ACIPC

Australasian College
for Infection Prevention and Control

**Guide for Managing the transmission of pathogens
through the air in acute care settings**

Guide for managing transmission of pathogens through the air in acute care settings

Executive Summary

The hierarchy of controls is a recognised framework that can be applied to manage the transmission of pathogens through the air. This systematic approach provides a structured method to implement multiple controls to protect patients, consumers and healthcare workers from the transmission of infection.

This guide should be read in conjunction with ACIPC Position Statement:

- Terminology for pathogens that transmit through the air.

ACIPC recommends:

- The hierarchy of controls risk management framework is applied in healthcare settings to reduce the risk of transmission of pathogens through the air.

- The risk management approach is incorporated into the health services Infection Prevention and Control (IPC) program.

Introduction

Within the healthcare settings, patients and consumers are often in close proximity, to each other and members of the workforce, creating opportunity for the spread of infection[1]. The transmission of infectious diseases, multi-resistant organisms, and the emergence of novel infectious diseases can cause considerable harm, increase the burden on the health system, and place greater demands on the workforce[1].

Infection prevention and control (IPC) within healthcare settings aims to minimise the risk of transmission of infection, and requires an effective risk management system for the identification of hazards and controls for patients, visitors and the workforce[1]. The use of the hierarchy of controls aligns infection prevention and control practices with risk mitigation strategies and compliance with occupational health and safety guidelines.

Definitions

Healthcare facility	The building and facilities in which care is provided – includes visits, short stay or permanent.
Healthcare setting	Places and services where healthcare occurs, including acute care hospitals, urgent care centres, rehabilitation centres, aged and disability residential care, specialised outpatient services (e.g., haemodialysis, dentistry, and office-based services), and community care

Australasian College for Infection Prevention and Control Ltd   Page 1 of 7
Level 6, 152 Macquarie Street, Hobart TAS 7000, Australia | ABN 61 154 341 036
P +61 3 6281 9239 | E office@acipc.org.au | W www.acipc.org.au

Healthcare worker:	anyone who works in a healthcare or social care setting, e.g., medical practitioners, nurses, midwives, carers, dentists, allied health, students on placement and contractors; as well as executives, managers, and administration.
IPC	Infection Prevention and Control
Infectious respiratory particles (IRPs):	A pathogen contained within a particle that travels through the air, which can enter the respiratory tract through inhalation or deposition on the mucosa.
Particulate filter respirator (PFR):	A respirator which forms a tight seal around the face, has higher filtration and is recommended for protection against particles such as fine dust vapours, smoke and aerosolising or airborne infectious diseases. The most common PFRs are P2 or N95 respirators.
PPE	Personal protective equipment
Transmission through the air:	The term used to characterise an infectious disease where the mode of transmission involves the IRP travelling through or being suspended in the air

The Hierarchy of Controls

The hierarchy of controls identifies step by step actions to control hazards in a preferred order based on their effectiveness[2]. The levels of actions to reduce or remove hazards can be implemented following on from each other or at the same time (Figure 1)[2].
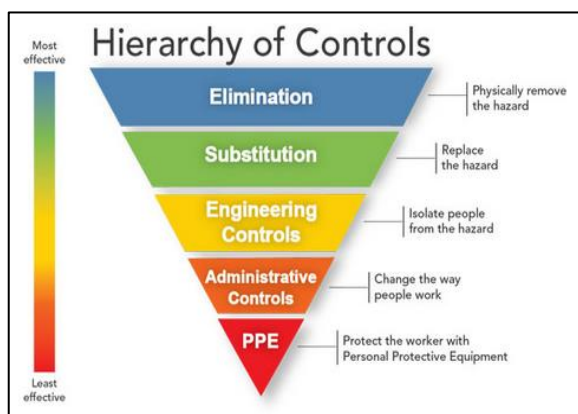

Figure 1. The Hierarchy of Controls.

The hierarchy of controls lists risk avoidance or mitigation strategies in decreasing order of effectiveness, multiple strategies can be implemented at the same time or following on from each other[3].

