



AURA 2021

**Fourth Australian report on antimicrobial use
and resistance in human health**

Consumer summary

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Contents

Introduction	1
Why is AURA important?	1
Antimicrobials and antimicrobial resistance	2
What are microbes and antimicrobials?	2
What is antimicrobial resistance?	2
What are antibiotics used for?	3
What causes antibiotic-resistant bacteria?	4
Types of resistant bacteria in Australia	4
How do we monitor antibiotic use and the spread of resistant bacteria?	5
About the AURA Surveillance System	5
Key findings of AURA 2021	6
How much do we use antimicrobials in Australia?	6
Antimicrobial use in hospitals	7
Antimicrobial use in the community	8
Antimicrobial use in residential aged care services	9
What can you do to prevent the spread of resistant infections?	10
What is AURA doing to support the prevention and control of resistant infections?	11

Introduction

Antimicrobial resistance (AMR) continues to be one of the greatest threats to human and animal health, as well as for food safety and agriculture.

This has been recognised in Australia by *Australia's National Antimicrobial Resistance Strategy – 2020 and beyond* and internationally, by the World Health Organization. AMR threatens the ability to provide safe healthcare now, and in the future.

Resistance to antimicrobials occurs when bacteria change to protect themselves from these medicines. When this happens, infections that could once be prevented or treated with antimicrobials can become life threatening once more.

Antibiotics are the most commonly prescribed type of antimicrobial – so improving the way we use antibiotics helps fight antimicrobial resistance.

Reducing antimicrobial resistance will help keep us healthy, and ensures that these precious medicines will be useful for future generations.

Why is AURA important?

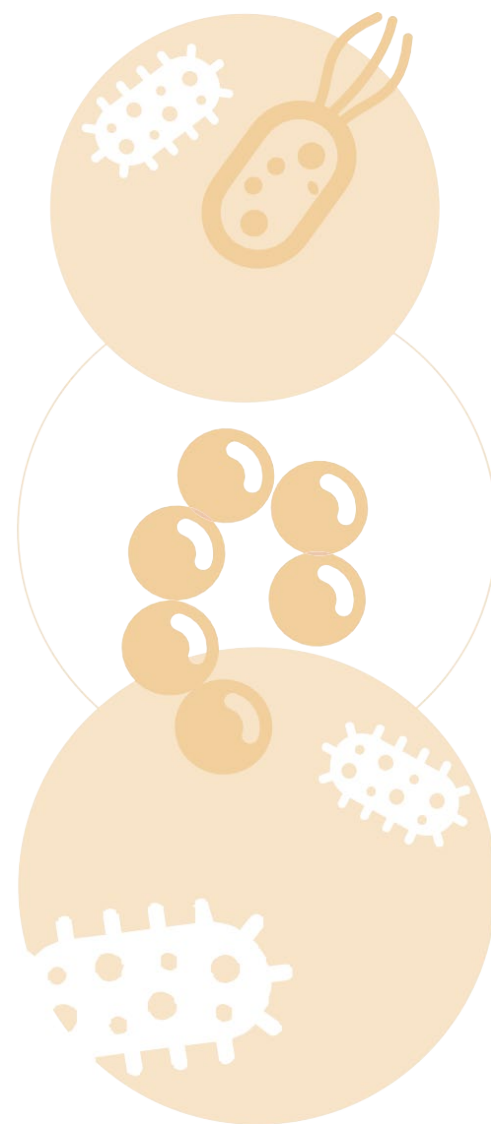
Stopping antimicrobial resistance requires a coordinated national effort, supported by data and evidence.

To do this, we need to know how people are using antimicrobials and what bacteria are developing resistance. We also need to monitor our current strategies for preventing and controlling antimicrobial resistance, to understand what is working, and what is not.

Antimicrobial Use and Resistance in Australia (AURA), is a national surveillance system developed by the Australian Commission on Safety and Quality in Health Care (the Commission) to collect, analyse and report on this information.

The data collected by AURA is being used to help health professionals and governments to take the right action to reduce antimicrobial resistance in Australia and harm to our community.

