

The Aged Care Infection Prevention and Control Guide

A supplementary resource for the **Australian
Guidelines for the Prevention and Control of
Infection in Healthcare** for aged care settings

Chapter 3

AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

Published by the Australian Commission on Safety and Quality in Health Care

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ISBN: 978-1-922880-81-9

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Australian Commission on Safety and Quality in Health Care. Aged Care IPC Guide. Sydney: ACSQHC; 2024.

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Chapter 3: The basics of microbiology and infection prevention and control

Key points

- Microorganisms include bacteria, viruses, fungi and some parasites, and these can all cause infections.
- Multidrug-resistant organisms (MROs) are types of microorganisms that are resistant to more than one type of antimicrobial and have adapted to survive, so that they can cause an infection even when being treated with a variety of antimicrobials, such as antibiotics that previously were able to kill the microorganism.
- Once a microorganism enters a person's body, either colonisation or infection can occur, where:
 - colonisation means that the microorganism is present on or in the body without causing infection or disease
 - infection means that the microorganism has entered and multiplied in or on the body and the person shows signs of illness.
- The chain of infection is an important concept that helps to explain how an infection spreads.
- The aim of infection prevention and control (IPC) is to interrupt the chain of infection to stop the spread of infection.
- Microorganisms that are spread through aged care services are usually from human sources such as older people, aged care workers and carers.
- Effective IPC in aged care settings is essential for the high-quality care for older people and a safe working environment for aged care workers, families and visitors.

The basics of microbiology



Essential knowledge

- Microbiology is the study of living things that are usually too small to see without a microscope, such as bacteria, viruses, fungi and most parasites.
- Microbiologists study these microorganisms (*micro* meaning small and *organism* meaning living thing) and how they affect the health and safety of humans.
- The microbiome is the collection of these microorganisms that live in or on the body, the environment or in animals.
- A variety of terms may be used to refer to microorganisms, including 'germs', 'pathogens', 'bugs', 'microbes', 'infectious organisms' or 'pathogenic organisms'.

Microorganisms exist naturally in animals, people and the environment, and have the ability to cause infection. Some microorganisms, such as certain types of bacteria, are beneficial and are part of the body's normal flora, providing protection and other health benefits such as helping to digest food, prevent diseases and produce vitamins.

Normal flora refers to the collection of 'helpful' microorganisms. These usually cause no harm and are found in all people. These microorganisms are acquired soon after birth and continuously reproduce, multiply and change throughout a person's life. Under certain conditions, and when the body's defences are lowered (such as in some older people) or if skin or a mucous membrane is damaged (such as an acute or chronic wound), or if a person is immunosuppressed, then the normal flora *may* cause a harmful infection.

Antimicrobials are medicines used to treat and prevent infections. They include antibiotics, antivirals, antifungals and antiparasitic medicines.



Practice point

The downside of antibiotics

Only use antibiotics when they are essential. An older person may be prescribed a course of antibiotics to treat a specific type of bacterial infection. But sometimes antibiotics disrupt the body's normal gut flora (good bacteria) causing symptoms such as diarrhoea and in some cases complications such as *Clostridioides difficile* infection.

Types of microorganisms

Table 6 outlines microorganisms that can affect the health and safety of humans and the antimicrobial treatments that may be used.

