution should then be followed by the use of a TGA-registered chemical germicide appropriate for the surface to be disinfected (e.g. either hospital or commercial grade disinfection) as specified in the manufacturer's instructions. This means that surfaces are cleaned twice. Alternatively, surfaces can be cleaned with a combined detergent/disinfectant solution, which combines a two-step process.

Patient equipment

Standard precautions concerning patient-care equipment are very important in the care of patients with MROs. Patient-care devices (e.g. electronic thermometers) may transmit infectious agents if devices are shared between patients. To reduce the risk of transmission, disposable or dedicated patient-care equipment is preferred.

Monitoring

Monitoring of the incidence of target MRO infection and colonisation should continue after these interventions are implemented. If rates do not decrease, more interventions may be needed to reduce MRO transmission (outlined in Section B3.1.3 of full NHMRC IPC Guidelines).

RECOMMENDATION

24 Implementation of core strategies in the control of multi-resistant organisms (MRSA, MRGN, VRE)
Implement transmission-based precautions routinely for all patients colonised or infected with a multi-resistant organism, including:

- putting on gloves and gowns before entering the patient care area;
- using patient dedicated or disposable noncritical patient care equipment (e.g. blood pressure cuff, stethoscope);
- using a single-patient room or, if unavailable, cohorting patients with the same strain of multi-resistant organism in designated patient care areas; and
- ensuring consistent cleaning and disinfection of surfaces in close proximity to the patient and those likely to be touched by the patient and healthcare workers.

When patients are placed on transmission-based precautions due to infection or colonisation with an MRO, efforts should be made to counteract potential psychological adverse effects of isolation such as anxiety and depression, and feeling of stigmatisation.

Refer to full *NHMRC Guidelines* for discussion on "Organism-specific approaches" and "Antibiotic stewardship".

B3.2 OUTBREAK INVESTIGATION AND MANAGEMENT

When there are more cases of infection with the same organism than would normally be expected in one area or period of time, this constitutes an outbreak.

An outbreak may be defined as:

- occurrence of more cases of disease than expected in a given area among a specific group of people over a particular period of time; or

- two or more linked cases of the same illness.

Commonly detected outbreaks involve:

- MRSA;
- aminoglycoside or multi-resistant enterobacteriaceae or pseudomonads;
- diarrhoeal pathogens;
- respiratory pathogens (e.g. *Salmonella, Campylobacter*, norovirus);
- measles, varicella;
- hepatitis A;
- *Clostridium difficile* enterocolitis; and
- Legionnaires' disease.

B3.2.1 Outbreak investigation and management

A suspected outbreak may be identified by a healthcare worker, by laboratory personnel, or by state/territory health authorities conducting routine surveillance or investigating reports of illness and from reportable disease notifications. When an outbreak is detected, the healthcare facility's infection control management system should be notified and an outbreak control team formed relevant to the size and seriousness of the outbreak and the healthcare facility involved. There may also be a requirement to notify the state/territory public health unit. The responsibility for investigation and the extent of investigations will vary according to the outbreak type and circumstances. It is important to investigate an outbreak immediately, as the availability and quality of microbiological evidence and epidemiological data diminishes rapidly with time between illness and investigation.

An outbreak management plan should be developed based on local policy and consultation between the infection control practitioner, healthcare workers, patients, facility management and state/territory health authorities as appropriate. Such a plan is multifactorial and its implementation is typically overseen by a person with designated responsibility for infection control, such as an infection control practitioner, clinical microbiologist or infectious diseases physician.

The outbreak response may differ according to the nature of disease, the virulence of the organism and the vulnerability of the patients concerned, however the principles that underlie an outbreak investigation are similar: identification of the aetiological agent; the route(s) of transmission; exposure factors and the population at risk.

Refer full *NHMRC Guidelines* on "Steps in an outbreak investigation" and corresponding management.

In practice many steps are taken more or less simultaneously, while the results of investigations and implementation of strategies to contain and control will vary with the availability and timeliness of information and seriousness of the outbreak. In primary care there may be a limited ability to investigate an outbreak, which will be generally conducted by public health authorities once they have been notified. All outbreaks, however minor, should be investigated promptly and thoroughly and the outcomes of the investigations documented.

B3.2.2 Infection control strategies to control/contain an outbreak

Good governance and administrative or managerial support are crucial to support outbreak management. The healthcare worker's role in outbreak management will include:

- *reinforcement of standard precautions*, including rigorous adherence to the 5 moments of hand hygiene and environmental cleaning protocols and appropriate use of PPE; and
- *implementation of relevant transmission-based precautions*, including isolation and cohorting.

Environmental cleaning

Increase frequency and efficiency of environmental cleaning to ensure any contaminants are removed. A targeted cleaning regime may be introduced and continued for the duration of the outbreak dependent on the mode of transmission of the infectious agent. Consider whether the surrounding environment will need to be disinfected in addition to cleaning.

Patient isolation

The isolation of infected patients — through allocation of single rooms or cohorting of patients — is important when managing an outbreak. Infected patients should be isolated using single rooms, cohorting and negative-pressure rooms if available and as advised by an infection control practitioner or person with designated responsibility for infection control. A warning sign should be posted on the door, which should be kept closed for patients on airborne precautions.

Single room

Single-patient rooms are always indicated for patients placed on airborne precautions and are preferred for patients who require contact or droplet precautions. In the event of an outbreak, single patient rooms are preferred for all modes of transmission.

When there is only a limited number of single-patient rooms, they should be prioritised for patients who have conditions that facilitate transmission of infectious material to other patients (e.g. draining wounds, stool incontinence, uncontained secretions) and for those who are at increased risk of acquisition and adverse outcomes resulting from infection (e.g. immunosuppression, open wounds, indwelling catheters, anticipated prolonged length of stay, total dependence on healthcare workers for activities of daily living).

Cohorting

Cohorting patients who are colonised or infected with the same strain confines their care to one area and prevents contact with other patients. Cohorts are created based on clinical diagnosis, microbiologic confirmation when available, epidemiology, and mode of transmission of the infectious agent. It is generally preferred not to place severely immunosuppressed patients in patient care areas with other patients. Cohorting allows more efficient use of staff.

Cohorting has been used for managing outbreaks of MROs and pandemic influenza, and modelling studies provide additional support for cohorting patients to control outbreaks.

Placement of large numbers of patients

In the event of an outbreak or exposure involving large numbers of patients who require airborne precautions, an infection control practitioner should be consulted before patient placement. Appropriate measures may include:

- cohorting of patients in areas of the facility that are away from other patients; and
- using temporary portable solutions (e.g. exhaust fan) to create a negative pressure environment in the converted area of the facility.

Restricting movement within the facility

Restricting movement of patients during an outbreak reduces the risk of further transmission. If transfer within the facility or transport to another facility is necessary, advice should be sought from an infection control practitioner. If an infected patient must be moved the receiving area or facility should be notified of the nature of the patient's infection.

It is important to:

- ensure that infected or colonised areas of the patient's body are covered if relevant; and
- if the target infection is transmitted by the droplet or airborne route, ask the patient to wear a mask while they are being moved.

Contaminated PPE should be removed and disposed of and hand hygiene performed before the patient is moved. Clean PPE should be put on before the patient is handled at the destination.

Exclusion policies

Exclusion policies may also be implemented to restrict the spread of disease throughout a health care facility. This could include:

- excluding patients from participating in specific activities;
- restricting or cancelling visiting hours for patients in outbreak areas; and

- excluding staff from work until well if they are implicated in the transmission of infection (for e.g. food handlers)

In an outbreak of viral gastroenteritis, health care workers should not return to work until diarrhoea and vomiting have ceased for 2 days. It is extremely important that health care workers comply with appropriate hand hygiene methods and stringent infection control practices upon return to work, given that some studies have shown prolonged viral shedding.

Notifications and contact tracing

All health care facilities should have systems in place to ensure timely reporting of notifiable diseases to the relevant state/territory health department. As patients may present to a health care facility and be later confirmed to have a transmissible disease state/territory health authorities need to be notified to enable tracing of contacts of the infected patient in order to initiate appropriate counselling, quarantine and postexposure prophylaxis. Healthcare facilities may need to identify staff on duty and other patients present who may have been exposed to the infectious patient and be at risk.

Communication

One of the important aspects of the control effort is the written and oral communication of findings to the appropriate authorities, the appropriate health professionals and the public. This communication is based on the type and severity of the outbreak. During an outbreak it is important to provide education to the key stakeholders and clinicians about the organism, its mode of transmission and its behaviour in disease.

Within a healthcare facility, effective communication could consist of:

- appropriate signage to limit access to a room or a clinical unit;
- electronic alerts on the medical record to manage cases and contacts;
- emails and multimedia to target all stakeholders within the healthcare facility; and
- provision of education and written materials to visitors to inform them of the situation and the infection control measures with which they should comply.

Patients, their families, and visitors may experience concern or fear or may feel they are not being given enough information in an outbreak situation. Clearly explaining the process of outbreak management and the importance of infection control measures may assist them in understanding the situation and improve compliance with infection control directives.

B3.2.3 Applying transmission-based precautions during an outbreak

Successful outbreak management is based on a combination of transmission-based precautions. Specific interventions will be determined by the infection control practitioner, based on the mode of transmission of the infectious agent. These include:

- rigorous adherence to the 5 moments of hand hygiene;
- use of appropriate personal protective equipment (including gloves, apron or gowns, and surgical or P2 (N95) respirators);
- implementing patient dedicated or single-use non-critical equipment (e.g. blood pressure cuff, stethoscope) and instruments and devices;
- following standard procedures for containment, cleaning and decontamination of spills; and
- increasing the frequency of environmental cleaning, using appropriate products.

PUTTING IT INTO PRACTICE

Individual actions for reducing the risk

Become familiar with local policy on the implementation of transmission-based precautions in the event of an outbreak.
If an outbreak is suspected or identified, implement core strategies for prevention and control and seek advice from an infection control practitioner or person with designated responsibility for this task regarding intensified strategies appropriate to the specific organism.
Practice hand hygiene assiduously and wear appropriate PPE when caring for patients who may be colonised or infected.

Become familiar with local policy on antibiotic stewardship.

Involving patients in their care

The following information may be provided to patients to assist them in understanding outbreak management.

Hand hygiene is the most important part of preventing transmission of an infection — this applies to everyone including healthcare workers, patients, visitors and families.

If infected patients are transferred, they may be asked to wear a mask.

Infected patients should avoid unnecessary movement around other parts of the healthcare facility.

To minimise transmission of infection In hospitals, visitors should perform hand hygiene using alcohol-based hand rub before entering or exiting the patient care area; they may also be asked to wear gloves and gowns while they are with the patient.

In hospitals, staff must respond quickly to an outbreak of an infection to contain the infection and stop it spreading any further. Actions may include testing patients to see who may be carrying the infection, placing patients in single rooms or with other patients who have the same infection, and limiting movement of people around the facility.

B4 - APPLYING STANDARD AND TRANSMISSION-BASED PRECAUTIONS DURING PROCEDURES

Summary

- Medical and dental procedures increase the risk of transmission of infectious agents between patients and healthcare workers.
- 'Procedure' includes any situation in which there is a potential for contact between the skin of the healthcare worker and the patient's tissues, body cavities or organs, either directly or via surgical instruments or therapeutic devices.
- The more invasive the procedure, the greater the risk of transmission of infection. Before a procedure is undertaken, consideration should be given to whether there is a safer, less invasive alternative.
- The level of perceived infection risk depends on a range of factors including the site and complexity of the procedure and patient characteristics (e.g. age, underlying illness).
- Healthcare workers should be trained and competent in safe procedural techniques and participate in regular education sessions about minimising the infection risk of procedures. If there is any uncertainty, healthcare workers should contact the person with designated responsibility for infection control.

Patients and their carers should be offered clear, consistent information and advice through all stages of their care. This should include the risks of procedure-related infections, what is being done to reduce them and how they are managed.

This section outlines processes for risk identification and the application of standard and transmission-based precautions for certain procedures. It is not intended to provide guidance on performing procedures, but outlines the principles involved in the delivery of care that reduce the risk of transmission of infection during the insertion and maintenance of therapeutic devices and for surgery.

B4.1 TAKING A RISK MANAGEMENT APPROACH TO PROCEDURES

All procedures involve some risk of infection. Minimising the infection risk associated with a procedure should be an integral part of considering the overall risks and benefits of that procedure to the patient. The aim should be to perform the procedure with the lowest level of perceived infection risk that will meet the treatment goals for that patient. When performing the procedure, associated infection risks should be identified and minimised.

B4.1.1 Classifying procedures

Procedures can be classified according to the level of perceived risk, by applying the principles of Spaulding's criteria for assessing the risk of medical instruments and equipment according to their intended use (see Section B1.5).

Table B4.1: Level of risk to patients from different types of procedures

Level of risk	Criteria	Example
High risk (critical site)	Any surgical entry into tissue, body cavities or organs, or repair of traumatic injury.	Abdominal surgery Dental surgery
Medium risk (semi-critical site)	Contact with mucous membranes or non-intact skin	Respiratory procedure Internal/instrument examination (e.g. ultrasound, endoscopy) Minor skin surgery Minor dental procedures

Low risk (non-critical site)	Contact with intact skin	Non-invasive examinations or procedures (e.g. abdominal ultrasound) Blood pressure measurement, ECG, injection through intact skin Dental examination

B4.1.2 Appropriate use of devices

Appropriate use of devices is integral to reducing the risk of procedures. Single-use or single-patient items should be used wherever practical, and items designed for single use must not be used for multiple patients. Healthcare workers should be aware of situations where cross-contamination may occur during routine procedures.

Healthcare workers must adhere to infection control principles, including safe injection practices and aseptic technique for the preparation and administration of parenteral medications.

Single-dose vials

Medications or solutions that come into contact with normally sterile tissue should be sterile. The most effective way to avoid cross-infection via injection of medication is through the use of single-dose vials or ampoules and single-use sterile injecting equipment. Single-dose vials or ampoules, or prefilled syringes, should be used wherever these are available. These include the use of a sterile, single-use needle and syringe for each injection given, and adherence to practices that prevent contamination of injection equipment and medication.

Multi-dose vials

The Australian Drug Evaluation Committee (ADEC) has advised that injectable products packaged in multidose vials should not be used except where products such as insulin are intended solely for the exclusive use of an individual patient. In these particular cases, specific protocols should be in place to ensure the products are used for those individuals only, and practices that prevent contamination of injection equipment and medication are adhered to.

