

# Shampoo in the water supply triggers growth of deadly drug-resistant bugs

Household cleaning products are creating a bacterial timebomb in our drains and rivers

Fabric softeners, disinfectants, shampoos and other household products are spreading drug-resistant bacteria around Britain, scientists have warned. Detergents used in factories and mills are also increasing the odds that some medicines will no longer be able to combat dangerous diseases.

The warning has been made by Birmingham and Warwick university scientists, who say disinfectants and other products washed into sewers and rivers are triggering the growth of drug-resistant microbes. Soil samples from many areas have been found to contain high levels of bacteria with antibiotic-resistant genes, the scientists have discovered - raising fears that these may have already been picked up by humans.

"Every year, the nation produces 1.5m tonnes of sewage sludge and most of that is spread on farmland," said Dr William Gaze of Warwick University. That sludge contains antibiotic-resistant bacteria whose growth is triggered by chemicals in detergents, he explained. "In addition, we pump 11bn litres of water from houses and factories into our rivers and estuaries every day, and these are also spreading resistance."

The study is important because it suggests that the problem of drug resistance is not merely the result of the over-prescription of antibiotics or poor hygiene standards in hospitals. However, the team stressed the emergence of the most deadly superbugs - such as MRSA that has caused thousands of deaths in hospitals - is not linked to the use of disinfectants.

"Our research shows drug resistance is not confined to hospitals, but is out in the community. It is spreading and all the time it is eroding our ability to control infections. It is extremely worrying," said Professor Liz Wellington, also of Warwick University.

In their study, the scientists looked at quaternary ammonium compounds (QACs) that are used in many household cleaning goods. Every day, huge volumes of these chemicals are flushed from homes and factories into sewers and rivers. In high concentrations, QACs kill bacteria. However, in sewage, these chemicals become diluted and bacteria have evolved resistance to them.

"That is a natural evolutionary process," said Gaze. "If other bacteria are killed, those that are resistant to QACs will survive and, without competition, will multiply in vast numbers. However, it turns out that the piece of DNA that confers that resistance also contains genes that confer resistance to antibiotics. In this way, we have created an ideal environment for the emergence of antibiotic-resistant bacteria in our drains and sewers. These microbes are now being spread round the country in river water and in sewage sludge used on farms."

As part of its study, the team - which also includes Professor Peter Hawkey of Birmingham University - looked at soil contaminated with QACs and sewage sludge in the Midlands, the Cotswolds, Hertfordshire and other areas. Using techniques similar to those involved in DNA fingerprinting, they then looked for the presence of antibiotic-resistant genes - and found these in high concentrations.

"The inference is clear," added Gaze. "We are producing sewage and river water that have more and more drug-resistant bacteria in them and that these are now poised to enter the food chain."

Wellington added: "Once they are in the land, these bacteria will get into the bodies of agricultural workers or people who use the land recreationally and will form reservoirs of drug-resistant microbes that could pose all sorts of problems. This is going to need a great deal of monitoring."

In addition, the team found that antibiotics used to treat farm animals - in particular pigs - are also helping to spread drug resistance in the soil. In their tests, the team found samples of pig slurry that possessed high levels of antibiotic-resistant genes, raising fears that strains of resistant bacteria were contaminating the land by another route and could enter the food chain.

"We might think of special measures that will help us control or localise drug-resistant bacteria in hospitals, but the problem is much more widespread than that," added Wellington. "It is now out there in the environment."