Vetpath is a specialist veterinary laboratory dedicated to providing our clients with the finest laboratory diagnostic service. A team of veterinary pathologists and medical scientists with extensive experience in veterinary diagnostic pathology forms the core of the Vetpath team.

VNews

VETPATH LABORATORY SERVICES

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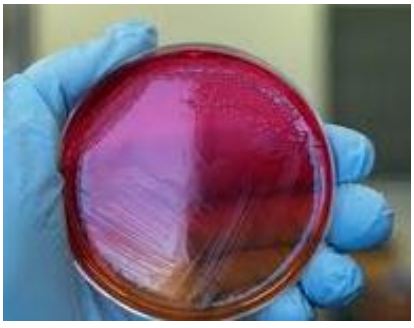
Antimicrobial resistance – a threat to human and animal health

In 1946, Alexander Fleming, at his Nobel Prize speech said: "The thoughtless person playing with penicillin treatment is morally responsible for the death of the man who finally succumbs to infection with the penicillin-resistant organism."

Antimicrobial resistance is developing at a rapid rate, and appears to be originating from both human and veterinary antibiotic use and misuse. Antibiotic resistance can be transferred from animals to humans, and *vice versa*. Some of the reasons for the increase in resistance include antibiotic misuse and overuse as well as more immunocompromised people in the community (diseases, ageing). Also, antibiotics are often overprescribed and used for illnesses they can't treat.

Resistance builds up by conjugal transfer of plasmids, direct uptake of naked DNA (natural transformation) and by the action of bacteriophages (transduction). Cross resistance also occurs, where genes encoding resistance to one antibiotic in a class have the capacity to encode resistance to all antibiotics in that class. A new area of concern is the rapid emergence of multiple drug resistant bacteria. In some cases a single plasmid can encode for resistance to multiple antibiotics.



Antibiotic use in both humans and animals determines the resistance profile of bacteria in the human gut. Increasing antibiotic resistance was recognised in zoonotic enteric bacteria such as *Salmonella sp* and *Campylobacter sp* in the 1970s and 1980s, however little action was taken. In the late 20th century many antibiotics were banned from animal use in Europe, however, there are now multiple resistant organisms in humans, livestock and companion animals. Methicillin-resistant *Staphylococcus pseudointermedius* was first reported in 2011. Methicillin-resistant staphylococci resulted in increased treatment with vancomycin, producing in VRE.

Antibiotics are used in animals for treatment, prevention and as growth promotants, resulting in resistant/multi-drug resistant strains of bacteria. Antibiotics excreted from humans and animals into the environment have the potential to increase the rate of antimicrobial resistance of

bacteria, especially as some drugs biodegrade slowly, enabling them to exert selective pressure for a long period of time. Unfortunately, it appears that if antibiotic resistance can be reversed, it happens quite slowly, even if the antibiotic of interest is withdrawn from use. Of the 18 large pharmaceutical companies that previously developed antibiotics, 15 have left the field. No new classes of antibiotics against Gram negative bacteria have been developed for 40 years, and new antibiotics take decades to develop.

Australia has one of the lowest non-human uses of antibiotics in the world, however, many bacteria are shared by both humans and animals and resistant bacteria are able to move fairly easily across the world. In Australia multi-resistant organisms have been found in dogs, cats, horses, poultry and pigs. No antibiotics are registered for use in aquaculture, however, widespread antibiotic use occurs in some Asian countries and antibiotic resistance is now common in Australian aquaculture isolates. Bacterial diseases in plants have also been treated with a restricted range of antibiotics since the 1950s, and antibiotic resistance has been found in pathogenic plant bacteria.

In Australia surveillance into animal-related microbial disease is more difficult than in human practice as animal owners pay for virtually all veterinary care and testing, and government subsidies for diagnostic services in food animals has declined significantly.

What can we do?

- Improve consumer understanding of antimicrobial resistance and the importance of using antibiotics appropriately
- Choose antibiotics based on the most likely pathogen in that disease setting
- Perform culture and sensitivity, especially if initial empirical treatment has failed
- Avoid empiric use of fluoroquinolones for UTI or chronic staph infection in dogs
- Avoid combination therapy if at all possible
- Treat for an appropriate amount of time, and try to ensure owner compliance
- If clusters of an unusual or multi-resistant organism occur, forward to a suitable reference laboratory
- Use good in-practice hygiene practices and develop infection control guidelines
- Use vaccination wherever possible

Additional resources can be found at:

https://www.amr.gov.au/

https://www.amr.gov.au/what-you-can-do/veterinary-practice

https://www.amr.gov.au/what-you-can-do/animal-owners

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