Currently some injectable products (e.g. Bacillus Calmette-Guérin [BCG] and botulinum toxin) are only available in multi-dose vials. When single-dose vials or ampoules are not available, there is a high risk of cross-contamination if injectable products are used on multiple patients. Steps should be taken to ensure these become available in single dose vials, however the risk of infectious disease transmission may be mitigated by:

- compliance with manufacturer's recommendations (adhere to instructions for refrigeration, storage, use within a specified time, expiry date);
- establishing a separate area designated for the placement of these medications away from any work area;
- having only the current patient's medication in the immediate working environment;
- using a clean needle and syringe to draw up the required dose from the vial or ampoule on every occasion;
- using a clean needle to draw up all the contents of the container into individual syringes before administering to patients;
- discarding any open ampoule(s) at the end of each procedure; and
- discarding product if sterility is compromised or questionable.

The use of multi-dose vials for vaccination programs has been associated with the transmission of infectious diseases including HIV, hepatitis B, hepatitis C, *Staphylococcus aureus*, *Streptococcus pyogenes* and *Pseudomonas aeruginosa*. International agencies such as the CDC and WHO recommend that single-dose vials be used for parenteral additives or medications whenever possible, especially when medications will be administered to multiple patients.

There may be some exceptional circumstances where for short periods (e.g. a few months) multi-dose vials may be the only way to deliver vaccines or drugs to a large proportion of the population in a timely fashion.

An example would be when a health emergency is declared because of an infection that has a high associated mortality and rapid spread (e.g. smallpox outbreak) and when there may be a delay in singledose vaccines or drugs becoming available for a period of time.

Table B4.2: Summary of processes for appropriate use of devices

Injection equipment	• Avoid contamination of the needle
Single-use items	• Do not use the same needle, cannula or syringe for more than one patient nor to access a medication or solution that might be used for a subsequent patient • Do not administer medications from a single syringe to multiple patients, even if the needle or cannula on the syringe is changed.
Single-patient items	• Use single-patient items for one patient only and dispose of them appropriately.
Single-use medications	• Only use single dose vials when administering drugs, therapeutic agents and vaccines to multiple patients • Do not administer medications from single-dose vials or ampoules to multiple patients or combine leftover contents for later use
Multi-dose vials	• Multi dose vials should not be used except where they are intended solely for the exclusive use of an individual patient (e.g. insulin)
Fluid infusion and administration sets (i.e. intravenous bags, tubing and connectors)	• Use for one patient only and dispose of appropriately after use • Do not use bags or bottles of intravenous solution as a common source of supply for multiple patients • Consider syringes or needles/cannulae as contaminated once they have been used to enter or connect to a patient's intravenous infusion bag or administration set • These should be changed on a regular basis, depending on their use

B4.2 THERAPEUTIC DEVICES

Therapeutic devices include catheters inserted for drainage (e.g. urinary catheter), for intravascular access (e.g. central venous line), for mechanical ventilation (e.g. intubation) and for feeding (e.g. enteral feeding tube).

Indwelling devices provide a route for infectious agents to enter the body. Aseptic insertion and careful maintenance of devices is critical to reducing infection risk.

Therapeutic medical devices are a common source of HAIs in intensive care units. Pneumonia, urinary tract infections and bloodstream infection account for around 70% of intensive care unit HAIs, and most of these are associated with invasive devices.

Table B4.3: Key concepts in minimising the risk of infection related to the use of invasive devices

Consider the infection risk during decision-making about whether or not to perform the procedure, ensuring that a therapeutic device is absolutely necessary for the patient
Ensure you are adequately trained and competent in the skills required for safe insertion and maintenance of the device
Choose the most appropriate device for the patient

Minimise the period of time a device remains in a patient
Use processes identified as those that minimise the risk of infection
Regularly monitor patients for any signs and symptoms of infection
Provide patient education on the infection risk associated with the insertion of devices and the importance of proper maintenance

Refer to full NHMRC Guidelines for discussion on specific devices -

- **Indwelling urinary devices**
- **Intravascular access devices**
- **Ventilation**
- **Enteral feeding tubes**

B4.3 SURGICAL PROCEDURES

The discussion in this section applies to all surgical procedures regardless of setting. While there is less evidence for surgical procedures in office-based practice than in hospitals, the same principles apply.

This information is included for audiologists who may be observing a surgical procedure or completing an audiological procedure while other surgery in progress or just completed.

B4.3.1 What are the risks?

The microorganisms that cause surgical site infections are usually derived from the patient (endogenous infection), being present on their skin or from an opened viscus. Exogenous infection occurs when microorganisms from instruments or the operating environment contaminate the site at operation, when microorganisms from the environment contaminate a traumatic wound, or when microorganisms gain access to the wound after surgery, before the skin has sealed.

The risk of surgery-related infection is increased by factors that:

- increase the risk of endogenous contamination (e.g. procedures that involve parts of the body with a high concentration of normal flora such as the bowel);
- increase the risk of exogenous contamination (e.g. prolonged operations that increase the length of time that tissues are exposed); and
- diminish the efficacy of the general immune response (e.g. diabetes, malnutrition, or immunosuppressive therapy with radiotherapy, chemotherapy or steroids) or local immune response (e.g. foreign bodies, damaged tissue or formation of a haematoma).

B4.3.2 Minimising the risk of surgical procedures

Practices to prevent surgical site infections are aimed at minimising the number of microorganisms introduced into the operative site, for example by:

- removing microorganisms that normally colonise the skin;
- preventing the multiplication of microorganisms at the operative site, for example by using prophylactic antimicrobial therapy;
- enhancing the patient's defences against infection, for example by minimising tissue damage and maintaining normothermia; and
- preventing access of microorganisms into the incision postoperatively by use of a wound dressings.

Patients and carers require clear, consistent information and advice throughout all stages of their care, including:

- the risks of surgical site infections, what is being done to reduce them and how they are managed;
- how to care for their wound after discharge; and
- how to recognise a surgical site infection and who to contact if they are concerned.

An integrated care pathway helps to communicate this information to both patients and all those involved in their care after discharge.

Patients should always be informed if they have been given antibiotics.

B4.3.3 Considerations pre-procedure

- The importance of hand hygiene for health care workers is discussed in Section B1.1. Artificial nails and jewellery may conceal underlying soiling and impair hand decontamination, and should not be worn by health care workers performing or assisting in surgical procedures.
- In carrying out procedures, there is a need to minimise the risk of microbial contamination of the operating site from the environment. Although there is limited evidence concerning the use of dedicated non-sterile operating attire (scrub suits, masks, hats and overshoes) by general staff in the operating environment, it may contribute to minimising operating environment contamination and reduce the risk of surgical site infection.
- While there is evidence to support the efficacy of preoperative showering of patients in the hospital setting as a measure to reduce the rate of surgical site infection, there is no evidence of a difference on surgical site infection rate between chlorhexidine as a cleansing agent and plain detergent or soap. In addition, chlorhexidine has been found not to be cost-effective for this application.
- There is no evidence that hair removal from patients influences the incidence of surgical site infection, but it might be appropriate in some clinical circumstances.
- Antibiotic prophylaxis has been used effectively to prevent surgical site infections for appropriate operative procedures since 1969. Prophylaxis usually involves a single dose of antibiotic often given to the patient intravenously, close to the time of surgery and differs from treatment that entails a course of antibiotics over a period of time. In common with therapeutic use, the use of antibiotics for prophylaxis carries a risk of adverse drug reactions (including *Clostridium difficile*-associated diarrhoea) and increased prevalence of antibiotic-resistant bacteria. The choice of antibiotic prophylaxis should be based on the *Australian Therapeutic Guidelines*.
- The evidence suggests that mupirocin or chlorhexidine nasal decontamination does not reduce the overall rate of surgical site infection.

Table B4.12: Summary of processes pre surgical procedure

Hand preparation	• If hands are visibly soiled, perform hand hygiene with plain soap prior to scrubbing • Remove debris from underneath fingernails using a nail cleaner, preferably under running water • Using a suitable antimicrobial soap, preferably with a product ensuring sustained activity, scrub hands and forearms for the length of time recommended by the manufacturer
Operating suite/room or procedure attire	• The operating team must wear sterile operation or procedure attire. • All operating suite/room staff who are not operating within the sterile field must wear dedicated non-sterile attire in all areas where operations are undertaken. • Movements in and out of the operating area should be kept to a minimum. • The operating team should remove hand jewellery before operations • The operating team should not wear artificial nails or nail polish during operations

Patient preparation	• Advise patients to shower or have a bath (or help patients to shower, bath or bed bath) using soap, either the day before, or on the day of, surgery • Avoid routine removal of hair — if clinical circumstances require hair removal, electric clippers with a single-use head are preferred to razors, and hair removal should occur on the day of surgery • Provide antibiotic prophylaxis where appropriate. Do so in accordance with the *Australian Therapeutic Guidelines* • Do not routinely use nasal decontamination with topical antimicrobial agents aimed at eliminating *Staphylococcus aureus*

B4.3.4 Considerations during a surgical procedure

- Hand hygiene before surgery is required to minimise the risk that the resident flora of microorganisms that normally colonise the skin, and/or transient organisms acquired by touch, contaminate the surgical wound. While transient microorganisms are readily removed by soap and water, antiseptics such as alcohol or detergent solutions containing chlorhexidine and povidone-iodine are required to eliminate resident microorganisms that reside in deep crevices and hair follicles.
- In the hospital setting, it is good practice to use sterile gowns in the operating area, to prevent patients from being exposed to the risk of contamination.
- There is no available evidence that double-gloving reduces the risk of surgical site infection or that glove perforation increases the risk of surgical site infection. However, current practice involves double-gloving in circumstances when the risk of glove perforation and its consequences for contamination of the operative field (in prosthetic surgery for example) is high.
- There is no evidence of difference between chlorhexidine and povidone-iodine (either aqueous or alcohol-based preparation) for antiseptic skin preparation and the costs are similar.
- There is a need for safe operating suite/room practice when using alcohol-based antiseptic skin preparations prior to incision with diathermy. The evidence suggests that there is no difference between rates of surgical site infection where diathermy is used to make an incision compared with conventional techniques.
- Although the use of non-iodophor-impregnated incise drapes is routine in some operations (such as prosthetic joint or graft surgery), they may marginally increase the risk of surgical site infection. However, adhesive drapes may have a role in maintaining the integrity of the operative site/field.
- Evidence from small surgery-specific studies up to 20–30 years old suggest that intraoperative subcutaneous wound irrigation with povidone-iodine or with saline under pressure reduces the incidence of surgical site infection. Although this was considered to be an adjunct to antibiotic prophylaxis in contaminated surgery, current practice has improved to make this approach unnecessary for the prevention of surgical site infection.
- There is no evidence that intracavity lavage with antibiotics, other than a single small study of tetracycline lavage after contaminated surgery, reduces the incidence of surgical site infection. There is some evidence that postoperative lavage of the perineal space with povidone-iodine reduces surgical site infection.
- There is evidence that re-disinfection of the skin adjacent to the wound with iodine in alcohol solution prior to incisional closure has no effect on the incidence of surgical site infection.
- The instillation of cefotaxime into wounds prior to closure appears to have no effect on surgical site infection incidence after surgery for peritonitis.
- There is no robust evidence to support the use of a dressing in the immediate postoperative period for the prevention of surgical site infection. However, it is generally accepted good clinical practice to cover the wound with an appropriate interactive dressing for a period of 2 days unless otherwise clinically indicated, for example, if there is excess wound leakage or haemorrhage.
- There is no robust evidence to support the use of one dressing over another. However, in the majority of clinical situations a semi-permeable film membrane with or without an absorbent island is preferable.

Table B4.13: Summary of processes during a surgical procedure

Hand hygiene	• Perform hand hygiene before the first operation on the list using an aqueous antiseptic surgical solution, according to the manufacturer's instructions for the product which is being used. Use a single-use brush or pick for the nails, and ensure that hands and nails are visibly clean • Before subsequent operations, perform hand hygiene using an antiseptic surgical solution. If hands are soiled during a procedure, hand hygiene should be performed again with an antiseptic surgical solution
Operating suite/room attire	• In hospital settings, wear sterile gowns during the procedure • Consider wearing two pairs of sterile gloves when there is a high risk of glove perforation
Patient preparation	• Prepare the skin at the surgical site immediately before incision using an antiseptic (aqueous or alcohol-based) preparation: chlorhexidine or povidone-iodine are most suitable • If diathermy is to be used, use aqueous-based preparations or ensure that antiseptic skin preparations are dried by evaporation and there is no pooling of alcohol-based preparations • If an incise drape is required, use an iodophor-impregnated drape unless the patient has an iodine allergy. Do not use non-iodophor-impregnated incise drapes routinely for surgery as they may increase the risk of surgical site infection
Wound management	• Avoid routine use of wound irrigation or intracavity antibiotic lavage as measures to reduce surgical site infection • Avoid routine use of intraoperative skin re-disinfection or topical cefotaxime as measures to reduce the risk of surgical site infection in abdominal surgery • It is recommended that at the end of the operation, surgical incisions are covered with an appropriate dressing such as semi-permeable film membrane with or without an absorbent island

B4.3.5 Considerations post-procedure

- There is no high-quality evidence available that supports a change to the current clinical practice of using an aseptic technique. However, the use of aseptic technique when removing or changing surgical wound dressings can minimise the risk of contaminating the site with additional microorganisms.
- Many of the trials investigating dressing for wound healing by secondary intention are old and most of the materials used do not reflect the underlying principles of current wound management and may have a detrimental effect on the patient's experience (e.g. pain). A number of new dressings containing antimicrobials, such as honey, silver and cadexomer iodine, are now available and may be clinically appropriate. However, to date, there is no evidence to prove their efficacy in prophylaxis of surgical site infection (SSI).
- There was no evidence available that examined the effects of wound cleansing solutions for the prevention of SSI.
- Not all SSIs require antibiotic treatment: minor infections may respond to drainage of pus (for example, by removal of sutures) and topical antisepsis. Antibiotic therapy carries with it the risk of adverse drug reactions and the development of antimicrobial-resistant bacteria as well as the associated risk of *C. difficile* diarrhoea.
- It is good practice to discard all used operating suite/room attire prior to leaving the operating area to prevent healthcare workers, patients and visitors from being exposed to the risk of contamination.