This booklet explains why antimicrobial resistance is a problem, how and why it occurs, and what we can do about it.



Antimicrobials and antimicrobial resistance

What are microbes and antimicrobials?

Microbes, sometimes known as germs, include bacteria, parasites, viruses, fungi and other microorganisms. Bacteria live on our body surfaces including our skin and in our nose, throat and gut – this is known as colonisation.

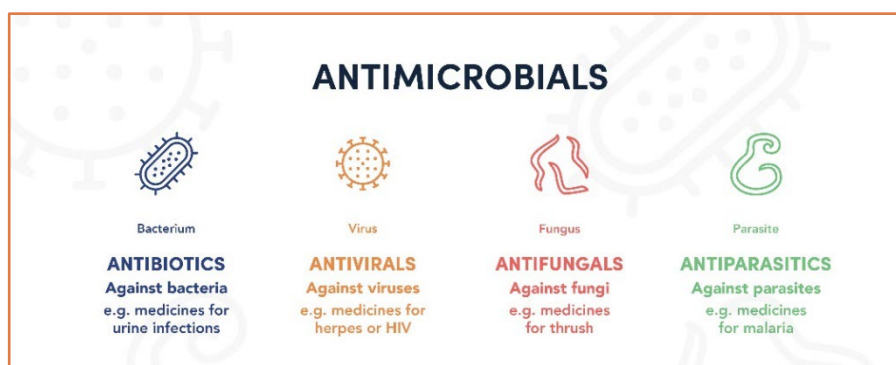
Almost all of these bacteria are beneficial to our health, but some can make us unwell if given the opportunity, such as *Escherichia coli* (*E. coli*), a bacterium that causes many urinary tract infections.

Other bacteria that do not live on, or in us, can also lead to infections, such as *Clostridium tetani* – the cause of tetanus.

Antimicrobials are medicines that treat or prevent infections caused by bacteria, parasites, viruses or fungi. They kill these microbes, or stop them from multiplying.

As shown in the image below, there are different types of antimicrobials including:

- **Antibiotics** – for infections caused by bacteria
- **Antivirals** – for infections caused by viruses
- **Antifungals** – for infections caused by fungi
- **Antiparasitics** – for infections caused by parasites



What is antimicrobial resistance?

Antimicrobial resistance occurs when microorganisms such as bacteria become resistant to antimicrobial medicines such as antibiotics.

Resistance means that these medicines are no longer as effective at treating the infections caused by these bacteria. Some bacteria have become so resistant, that there are no medicines available to treat the infections they cause.

Sometimes bacteria can develop resistance to a range of different antimicrobials.

These are called multidrug-resistant bacteria, or 'superbugs'.

Resistant bacteria can spread easily between people in the community, hospitals and other health services. Aged care homes are especially at risk because residents live in close proximity to one another and there are high levels of antimicrobial prescribing. This can increase residents' risk of being exposed to antimicrobial resistant bacteria.

The main cause of antimicrobial resistance is using antimicrobials, so reducing our use of antimicrobials is important. However, it is also important to take a range of actions to slow the spread of resistant bacteria, such as good hand hygiene and effective cleaning practice.

What are antibiotics used for?

Antibiotics are valuable and useful medicines that treat **bacterial** infections. Used in the right way, they save lives. However, if antibiotics are used when they're not needed, or if they are used incorrectly, they can contribute to drug-resistant infections or antimicrobial resistance.

In Australia, we use antibiotics more than many other developed countries and sometimes these medicines are prescribed when they're not needed, which can lead to more bacteria developing resistance.

It is important to remember that even though antibiotics treat infections by getting rid of the bad bacteria that make you sick, they also kill the good bacteria that keep you healthy. Without these good bacteria, other types of bacteria have room to grow, possibly leading to other infections.

Types of antibiotics

There are different types of antibiotics. Each is designed to work on a specific bacterium or a group of bacteria.