Control level	Action
Elimination	**Remove the hazard at the source**
	Elimination and substitution can be the most difficult to adopt into existing infrastructure and processes[2].
	Prevention through design is a proactive approach to include elimination and substitution controls[2].
Substitution	**Replace the risk to minimise infections**

	Use a safer alternative
Engineering controls	**The use of physical or mechanical controls to reduce the risk**
	Reduce or prevent hazards from coming into contact with workers[2].
	Engineering controls can incur increased upfront costs than administrative controls or PPE, however these can be lower in the long term, especially when protecting multiple people.
	Includes modifying equipment, workspaces, using protective barriers and ventilation systems[2].
Administrative controls	**Develop work processes, guidelines or educational programs to reduce risk**
	Controls that establish a work practice that can reduce the duration, frequency or intensify of exposure to a hazard.
	Includes training and appropriate rest breaks
Personal protective equipment (PPE)	**Provide workers with protective equipment when other controls are insufficient**
	PPE includes clothing and devices to protect workers.
	It requires constant effort and attention from workers including proper use and training.

Using the hierarchy of controls in infection prevention and control

To effectively manage risk, the four steps of risk management provide a structured approach to identify and mitigate risks in a health service. The four steps are:

Identify hazards	Identification of potential risks early
Assess risks	Evaluate the severity of the identified risks, based on the impact to patient and HCW safety
Control risks	The implementation of measures to reduce harm
Review controls	Regular monitoring and updating control measures to ensure they remain effective and adapt to evolving circumstances

The National Safety and Quality Health Service (NSQHS) Standards require health service organisations to implement systems to prevent, control and manage the risk of infections to patients, consumers and healthcare workers[4]. The use of the hierarchy of controls in conjunction with IPC systems and risk management strategies provides a tiered risk management approach to prevent infections[4].

In the context of IPC, a hazard may be an infectious agent that can contaminate an environment and lead to colonisation or infection of patients, consumers or healthcare workers[4]. Risks include healthcare associated infections and occupational exposure injuries, and controls include strategies to minimise risk including standard and transmission-based precautions and the use of safety devices[4].

The hierarchy of controls for pathogens that are transmitted through the air

The application of the hierarchy of controls can reduce the risk of transmission of pathogens that are transmitted through the air and create a comprehensive strategy to protect people from respiratory illness. The following table provides examples of the control strategies that can be implemented.

Table 1: The hierarchy of controls for the transmission of particles through the air.

Australasian College for Infection Prevention and Control Ltd　Page 3 of 7
Level 6, 152 Macquarie Street, Hobart TAS 7000, Australia | ABN 61 154 341 036
P +61 3 6281 9239 | E office@acipc.org.au | W www.acipc.org.au

Control	Action
Elimination	Physically remove the hazard
Reduce opportunity for IRPs to be introduced into the facility	Do not admit patients with IRPs unless clinically necessary Manage care in home or another location if possible
	Limit the number of people with IRP entering a healthcare setting. Consider telehealth, reschedule non-urgent appointments, establish fever-clinics
	Screen staff and visitors prior to entry into the healthcare setting
	Reduce the number of visitors, students and non-essential staff to a minimum
	Reduce the number of entry points into the facility
	Monitor visitor and staff movement
	Simplify visitor registration processes
	Exclude unwell staff with symptoms from the workplace, consider alternative working arrangements where possible
	Consider furlough for identified contacts of infectious people
	Minimise inter-hospital transfers unless patient management will be compromised
Substitution	Replace the hazard
Find alternative ways to provide care that reduces potential for transmission	Substitute in-person appointments with telehealth services, where appropriate
	Administer aerosolised medicines with spacers instead of nebulisers
	Consider conducting group sessions and activity outdoors
	Promote tele-links for visitors where possible and appropriate
	Plan for alternatives for aerosol generating procedures, including high flow oxygen and continuous/bilevel positive airway pressure where possible and appropriate
Engineering	Isolate people from the hazard
Isolation	Use negative pressure rooms with an anteroom for aerosol/inhalation precautions. If a negative pressure room is not available, use an isolation room/single room with private bathroom.
	During outbreak situations create zones and group patients in dedicated areas separate to uninfected people.
	If there are multiple people infected with an IRP, consider increasing the distance between rooms, physical re-design, creation of isolation/zone areas.
	Ensure appropriate waste management for clinical and related waste
Use physical barriers for hazard reduction	Review and optimise ventilation and air quality including, air exchange rates, air flow and air filtration systems, temperature and ambient humidity
	Encourage outdoor visits where possible
	Optimise air exchanges in rooms
	Ensure air from the room of an infected person does not enter adjacent corridors
	Redesign work areas to limit number of workers at workstations
	Maintain airflow direction away from staff workstations towards clinical care areas where possible
	Consider physical barriers (e.g., glass or plastic screens) in triage and reception areas where physical distancing is difficult to maintain.
	Ensure optimal vaccination coverage of employees and residents
Administrative controls	Change the way people work
	Organisational lines for governance and reporting must be in place for; - Task analysis and risk assessment - Ventilation assessments and monitoring of indoor air quality