Table B4.14: Summary of processes following a surgical procedure

Dressings	• Use an aseptic technique for changing or removing surgical wound dressings • Avoid the routine use of topical antimicrobial agents for surgical wounds that are healing by primary intention as measures to reduce the risk of surgical site infection • Avoid the use of use Eusol and gauze, or moist cotton gauze or mercuric antiseptic solutions to manage surgical wounds that are healing by secondary intention • Use an appropriate dressing (such as semi-permeable film membrane with or without an absorbent island) to manage surgical wounds that are healing by secondary intention
Cleansing	• Use sterile saline for wound cleansing up to 2 days after surgery • Advise patients that they may shower safely 2 days after surgery
Management of surgical site infection	• When surgical site infection is suspected, either *de novo* or because of treatment failure, take a culture and give the patient an antibiotic that covers the likely causative organisms. Consider local resistance patterns in choosing an antibiotic and review the selection in light of results of microbiological tests • Avoid the use of Eusol and gauze, or dextranomer or enzymatic treatments for debridement in the management of surgical site infection

Refer to full NHMRC Guidelines for Checklist of standard precautions for procedures

This table outlines the use of standard precautions for a range of procedures. It is assumed that there is no known or suspected infection. Decision-making about the level of protection required involves a risk assessment of the procedure to be performed; for example, usual wound irrigation is unlikely to require surgical mask and eye protection in primary care, but may be required more often in the hospital setting.

PART C - ORGANISATIONAL SUPPORT

For infection prevention and control to be effective at the clinical level, much organisational support is required. This includes embedding infection control into governance and management structures, initiating procedures (e.g. immunisation programs) to ensure that health care workers are protected, instituting processes for surveillance that feed into the overall quality control program, implementing systems for ongoing staff education and training, and incorporating infection control into planning for facility design and maintenance.

Infection control is an occupational health and safety issue, which means that all those working in the healthcare facility — managers, healthcare workers and support staff —are responsible for providing a safe environment for patients and other staff.

Organisational support should aim to ensure that clinical work practices provide patient-centred care — this is not only essential from a safety and quality perspective but out of consideration for patient preferences. This may require consultation with patients and relevant consumer groups in the development of health care services.

The information presented in this Part is particularly relevant to managers of healthcare facilities. It outlines responsibilities of management of healthcare facilities, including governance structures that support the implementation, monitoring and reporting of effective work practices. While the focus of the information is acute care facilities, much of the information is relevant in other healthcare settings.

C1 - MANAGEMENT AND CLINICAL GOVERNANCE

Summary

- To be effective, infection prevention and control must be a priority in every healthcare facility — this requires total commitment at every level of the organisation.
- Organisational capacity is achieved by having appropriate governance and management structures. This means that managers are aware of the healthcare facility's performance in terms of infection transmission and there are systems in place to prevent the transmission of infection, reduce risk and address problems when they arise.
- The management structure and processes associated with infection control will differ depending on the size of the organisation and the types of healthcare services it delivers. However, the principles of clinical governance apply regardless of the setting and essential roles and responsibilities should be fulfilled.
- The person in charge of the organisation (e.g. chief executive officer [CEO] of a hospital, principal of an office-based practice) must have overall responsibility for and direct involvement in the organisation's infection control program.
- There must be adequate resourcing for dedicated infection control staff, and resources to run the infection prevention and control program including professional development.
- Each organisation should define the outcome measures for monitoring infection control policies (see Section C4).
- All employees should understand their roles and responsibilities and have appropriate training to maintain a safe work environment (see Section C3).
- Patient-centred health care is safer health care — patients' healthcare rights must be considered during the development of programs, policies and procedures.

C1.1 CLINICAL GOVERNANCE IN INFECTION CONTROL

Addressing infection prevention and control requires a facility wide program and is everybody's responsibility.

Healthcare facilities have a legal responsibility to provide a safe work environment, safe systems of work and a safe environment for patients and visitors.

Clinical governance refers to the system by which managers and clinicians in each healthcare facility share responsibility and are held accountable for patient care, for minimising risks to patients, and for continuously monitoring and improving the quality of clinical care.

Preventing transmission of infectious agents should be a priority in every healthcare facility. This will involve action to:

- develop a facility-wide strategic plan for infection control;
- establish a system of infection control management (such as a committee) with input from across the spectrum of clinical services and management, and a mechanism for considering patients' feedback;
- appoint infection control practitioners and support their professional development (e.g. attendance at relevant state or national professional organisation meetings);
- incorporate infection control into the objectives of the facility's patient and occupational safety programs;
- provide administrative support, including fiscal and human resources, for maintaining infection control programs; and
- provide adequate staff training and protective clothing and equipment, and arrange workplace conditions and structures to minimise potential hazards.

All healthcare workers need to be aware of their individual responsibility for maintaining a safe care environment for patients and other staff.

C1.2 ROLES AND RESPONSIBILITIES

Management and clinical governance can have a positive impact on the effectiveness of infection prevention and control, by driving continuous quality improvement and promoting a non-punitive culture of trust and honesty . Studies have found that where clinical governance and management encourage collaboration between healthcare managers and clinicians, change is more likely to be achieved than where there is unilateral governance. Change is also more likely to be achieved and sustained when the role of patients as partners in their health care is strengthened, and where there is a shared understanding of the role of patients, healthcare workers and organisations in achieving the best possible outcomes.

The roles and responsibilities described below are most relevant to acute health care settings. However, all the roles described in this section are important for effective infection control and can be readily adapted to other healthcare settings — for example, with the practice principal fulfilling relevant roles and responsibilities of a CEO, and the office manager or other staff representative with an interest in infection control fulfilling the role of infection control practitioner.

C1.2.1 Chief Executive Officer/Administrator

The healthcare facility's CEO or designated equivalent administrator should support and promote infection control as an integral part of the organisation's culture through the following strategies:

- having a performance agreement that includes infection prevention and control outcomes as a key performance indicator;
- endorsing the inclusion of specific articulated infection prevention and control roles, responsibilities and accountabilities for relevant staff within the facility's management plan;
- attending and participating in each Infection Prevention and Control (IPC) Committee meeting;

- ensuring that infection control practitioners are resourced:
    - in terms of co-workers, information technology, access to up-to-date information, designated office/work space and tools to meet relevant infection prevention-related legislative, regulatory and accreditation requirements;
    - to achieve negotiated healthcare-associated infection reduction targets and to perform the essential tasks outlined in Section C1.2.2 below;
- ensuring that the hospital's IPC program includes involvement of a medical practitioner to support and play a shared leadership role;
- ensuring that the rights of patients, as articulated in the Australian Charter of Healthcare Rights, are integral to the IPC program;
- committing to the IPC program vision, mission, priorities, targets and annual infection prevention plan with specific, measurable goals for healthcare-associated infection risk mitigation and reduction — these should be outlined in an annual infection prevention and control business plan which the CEO (or his or her designate) and the infection control practitioner jointly develop;
- supporting an organisational culture that promotes individual responsibility for infection prevention and control among all staff and values the IPC program contribution to the safety of patients, healthcare workers and others — this support includes ensuring IPC program staffing levels are sufficient and incorporating responsibility for infection prevention and control into every staff member's job description;
- authorising infection control practitioners to:
    - implement IPC program recommendations;
    - intervene when clinical or other practices pose infection risks (e.g. halt building and construction activities, close units during outbreaks and guide patient placement for isolation or cohorting); and
- recommending remedial action when infection prevention and control measures are compromised or breached.

In some Australia states and territories and internationally, personal performance agreements for CEOs include responsibility for infection control. For example, in Tasmania, there is a performance monitoring framework for CEOs called Vital Signs. This includes a number of key indicators that need to be achieved, including five infection control related indicators. CEOs are personally accountable for ensuring that all key indicators are met.

C1.2.2 Infection control practitioners

Infection control practitioners should have the skills, experience and qualifications relevant to their specific clinical setting and be able to develop, implement, coordinate and evaluate a facility-wide IPC program. They are primarily responsible for designing, coordinating, implementing and undertaking ongoing evaluation of the facility's infection control program and policies, including compliance with the respective state/territory and/or national accreditation, licensing, policy or regulatory requirements. They need to be supported by the facility with resources, authority and time to maintain clinical and professional currency (including support for credentialling and preferably a postgraduate qualification).

Infection control practitioners must be involved in decisions on facility construction and design, patient placement ratios (e.g. single rooms, negative pressure rooms) and environmental assessments.

The infection control practitioner's performance should be appraised at least annually, along with negotiation of individual professional development goals, support, opportunities and plan of work.

C1.2.3 Infection prevention and control committee

A multidisciplinary IPC Committee should review and guide the hospital's IPC program, strategies and plans. Membership must include but not be limited to the CEO or his/ her designate, an executive member with the authority to allocate the necessary resources and take remedial action as needed from time to time, a senior infection control practitioner and a medical practitioner.

The meeting frequency and content will depend on the facility's size, case-mix complexity and the infection risk of populations serviced. IPC Committee activity should be measured against negotiated annual performance goals as stipulated in the business plan.

The Committee should have a formal mechanism for regularly considering patients' experiences and feedback and modifying the IPC program accordingly.

The IPC Committee should have an organisational communication strategy to facilitate day-to-day activities and reporting activities, which should be able to be escalated in response to an incident or outbreak. Regular and ad-hoc communication processes should exist between the IPC team and relevant public health authorities.

C1.2.4 Infection control processes in office-based practice

In office–based practice, the processes associated with infection prevention and control will differ although the responsibilities are the same. The principal of the practice is equivalent to the CEO, with overall responsibility for infection prevention and control in the practice and a strong commitment to an agreed infection control plan based on the identified risks for the specific office-based practice. A nominated staff member must take on the role of infection control practitioner, developing infection control procedures and overseeing their implementation. This staff member will likely need additional training and perhaps ongoing external support in managing infection control issues. Infection control should be considered at every staff meeting, with discussion of procedures and processes of the practice and any problem areas.

C1.3 INFECTION PREVENTION AND CONTROL PROGRAM

The IPC program is the means by which infection control practice is implemented in every part of the healthcare facility. Elements of an IPC program include:

- development of a risk-management policy for the facility;
- development of infection prevention and control policies and procedures that are based on national and/or state/territory guidelines and relevant to the healthcare facility (including risk management);
- education and training of staff so that they can implement the policies and procedures;
- oversight of the implementation of policies and procedures;
- development of a monitor and review process to ensure that policies and procedures are being implemented correctly (e.g. completion of checklists during care provision, log books); and
- oversight of surveillance of:
  - specific organisms that are relevant to the local environment (this may require consultation with infectious diseases specialists or epidemiologists);
  - surgical site infections and other device-related infections; and
  - notifiable diseases

C1.3.1 Recommendations including policies and procedures

National and/or state infection prevention and control recommendations relevant to the facility should be endorsed and their principles applied as necessary according to local need by the IPC Committee. Compliance with these recommendations must be monitored. At a minimum, these recommendations form the basis of the infection control practitioner's directives, which should be easily accessible in hard copy, electronic or other formats. Suggested topics to be addressed, depending on the facility, include:

- hand hygiene;
- standard and transmission-based precautions, including:
  - aseptic technique and prevention of device-related infections and other healthcare-associated infections (e.g. surgical site infections, IVD-related bloodstream infections);
  - environmental cleaning and disinfection (with Environmental Services);
  - reprocessing of reusable equipment and supplies (with Reprocessing Services);
  - safe management of clinical and related waste and sharps;
- healthcare-associated infection surveillance;
- communicable disease post-exposure management and follow-up;

- outbreak management, including systems to designate patients known to be colonised or infected with a targeted MRO and to notify receiving healthcare facilities and personnel before transfer of such patients within or between facilities;
- critical incident management and investigation;
- epidemiologically significant organisms (including MROs);
- use of appropriate infection control measures (including transmission-based precautions) of potentially infectious persons at initial points of patient encounter such as at the time of admission and in the outpatient settings (triage areas, emergency departments, outpatient clinics, clinicians' offices).
- prevention and management of bloodborne pathogen exposure (with occupational health and safety);
- surge capacity for novel respiratory and other communicable disease emergencies (with emergency response committees and outbreak management teams); and
- construction/ refurbishment/ engineering.

C1.3.2 Infection prevention measures

To implement the measures outlined in infection prevention and control policies and procedures, the facility must have access to an accredited (e.g. National Association of Testing Authorities [NATA]) laboratory and pharmacy staff, as well as systems, protocols and resources to:

- implement the recommendations included in national and state/territory guidelines;
- perform surveillance and auditing;
- provide regular, meaningful feedback of HAI data to individual clinicians, specific specialty departments/units, quality improvement, senior management and others as stipulated in the annual IPC program business plan;
- implement and participate in periodic intensive local, state, national or global HAI reduction campaigns including application of recommendations for healthcare-associated infection surveillance and reporting;
- ensure collaboration between the infection control practitioner and other stakeholders such as infectious disease and pharmacy departments to support antibiotic stewardship;
- collaborate with product and device committees to assess the infection prevention implications of new devices, procedures and technologies;
- provide education regarding infection prevention core principles to all new staff and to existing staff at least annually;
- provide advice and information to staff regarding new and emerging infectious disease threats and trends; and
- have a process for engaging patients in the safety of their healthcare by routinely:
    - providing advice and education related to specific and general healthcare-associated infection prevention to patients and families (e.g. brochures, pamphlets, face-to-face discussions, information sheets); and
    - asking patients and families for feedback about their care.

C1.3.3 Quality improvement

Safe and high quality infection control practices contribute to continual improvements in the quality of healthcare provided in any setting. These practices occur at the organisational, staff and patient levels.

IPC programs need to incorporate the principles of quality improvement, through the use of approaches such as *plan-do-study-act* that enable processes to be enhanced and improved. It is essential to performance improvement that healthcare staff understand the value of monitoring and evaluating their own clinical practice. Examining patient and carer experiences can provide an insight into their perspectives and allow these to be taken into account in improving the quality of care.

Integrating monitoring and review processes into policies and procedures (e.g. through infection control audits) enables data to be collected. Performance indicators can be developed from this, such as surveys on compliance with protocols and monitoring the use of infection control products.