If the antibiotic kills a small number of different types of bacteria, or stops them from multiplying, it is called 'narrow spectrum'. If the antibiotic kills many different types of bacteria, it is called 'broad spectrum'. Broad-spectrum antibiotics are more likely to cause antimicrobial resistance.

Antibiotics do not fight infections caused by viruses, such as:

- Colds and flu
- Most coughs and bronchitis
- Most sore throats.

Taking antibiotics won't help treat these infections – but it will increase the risks of antimicrobial resistance and experiencing side effects, such as thrush and nausea.

If you are prescribed an antibiotic, it is important that you follow your doctor's instructions on how to use it, and for how long.

If you have a viral infection, such as a cold or flu, antibiotics will not help you

Why is antimicrobial resistance important?

Antimicrobial resistance puts people at risk of infections that we may not be able to treat.

Unless we can slow down antimicrobial resistance and develop new antimicrobials, the effects and cost of antimicrobial resistance will continue to increase – more people will become unwell for a longer amount of time with infections and complications that are harder to treat.

Antimicrobial resistance is a risk to people's health because:

- It reduces the number of antimicrobials that can be used to treat infections
- It increases illness and deaths caused by infections from multidrug-resistant microbes
- Infections may require broad-spectrum rather than narrow-spectrum antimicrobials, or the use of antimicrobials which may have more side effects
- Medical procedures such as organ transplantation, cancer chemotherapy and major surgery become more risky as people might develop an infection afterwards that can't be treated with common antibiotics
- People may need to be treated in hospital with intravenous antibiotics, because the bacteria causing their infection are resistant to all the medicines that can be given by mouth
- It can increase the length of a stay in hospital
- If someone carries, or is infected with, a resistant organism, they may spread it to their family, friends, or other people they work with. This may have drastic consequences, especially if they have a compromised immune system.

What causes antibiotic-resistant bacteria?

The use of antibiotics is one of the main contributors to antimicrobial resistance.

The more we use antimicrobials, especially when they're not needed, the more bacteria have the chance to change and develop a resistance to the medicine. It is bacteria, not the human body, that become resistant to the antibiotics designed to kill them.

Types of resistant bacteria in Australia

Twelve bacteria, or bacterial families, have been identified as the most important for monitoring in Australia.

Some of these bacteria are important to monitor because they commonly cause infection or spread easily, while others are important to monitor because they can have a significant impact on a person's health.

Resistant bacteria can spread easily between people in the community, hospitals, other health services and aged care homes. The spread of these bacteria often happens quickly and may go unnoticed until an infection has developed. Therefore, it is important that Australia identifies and monitors resistant bacteria so that action can be taken to prevent them from spreading.

Two common bacteria that are monitored are:

Enterobacterales

This is a large family of bacteria, including *E. coli*, which lives in the human intestine (gut), and commonly causes urinary tract infections and may cause infections in the bloodstream, or infections after surgery.

Resistance in these bacteria is increasing. Resistant infections may need to be treated in hospital, as there may be no effective antibiotics that can be taken by mouth outside of hospital.

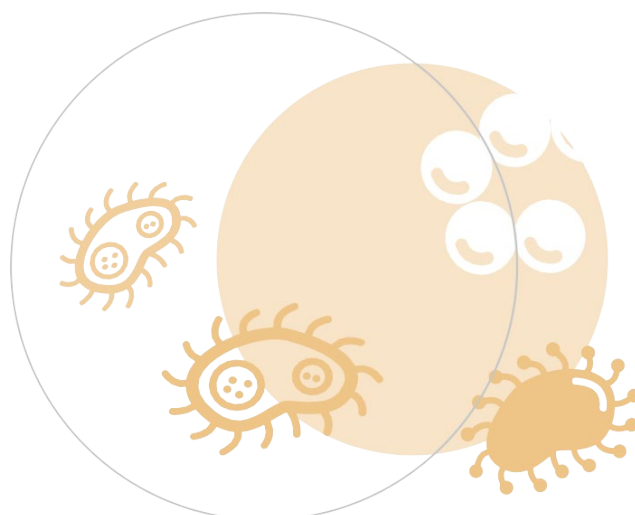
Bacteria from this family are resistant to many antibiotics, including to a group of broad-spectrum antibiotics known as carbapenems. These bacteria are now found in Australia in hospitals and in the community.

