Reducing environmental pollution by antibiotics to curb drug resistance

Widespread use of antibiotics to prevent and treat infections in people and animals as well as for promoting growth in livestock is causing environmental contamination. A new study highlights the need for extra measures to reduce environmental pollution from antibiotics. Such pollution can increase the risk of diseases caused by bacteria that become resistant to antibiotics.

Over recent decades large amounts of antibiotics have been released into the environment, but little is known about the effects of these antibiotics on microbes living in natural habitats. The antibiotics are released into the environment when they are excreted along with body wastes and pass into water systems, the soil and sewage treatment plants.

Since bacteria can develop resistance to antibiotics and this resistance can be passed on to other bacteria, there is a risk that bacteria found naturally in the environment will develop resistance to antibiotics commonly used to treat human diseases. This resistance can in turn be passed on to bacteria that cause diseases in humans and animals, making it more difficult to control bacterial infections.

In addition to developing new resistance in natural microbial populations, antibiotics released into soil and water can change the composition and activity of local microbial communities. For example, antibiotics can reduce the numbers of naturally susceptible bacteria thus favouring the growth of resistant strains of bacteria.

Antibiotics break down at different rates in the environment. Over time, the concentration of antibiotic pollution in natural ecosystems diminishes, unless further contamination occurs. Some environments are repeatedly polluted, for instance, by hospital or farm discharges. Continued exposure to antibiotics is of particular concern in these environments as repeated exposure to low levels of antibiotics could promote resistance.

Although environmental bacteria can develop resistance to antibiotics under selective pressure, the same antibiotic resistance genes, already present in human bacterial pathogens, have been found in bacteria in environments where no pollution by antibiotics has occurred. This may occur because resistance genes can be maintained and spread in natural bacterial populations through gene transfer when bacteria reproduce and migrate to different ecosystems. This indicates that it may be difficult to eliminate pollution by antibiotic resistance.

A lack of reliable information in some countries makes it difficult to estimate the global extent of antibiotic use in veterinary medicine. This issue needs to be addressed as antimicrobial use in livestock and, increasingly, in fish farming is an important source of antibiotic contamination. In the EU, antibiotics used to treat human infections cannot be used to promote growth in livestock. However there has been an increase of the use of antibiotics for therapeutic purposes in animals.

It is suggested that water, sewage and other wastes polluted with antibiotics should be specifically treated for antibiotics before being released to the environment or used as fertiliser in agriculture.


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