In the acute setting, it is recommended that hospitals support local research regarding specific cases of infection, outbreaks or preventative strategies, and adopt relevant research findings that reduce or prevent healthcare-associated infections. In addition, comprehensive and epidemiologically sound systems, protocols and resources should exist to:

- actively manage all infection prevention components of accreditation;
- design, undertake and respond to results of periodic audits and formal reviews of relevant clinical practice and performance (e.g. antibiotic use, hand hygiene compliance, cleaning);
- collaborate with Clinical Risk Departments and Executive Staff to develop appropriate methods for rapid response, remediation, investigation and evaluation of infection prevention critical incidents (e.g. sterilisation or disinfection failures); and
- provide basic, minimum infection control education to staff, healthcare workers and volunteers appropriate to their roles, risks and the services provided by the hospital; and
- include patient feedback on their care as an integral part of quality improvement.

Surveillance and healthcare-associated infection monitoring strategies should be designed and driven according to local activity, performance and trends in the incidence of epidemiologically significant organisms.

A useful resource is the ACSQHC *Measurement for improvement tool kit* it provides a set of practical methods to measure the safety and quality of clinical health care services.
http://www.safetyandquality.gov.au/internet/safety/publishing.nsf/Content/CommissionPubs

C1.3.4 Resource allocation

Healthcare facility managers should ensure that there are sufficient human and fiscal resources available to support all aspects of the IPC program, including:

- providing specific infection control full-time equivalents, determined according to the scope of the IPC program, the complexity of the healthcare facility, the characteristics of the patient population and the needs of the facility and community (office based practices may choose to attribute responsibilities and functions relating to infection prevention and control to a particular staff member);
- meeting occupational health needs related to infection control (e.g. provision of appropriate technologies and protective personal equipment, healthcare worker immunisation, post-exposure evaluation and care, evaluation and management of healthcare workers with communicable infections);
- in a hospital setting, providing clinical microbiology laboratory support, including a sufficient number of medical technologists trained in microbiology, appropriate to the healthcare setting, for detecting endemic and emerging pathogens, monitoring transmission of microorganisms, planning and conducting epidemiologic investigations; and
- funding surveillance cultures, rapid diagnostic testing for viral and other selected pathogens, preparation of antibiotic susceptibility summary reports and trend analysis.

C1.4 RISK MANAGEMENT

Risk management is the basis for preventing and reducing harm arising from HAIs and underpins the approach to infection prevention and control throughout these guidelines. Within a healthcare facility, a successful approach to risk management includes action at the organisational level (for example providing support for effective risk management through an organisational risk management policy, staff training and monitoring and reporting) as well as in clinical practice.

C1.4.1 Organisational support for risk management

For risk management within an organisation to be effective there needs to be appropriate infrastructure and culture; a logical and systematic approach to implementing the required steps; and embedding of risk management principles into the philosophy, practices and business processes of an organisation, rather than it being separate activity or focus.

Factors that support risk management across the organisation include development of a risk management policy; staff training in risk management; implementation of a risk register, risk treatment schedule and integrated action plans; monitoring and audit; and risk management reporting.

An infrastructure and environment that encourages two-way communication between management and healthcare workers and among healthcare workers is an important factor in increasing the level of support for and compliance with IPC programs. Management should:

- provide direction (e.g. nominate issues for attention that are relevant to the core business of the organisation, such as cough etiquette in general practice, prevention of diarrhoeal disease in paediatrics, appropriate management of urinary catheters in spinal injury care);
- establish and evaluate periodic goals (i.e. nominate reduced rates for performance improvement);
- seek feedback on policy directives particularly in regards to changes in clinical care protocols or new technologies;
- provide information to individuals, self-directed work groups, patients and other stakeholders, with an emphasis on continually improving performance.

Health care workers can contribute to the development of risk management structures, and are integral to the strategies within these. Strategies to assist individual healthcare workers to reduce risk is included at the end of each section of Part B.

C1.4.2 A stepwise approach to risk management

The International Standard for Risk Management ISO31000-2009 outlines a stepwise approach to risk management:

- ***establishing the context***— identifying the basic parameters in which risk must be managed (e.g. the type of health facility, the extent of and support for the facility's infection control program);
- ***avoiding risk*** — establishing whether there is a risk and whether potential risk can be averted (e.g. by questioning whether a procedure is necessary);
- ***identifying risks*** — a systematic and comprehensive process that ensures that no potential risk is excluded from further analysis and treatment (e.g. using root cause analysis);
- ***analysing risks*** — considering the sources of risk, their consequences, the likelihood that those consequences may occur, and factors that affect consequences and likelihood (e.g. existing controls);
- ***evaluating risks*** — comparing the level of risk found during the analysis process with previously established risk criteria, resulting in a prioritised list of risks for further action; and
- ***treating risks*** — selecting and implementing appropriate management options for dealing with identified risk (for example modifying procedures, protocols or work practices; providing education; and monitoring compliance with infection control procedures).

C1.5 TAKING AN ORGANISATIONAL SYSTEMS APPROACH TO QUALITY AND SAFETY

Addressing infection control issues requires a multi-component, facility-wide program and is everybody's responsibility. This section gives an outline of a systematic approach that has been shown to be effective (care bundles), together with the organisational support required at facility level to address crucial areas of infection prevention and control. C2 to C6 discuss the separate aspects of a systems approach to infection prevention and control.

A good example is the QSA program which focuses on the systems in organisations within the NSW Health system for quality and safety and not on individual performance. More info is at the Clinical excellence Commission website: http://www.cec.health.nsw.gov.au/programs/qsa.html

C1.5.1 Care bundles

'Care bundling' is an approach developed by the US Institute of Healthcare Improvement (IHI) to improve consistency of practice in healthcare facilities, particularly for conditions and procedures known to increase patients' risk of healthcare-associated infections. While large studies have not yet been undertaken, the approach has been shown to reduce healthcare-associated infections within hospitals16 and is now used widely, particularly in the US and UK.

A ‘care bundle’ is set of four or five evidence-based processes that aims to tie routine processes together into a cohesive unit that must be adhered to for every patient. The keys to the bundle strategy’s success are the standardised and unvarying application of bundle practices, the use of multidisciplinary rounds, and daily tracking and auditing of compliance.

Care bundles can be used to monitor care and to feedback care bundle results to clinical staff in order to decrease the rate of healthcare-associated infections related to that condition or that procedure. It is important that bundles are designed, implemented and evaluated with measurement designed for quality improvement rather than research or judgement.

C2 - STAFF HEALTH AND SAFETY

Summary

- Infection protection for healthcare workers should be an integral part of the infection control and occupational health and safety programs of every healthcare facility.
- This includes implementing a staff health screening policy, promoting immunisation, instituting extra protection for healthcare workers in specific circumstances (e.g. pregnant healthcare workers), and having processes for minimising and managing risk exposure.
- While the organisation has a duty of care to healthcare workers, staff members also have a responsibility to protect themselves and to not put others at risk.

C2.1 ROLES AND RESPONSIBILITIES

In the course of their duties, healthcare workers can be exposed to infectious agents (e.g. through direct contact with an infectious patient, visitor or colleague or indirectly through a contaminated surface or environment (ie air) or as the result of a sharps injury). Health care workers can also place patients at risk of transmission of infection (e.g. if the healthcare worker has an infectious condition that is capable of being transmitted as they perform their duties).

To ensure the safety of everyone in the facility, both employers and employees have a responsibility in relation to infection control and occupational health and safety.

C2.1.1 Responsibilities of healthcare facilities

As part of its IPC program, each healthcare facility should develop, implement and document effective policies and procedures related to staff health and safety, including strategies to prevent occupational exposure to infection hazards; prevent occupational risks from chemicals or processes used for recommended infection control activities; and implement healthcare worker immunisation programs for infectious agents they may encountered in the course of their duties.

At the start of their employment, all healthcare workers should be informed of the facility's policy on health screening and counselled, as appropriate, about their work placement in accordance with these policies. As personal and organisational circumstances change over time, reassessment and additional education may be necessary. Similarly, training institutions should inform healthcare students before their course admission about policies and procedures for staff health and safety and their implications, and provide counselling for students that may be prohibited from completing any requirements of their course due to disabilities, impairments or transmissible infections.

Healthcare worker's privacy and civil rights must always be respected and not breached.

Positive measures should be undertaken to implement and sustain appropriate infection control. There are five measures of protection:

- health status screening;
- education on safe work practices that minimise the transmission of infection;
- safe systems of work , with workplaces designed to allow clinical practice that minimises transmission of infection;
- physical protection, involving the use of PPE and immunisation; and
- reporting systems for compliance and identifying breaches of infection control protocols.

C2.1.2 Responsibilities of healthcare workers

Healthcare workers have an obligation to always follow specific establishment infection control policies as part of their contract of employment. This includes reporting their infectious status as well as any known potential exposures to blood and/or body substances. Failure to follow infection control policies and procedures may be

grounds for disciplinary action. Some states/territories have statutory infection control requirements for healthcare workers.

Healthcare workers with infections should seek appropriate medical care from a doctor qualified to manage the specific infectious diseases. Where there is a risk of a healthcare worker transmitting infection to a patient or other healthcare worker (e.g. if he or she is infected with an acute infection or other transmissible infection, carries a blood borne virus, or has a predisposing skin condition), the healthcare worker should be counselled about work options and either rostered appropriately or provided with equipment, information and facilities to enable him or her to continue to provide safe care.

The appropriate work option will depend on the specific circumstances:

- healthcare workers with symptoms of acute infections (e.g. vomiting, diarrhoea, flu symptoms) should not come to work for the specified exclusion period; and
- healthcare workers who carry a bloodborne virus (e.g. hepatitis B, hepatitis C, HIV) may need to accept that their duties may not involve significant amounts of direct patient care or exposure-prone procedures. In some jurisdictions, healthcare workers who carry a bloodborne virus are legally obliged to declare their infectious status.

Healthcare workers should be aware of their requirements for immunisation against infectious diseases and maintain personal immunisation records.

Healthcare workers in specific circumstances (e.g. pregnant healthcare workers) may be particularly susceptible to some infections and should work with occupational health and safety officers to ensure their safety.

Education about safe work practices is discussed in Section C3.

C2.2 HEALTH STATUS SCREENING AND IMMUNISATION

C2.2.1 Staff health screening policies

Before beginning employment, all staff should be assessed and offered testing and/or vaccination for specific infectious diseases before being allowed to work in high-risk areas, with particular attention paid to immune status, skin conditions and pregnancy in staff, as well as risk factors for specific groups of patients. These conditions may vary according to state/territory specific requirements and recommendations.

Routine screening and assessment

Routine screening at the start of employment occurs in three forms:
personal assessment of disease and immune status — a questionnaire (with recording of information gained) should check for details of medical history, particularly for rubella, measles, mumps, varicella (chickenpox), herpes simplex, Hepatitis B, immune disorders and skin conditions, and for prior exposure to tuberculosis (including working in high-risk settings and high-risk demographic background);
immunisation — (see Section C2.2.2); and
laboratory and other testing — this should include a routine tuberculin skin test. Routine screening for streptococcus and salmonella carriers is not recommended, although this form of screening may be instituted in the case of an outbreak.

C2.2.2 Immunisation

Though employers are not required to vaccinate staff, they should take all reasonable steps to ensure that staff members are protected against vaccine-preventable diseases. In small facilities (e.g. office-based practices), non-immune workers should be encouraged to be vaccinated. In larger facilities (where healthcare workers may be at significant occupational risk of acquiring a vaccine preventable disease) a comprehensive occupational vaccination program should be implemented that includes:

- a vaccination policy;
- maintenance of current staff vaccination records;
- provision of information about the relevant vaccine-preventable diseases, and

- the management of vaccine refusal (which should, for example, include reducing the risk of a healthcare worker transmitting disease to a vulnerable patient).

Healthcare facilities should advise healthcare workers of the potential consequences if they refuse reasonable requests for immunisation. Such advice and refusal to comply should be documented. Should such healthcare workers subsequently develop work-related infections, it is most likely that the healthcare establishment would not be found to be in breach of its duty of care.

Training institutions should ensure that healthcare students are vaccinated according to the *Australian Immunisation Handbook* schedule, to protect them against infections that they may encounter during their training.

Recommended vaccinations

The most recent edition of *The Australian Immunisation Handbook* (currently NHMRC 2008) provides detailed information on immunisation schedules and vaccines. Staff vaccination programs should comply as much as possible with these schedules, which acknowledge that some circumstances may require special consideration before vaccination.

Table C1: Recommended vaccinations for all healthcare workers

Hepatitis B
Influenza
Booster dose of adult formulation diphtheria-tetanus-pertussis vaccine
MMR (if non-immune)
Varicella (if seronegative)
Hepatitis A immunisation is recommended for healthcare workers in paediatric wards, ICUs and emergency departments that provide for substantial populations of Aboriginal and Torres Strait Islander children, and healthworkers in rural and remote Indigenous communities

Source: *Australian Immunisation Handbook*
Available at: http://www.health.gov.au/internet/immunise/publishing.nsf/Content/Handbook-home

Pre-vaccination screening

Pre-vaccination screening is outlined in Section 1.3.4 of the *Australian Immunisation Handbook*, including a pre-vaccination checklist. Healthcare facilities should have education programs to support their immunisation policy and reinforce the need for compliance.

C2.2.3 Staff records

Healthcare facilities should maintain a regularly updated record of healthcare workers' immunisation records on commencement of employment; any subsequent vaccinations received after commencing employment; serological results; and any counselling or education given regarding infectious diseases and the use of standard or additional precautions.

C2.3 EXCLUSION PERIODS FOR HEALTHCARE WOKERS WITH ACUTE INFECTIONS

Every healthcare facility should have comprehensive written policies regarding disease-specific work restriction and exclusion, which include a statement of authority defining who can implement such policies.

Any employee who has an infectious disease has a responsibility to:

- consult with an appropriate medical practitioner to determine that they are capable of performing their tasks without putting patients or other workers at risk;
- undergo regular medical follow-up and to comply with all aspects of informed clinical management regarding their condition; and
- observe standard precautions at all times (and any other recommended infection control practices and procedures).

These policies should encourage healthcare workers to seek appropriate preventive and curative care and report their illnesses, medical conditions, or treatments that can render them more susceptible to opportunistic infection or exposures. They should not penalise healthcare workers with loss of wages, benefits, or job status.