Staphylococcus aureus

This is a common bacterium which lives on the skin of many people. Also known as 'Golden Staph' or MRSA, it causes a wide range of infections, such as boils, impetigo (school sores), wound infections, bone and joint infections, and bloodstream infections (septicaemia).

Resistance to 'Golden Staph' is reducing in hospitals but increasing in the community.

Working to combat antimicrobial resistance is a priority for our health system due to its serious and growing impact on human health



How do we monitor antibiotic use and the spread of resistant bacteria?

To fight antimicrobial resistance we need to understand the scale of the problem, and bring together as much information as possible.

We know that the more antimicrobials are used, the more likely it is that resistance will develop. So carefully monitoring how antibiotics are prescribed and used, is essential for informing strategies to prevent and contain antimicrobial resistance in Australia.

We need to understand:

- Which microbes are becoming resistant and if these are different across Australia
- Which antimicrobials they are resistant to
- How fast this resistance is changing
- How much and how we are using antibiotics.

About the AURA Surveillance System

The AURA Surveillance System was established by the Commission in 2014, to collect the data that we need to better inform strategies to tackle antimicrobial resistance.

AURA collects data on antimicrobial use, appropriateness of use, and antimicrobial resistance from a range of sources including hospitals and community settings like general practice and aged care. The range of data sources (where the information comes from), and the type of data included (from the community and from hospitals) is gradually increasing to provide an even better picture of the changes in resistant bacteria and antimicrobial prescribing patterns.

By looking closely at this information, we can better understand which antimicrobials are being prescribed unnecessarily, which antimicrobials may be at risk of becoming less effective or ineffective, and which bacteria are particularly threatening to our health.

AURA uses this data to produce a range of reports to support Australia's overall response to the challenge of antimicrobial resistance.

AURA 2021 is the fourth national report of its type on antimicrobial resistant bacteria and antibiotic use in Australia. It includes:

- Data about organisms that are a priority for Australia
- The volume of antibiotic use
- The appropriateness of antimicrobial prescribing
- Key emerging issues for antimicrobial resistant bacteria
- A comparison of Australia's situation with other countries.

To access the full AURA 2021 report, go to www.safetyandquality.gov.au/AURA2021

Key findings of AURA 2021

How much do we use antimicrobials in Australia?

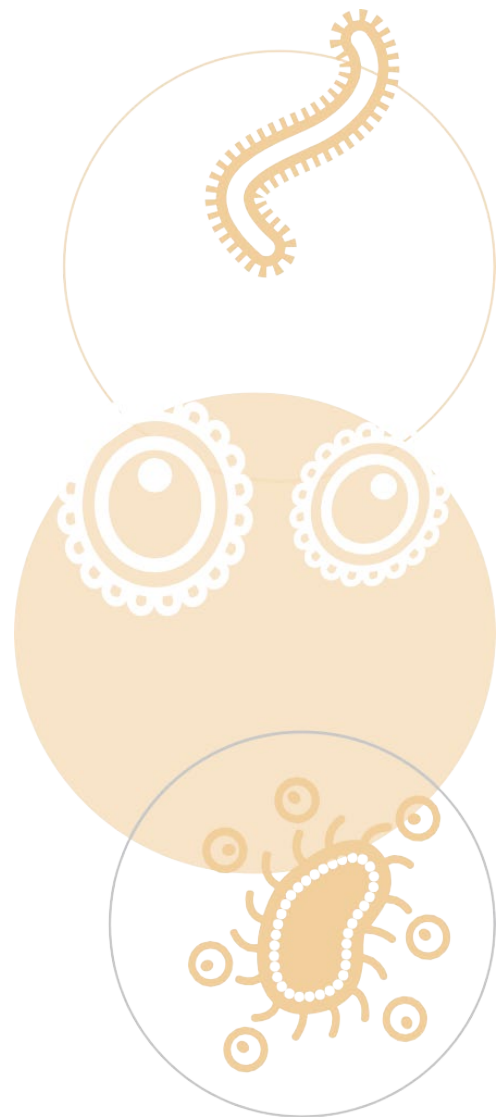
In 2019, over 40% of Australians had at least one antimicrobial dispensed in the community.

