AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

AURA Antimicrobial Use and Resistance in Australia

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# Antimicrobial Resistance and AURA 2016

## Information Series

The AURA Program have prepared this document on behalf of the Australian Commission on Safety and Quality in Health Care

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# ANTIMICROBIAL RESISTANCE and AURA 2016

This information is drawn from AURA 2016: first Australian report on antimicrobial use and resistance in human health (AURA 2016), and provides a general summary of information on antimicrobial resistance in key priority organisms contained in the report.

## What are antimicrobials?

The term 'antimicrobial' refers to all medicines designed to slow the growth or kill infection-causing bacteria, fungi, viruses and parasites. Antibiotics, which are used to treat infections caused by bacteria, are the most commonly prescribed form of antimicrobial.

## What is antimicrobial resistance?

Antimicrobial resistance occurs when bacteria change to protect themselves from the effects of antibiotics. Such change may mean that these antibiotics are no longer effective in treating infections caused by particular bacteria. As a result, infections that could once be treated with, or prevented by, antibiotics are becoming life-threatening once more.

Different resistances to different antimicrobials can accumulate within bacteria. These are called multidrug-resistant bacteria or multidrug-resistant organisms ('superbugs'). Methicillin-resistant *Staphylococcus aureus* (MRSA), sometimes known as 'golden staph`, is an example of a multidrug-resistant organism.

It is important to understand that it is not you, as an individual, that becomes resistant to antibiotics – it is the bacteria that cause the infection that can become resistant.

## What causes antimicrobial resistance?

There is overwhelming evidence that the use, and overuse, of antimicrobials (especially antibiotics) has been a powerful driver for the development of antimicrobial resistance.

Both appropriate and inappropriate use of antimicrobials, provide bacteria with the opportunity to evolve and develop antimicrobial resistance. Inappropriate use includes: using antibiotics for viral infection such as colds and 'flu'; using the wrong antimicrobial, and, using it for the wrong duration or at the wrong time.

Antimicrobial resistance can never be eliminated, but it can be controlled.

## Why is antimicrobial resistance important to me?

Antimicrobial resistance can affect your health by limiting the healthcare treatment options available to you. If you get an infection with bacteria that are resistant to antimicrobials, you might:

- be sick for longer
- develop preventable complications from the infection
- need to go to hospital to receive effective treatment
- remain infectious for longer
- spread the infection to more people.

Some medical treatments requiring the use of antimicrobials to be safe, such as cancer chemotherapy and joint replacement surgery, also become much riskier.

Unless the rate of antimicrobial resistance is slowed, and new antimicrobials are developed, the impact of antimicrobial resistance will continue to increase because more people will be sicker for longer, and have infections and complications which are harder to treat.

## What is AURA?

If Australia is to reduce the amount and impact of antimicrobial resistance, we need to understand which bacteria are becoming resistant to the antibiotics designed to treat them, and how fast this resistance is happening. This means that surveillance (or systematic monitoring) is essential to track the spread of resistant organisms between people in hospitals and in the community.

The Australian Commission on Safety and Quality in Health Care (the Commission) has established a national surveillance system through the work of the Antimicrobial Use and Resistance in Australia (AURA) project. This system provides information about antimicrobial resistance and antimicrobial use to help develop effective strategies to combat resistance in Australia.

In June 2016, the Commission released its first AURA report. The information in this report shows 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 people's health.

## Antimicrobial resistance 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 are a common cause of infection or spread easily, while others are important to monitor because they can have a significant impact on a person's health when they do cause infection.

The following outlines AURA 2016's main findings for these organisms:

### *Acinetobacter baumannii*

This organism is associated with pneumonia and wound infection. It is particularly important that it is monitored in intensive care units and burns units.

The resistance rates for the important antibiotics used to treat infections with this organism are low, at less than 5%.

### *Enterobacteriaceae*

This is a large family of bacteria that includes *Escherichia coli* (*E. coli*), *Klebsiella pneumoniae* and *Enterobacter cloacae* complex. They cause urinary tract infections, infections after surgery and blood poisoning (septicaemia).

Resistance in *Enterobacteriaceae* is an increasing problem because these bacteria are often resistant to several classes of antibiotics. Infections caused by them need to be treated in hospital because of a lack of effective antimicrobials that can be taken orally in the community.

### *Enterococcus species*

This group includes *Enterococcus faecium (E. faecium)* and *E. faecalis*. These bacteria can cause infections in people in hospitals after surgery or in people requiring treatment involving invasive devices, such as catheters.