Table C2 Staff exclusion periods for infectious illnesses

Acute infection	Exclusion period
Conjunctivitis	Must not provide patient care for the duration of symptoms (i.e. while eye discharge is present).
Gastro-enteritis (infectious diarrhoea)	Must not come to work while symptomatic (e.g. diarrhoea and/or vomiting) or until 48 hours after symptoms have resolved (see GPP below)
Glandular fever	NO need for exclusion, even if having direct patient contact, provided staff are well enough to return to work and employ standard precautions.
Herpes Simplex (cold sores)	Must not provide direct care to neonates, newborns, patients in delivery suites, severely immunocompromised patients, burns patients, patients with extensive eczema, or patients in operating room if there is an exposed herpetic lesion. May provide direct patient care to other patients, do not need to wear a mask.
Herpes Zoster(Shingles)	Must not provide ANY direct patient care if lesions cannot be covered (e.g. ophthalmic zoster) If active lesions can be covered, can provide care to all patients except for pregnant women, neonates, severely immunocompromised patients, burns patients and patients with extensive eczema.
Influenza	If treated with an antiviral within 2 days of the onset of the disease, may return to work following 2 days of treatment If they feel well enough. Employees who have had no treatment should remain off work for 5–6 days.
Pertussis (Whooping Cough)	Remain away from work until at least 5 days after commencement of appropriate antibiotic therapy; or for 21 days after the onset of symptoms if not receiving antibiotic treatment.
Scabies and Lice	Remain off work until at least 24 hours after appropriate treatment has been completed.
Staphylococcal infection	Any staphylococcal-infected lesions (e.g. boils, wound infections) must be covered while at work. If lesions cannot be covered, must not perform patient care or prepare hospital food until they have received appropriate antibiotic therapy and the infection has resolved
Streptococcal infection	Any employee with streptococcal infected lesions (e.g. impetigo, tonsillitis) must ensure that lesions are covered while at work. If lesions cannot be covered, employees must not provide direct patient care nor prepare hospital food until 24 hours after appropriate antibiotic therapy. Employees with pharyngitis/tonsillitis should avoid patient contact for at least 24 hours after starting appropriate antibiotic therapy.
Tuberculosis (TB)	If TB disease is suspected or is present, staff to be notified to TB Services and treated. Any personnel with pulmonary TB is to be

	excluded from the workplace until cleared by TB Services. Any active TB must be monitored by TB Services.
Viral rashes	*Measles* — If suspected, must remain off of work until appropriate test results are known. May return but must be excluded for 4 days after the appearance of the rash if they develop measles. *Mumps* — If suspected, must remain off work until appropriate test results are known. May return to work if they have serological evidence of immunity (i.e. are IgG sero-positive and IgM seronegative). Must be excluded from work for 9 days after the onset of parotid gland swelling if they develop mumps. *Rubella (German Measles)* — If suspected, must remain off of work until appropriate test results are known. May return to work if they have serological evidence of immunity (i.e. are IgG sero-positive and IgM sero-negative).Personnel must be excluded for 7 days after the appearance of the rash if they develop Rubella. *Varicella (Chicken Pox)* — Before starting employment, personnel should be screened by completing a pre-employment health assessment; non immune staff should be offered vaccination unless contraindicated; personnel must be excluded for at least 5 days after the rash appears and all blisters have dried. *Human Parvovirus B19 (Slapped Face)* — does not require exclusion from work, non-infectious once rash develops.
Viral respiratory tract infections (e.g. common cold).	Staff should be excluded from contact with susceptible persons, until they are no longer symptomatic. Staff with viral respiratory tract infections should stay at home until they feel well.

GOOD PRACTICE POINT

Norovirus exclusion periods
Health care workers should not return to work until diarrhoea and vomiting have ceased for 2 days.
It is extremely important that health care workers comply with appropriate hand hygiene methods and stringent infection control practices upon return to work, as some studies have shown prolonged viral shedding with this infection.

C2.4 HEALTHCARE WORKERS WITH SPECIFIC CIRCUMSTANCES

Healthcare facilities should have comprehensive occupational health programs to manage healthcare workers in specific circumstances that put them at greater risk of infection.

Where a healthcare worker is known to be particularly susceptible to healthcare associated infections, work duties are assessed to ensure that the welfare of that person, patients and other healthcare workers is safeguarded. This may involve redeployment to a role involving less risk. Healthcare workers in this situation may require counselling on what tasks they can perform, what they should avoid and the possible impact on their work on their health.

C2.4.1 Pregnant healthcare workers

Employers should provide information on the risks associated with pregnancy and should assist pregnant healthcare workers to avoid infectious circumstances that may present a risk to the healthcare worker (mother) or foetus. It is the responsibility of pregnant healthcare workers to advise their doctor and employer of their pregnancy; this information must remain confidential.

Adherence to standard and transmission based precautions and vaccination should protect healthcare workers. However, pregnant healthcare workers should be given the opportunity to avoid patients with specific infections. Those without immunity to rubella, varicella, cytomegalovirus or parvovirus, or who have not had cytomegalovirus infection, should be redeployed if they are at risk of contracting these diseases through their work.

For more information, refer to Section 2.3.2 of the *Australian Immunisation Handbook.*

C2.4.2 Immunocompromised healthcare workers

Healthcare workers with immune deficiencies are more at risk of acquiring infections. The type of employment they can undertake should include only duties that will minimise their exposure to infections. Predisposing conditions include neutropenia, disseminated malignancy and infections that produce immunodeficiency (e.g. HIV).

Refer to Section 2.3.3 of the *Australian Immunisation Handbook* for guidance on the immunisation of immunocompromised healthcare workers.

C2.4.3 Healthcare workers with skin conditions

Skin integrity is the ultimate barrier to transmission of infectious agents. When staff members have damaged skin or weeping skin conditions (e.g. allergic eczema, psoriasis, exfoliating dermatitis), they may be readily colonised by healthcare associated microorganisms and may become a vehicle for disseminating these organisms. Healthcare workers in this situation should be identified by personal history screening when they start employment, and need to be informed of the risks they may pose to patients. Any damaged skin must be appropriately covered before healthcare workers carry out procedures. Consideration must be given to providing these staff members with appropriate, individual PPE such as specific types of gloves, hand hygiene product and moisturising lotion.

C2.5 EXPOSURE PRONE PROCEDURES

Exposure prone procedures (EPPs) are invasive procedures where there is potential for direct contact between the skin, usually finger or thumb of the healthcare worker, and sharp surgical instruments, needles, or sharp body parts (e.g. fractured bones), spicules of bone or teeth in body cavities or in poorly visualised or confined body sites, including the mouth of the patient.

During EPPs, there is an increased risk of transmitting bloodborne viruses between healthcare workers and patients (DoHA 2004). A list of EPPs is in Appendix 3 of full NHMRC IPC Guidelines. The nature of EPPs can be categorised according to level of risk of transmission, in increasing order of magnitude.

Table C3 Categories of exposure prone procedures

Category 1	A procedure where the hands and fingertips of the healthcare worker are usually visible and outside the body most of the time and the possibility of injury to the worker's gloved hands from sharp instruments and/or tissues is slight. This means that the risk of the healthcare worker bleeding into a patient's open tissues should be remote (e.g. insertion of a chest drain).
Category 2	A procedure where the fingertips may not be visible at all times but injury to the healthcare worker's gloved hands from sharp instruments and/or tissues is unlikely. If injury occurs it is likely to be noticed and acted upon quickly to avoid the

	healthcare worker's blood contaminating a patient's open tissues (e.g. appendectomy).
Category 3	A procedure where the fingertips are out of sight for a significant part of the procedure, or during certain critical stages, and in which there is a distinct risk of injury to the healthcare worker's gloved hands from sharp instruments and/or tissues. In such circumstances it is possible that exposure of the patient's open tissues to the healthcare worker's blood may go unnoticed or would not be noticed immediately (e.g. hysterectomy).

Source: DH/HP/GHP3. *HIV Infected Health Care Workers: Guidance on Management and Patient Notification.* London; 2005

C2.5.1 Responsibilities

Employers

Employers must ensure that employees who perform EPPs have access to appropriate information, testing, counselling and vaccination programs. Serological testing may be provided by the healthcare facility or healthcare workers may choose to seek testing from outside sources. Healthcare facilities should aim to achieve voluntary compliance and self-disclosure by providing an environment in which healthcare workers know their confidentiality will be maintained.

Under current notification requirements, medical practitioners must notify the chief medical officer or state/territory health department of cases of HIV, HBV and HCV, by either name or code. A medical practitioner may be legally obliged to bring to the attention of the appropriate registration board any registered professional who is unable to practise competently or who poses a threat to public safety.

Healthcare workers who need to modify their work practices because they are carriers of a bloodborne virus should be provided with counselling and, where practical, with opportunities to continue appropriate patient care activities, either in their current position or in a redeployed position, or to obtain alternative career training.

Healthcare workers

Healthcare workers who undertake EPPs have a responsibility to know their infectious status with regard to bloodborne viruses such as hepatitis B virus, hepatitis C virus and HIV, and should be given relevant information about the tests available and encouraged to have voluntary testing.

Healthcare workers who carry a bloodborne virus have a clear responsibility to follow the treatment recommended by their doctor and modify their involvement in direct patient care. They **must not** perform EPPs if they are:

- HIV antibody positive;
- hepatitis B e antigen (HBeAg) positive and/or HBV DNA positive at high titres; or
- HCV RNA positive (by polymerase chain reaction or similar test).

Healthcare workers who carry a bloodborne virus and are not in these categories must not perform EPPs until specialist medical advice has been sought.

Healthcare workers who are currently HBsAg positive and HBV DNA negative or HCV antibody positive and HCV RNA negative must obtain ongoing medical advice regarding their potential infectiousness and the appropriateness of their continued performance of EPPs.

Healthcare students

Conditional registration may be required for students who have had to undertake modified training programs. This will require an undertaking that individuals who are known to carry HIV, HCV or HBV will report their infectious status at the start of their employment and agree not to perform EPPs. Training courses that require the performance of EPPs should include information, counselling, opportunities for testing and career advice.

Training institutions should counsel student healthcare workers carrying bloodborne illness capable of being transmitted through EPPs, against a career in any profession which may involve such procedures.

C2.6 OCCUPATIONAL HAZARDS FOR HEALTHCARE WORKERS

Needlestick and other blood or body fluid incidents are the main causes of occupational hazards for healthcare workers, including HIV, HBV and HCV.

C2.6.1 Sharps injuries

Healthcare workers face the risk of injury from needles and other sharp instruments during many routine procedures. Injuries most often occur after use and before disposal of a sharp device, during use of a sharp device on a patient and during or after disposal. There are many possible mechanisms of injury during each of these periods.

Measures to help combat needlestick and other sharps injuries include training and education on the risks associated with procedures and on the use of needlestick devices; and safer working practices (including adherence to proper handling and disposal procedures and ensuring that disposal containers are not overfilled.

The use of devices with safety engineered protective features was mandated in the US in 2000 and has been associated with reduced rates of incidence of needlestick injuries (Jagger 2008). Despite difficulties in determining, the direct impact of using safety-engineered devices compared to standard devices safety-engineered devices are an important component in percutaneous injury prevention. Typically a sharps-injury campaign involves multi-modal strategies. As a result many studies that show a reduction in incidence of needlestick injuries with the use of safety engineered devices have also involved a combination of other intervention measures such as training and education, overarching hospital policies and other technologies.

Australia is the only country with well-developed systems of infection control and occupational health and safety that has not yet mandated the use of safety or retractable devices. Such mandates exist in the USA, Canada and most recently the European Union, including the UK. The current UK policy recommends the provision of medical devices that incorporate a sharps protection mechanism where there are clear indications that they will provide safe systems of working for healthcare workers. Consideration of economic and social costs, staff preferences, ease of use, and time required to train staff is necessary before widespread implementation of safety-engineered devices in Australia. In the meantime, if a facility chooses to use safety-engineered devices, introduction of the devices must be supported by a comprehensive training and education program.

Despite systems approaches to improving safety and with growing availability of safety devices, healthcare workers are still being exposed to bloodborne virus infections. For example, a survey of occupational exposures in Australian nurses found that in the 12 months prior to the survey, 11.2% of nurses had sustained at least one needlestick or other sharps injury. As well as individual actions, safe systems of work and engineering controls must be in place to minimise any identified risks.

C2.6.2 Managing risk of exposure

Exposures that might place a health care worker at risk of hepatitis B virus, hepatitis C virus, HIV or human T-cell lymphotropic virus type I (HTLV-I) are percutaneous injury (e.g. needlestick or cut with a sharp object) or contact of mucous membrane or non-intact skin (e.g. exposed skin that is chapped, abraded, or affected by dermatitis) with blood, tissue or other potentially infectious body fluids.

Healthcare facilities must have documented, readily accessible protocols for providing **immediate postexposure advice** for sharps injuries and other blood or body fluid incidents involving healthcare workers:

- Treatment protocols include removal of contaminated clothing, thorough washing of the injured area with soap and water; and flushing of affected mucous membranes with large amounts of water.
- Healthcare workers should be aware that they must report occupational exposures immediately.
- Immediate post-exposure prophylaxis (PEP) should be performed, involving:

    - a risk assessment of the exposure, taking into account the type of exposure, the type and amount of fluid involved, the infectious status of the source (if known), and the susceptibility of the exposed health care worker (through collection of information about medications they are taking and any underlying medical conditions or circumstances);
    - testing the source (if known) for HBV surface antigen (HBsAg), HCV antibody and HIV antibody; and
    - baseline testing of the injured health care worker for HBV surface antibody, and serum held for further testing (e.g. HIV antibody, HCV antibody, and/or baseline alanine aminotransferase testing), if required.
- Continuing PEP should be offered if the source person is found to be positive for HIV, HBV or HCV — the nature of the PEP will depend on the virus involved (see the *Australian Therapeutic Guidelines* advice on longer-term, virus-specific PEP (available at http://www.tg.org.au/etg_demo/tgc.htm#tgc/abg/7356.htm).
- postexposure counselling and follow-up should take place — if the person has been exposed to a bloodborne virus, they should be advised about precautions to prevent secondary infection at work and in the community in the follow-up period (e.g. not sharing implements, safe sex and safe injecting, and other relevant matters based on an individual risk assessment)

Each healthcare facility requires a policy on the management of needlestick injuries, as generic policies may not be relevant to individual settings (e.g. access to care, especially after hours).

C3 - EDUCATION AND TRAINING

Summary

- Education and training underpin efforts to integrate infection control practices into practice at all levels of every healthcare facility.
- Essential education for all healthcare workers should cover infection prevention and control work practices and their role in preventing the spread of infection, as part of undergraduate education, staff orientation and continuing professional development.
- Specific postgraduate education of infection control practitioners is strongly recommended.
- Engaging patients and carers in their own healthcare is integral to effective infection control. All healthcare workers should be informed about the rights and responsibilities of patients and learn how to apply this understanding in the way that they deliver care.