Australia has a high rate of antimicrobial use compared with many other developed countries, including the United Kingdom, Canada, Germany and the Netherlands.

Australia has national guidelines called '*Therapeutic Guidelines: Antibiotic*' to help healthcare professionals make decisions about whether to prescribe antimicrobials, which ones are appropriate, the appropriate dose, and the length of time for use.

Despite the availability of these guidelines, antimicrobials are sometimes prescribed inappropriately. For example, to treat viral infections (such as colds or flu) where we know they have no benefit, or in cases where it is known that an infection will improve without any treatment.

More investigation is needed to understand why this is happening, so we can learn how best to work together to improve antimicrobial prescribing and use in Australia.



Antimicrobial use in hospitals

Australia's antimicrobial use, in hospitals participating in surveillance, has been gradually increasing since 2017. The reasons for this increase are not clear, but additional work will be undertaken to better understand the causes and to improve this situation.

Some of the most commonly-used antibiotics in hospitals include:

- Cefazolin
- Amoxicillin–clavulanic acid
- Flucloxacillin
- Doxycycline
- Amoxicillin
- Cefalexin.

Reducing inappropriate prescribing of the broad-spectrum antibiotics cefalexin and amoxicillin–clavulanic acid, and promoting use of narrower-spectrum antibiotics such as amoxicillin, will help to prevent and contain antimicrobial resistance. Broad-spectrum antibiotics work against many different species of bacteria and contribute more to resistance. Narrow-spectrum antibiotics work against one or two kinds of bacteria and contribute less to resistance.

The most common reasons for antibiotics being prescribed in hospitals in 2019 were:

- Preventing infections during surgery or for patients with a compromised immune system (known as prophylaxis)
- Community-acquired pneumonia
- Urinary tract infections
- Skin infections.

Key points

- Antibiotics are being overprescribed in Australia and not in compliance with *Therapeutic Guidelines: Antibiotic*

- Inappropriate prescribing in hospitals remains a problem, with nearly one-quarter of the prescriptions assessed found to be inappropriate
- Many of the most commonly used antimicrobials in hospitals also have the highest rates of inappropriate prescribing
- Cefalexin and amoxicillin–clavulanic acid had the highest rates of inappropriate prescribing
- Different types of hospitals have different levels of appropriate prescribing.

Priorities

Chronic obstructive pulmonary disease (COPD)

Prescribing of antimicrobials for respiratory conditions, including bronchitis and chronic obstructive pulmonary disease, is a priority area for improvement, as antibiotics are commonly being inappropriately prescribed.

Inappropriate use of antimicrobials in hospitals for the management of COPD in particular, has been an ongoing issue since 2013. The most antimicrobial prescribing problem for treatment of COPD is the use of broad-spectrum antibiotics, when narrow-spectrum antibiotics (would be more appropriate, and contribute less to AMR).

AURA is working with clinical specialist groups to improve appropriate prescribing for these conditions.

Amoxicillin–clavulanic acid and cefalexin prescribing

Reducing inappropriate prescribing of these antibiotics and promoting use of narrow-spectrum antibiotics such as amoxicillin, will reduce the volume of broad-spectrum antibiotic use, and help to prevent and contain antimicrobial resistance.

Antimicrobial use in the community

The good news is that overall, the use of antimicrobials is decreasing in the community. Community refers to general practice, specialist outpatient clinics, dental clinics and aged care homes.