Australia has one of the highest rates of resistance to the antibiotic, vancomycin in *E. faecium* in the world.

### *Mycobacterium tuberculosis*

This is the organism that causes tuberculosis, an infection that most commonly presents as lung disease. Although Australia has one of the lowest rates of tuberculosis in the world, and multidrug resistance is also currently low in Australia, continued vigilance is required to maintain or improve on this low rate.

## *Neisseria gonorrhoeae*

This organism causes gonorrhoea, a sexually transmitted infection. The most important antibiotic for treating gonorrhoea is called ceftriaxone.

Resistance to ceftriaxone is rare; however, this is being closely monitored as failures of ceftriaxone treatment have been documented in Australia in strains that have increased resistance to it.

## *Neisseria meningitidis*

This organism causes so-called invasive meningococcal disease (mostly septicaemia and meningitis, an inflammation of the membranes around the brain or spine), which can kill rapidly. Invasive meningococcal disease is very uncommon in Australia because of the availability of vaccines that provide immunity against some strains. Occasional strains are found with resistance to some of the antibiotics used to treat it.

Resistance rates in this organism to key antimicrobials are low, at less than 5%.

## *Pseudomonas aeruginosa*

This organism mainly affects hospitalised patients or patients with compromised immune systems. It can cause urinary tract infections, and infections in burns and other wounds.

Resistance rates to key antimicrobials are around 10% or less.

## *Salmonella species*

These species cause infections such as gastroenteritis, and are spread in contaminated foods. The so-called typhoidal *Salmonella* species also cause a condition called enteric (typhoid) fever, which can be fatal if left untreated.

People with *Salmonella* gastroenteritis usually get better without the use of antimicrobials. Antimicrobial treatment is appropriate for patients with severe disease or septicaemia.

The fluroquinoline class of antibiotics is very important for treatment for these infections. Currently, rates of resistance to fluroquinolines are very low (1%) in the non-typhoidal *Salmonella* species, but are more than 12% in the typhoidal *Salmonella* species.

## *Shigella species*

These organisms are an uncommon but important cause of gastroenteritis. They can be easily transmitted between people. The main aim of treatment is to prevent transmission to others rather than to treat symptoms.

Although resistance is currently low, any resistance in Australia is of concern, given the capacity of this organism to cause outbreaks, when it rapidly spreads from person to person.

## *Staphylococcus aureus*

Also known as ‘golden staph’, this organism causes a wide range of infections, such as boils, impetigo (school sores), wound infections, bone and joint infections, inflammation of the lining of the heart (endocarditis), and septicaemia. It is also a common cause of healthcare-associated infections, such as intravenous (IV) line infections.

Moderate and serious infections require antibiotic treatment. The healthcare-associated strains resistant to many antibiotics are commonly known as MRSA, and are now common in many parts of Australia. Strains of MRSA that arise in the community now cause a significant level of infection in both the community and hospital settings, especially with the increased movement of patients.

Australia has moderately high levels of resistance to key antibiotics, both in hospitals and in the community.

### *Streptococcus agalactiae*

This is a major cause of life-threatening infection in newborn babies. Antibiotics are given at the time of delivery to mothers who carry the organism (without any symptoms). This organism also causes skin and soft tissue infections, as well as more serious infections such as septicaemia and bone and joint infections.

Resistance to the backup class of antibiotics is at around 20%, which is important, as this is the threshold at which alternative antibiotics may need to be used to be effective.

### *Streptococcus pneumoniae*

This organism commonly causes ear infections, sinusitis and pneumonia. It can also cause septicaemia and bacterial meningitis.

Rates of resistance to the main treatment (penicillin) are low, at less than 5%, but resistance to other key antimicrobials is between 21% and 26%.

## Where next?

Information from the AURA Surveillance System will be used to support ‘calls to action’ to better understand the risk of antimicrobial resistance in modern medicine and develop response strategies. Part of this national response is to build awareness and understanding of the link between antimicrobial use and antimicrobial resistance with healthcare consumers.

All antibiotic use will create some resistance, but inappropriate use and overuse of antibiotics makes antibiotic resistance a lot worse than it would otherwise be. Using antibiotics when we don’t need them may mean that they won’t work when we do need them in the future.

More information on what you can do to slow antimicrobial resistance is available in the **AURA 2016 Consumer Summary.**