C3.1 TEACHING FACILITIES

All healthcare workers need to understand the basis and importance of infection control. Up-to-date information on infection control basics, policy, procedures, quality assurance and incident monitoring should be included in the curriculum of all undergraduate and postgraduate courses in health-related areas. Universities and training colleges also have an obligation to inform prospective students about the impact that particular infections may have on their ability to complete the course and engage in the full spectrum of clinical practice after graduation (see Section C2). This information should include advice about specific measures, including immunisation, that reduce the risk of acquiring infection.

C3.1.1 Education of infection control practitioners

While some states in Australia have some requirements for practising as an infection control practitioner, there is currently no minimum or standardised educational requirement to practice as an infection control practitioner, or to coordinate an organisational IPC program. A range of postgraduate education programs are currently available for nurses seeking or establishing a career in infection control in Australia, although the content of these courses is variable.

GOOD PRACTICE POINT

Education of infection control practitioners

Postgraduate education gives infection control practitioners the necessary expertise to fulfil the role. Specific professional development should be supported at all levels.

C3.2 HEALTHCARE FACILITIES

Healthcare facilities should provide specific education and training for all healthcare workers and students about infection control principles, polices and procedures that are relevant to the facility. The aim is to inform and educate healthcare workers about the infectious hazards they will face during their employment, and their role in minimising the spread of infection to others. Special attention should be given to advice about hand hygiene. The role of clinical educators in providing this education needs to be supported, as they provide a vital link between teaching and health care facilities.

At a minimum, all staff (both clinical and non clinical) should be educated about**:**

- modes of transmission of infectious agents;

- risk identification, assessment and management strategies including transmission-based precautions;
- orientation to the physical environment;
- safe work procedures;
- correct use of standard precautions;
- correct choice and use of PPE, including donning and doffing procedures and fit checking of masks;
- appropriate attire (shoes/hair/nails/jewellery);
- hand hygiene practices;
- levels of cleaning required for clinical areas and equipment;
- how to deal with spills;
- safe handling and disposal of sharps;
- reporting requirements of incidents such as sharps injuries and exposures;
- waste management;
- antibiotic policy and practice; and
- patient confidentiality.

This information should be provided in the context of their roles in the organisation or practice, and with a focus on respecting and maintaining patient confidentiality at all times. It should be provided as part of their orientation, with periodic updates and refresher courses as required for their specific jobs.

Healthcare workers may also require job or task-specific education and training, such as:

- instrument cleaning and sterilisation competency testing;
- insertion and management of central and peripheral lines; and
- risks and prevention of MRO transmission.

Job-specific training should be provided as part of orientation, when new procedures affect the employee's occupational exposure, before rostering to hazardous areas (e.g. caring for patients with hepatitis B in a general medical ward); and at a minimum, in annual refresher courses. Healthcare workers should be assessed to ensure that they are competent in using and consistently adhering to the specific infection control practice. Healthcare facilities should maintain records of participation by healthcare workers in infection control education programs.

C3.3 EDUCATION STRATEGIES

The term 'educational strategies' encompasses a wide range of commonly applied interventions that aim to bring about and sustain changes in the practice of healthcare workers. A review was undertaken to inform the development of these guidelines, identifying relevant systematic reviews of educational interventions in general healthcare settings and, more specifically, where education has been used to reduce healthcare associated infections and improve hand hygiene in the workplace.

Examples of education activities include:

- educational meetings, either didactic (e.g. lecture, presentation) or interactive (e.g. workshop with role play and case discussion);
- educational materials, either printed or audiovisual;
- educational outreach, where an intervention is delivered by a visiting infection control expert;
- continuing medical education;
- multifaceted, tailored interventions to address barriers to good practice; and
- inter-professional education.

While the overall findings of the reviews were inconclusive, they did identify some consistent trends:

- Multifaceted strategies, which consider the needs of the target group, potential barriers and facilitators and the context in which educational strategies are applied, are likely to be more effective than single strategies, although it is not known what combination of interventions, if any, is optimal.

- Active educational interventions that are repeated with some frequency have a greater chance of changing behaviour than a single, didactic session. Repetition and interactivity have both been shown to be important factors in achieving behaviour change that is sustained.
- The distribution of printed materials on their own was not found to be consistently effective, but may contribute when included in a multifaceted intervention. The use of multiple forms of media in an education intervention may be more effective than the use of single media.
- Educational outreach visits have been found to be an effective method, especially when combined with other strategies such as interactive education and printed materials, but are costly to implement. They seem to be most effective when related to prescribing practices of moderate complexity.

Education activities can be integrated into staff orientation programs, credentialling packages, annual training and competency testing, implementation of policy and procedure manuals, and in decision support tools available on the facility intranet. The infection control practitioners' contact details should be readily available to all staff and included in all resources.

E-learning (e.g. interactive web-based training) is being used in some states, and may be a useful addition to other education strategies. For example, the Queensland Health Clinician Development Education Service offers interactive flexible on-line learning programs across a wide range of topics, including infection control, which are available 24 hours a day from work or home.

C3.5 COMPLIANCE AND ACCREDITATION

C3.5.1 Auditing

Auditing of healthcare worker behaviour is important for surveillance and accreditation, and to reinforce positive signs of culture change within the facility. Auditing to measure compliance with infection control policies and procedures can occur through:
direct observation;
examining logs and register of specific activities (e.g. sterilisers); and
monitoring use of PPE or hand hygiene products.

Timely feedback is a critical aspect of auditing. In acute care settings, measurement and feedback generally occurs at ward level.

C3.5.2 Accreditation and credentialing

AICA (Australian Infection Control Association), the peak national body representing the interests of the specialist practice of infection control within Australia, recommends certificated credentialing of infection control practitioners. This is a self-regulatory process to determine and acknowledge that an individual has demonstrated prescribed competence of the relevant specialist nursing role.

C3.5.3 Mentoring, support and networking

While there are no formal mentoring programs in place, many infection control practitioners provide mentoring to less experienced staff as part of their role.

There are networking and support forums available through AICA and the AICA state and territory affiliated associations, as well as region-based forums, and practitioners can also use other informal networks and contacts with other infection control practitioners.

C3.6 PATIENT ENGAGEMENT

Informing patients and carers about infection prevention strategies and taking their experience and feedback into account is pivotal to safe and effective clinical care. Patient engagement is not just about giving information, it is a process of informing, listening and interacting that gives patients the skills and knowledge

to be actively involved in their own health care, give feedback and participate in quality improvement procedures.

Through open, respectful interactions with healthcare workers, patients and carers can be given information and support to ensure that they are able to maintain a safe environment in which they receive their care (e.g. information on caring for wounds, basic advice on hand hygiene and spread of infection).

Written material (such as brochures and posters) can be used to reinforce verbal discussions with patients as part of their care. Examples of useful instructional materials for patients and visitors include:
recommended hand hygiene;
respiratory hygiene/cough etiquette practices;
the need for and application of transmission-based precautions; and
information about specific MROs (e.g. MRSA or *C. difficile*) and how to stop them spreading.

Patient engagement is especially important in the event of a gastroenteritis or influenza outbreak or entry into a ward that houses immunosuppressed patients.

C4 - HEALTHCARE-ASSOCIATED INFECTION SURVEILLANCE

Summary

- Appropriate surveillance can substantially reduce healthcare-associated infections, morbidity and mortality.
- Both outcome and process measures are used for surveillance in large health facilities; process measures alone can provide a useful alternative, particularly in smaller facilities.
- Timely targeted feedback is critical for effective surveillance.

Many infections can be prevented using approaches based on quality and safety theories such as:

- quality improvement methodologies;
- creating a safety culture (individuals taking responsibility for ensuring safety and quality of themselves and others); and
- application of systems thinking (i.e. understanding the factors in the system that allow errors to occur).

To be successful, all these approaches need to be based on comprehensive information obtained through surveillance — 'the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health' (CDC 2001).

All healthcare facilities require healthcare-associated infection surveillance systems — local data collection that results in timely feedback has been shown to reduce infection rates.

Refer to full NHMRC Guidelines for discussion on

- Role of surveillance in reducing HAI
- Types of surveillance programs – process surveillance and outcome surveillance

NOTIFIABLE DISEASES

Notifiable diseases

Notifiable diseases in Australia are listed at:
http://www.health.gov.au/internet/main/publishing.nsf/Content/cda-surveil-nndss-casedefs-distype.htm.

State and territory health departments

Public health legislation in each state and territory mandates the reporting of certain diseases by medical practitioners, hospitals, and/or laboratories to the relevant state or territory Communicable Diseases Unit. Notifications are collected at the state/territory level, and computerised, de-identified records are sent to the Australian Government Department of Health and Ageing for collation into the National Notifiable Diseases Surveillance System (NNDSS) for analysis at a national level. NNDSS was established in consultation with the Communicable Diseases Network Australia (CDNA).

Links to state and territory public health legislation can be found at:
http://www.health.gov.au/internet/main/publishing.nsf/Content/cda-state-legislation-links.htm.

C5 - ANTIBIOTIC STEWARDSHIP

Refer to full NHMRC Guidelines for discussion

C6 - INFLUENCE OF FACILITY DESIGN ON HEALTHCARE-ASSOCIATED INFECTION

Summary

The design of a healthcare facility can influence the transmission of healthcare-associated infections by air, water and contact with the physical environment. Key design features that minimise the transmission of infection include:

- surface finishes that are easy to maintain and clean;
- ventilation, air conditioning, cooling towers and water systems that meet Australian standards for the facility they are to service;
- the ability to isolate patients:
    - in a single room (infectious patients) or negative pressure room (to prevent transmission of airborne pathogens)
    - positive pressure rooms or use of laminar airflow filtration (LAF) for immunocompromised patients
    - triaging of patients in waiting rooms with separation of infectious patients;
- appropriate work place design:
    - separation of procedural and cleaning areas
    - movement of work flow systems from clean to contaminated areas
    - ready access to hand hygiene facilities
    - adequate storage for clean and sterile items;
    - adequate waste management procedures and linen handling; and
- involvement in demolition, construction and renovation projects of a multidisciplinary team that includes infection control staff to coordinate preventive measures.

C6.1 FACILITY DESIGN AND ITS IMPACT ON INFECTION CONTROL

Infection prevention and control requirements are critical to the planning of a healthcare facility and need to be incorporated into plans and specifications. All areas of a healthcare facility should be designed, constructed, furnished and equipped to minimise the risk of transmission of infection. In particular, the design and layout of the facility should facilitate the application of standard and transmission-based precautions by all staff.

C6.1.1 Evidence on the influence of environmental design on healthcare-associated infection

There are few randomised controlled trials relevant to the effects of specific design features or interventions on health outcomes. However, from case reports, published literature relating to outbreaks and from a theoretical risk management perspective, it is clear that the design of buildings can have an impact on rates of HAIs. Reliable patterns across several studies emerged, which were broadly consistent with predictions based on established knowledge and theory concerning environment and healthcare outcomes.

However, it is difficult to distinguish the independent effect of any environmental factor, as most changes of the physical environment in healthcare settings alter several environmental factors simultaneously. For example, renovating an intensive care unit with two-bed patient rooms to create single-bed rooms would be likely to alter not only the number of patients per room, but also the ratio of hand hygiene sinks per bed and possibly the room ventilation or air quality.

C6.2 MECHANISMS FOR INFLUENCING HEALTHCARE-ASSOCIATED INFECTION THROUGH ENVIRONMENTAL DESIGNS

C6.2.1 Reducing airborne transmission

Reservoirs for airborne pathogens include:
dust (e.g. spores of *C. difficile* or *Aspergillus*);
aerosol droplets (e.g. TB, severe acute respiratory syndrome [SARS], influenza, chickenpox), and
skin scales shed by patients infected with MRSA.

Airborne transmission has also been implicated in outbreaks of other infections such as *Acinetobacter* and *Pseudomonas* spp.

Most pathogens in healthcare settings originate from patients, staff and visitors within the buildings. Other pathogens can enter buildings from outside air through dust that harbours pathogens such as *Aspergillus*, streptococci or staphylococci. There are also less common sources of airborne infections; for example, bird droppings or aerosols from contaminated water in a warm-water therapy pool.

Approaches to airborne transmission

Approaches to reducing airborne transmission include:
installation of effective air filtration;
specifying appropriate ventilation systems and air change rates;
employing monitoring and control measures during construction or renovation; and
using single-bed rooms instead of multi-bed rooms to increase isolation capacity.

In dental practices, engineering rules state there must be separation between inlet air for compressors and air conditioning outlets.

C6.2.2 Reducing infections spread through the physical environment

The prevention of contact-spread infections is of paramount importance in healthcare settings. Contact contamination is generally recognised as the principal transmission route of healthcare acquired infections, including pathogens such as MRSA, *C. difficile* and VRE, which survive well on environmental surfaces and other reservoirs.

Environmental routes of contact-spread infections include direct person-to-person contact and indirect transmission via environmental surfaces.

Reducing surface contamination through hand hygiene compliance

Healthcare workers' hands play a key role in both direct and indirect transmission. Given the importance of maximising hand hygiene compliance, it is absolutely essential that all areas of the facility are designed to facilitate compliance with hand hygiene requirements.

Accessibility

Inconveniently located alcohol-based product dispensers, sinks and basins are a major barrier to healthcare worker compliance with hand hygiene requirements.

Design features can increase hand hygiene compliance by providing a greater numbers of alcohol-based product dispensers. This increased accessibility assists healthcare workers in complying with hand hygiene requirements, particularly if dispensers are placed in appropriate locations (where clinical care is provided [e.g. bedside] or where indirect care tasks are performed). Other aspects of design that may increase compliance include automated dispensers of hand hygiene products, electronic monitoring and computerised voice prompts.

As well as being installed in all patient care areas, hand hygiene facilities should be placed in all areas where careful attention to hygiene is essential, such as kitchens, laundries, pharmacies, laboratories and staff amenities areas (e.g. bathrooms, toilets and change rooms).

Staff preference

Healthcare worker acceptance of alcohol-based hand rub is a crucial factor in the success of any program to improve hand hygiene compliance. The choice of hand hygiene products should combine good antibiotic activity with good user acceptability/skin tolerability.