However, antimicrobials continue to be overprescribed in the community, compared with national guideline recommendations:

- More than 80% of people with acute bronchitis or acute sinusitis were prescribed antimicrobials when they are not recommended by current prescribing guidelines
- Some antimicrobials were prescribed much more in winter, which suggests that they are being used to treat colds and flu, for which they have no benefit
- Antimicrobials from the penicillin (e.g. Amoxil®) and cephalosporin (e.g. Keflex®) classes were the most commonly prescribed antimicrobials in the community setting.

For some important resistances in Australia, there have been increases in the community since 2006, such as methicillin-resistance in *Staphylococcus aureus* (MRSA). When people go into hospital with a resistant infection they caught in the community, it makes their care more complex, so reducing resistance in the community is also important.

Coronavirus (COVID-19) and antimicrobial use

In 2020, there was a large drop in the amount of antimicrobials dispensed in Australia as a result of the Coronavirus (COVID-19) pandemic. The use of antimicrobials in the community in other countries, including the United States and New Zealand, also decreased during this time, without an increase in the number of people going to hospital for infections usually treated with antimicrobials in the community.

This suggests that it is possible to reduce levels of antimicrobial use without causing harm to patients. It is important to continue to work together to keep these lower levels of antimicrobial use, and help reduce the risk and impact of antimicrobial resistance.

Key points

- There has been a gradual decrease in antibiotic dispensing in the community since 2015
- Antibiotics are prescribed for acute bronchitis and flu, even though antibiotics are never recommended for these infections. The most commonly supplied antibiotics are cefalexin, amoxicillin and amoxicillin–clavulanic acid
- In patients aged under 65 years, the highest rate of dispensing was for children aged between two and four years
- Approximately 50% of all antibiotic prescriptions were ordered with repeats, when they may not be needed
- There have been distinct upward trends in some resistant bacteria in the community
- The COVID-19 pandemic has led to a decrease in the amount of antimicrobials dispensed in Australia. It is important that we work together to keep these levels as low as appropriately possible.

General practitioners play a crucial role in improving the appropriate use of antimicrobials and supporting the reduction of resistance in the community.

AURA will continue to work with primary care providers to support appropriate reduction in antimicrobial prescribing.

Antimicrobial use in residential aged care services

Preventing and controlling infections in aged care homes is challenging, making them a high-risk environment for antimicrobial resistance.

Data from AURA show that, for some organisms, rates of antimicrobial resistance in aged care are as high, or higher, than rates in hospitals.

In facilities with frequent and inappropriate antimicrobial use, there is an increased risk for all residents of acquiring an antimicrobial-resistant infection.

Residents of aged care homes can be frail and vulnerable to infections. Their immune systems may not be as strong as younger people. This means a higher rate of infections, higher levels of unnecessary prescribing, and increased potential for antimicrobial-resistant bacteria to spread quickly.

Even those who are not receiving antimicrobial treatment are vulnerable because of the potential for infections to spread among the residents.

Other high-risk factors exclusive to aged care homes include:

- A close living environment and frequent contact with other residents, visitors and staff who may be infected
- Residents moving frequently in and out of hospitals
- Higher use of invasive devices such as urinary catheters
- Higher levels of infection and colonisation with multi-drug resistant organisms.



Key points

- A large number of antimicrobial prescriptions in residential aged care services were for the prevention of infections – this is concerning because antimicrobials should rarely be used to prevent infection in this setting
- Antimicrobials are being used in aged care for conditions where they are not required, such as urinary tract, soft tissue and skin infections
- Almost 1 in 6 antimicrobials in the aged care setting were prescribed for use “when required” – this may lead to unnecessarily long treatment duration and increase the risk of antimicrobial resistance.

Priorities

The AURA team at the Commission will continue to work to promote antimicrobial prescribing improvement programs, and support ongoing monitoring of antimicrobial use in residential aged care services. The Commission will also continue to support the development and implementation of effective strategies to prevent and control AMR infections in these settings. These may include:

- Promoting regular review of antimicrobial prescribing patterns by medical and nursing staff, to ensure these are consistent with Australian prescribing guidelines
- Policies that require dates to be set for review of antimicrobial treatment
- Education for staff who provide care to residents on the importance of preventing and controlling infections.