Table 6: Types of microorganisms and antimicrobial treatments

Microorganism	Description	Antimicrobial treatment
Bacteria	Bacteria can survive in many environments. They must enter the body for them to cause an infection; therefore, bacterial infections can occur through a skin opening, (wound or insect bite), the airways (bacterial pneumonia), the urinary tract (bladder and kidney infections), eyes, blood or dental injuries/diseases.	Antibiotics, also known as antibacterials, only work against infections caused by bacteria. They can be administered as oral, intramuscular or intravenous medicines.
Viruses	Unlike bacteria, viruses require a living host (such as a person, plant or animal) in which they can live, grow and multiply. Viruses are unable to live outside a living host. After entering a host, a virus enters and uses the host's cells to multiply. Examples of viruses include respiratory viruses (such as respiratory syncytial virus [RSV] and influenza), systemic viruses (such as measles, rubella, herpes and varicella-zoster), gastrointestinal viruses (such as rotavirus and norovirus) and bloodborne viruses (such as hepatitis).	Viral infections cannot be treated with antibiotics. Antivirals can be prescribed as oral, intramuscular or intravenous medicine. There are vaccinations for many viruses; these offer a simple, safe and effective way to protect older people and aged care workers.
Fungi	Fungi are mostly found in the environment. Yeast, mildew, and moulds are types of fungi. There are millions of fungal species, but only relatively few species make people unwell. Anyone can get a fungal infection. However, they are more likely to cause infections in people with weakened immune systems, or after receiving antibiotics. So, often this will include many older people. Common types of fungal infections are vaginal candidiasis, nail infections, oral thrush and ringworm.	Antifungal medicines only work against fungal infections. Antifungals can be prescribed as oral, intravenous or topical medicine.
Parasite	A parasite is a larger organism than a bacterium, and lives on or in a host and gets its food from, or at the expense of, the host. Some are large enough to see. Examples of common parasitic infections are giardia, bed bugs, head lice, intestinal worms and scabies.	Antiparasitic medicine usually only works against parasitic infections. Antiparasitics can be prescribed as oral or topical medicine.

Antimicrobial resistance

Antimicrobial resistance (AMR) occurs when a microorganism cannot effectively be treated by an antimicrobial.

The self-defence processes that microorganisms develop against antimicrobials are known as 'resistance mechanisms'. Microorganisms such as bacteria and fungi can carry genes that encode for a variety of resistance types. When microorganisms that are already difficult to treat acquire or develop the right combination of these resistance mechanisms, many antimicrobials become ineffective. This causes 'resistant infections', which are more difficult to treat and on occasion leave no options for treatment.

All antimicrobial use contributes to the development of AMR, which is why unnecessary or inappropriate use of antimicrobials is especially concerning. The spread of resistant microorganisms (sometimes called *superbugs*) can be reduced by effective IPC practices.

Monitoring (also known as surveillance) of antimicrobial use and resistance in Australia has shown high rates of antimicrobial use that is not consistent with treatment guidelines in aged care homes.



Resources

This [fact sheet](#) from the ACSQHC highlights key findings from the *Fifth Australian report on antimicrobial use and resistance in human health* (AURA 2023) and presents priorities for action to support aged care organisations to prevent and control AMR and improve antimicrobial use.

More information on AMR can be found in **Chapter 10**.

Multidrug-resistant organisms

Multidrug-resistant organisms (MROs) are microorganisms that can survive and cause infection when being treated with a variety of different antimicrobials that once effectively killed them. Infections caused by MROs cannot be effectively treated with antimicrobials. This may result in an older person needing hospitalisation for treatment. On occasion, these infections may be untreatable. MROs are challenging in a variety of healthcare settings, especially in aged care.

The most common types of MROs found in aged care services include:

- Methicillin-resistant *Staphylococcus aureus* (MRSA)
- Vancomycin-resistant enterococci (VRE)
- Carbapenemase-producing Enterobacterales (CPE).

A local risk assessment should be conducted to determine the precautions needed for older persons diagnosed with an MRO.

If an older person is colonised with an MRO but shows no signs or symptoms of infection (for example, all wounds are healed, and the older person is not on antimicrobial treatment) and can independently manage personal hygiene, the use of standard precautions by aged care workers is suitable for ongoing management. The older person should be encouraged to clean their hands before entering a group activity or dining areas.

If an older person is infected with an MRO (for example: they have an infected wound site requiring antimicrobial treatment), standard and contact precautions should be followed. This includes:

- Performing hand hygiene and wearing gloves and aprons or gowns when providing care
- Using dedicated or single-use equipment
- Using a single room if possible and minimising unnecessary movement around the home
- Ensuring consistent cleaning and disinfection of surfaces and shared equipment in close proximity to the older person, as well as surfaces and equipment likely to be touched by the older person and aged care workers
- Ensuring that wounds are covered and wound dressings are changed regularly, and continence is managed to support the older person to participate in daily activities
- Encouraging the older person and others to perform hand hygiene before and after group activities.