The *Hand Hygiene Australia Manual* (Grayson et al 2009) outlines the following alcohol-based hand rub features as important in influencing acceptability, as well as ready accessibility at each bedside and in all patient care areas:
fragrance and colour — these may increase the initial appeal but may cause allergenic reactions, and are therefore discouraged;
emollient agent(s) in the alcohol-based hand rub — these should prevent skin drying and irritant skin reactions, but not leave a sticky residue on hands;
drying characteristics — in general, solutions have lower viscosity than gels and therefore tend to dry more quickly; and
risk of skin irritation and dryness — proactive and sympathetic management of this problem is vital.

There is some evidence to suggest that gels are preferred to solutions, however it is important for staff to evaluate products themselves before implementation where possible. Even where emollient agents are present in the product, ready access to a moisturising skin-care product is essential. All hand hygiene products should be chemically compatible. It is advisable to purchase hand hygiene and hand care products from a range made by a single manufacturer, as this ensures compatibility between the products.

C6.2.3 Control of surface contamination through material selection

Ease of cleaning should be a key consideration in selecting appropriate floor and furniture coverings. Several design-related factors should be considered to minimise the risk of infection stemming from contaminated surfaces:
the nature and type of contamination that is likely to occur; and
if a suitable cleaning method for that surface can be performed.

Areas that may be in direct contact with blood and body fluids (e.g. surfaces such as floors and bench tops) need to be made of impervious material that is smooth and easy to clean.

Floor coverings

The use of carpet can be controversial as it is perceived to be difficult to clean compared with hard floor coverings. Some studies have identified carpeting as susceptible to contamination by fungi and bacteria.

In terms of infection control, the advantages of hard floor coverings include:
being easier to clean;
being easier to disinfect where required;
allowing use of the most appropriate disinfectant, rather than a product that is suitable for use on carpet;
costing less, as disinfectant is less expensive than steam cleaning, and steam cleaning may not be readily available;

there is less surface area so hard floor coverings are less likely to act a as reservoir than carpet;
there may be occupational health and safety issues relating to staff vacuuming compared with mopping; and
when additional cleaning is required, hard floor surfaces are easier to clean than carpet.

However, carpeting may offer advantages unrelated to infection control, including noise reduction.

Carpeting should be avoided in areas where
spills are likely to occur(e.g. around sinks or in isolation or soiled utility/holding areas);
areas where patients may have direct contact with contaminated carpets (e.g. children/babies crawling on the floor); and
where patients are at greater risk of airborne infections.

Furnishings
Noskin et al (2000) identified fabric-covered furniture as a source of VRE infection in hospitals and suggested the use of easily cleanable, nonporous material.

A study comparing the performance of a variety of furniture upholstery types with respect to VRE and *Pseudomonas aeruginosa* (PSAE) contamination found that performance was similar across different furniture coverings in terms of reductions in VRE and PSAE after cleaning and the transfer of VRE and PSAE to hands through contact. However, while there were no differences in the ability of different upholstery types to harbour PSAE, the VRE pathogen survived less well or for shorter periods on vinyl.

The CDC/HICPAC guidelines recommend minimising the use of upholstered furniture in areas housing immunocompromised patients.

Blinds and curtains should be easy to clean and also discourage the accumulation of dust.

C.6.2.4 Reducing water-borne transmission
Compared with airborne and contact transmission of infection, fewer studies were identified on waterborne transmission in relation to hospital design factors. The literature nonetheless is clear that waterborne infections can be a serious threat to patient safety. Many bacterial and some protozoal microorganisms can proliferate or remain viable in moist environments or aqueous solutions in healthcare settings.

Contaminated water systems in healthcare settings (such as inadequately treated wastewater) may lead to the pollution of municipal water systems, enter surface or ground water, and affect people in the community.

Sources of water contamination
The CDC/HICPAC guidelines identify the following categories of environmental routes or sources of waterborne transmission:
direct contact, such as hydrotherapy;
ingestion of water, such as drinking water;
inhalation of aerosols dispersed from contaminated water sources, such as improperly cleaned or maintained cooling towers, showers, respiratory therapy equipment and room air humidifiers; and
aspiration of contaminated water.

Approaches to reducing waterborne transmission
Water supply system
The water supply system should be designed and maintained with proper temperature and adequate pressure; stagnation and back flow should be minimised and dead-end pipes should be avoided.

To prevent the growth of *Legionella* and other bacteria, the CDC/HICPAC guidelines recommend that healthcare facilities maintain cold water at a temperature below 20°C, store hot water above 60°C, and circulate hot water with a minimum return temperature of 51°C.

When the recommended standards cannot be achieved because of inadequate facilities that are unable to be renovated, other measures such as chlorine treatment, copper-silver ionization, or ultraviolet lights are recommended to ensure water quality and prevent infection.

Point-of-use fixtures
Water fixtures such as sinks, faucets, aerators, showers, and toilets have been identified as potential reservoirs for pathogenic microorganisms. Such fixtures produce aerosols that can disperse microbes and they have wet surfaces on which moulds and other microorganisms can proliferate. However, empirical evidence linking these fixtures to HAIs is still limited; no consensus has been reached regarding the disinfection or removal of these devices for general use.

Regular cleaning, disinfection and preventative maintenance programs should be provided, especially in areas housing immunocompromised patients.

Ice machines
Ice storage receptacles and ice-making machines should be properly maintained and regularly cleaned. Ice and ice-making machines may be contaminated through improper handling of ice by patients and/or staff. Suggested steps to avoid this include minimising or avoiding direct hand contact with ice intended for consumption; using a hard-surface scoop to dispense ice, and installing machines that dispense ice directly into portable containers at the touch of a control.

Water features
Despite the absence of empirical documentation linking properly maintained fountains to hospital-acquired infections, the AIA & FGI Guidelines (2006) recommend that fountains not be installed in enclosed spaces in hospitals.

C6.4 CONSTRUCTION AND RENOVATION

Infection control precautions during construction and renovation should be integrated into the design and documentation of the facility from the beginning of the design stage. It is important that the dust control and infection control principles developed during the pre-design stage are integrated from the initial stages of design development until the completion of the activity.

Identification of the 'at risk' population, knowledge of the transmission route of a likely pathogen and location of the 'at risk' population all need to be taken into account in the planning stages.

PART D - STANDARDS, LEGISLATION AND OTHER RESOURCES

Many other resources exist that support and add to these guidelines:

- Australian Standards and legislation that regulate many infection control work practices;
- international and local guidelines that give more detailed guidance on specific areas of infection control; and
- published and web-based tools which can be used to assist implementation of guidelines recommendations.

Refer to full NHMRC Guidelines for additional detailed references:

General Infection Control Resources

International guidelines on infection control

- Centers for Disease Control and Prevention *Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings* 2007.
- *epic2: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England* http://www.epic.tvu.ac.uk/PDF%20Files/epic2/epic2-final.pdf
- National Institute for Clinical Excellence *Infection Control: Prevention of Healthcare-associated Infections in Primary and Community Care* 2003 http://www.nice.org.uk/guidance/index.jsp?action=byID&o=10922

Policies on infection control

- NSW Health Department Policy Directive 2007_036. *Infection Control Policy* http://www.health.nsw.gov.au/policies/pd/2007/PD2007_036.html
- NSW Health Department Guideline 2005_037 *Infection Control Guidelines for Oral Health Care Settings* http://www.health.nsw.gov.au/policies/GL/2005/GL2005_037.html
- Department of Health Victoria. *Infection Control and Cleaning in Hospitals* http://www.health.vic.gov.au/ideas/infcon
- NT Dept of Health and Families *Infection Control* http://www.health.nt.gov.au/Remote_Health_Atlas/Contents/Infection_Control/index.aspx
- Queensland Health *Infection Control Guidelines* and associated policies, recommended practices and advisories. http://www.health.qld.gov.au/chrisp/

Standard Precautions

Hand hygiene

Standards

- Standards Australia. HB 260-2003. *Hospital acquired infections – Engineering down the risk.* Sydney: Standards Australia International Ltd. 2003.

Guidelines

- WHO *Guidelines on Hand Hygiene in Healthcare* 2009 http://www.who.int/patientsafety/information_centre/documents/en/index.html
- *Hand Hygiene Australia Manual* (available at http://www.hha.org.au/)

Tools and web-based resources

- Hand Hygiene Australia's website contains numerous educational resources, tools, and information on implementing hand hygiene programs (available at http://www.hha.org.au/)

Personal protective equipment

Standards

Gloves

- Standards Australia/Standards New Zealand. AS/NZS 4011:1997/Amdt 1:1998. Single use examination gloves – Specification. Sydney: Standards Australia International Ltd.

- Standards Australia/Standards New Zealand. AS/NZS 4179:1997/Amdt 1:1998. Single use sterile surgical rubber gloves – Specification. Sydney: Standards Australia International Ltd.

Masks

- Australia/New Zealand Standards, 2002, AS/NZS 4381: Single use facemasks for use in healthcare.

Eyewear/goggles

- Australia/New Zealand Standards, 2002, AS/NZS 4381: Single use facemasks for use in healthcare

Tools and web-based resources

- Department of Health and Ageing *Putting on and Removing PPE - Pandemic Influenza* http://www.healthemergency.gov.au/internet/healthemergency/publishing.nsf/content/safe-usedvd.htm
- Centers for Disease Control and Prevention *Decision Aid on Choosing PPE* http://www.cdc.gov/ncidod/dhqp/ppe.html

Handling and disposing of sharps

Standards

- Australian standards AS4031 Non-reusable containers for the collection of sharp medical items used in health care areas 1992 /AMDT 1 1996
- AS/NZS 4261 Reusable containers for the collection of sharp items used in human and animal medical applications 1994/AMDT 1: 1997

Routine management of the physical environment

Standards

- Victorian Department of Human Services Cleaning standards for Victorian public hospitals http://www.health.vic.gov.au/ideas/infcon/publications

Legislation/codes of practice

- Therapeutic Goods Order No 54 - Standard for Disinfectants and Sterilants (TGO 54),
- Australian Register of Therapeutic Goods (ARTG) Class B for disinfectants
- National Occupational Health and Safety Commission. National Code of Practice for the preparation of material safety data sheets. [NOHSC: 2100(1994)]. Canberra: Australian Government Publishing Services.

Tools and web-based resources

- *Little Yellow Infection Control Book*. Available at http://www.health.vic.gov.au/__data/assets/pdf_file/0018/37350/lyicb_original.pdf
- Health Protection Scotland *Control of the Environment - Standard Infection Control Precautions (SICP)* http://www.hps.scot.nhs.uk/haiic/ic/guidelinedetail.aspx?id=31229

Processing of instruments and equipment

Standards

- AS 2773.1-1998 Ultrasonic cleaners for health care facilities – Non-portable
- AS 2773.2-1999 Ultrasonic cleaners for healthcare facilities-Benchtop

Occupational health and safety

Legislation/ policy

Each state and territory has numerous legislation/ Acts relating to occupational health and safety, workers compensation and the employers responsibility to provide a safe work environment.
Immunisation of health care workers is an aspect of occupational health and safety in the health care setting. Each state has its own policies, examples are provided below:

- *Immunisation for Health Care Workers* (Revised October 2007) – DHS Victoria http://www.health.vic.gov.au/immunisation/general/guide_hcw

- Health Department Policy Directive 2007_006 *Occupational Assessment, Screening & Vaccination Against Specified Infectious Diseases* http://www.health.nsw.gov.au/policies/pd/2007/PD2007_006.html
- NSW Health Department Policy Directive 2005_203. I*nfection Control Management of Reportable Incidents*
- *Immunisation for HCWs in South Australia* – www.health.sa.gov.au/infectioncontrol/

Guidelines

- *National Immunisation Program Schedule* – 2007 DoHA
- *Australian Immunisation Handbook* - 9th Edition 2008 (NHMRC)

Surveillance

Notifiable diseases

- Department of Health and Ageing- Australian Notifiable diseases http://www.health.gov.au/internet/main/publishing.nsf/Content/cda-surveil-nndss-casedefs-distype.htm
- Links page to state and territory Public Health Legislation, the Quarantine Act, and the National Health Security Act 2007 http://www.health.gov.au/internet/main/publishing.nsf/Content/cda-state-legislationlinks.Htm

APPENDICES

EXPOSURE PRONE PROCEDURES (EPP)

Exposure prone procedures (EPPs) are invasive procedures where there is potential for direct contact between the skin, usually finger or thumb of the healthcare worker, and sharp surgical instruments, needles, or sharp tissues (e.g. fractured bones), spicules of bone or teeth in body cavities or in poorly visualised or confined body sites, including the mouth of the patient.

During EPPs, there is an increased risk of transmitting bloodborne viruses between healthcare workers and patients.

EPP categories

The nature of the EPP performed by the healthcare worker can be categorised according to level of risk of transmission, in increasing order of magnitude.

Category 1	**A procedure where the hands and fingertips of the healthcare worker are usually visible and outside the body most of the time and the possibility of injury to the worker's gloved hands from sharp instruments and/or tissues is slight. This means that the risk of the healthcare worker bleeding into a patient's open tissues should be remote, e.g. insertion of a chest drain.**
Category 2	A procedure where the fingertips may not be visible at all times but injury to the healthcare worker's gloved hands from sharp instruments and/or tissues is unlikely. If injury occurs it is likely to be noticed and acted upon quickly to avoid the healthcare worker's blood contaminating a patient's open tissues, e.g. appendicectomy.
Category 3	A procedure where the fingertips are out of sight for a significant part of the procedure, or during certain critical stages and in which there is a distinct risk of injury to the healthcare worker's gloved hands from sharp instruments and/or tissues. In such circumstances it is possible that exposure of the patient's open tissues to the healthcare worker's blood may go unnoticed or would not be noticed immediately, e.g. hysterectomy.

Source: DH/HP/GHP3. *HIV Infected Health Care Workers: Guidance on Management and Patient Notification*. London; 2005

Advice on EPPs in specific areas of clinical care

Ear, nose and throat surgery (otolaryngology)

ENT surgical procedures generally should be regarded as exposure prone with the exception of simple ear or nasal procedures, and procedures performed using endoscopes (flexible and rigid) **provided fingertips are always visible**. Non-exposure prone ear procedures include stapedectomy/stapedotomy, insertion of ventilation tubes and insertion of a titanium screw for a bone anchored hearing aid.