What can you do to prevent the spread of resistant infections?

Everybody can be part of preventing antimicrobial resistance, not just health professionals.

As a consumer of health services and antimicrobials, it is important that you know that not all infections require treatment with antimicrobials.

Antibiotics treat some bacterial infections, but for many common conditions, such as colds and flu, they are not effective at all.

For your own personal health, you should only use antibiotics for infections caused by bacteria. Antibiotics will not help if you have a viral infection, and you run the risk of experiencing side effects and contributing to antimicrobial resistance.

It is important that you talk to your healthcare provider about the signs and symptoms of your illness, so you both have the information you need to make the best decision about your treatment.

1 You can prevent the spread of germs by:

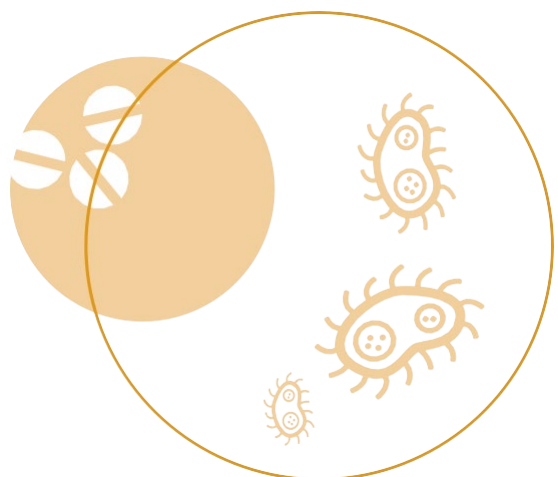
- Washing your hands after sneezing or touching your eyes, nose or mouth, after using the toilet and before eating and food preparation
- Coughing into your elbow instead of your hand
- Staying away from work or school if you are unwell
- Having the vaccinations your doctor recommends for you
- Ensuring your home environment is clean.

2 If you do get sick:

- Ask your doctor what you can do to feel better and ease your symptoms while your body fights the illness
- Let your doctor know that you are concerned about antibiotic resistance and only want an antibiotic if it is really necessary
- Ask your doctor if a test would identify the cause of your infection.

3 If your doctor prescribes an antibiotic:

- Take your antibiotic exactly as your doctor has prescribed
- Never take leftover antibiotics or give them to someone else
- Don't keep any repeats of the prescription 'just in case' of future sickness – always see your doctor each time
- After you are better, return any unused medicine to your pharmacy.



What is AURA doing to support the prevention and control of resistant infections?

Understanding antimicrobial resistance through data collection

The more we understand prescribing patterns, resistance rates and trends over time, the better we can guide improvements in how health services manage infection control and antimicrobial prescribing.

AURA provides an overall picture of patterns and trends in antimicrobial use and resistance rates in Australia through its regular reports.

Sharing information with health professionals and consumers

AURA helps support consumer awareness and understanding, by providing information on appropriate use of antimicrobials, the risks of antimicrobial resistance, and the actions you can take to help tackle this public health challenge.

Health professionals can use information from AURA to better understand which microbes may be developing resistance to antimicrobials in their local area, and which conditions may therefore require a different treatment approach.

Health services and system managers can use information from AURA and their own organisational data to identify where they may be using antimicrobials differently to others, and where they may not be prescribing or using antimicrobials consistently with national guidelines. They can review the reasons why and learn how to improve treatment.

Working with health professionals, hospitals and aged care to improve antimicrobial resistance

Information and data from AURA is used to help health professionals and the community better understand the risk of antimicrobial resistant bacteria and develop response strategies.

The Commission and AURA will work closely with health care workers and health and aged care services to reduce AMR and promote safe use of antimicrobials, and will continue to collaborate with partner organisations such as NPS MedicineWise to ensure communication with healthcare consumers is both useful and meaningful.

Like to know more?

If you would like more information about an antibiotic you have been prescribed, you can ask your doctor or talk to your local pharmacist.

If you would like more information about AURA, go to www.safetyandquality.gov.au/AURA



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