Isolation of the older person with an MRO should be avoided as this is the older person's 'home' environment. The use of isolation to manage infection risk must always be balanced with the social, mental and physical wellbeing of the older person.

For information on MROs and transmission-based precautions, refer to 'Type and duration of precautions for specific infections and conditions in aged care' in Chapter 4.



Practice point

Managing MROs in different settings

In residential and centre-based aged care, if an older person experiences symptoms of an infection, it is important that a general practitioner (GP) or nurse practitioner provides a clinical review (either face to face or via telehealth). They will then decide whether the older person can be closely monitored or if further investigations and antimicrobial treatment are required. An infection caused by an MRO will often only be identified after an antimicrobial medicine has been prescribed and has not been effective, or when microbiological testing is undertaken.

In home and community aged care, if an older person is showing symptoms of an infection, the aged care worker should notify the appropriate workforce member (this may be the person responsible for IPC, the care coordinator, manager, or other workforce member). This workforce member should then consider contacting the older person directly (or their carer if appropriate) so that a risk assessment can be undertaken to decide how services will continue to occur, for example:

- What personal protective equipment (PPE) is needed?
- Are all workers trained in transmission-based precautions?
- Is there a need for more services to be put in place such as wound or specialist catheter care?

Colonisation and infection

Once a microorganism enters a person's body, **colonisation** or **infection** can occur.

Colonisation means the microorganism is present on or in the body without causing infection or disease. If a person is colonised with a microorganism, it can be spread to other parts of their body or to other people, where it may develop into an infection. Although antimicrobial treatment is not recommended for colonisation, IPC practices such as hand hygiene and appropriate use of PPE are required.



Practice point

What does a wound swab tell you?

Aged care workers will often come across the term colonisation on a microscopy, culture, and sensitivity (MC&S) report after taking a wound swab. If a wound swab result is positive for a microorganism, but the older person is asymptomatic and the wound has no signs of infection, then the older person is colonised with the microorganism. If the wound is colonised, it may take longer to heal; however, the older person does **not** require antimicrobial treatment.

Infection means the microorganism has entered and multiplied inside the body and is spreading. A person with an infection is usually unwell. An infected person may or may not have symptoms, depending on their health and immune status, age and the severity (also known as virulence) of the microorganism. If a person is showing signs of being unwell, then careful consideration is needed to work out the appropriateness of using antimicrobials.

In aged care, infections may be acquired as a direct or indirect result of aged care services delivered in a residential, centre-based, home or community setting.

The risk of a person becoming infected depends on a variety of factors, including their health status and medical history.

The chain of infection

The transmission of microorganisms occurs via a series of interlinked events called the *chain of infection*. For transmission of a microorganism to occur, all the following elements are required:

- Source (infectious agent)
- Reservoir
- Portal of exit
- Means of transmission
- Portal of entry
- Susceptible host.

The six elements in the chain of infection are explained in **Table 7**.