Intensive care

Intensive care does not generally involve EPPs on the part of medical or nursing staff

Nursing

General nursing procedures do not include EPPs. The duties of operating room nurses should be considered individually. Instrument nurses do not generally undertake EPPs. However, it is possible that nurses acting as first assistant may perform EPPs.

Paediatrics

Neither general nor neonatal/special care paediatrics has been considered likely to involve any EPPs. Paediatric surgeons do perform EPPs.

Resuscitation

Resuscitation performed wearing appropriate protective equipment does not constitute an EPP.

GLOSSARY

This section outlines the way in which certain terms are used in these guidelines.

Acinetobacter
An aerobic Gram-negative bacillus commonly isolated from the hospital environment (especially intensive care units) and hospitalised patients; can cause healthcare-associated infections, especially wound infections and pneumonia.

Aerosols
Microscopic particles < 5 µm in size that are the residue of evaporated droplets and are produced when a person coughs, sneezes, shouts, or sings. These particles can remain suspended in the air for prolonged periods of time and can be carried on normal air currents in a room or beyond, to adjacent spaces or areas receiving exhaust air.

Airborne precautions
A set of practices used for patients known or suspected to be infected with agents transmitted person-to person by the airborne route.

Alcohol-based hand rub
An alcohol-containing preparation designed for reducing the number of viable microorganisms on the hands.

Anteroom
A small room leading from a corridor into a room.

Antibiotic
A substance that kills or inhibits the growth of bacteria, fungi or parasites.

Antisepsis
The use of chemical or physical methods to prevent infection by destroying or inhibiting the growth of harmful microorganisms.

Aseptic technique
Aseptic technique is analogous to clean technique but introduces extra practices to prevent infectious agents from entering a patient's bloodstream, particularly during invasive procedures performed outside a controlled sterile environment (e.g. intravenous therapy on the ward or in a community healthcare setting). This involves creating a sterile field around susceptible sites, and ensuring there is no direct or indirect contact between sterile products (e.g. syringe) and any nonsterile surface.

Bloodstream infection
The presence of live pathogens in the blood, causing an infection.

Bundle
A set of evidence-based practices that have been shown to improve outcomes when performed collectively and consistently. The concept was developed by the Institute for Healthcare Improvement in the United States to improve the care process and patient outcomes.

Catheter
A thin, flexible, hollow tube used to add or remove fluids from the body.

Clean technique
Clean technique refers to practices that reduce the number of infectious agents, and should be considered the minimum level of infection control for non-invasive patient care activities. Practices include: personal hygiene, particularly hand hygiene, to reduce the number of infectious agents on the skin; use of barriers to reduce transmission of infectious agents (including proper handling and disposal of sharps); environmental cleaning; and reprocessing of equipment between patient uses.

Clinical waste
Waste material that consists wholly or partly of human or animal tissue, blood or body fluids, excretions, drugs or other pharmaceutical products, swabs/ dressings, syringes, needles or other sharp instruments.

Cohorting
Placing together in the same room patients who are infected with the same pathogen and are suitable roommates.

Colonisation
The sustained presence of replicating infectious agents on or in the body without the production of an immune response or disease.

Contact
The touching of any patient or their immediate surroundings or performing any procedure.

Contact point
The area of direct contact of skin to equipment.
Contact Precautions
A set of practices used to prevent transmission of infectious agents that are spread by direct or indirect contact with the patient or the patient's environment.
Cough etiquette
A combination of measures designed to minimize the transmission of respiratory pathogens via droplet or airborne routes in healthcare settings.
Decontamination
Use of 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.
Detergent solution
Detergent diluted with water as per manufacturer's instructions.
Disinfectant
A chemical agent used on inanimate objects and surfaces (e.g., floors, walls, or sinks) to destroy virtually all recognised pathogenic microorganisms, but not necessarily all microbial forms (e.g. bacterial endospores).
Disinfection
Destruction of pathogenic and other kinds of microorganisms by physical or chemical means.
Droplet precautions
A set of practices used for patients known or suspected to be infected with agents transmitted by respiratory droplets.
Droplets
Small particles of moisture generated when a person coughs or sneezes, or when water is converted to a fine mist by an aerator or shower head. These particles, intermediate in size between drops and droplet nuclei, can contain infectious microorganisms and tend to quickly settle from the air such that risk of disease transmission is usually limited to persons in close proximity (e.g. less than 1 metre) to the droplet source.
Engineering controls
Removal or isolation of a workplace hazard through technology.
Epidemic
A widespread outbreak of an infectious disease. Many people are infected at the same time.
Hand hygiene
A general term applying to processes aiming to reduce the number of micro-organisms on hands. This includes use of soap/solution (plain or antimicrobial) and water (if hands are visibly soiled), and application of a waterless antimicrobial agent (e.g. alcohol-based hand rub) to the surface of the hands.
Healthcare facility
Any facility that delivers healthcare services. Healthcare facilities could be hospitals, general practice surgeries, dentistry practices, other community-based office practices, day surgery centres, emergency services, domiciliary nursing services, residential aged care facilities, Aboriginal medical services, alternative health provider facilities and other community service facilities, such as needle exchanges.
Healthcare workers
All people delivering healthcare services, including students and trainees, who have contact with patients or with blood or body substances.
Healthcare-associated infections
Infections acquired in healthcare facilities ('nosocomial' infections) and infections that occur as a result of healthcare interventions ('iatrogenic' infections), and which may manifest after people leave the healthcare facility.
High-risk patients
Patients with an increased probability of infection due to their underlying medical condition. Often refers to patients in intensive care units, those receiving total parenteral nutrition, and immunocompromised patients.
High-efficiency particulate air (HEPA) filter
An air filter that removes >99.97% of particles > 0.3 microns (the most penetrating particle size) at a specified flow rate of air.
High level disinfection
Minimum treatment recommended for reprocessing instruments and devices that cannot be sterilised for use in semicritical sites
Hypochlorite

A chlorine-based disinfectant.

Immunocompromised

Having an immune system that has been impaired by disease or treatment.

Incidence

The number of new events (e.g. cases of disease) occurring in a population over defined period of time.

Infectious agent

An infectious agent (also called a pathogen or germ) is a biological agent that causes disease or illness to its host. Most infectious agents are microorganisms, such as bacteria, viruses, fungi, parasites and prions.

Invasive procedure

Entry into tissues, cavities or organs or repair of traumatic injuries.

Intermediate level disinfection

Minimum treatment recommended for reprocessing instruments and devices for use in non-critical sites, or where there are specific concerns regarding contamination of surfaces with species of myobacteria (e.g. *Mycobacterium tuberculosis*)

Klebsiella pneumoniae

Gram-negative bacteria frequently responsible for healthcare associated infections of wounds and urinary tract, particularly in immunocompromised patients; may also cause pneumonia.

Long-term care facilities

A range of residential and outpatient facilities designed to meet the bio-psychosocial needs of persons with sustained selfcare deficits.

Low-level disinfection

An alternative treatment to cleaning alone when devices for use in non-critical sites are reprocessed and when only vegetative bactericidal activity is needed.

Masks

Loose-fitting, single-use items that cover the nose and mouth. These include products labelled as surgical, dental, medical procedure, isolation and laser masks.

Methicillin-resistant *Staphylococcus aureus* (MRSA)

Strains of *Staphylococcus aureus* that are resistant to many of the antibiotics commonly used to treat infections. Epidemic strains also have a capacity to spread easily from person-to-person.

Multi-drug resistant organisms (MROs)

In general, bacteria that are resistant to one or more classes of antimicrobial agents and usually are resistant to all but one or two commercially available antimicrobial agents.

Needle-free devices (also needleless intravascular catheter connectors)

Intravascular connector systems developed to help reduce the incidence of needlestick injury while facilitating medication delivery through intravascular catheters. There are three types of needle-free connectors: blunt cannula (two-piece) systems, one-piece needle-free systems, and one-piece needle-free systems with positive pressure.

Negative pressure room

A single-occupancy patient care room used to isolate persons with a suspected or confirmed airborne infectious disease. Environmental factors are controlled in negative pressure rooms to minimise the transmission of infectious agents that are usually transmitted from person to person by droplet nuclei associated with coughing or aerosolisation of contaminated fluids.

P2 (N95) respirator

A personal protective device worn by healthcare personnel to protect them from inhalation exposure to airborne infectious agents that are < 5 microns in size.

Pandemic

An epidemic that is geographically widespread, occurring throughout a region or even throughout the world.

Patient contact

Involves touching the patient and their immediate surroundings, or performing any procedure on the patient.

Patient surroundings

All inanimate surfaces that are touched by or in physical contact with the patient (such as bed rails, bedside table, bed linen, invasive devices, dressings, personal belongings and food) and surfaces frequently touched by healthcare workers while caring for the patient (such as monitors, knobs and buttons).

Patient care area

The room or area in which patient care takes place.

Percutaneous injury

An injury that results in a sharp instrument/object, e.g. needle, scalpel, cutting or puncturing the skin.

Personal protective equipment (PPE)
A variety of barriers used alone or in combination to protect mucous membranes, skin, and clothing from contact with infectious agents. PPE includes gloves, masks, respirators, goggles, face shields, and gowns.
Phlebitis
Inflammation of the wall of a vein.
Prevalence
The number of events (e.g. cases of disease) present in a defined population at one point in time.
Procedure
An act of care for a patient where there is a risk of direct introduction of a pathogen to the patient.
Randomised controlled trial (RCT)
A clinical trial where at least two treatment groups are compared, one of them serving as the control group, and treatment allocation is carried out using a random, unbiased method. A non-randomised controlled trial compares a control and treatment group but allocation to each group is not random. Bias is more likely to occur in NRCT.
Routine
Performed as part of usual practice (as opposed to the use of additional measures in specific circumstances e.g. where invasive procedures are conducted or in the event of an outbreak).
Sharps
Instruments used in delivering healthcare that can inflict a penetrating injury, e.g. needles, lancets and scalpels.
Standard precautions
Work practices that constitute the first-line approach to infection control in the healthcare environment. These are recommended for the treatment and care of all patients.
Sterile technique
Sterile technique aims to eliminate microorganisms from areas and objects, and should be undertaken by all healthcare workers undertaking invasive medical procedures. This includes: ensuring that everything within a defined radius is clean and sterile, or as a minimum subject to high level chemical or thermal disinfection; use of skin antisepsis and sterile personal protective equipment; and reprocessing of instruments between patient uses.
Sterile
Free from all living microorganisms; usually described as a probability (e.g. the probability of a surviving microorganism being 1 in 1 million).
Sterilisation
Use of a physical or chemical procedure to destroy all microorganisms including substantial numbers of resistant bacterial spores.
Strain
A strain is a genetic variant or subtype of a microorganism (e.g. a virus, bacterium or fungus). Some strains may be more dangerous or difficult to treat than others.
Surface barrier
Barriers (e.g. clear plastic wrap, bags, sheets, tubing or other materials impervious to moisture) designed to help prevent contamination of surfaces and equipment.
Surgical site infection
An infection at the site of a surgical operation that is caused by the operation.
Surveillance
Disease surveillance is an epidemiological practice by which the spread of disease is monitored in order to establish patterns of progression. The main role of disease surveillance is to predict, observe and minimise the harm caused by outbreak, epidemic and pandemic situations, as well as increase knowledge as to what factors might contribute to such circumstances.
Targeted surveillance
A process in which data are collated on the susceptibilities and resistances of disease-causing microbes to various antimicrobial treatments. Targeted surveillance gathers data that is not generated by routine testing: specific species or groups of species are examined in detail to answer important questions that cannot be addressed by passive surveillance.
Transmission-based precautions (formerly additional precautions)
Extra work practices in situations where standard precautions alone may be insufficient to prevent infection (e.g. for patients known or suspected to be infected or colonised with infectious agents that may not be contained with standard precautions alone).

Vancomycin resistant enterococci (VRE)
Enterococci are Gram-positive bacteria that are naturally present in the intestinal tract of all people. Vancomycin is an antibiotic to which some strains of enterococci have become resistant. These resistant strains are referred to as VRE and are frequently resistant to other antibiotics generally used to treat enterococcal infections.

ABBREVIATIONS AND ACRONYMS

ACSQHC	Australian Commission on Safety and Quality in Health Care
ADEC	Australian Drug Evaluation Committee
AGREE	Appraisal of guidelines research and evaluation
AICA	Australian Infection Control Association
AusHFG	Australasian Health Facility Guidelines
BCG	Bacillus Calmette-Guérin
BSI	bloodstream infection
cCJD	classical Creuzfeldt-Jakob disease
CDC	Centers for Disease Control and Prevention (US)
CDNA	Communicable Diseases Network Australia
CEO	chief executive officer
EPP	exposure-prone procedures
GPP	good practice point
HAI	healthcare-associated infection
HBeAg	hepatitis B e antigen
HBsAg	HBV surface antigen
HBV	hepatitis B virus
HCV	hepatitis C virus
HEPA	high efficiency particulate air
HIV	human immunodeficiency virus
HTLV-I	human T-cell lymphotropic virus type I
IHI	Institute for Healthcare Improvement (US)
IPC	infection prevention and control
IVD	intravascular device
LAS	laminar airflow filtration
MMR	measles mumps rubella vaccine
MRGN	multi-resistant Gram negative
MRO	multi-resistant organism
MRSA	methicillin-resistant *Staphylococcus aureus*
NaOH	sodium hydroxide
NATA	National Association of Testing Authorities
NHHI	National Hand Hygiene Initiative
NHIG	normal human immunoglobulin
NHMRC	National Health and Medical Research Council
NICE	National Institute for Health and Clinical Excellence (NICE)
NNDSS	National Notifiable Diseases Surveillance System
NPS	National Prescribing Service
NRL	natural rubber latex
PBS	Pharmaceutical Benefits Scheme
PEG	percutaneous endoscopic gastrostomies
PEP	post-exposure prophylaxis
PPE	personal protective equipment
PSAE	*Pseudomonas aeruginosa*
PVL	panton-valentine leukocidin
RSV	respiratory syncytial virus
SARS	severe acute respiratory syndrome
SSI	surgical site infection

TB	tuberculosis
TGA	Therapeutic Goods Administration
VAP	ventilator-associated pneumonia
VRE	vancomycin-resistant enterococci
WHO	World Health Organization

REFERENCES

Refer to full NHMRC IPC Guidelines for detailed references
http://www.nhmrc.gov.au/node/30290
http://www.nhmrc.gov.au