

Antimicrobial Resistance (Q&A)

Animal welfare | Antimicrobial resistance | 03 March 2015

What is an antimicrobial? What is antimicrobial resistance and what is the difference between antimicrobial and antibiotic resistance?

An antimicrobial is the general term used for any drug that works to cure infections caused by microorganisms, such as viruses, bacteria, fungi and parasites, by killing or inhibiting their growth. The drugs used specifically to treat infections caused by bacteria are known as antibiotics.

Antimicrobial resistance (AMR) is the resistance of a microorganism to an antimicrobial drug that was originally effective to treat infections caused by it. Antibiotic resistance refers specifically to the resistance of bacteria to antibiotic drugs. However, both terms are usually used interchangeably – when bacteria are no longer killed by antibiotics.

How does antibiotic resistance occur?

Antibiotic resistance occurs as bacteria gradually evolve to become resistant to the drugs aimed at destroying them. When antibiotics are used to treat a bacterial infection, some bacteria may already have an inherent resistance mechanism. Those bacteria will then survive and pass on the resistance as they multiply, creating a new bacterial population more resistant to the antibiotic. That antibiotic becomes therefore less effective to treat infections caused by those specific bacteria. In some situations, the resistant gene can also be transferred to other types of bacteria, further spreading the resistance to that drug.

The evolution of resistance in bacteria is a natural occurrence; however human activity is accelerating the process. Resistance will not develop each time an antibiotic is used, but the more an antibiotic is used, the more chances there are for resistance to develop. Therefore, while resistance is an ongoing response to any antibiotic use, the misuse and overuse of antibiotics speeds up the process.

How does antibiotic resistance spread?

Antibiotics are prescribed to humans in hospitals and the general community, and animals, both to pets and farm animals. Pathogenic (disease causing) bacteria can develop resistance as already explained, but other non-pathogenic bacteria can also develop resistance in the intestine of both humans and animals and be excreted as waste. Poor hygiene practices, i.e. washing hands in hospital, can help the spread of bacteria from human to human. Resistant bacteria in waste, (from humans and pets in sewage) and farm animals (from use in manure as fertiliser), can contaminate the environment and get into the water supply, which is then used to irrigate crops and as drinking water. Traces of the resistant bacteria can remain on those crops and in the water, and then be ingested by humans and animals. Meat from farm animals can also be contaminated with bacteria, which can be ingested by humans if the meat is undercooked or food

hygiene practices not followed (e.g. cross contamination in the kitchen). While, over prescription and misuse of antibiotics does exacerbate the development and spread of resistance, poor hygiene in healthcare facilities, farms and slaughter houses is also important in its spread.

Does the use of antibiotics in food-producing animals contribute to the problem?

Certain types of resistant bacteria such as *Campylobacter* or *Salmonella*, could be transferred from animals to humans through food, or in some cases through direct human contact with animals. However, the major cause of antibiotic resistance in humans is the use of antibiotics in human medicine, be it by individuals, hospitals or healthcare facilities.

Why is antibiotic resistance a problem?

Antibiotic resistance results in drugs being less effective to treat illnesses. Diseases which have been treatable, are becoming harder and harder to treat as more drugs become ineffective against them. Bacteria can become resistant to many drugs which can extend the length and severity of the infection, and even lead to some diseases becoming entirely untreatable, resulting in human deaths or permanent disabilities. The cost of health care increases, as drugs become less effective and hospital stays become longer and more expensive.

Antibiotic resistance can affect everyone, however, people who are at particular risk of being affected by antibiotic resistance are those with weak immune systems, i.e. children, the elderly or immunocompromised.

Antibiotic resistance is of global concern because of human activities such as international travel for leisure, business or medical reasons. When people pick up new forms of resistant bacteria in their intestines and then return to their home country, they spread different types of resistance around the world. This appears to be a particular problem when visiting countries where antibiotics are freely available over the counter (and thus there is much more use, and misuse). In addition, international trade in meat and vegetables can also contribute to spreading resistant bacteria around the world.

What can be done to reduce the rate of antibiotic resistance?

The prevention of antibiotic resistance is a shared responsibility and should focus on coordinated action by all parties involved. Antimicrobials should be prescribed responsibly and appropriately, to both humans and animals. Here are some of the ways we can all contribute:

Responsible use of antibiotics: Antibiotics should never be taken unless prescribed, and should not be taken for viral infections, which include the majority of common colds and flu. Prescriptions of antibiotics should always be completed, even if the patient is feeling well. When antibiotics are used incorrectly, i.e. by not completing the course of the treatment or lowering the dose/ altering the frequency, there is insufficient drug in your body making it easier for bacteria to survive and become resistant. Always follow your doctor's advice on when and how to use antibiotics.

Hygiene: Personal and family hygiene can also make a significant contribution. This involves following good kitchen practices, such as, safe storage of foods in refrigerators, avoiding cross contamination and avoiding undercooking in the preparation of food, washing fruits and vegetables that are eaten raw, practising scrupulous hand washing before preparing food, eating or after using the toilet and using appropriate hand sanitizers before and after visiting hospitals. These general measures should also apply to hospitals and healthcare-facilities staff.

Sources

World Health Organization. [Antimicrobial Resistance Fact Sheet.](#)

Centers for Disease Control and Prevention. [About Antibiotic Use and Resistance.](#)

European Commission. [Antimicrobial resistance and antimicrobial consumption: Factsheet for the general public.](#)

European Commission. [Antimicrobial resistance and microbial consumption: Factsheet for experts.](#)

European Centre for Disease Control. [Infographic: Antibiotics: Be responsible](#)