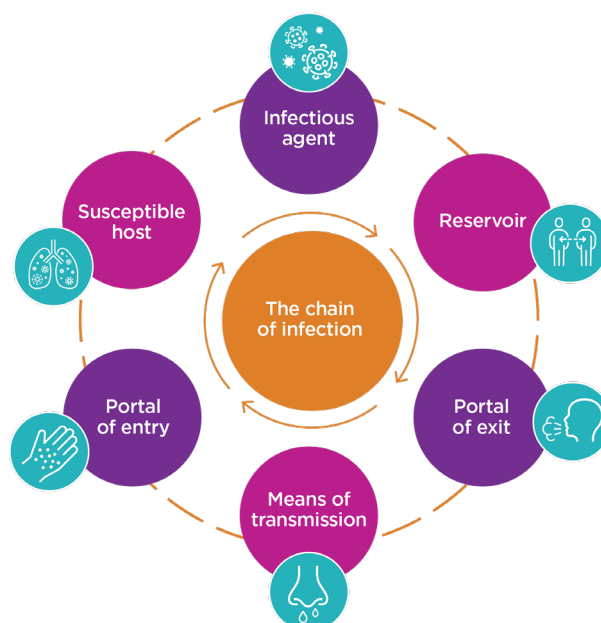


Table 7: The elements of the chain of infection

Element	Description
Source	The source is the microorganism (such as bacteria, viruses, fungi and some parasites) causing the infection. This can be referred to by a variety of terms including infectious agent, microbe, infectious organism or pathogenic organism.
Reservoir	The reservoir is where a microorganism lives. Microorganisms can live in a variety of environments including people, animals, food, soil, water or on an object.
The portal of exit	The portal of exit is how a microorganism gets out of where they live. Microorganisms can be spread via the mouth (such as saliva, vomit, sneezes or coughs), wounds, and the gastrointestinal and urinary tracts (such as faeces and urine).
Means of transmission	The means of transmission is how a microorganism is spread or travels between reservoirs. Microorganisms can spread through contact with contaminated surfaces, body fluids or blood, by ingestion or by inhalation of respiratory particles.
Portal of entry	This refers to how a microorganism enters the host, which may be a person, animal or surface. Often, microorganisms enter a new host the same way that they exited the old host. Microorganisms can be acquired through absorption, inhalation or ingestion.
Susceptible host	The susceptible host is the person at risk of infection. Everyone is at risk of infection, but people at high risk of infection include those who are immunosuppressed, such as babies, children and older people.

Breaking the chain of infection

The aim of IPC is to interrupt the chain of infection to stop the spread of infection. Successful IPC involves implementing work practices that reduce the risk of the transmission of microorganism through a two-tiered approach, including:

- Routinely applying basic IPC strategies, known as standard precautions, to minimise risk to both older people and aged care workers; these strategies include hand hygiene, appropriate use of PPE, cleaning, and safe handling and disposal of sharps (standard precautions)
- Effectively managing microorganisms where standard precautions may not be sufficient on their own – these specific interventions control infection by interrupting the mode of transmission (transmission-based precautions).

It is important that all aged care workers understand how infections are spread, how to use standard and transmission-based precautions, and when to use these precautions to prevent or control the spread of infections.

Information about standard and transmission-based precautions is in **Chapter 4**.

The clinical progression of an infection

Infection is the result of a complex relationship between a host and a microorganism, as shown in the chain of infection. The clinical progression of an infection is also complex, as each person responds differently to each microorganism.

A person exposed to a microorganism may:

- Never develop an infection
- Become temporarily or permanently colonised but never become infected
- Become infected but never develop symptoms or have only minimal symptoms
- Become moderately unwell or very sick but recover, with or without complications
- Become very sick and die.

The ways in which an older person responds after exposure to a microorganism will be determined by their immune status, age, health status (for example, underlying diseases such as diabetes and whether they are a smoker or have a complex wound), the type of the microorganism and the resistance of the microorganism. Older people living in residential aged care homes may be more vulnerable to acquiring all types of infections due to increased care needs, living in close proximity to one another and having shared living areas and bathrooms. In addition to the living environment, the risk of transmission is increased by cognitive deficits that limit the ability of some older people to comply with IPC interventions such as hand hygiene, and behaviours such as wandering.

A person may develop immunity to the microorganism naturally, after exposure to a microorganism, or by previous vaccination (see **Chapter 8** for more information on vaccination). If immunity has developed, the next time the person is exposed to this microorganism, their body remembers and is better equipped to fight it off. After exposure to a microorganism, a person may also become an asymptomatic carrier, which means they show no signs of infection but can still spread it to others.

Understanding how infections spread and knowing how and when to apply the basic principles of IPC (**standard** and **transmission-based precautions**) is critical to the success of an IPC system. This responsibility applies to everybody involved in providing aged care services including clinical and non-clinical staff, contractors, visitors, family members, carers, and the older person receiving care.

As IPC must be implemented in various settings, a risk management approach is required to prevent and minimise harm from infections. A risk management framework means that the organisation identifies and assesses the risks unique to their service and implements IPC interventions based on the risk assessment.

The core components of an IPC system aim to reduce the risk of infections in aged care settings. **Chapter 2** provides further information on the hierarchy of controls, how to conduct risk assessments and implementing risk-reducing strategies within an IPC system in aged care.

Involving older people and their carers is an essential component of IPC in aged care. Older people need to be appropriately informed and supported, based on their capacity, to help in reducing the risk of transmission of infections.

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