Effective and consistent implementation of policies and protocols	- Promoting and facilitating hand hygiene, respiratory etiquette and vaccination uptake
	Evidence based IPC policy and procedure are in line with guidelines
	Ensure staff training in standard and transmission-based precautions is provided
	Provide clear risk assessed guidance on environmental cleaning and disinfection
	Complete environmental cleaning and disinfection checks regularly
	Provide IPC education to staff, patients and visitors
	Provide regular updates to patients, visitors, HCWs and service providers
	Develop a vaccination and screening program for HCWs and patients when required
	Use signage at facility entrances to alert visitors and service providers to not attend while unwell
	Consider surveillance testing/screening of exposed or asymptomatic staff in health services during outbreak or exposure incidents
Minimise opportunity for infection transmission	Separate care of infectious and unaffected people
	Assign staff groups to care teams and reduce frequency and number of people on ward rounds
	Promote hand hygiene and PPE compliance
	Reduce opportunity for transmission between staff by maintaining use of technology for staff meetings
	Provide surgical masks to patients/residents with symptoms to use when interacting with others, or outside of their room
	Educate patients on safe mask use and disposal
	During outbreaks encourage patients/residents to remain in their allocated room/zone
	Manage workspaces to reduce transmission risks through adoption of physical distancing strategies (floor markings, spaced seating, maximum room occupancy notices)
	Implement measures to reduce contact spread, including hand hygiene product placement, increase cleaning and disinfection in shared areas
	Ensure organisation outbreak plans are in place and stakeholders are aware of roles and responsibilities
	Use standardised signage for standard and transmission-based precautions
Maintain staff wellbeing	Where possible roster appropriate number of staff to avoid excessive workloads and ensure staff can take regular breaks
	Redeploy vulnerable staff (immunocompromised, pregnant)
	Have a policy in place to manage staff who become unwell in the workplace
	Ensure staff immunity is known, and vaccinations are up to date
	Provide access to employee assistance programs for psychological support
PPE	Protect the worker
Review PPE policies and guidelines	Risk assess PPE recommendations for staff roles and activities
	Supply of PPE and related equipment is available at point of use
	Education on appropriate PPE use for standard and transmission-based precautions is provided and recorded
	PPE competency assessments for donning and doffing are conducted
	PPE supply chain is managed across the health service

Australasian College for Infection Prevention and Control Ltd   Page 5 of 7

Level 6, 152 Macquarie Street, Hobart TAS 7000, Australia | ABN 61 154 341 036
P +61 3 6281 9239 | E office@acipc.org.au | W www.acipc.org.au

	Anticipate PPE supply needs during outbreaks
	Ensure appropriate disposal of PPE
Respiratory protection program	Fit test staff who may require a particulate filter respirator (PFR)
	Train staff to undertake a fit check every time a PFR is used
	Implement spotters to observe staff donning and doffing PPE to reduce potential lapses

Adapted from: Infection Prevention and Control Expert Group. (2022, September 27). The hierarchy of controls for minimising the risk of COVID-19 transmission. Australian Government.

References

1. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. 2nd ed. ed. Sydney: ACSQHC; 2021.
2. National Institute for Occupational Safety and Health (NIOSH). About Hierarchy of Controls. Centers for Disease Control and Prevention. Updated April 10, 2024. Accessed 19 Feb, 2025. https://www.cdc.gov/niosh/hierarchy-of-controls/about/index.html
3. Australian Department of Health. Australian Health Protection Principal Committee (AHPPC) coronavirus (COVID-19) statements on 24 April 2020. Australian Government. Updated 25th April 2020. Accessed 25th April, 2021. https://www.health.gov.au/news/australian-health-protection-principal-committee-ahppc-coronavirus-covid-19-statements-on-24-april-2020
4. Australian Commission on Safety and Quality in Health Care. Use of the hierarchy of controls in infection prevention and control. . *Factsheet for health service organisations*. 2022;

Version

Version	Date	Addition/Amendments	Author	Review By
1.0	Feb 2025	New guide	IPC Clinical Nurse Consultant	ACIPC Board

Australasian College for Infection Prevention and Control Ltd   Page 7 of 7
Level 6, 152 Macquarie Street, Hobart TAS 7000, Australia | ABN 61 154 341 036
P +61 3 6281 9239 | E office@acipc.org.au | W www.acipc.org.au