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## Antibiotic resistance - ‘a faceless pandemic’, UCT scientist warns

The rapid increase in antibiotic-resistant bacteria in South Africa and across the globe is driven by the misuse and overuse of antibiotics in humans and food-producing animals, and poses a huge threat to modern medicine, warns University of Cape Town’s (UCT) Professor Marc Mendelson, head of the Division of Infectious Diseases and HIV Medicine at Groote Schuur Hospital.

Antimicrobial resistance occurs when micro-organisms such as bacteria, viruses, fungi and parasites change in ways that render ineffective the medications (antimicrobials) used to treat and cure the infections they cause. In South Africa, this type of drug resistance impacts tuberculosis (TB), HIV, malaria, and fungal infections. According to Professor Mendelson, antibiotic-resistant bacteria threaten modern medicine as we know it.

Mendelson, who has recently been re-appointed the chairperson of the national Department of Health’s Ministerial Advisory Committee on Antimicrobial Resistance, described antibiotics as “naturally occurring” chemicals produced by fungi and bacteria in soil and other environments, and designed to kill competing bacteria. But through evolution, some bacteria have the ability to resist and evade antibiotics. “When this happens, bacteria have a survival advantage and may become the dominant species in that environment,” he said.

“When we take an antibiotic, bacteria that don’t possess resistance mechanisms will be killed off, while others that possess the ability to resist will survive. They may then become the dominant population, and can cause an antibiotic-resistant infection in our body and transfer it to others by touch, via droplets from our airways or during unprotected sex, depending on the type of bacteria, and cause infection in them,” Mendelson said.

### “Catastrophic” increase

In the past few decades, Mendelson said, South Africa has seen a “catastrophic” increase in antibiotic consumption, the majority of which has been unnecessary. As a result, clinicians are now seeing common, everyday infections of the urinary tract, abdomen, lungs and brain that are resistant to first- and second-line antibiotics. “In some cases we are left only with a last-resort antibiotic, colistin, that was removed from human use in the 1960s due to poor function and side effects.”

Mendelson said that clinicians are also witnessing more pan-drug-resistant infections in patients. These infections require drastic measures to control them. "Earlier this year, we had to amputate a woman's leg to treat a pan-drug-resistant infection in her knee. And that wasn't the first time this has happened," he said.

Modern medicine – surgical operations, cancer care, HIV care, transplantation, and preventing and treating everyday infections – relies on functioning antibiotics. But as antibiotic resistance rates continue to increase, medicines "that we have taken for granted for decades are no longer working".

### **Antibiotic consumption rates**

South Africa's high antibiotic consumption rates are also driven by food-production practices. Their processes make use of large quantities of antibiotics, Mendelson said, to promote growth in animals, avert illness and speed up the timeline for getting herds and flocks to the retail market.

This phenomenon has been around for decades and is done in order to maximise production and profits. However, he explained, antibiotics used for growth promotion are banned in the European Union and in many other countries. Governing organisations for animal health and food production have called for a cessation of all use of antibiotics for these purposes.

"Antibiotic resistance poses the quintessential 'one health' problem, and it's driven by the abuse of antibiotics in humans and food-producing animals, as well as the contamination of the environment by antibiotics," he said.

### **Mitigating the effects**

According to global research, by 2050, 10 million people will die each year as a direct result of antibiotic-resistant infections – that's four times more people than those who died from COVID-19 in the first year of the pandemic.

"Its threat has been framed largely as futuristic, rather than like the real-time threat of COVID-19, but it's happening in the here and now. And the hammer blow is falling on Africa and Asia, where 88% of the estimated 10 million deaths will occur."

Mendelson said that mitigating antibiotic resistance relies on five key pillars – infection prevention; good surveillance; optimisation of antibiotic use; research and development of new antibiotics, diagnostics and vaccines; and promoting education and awareness. Underpinned by these pillars, there is also a need for good governance and access to currently available antibiotics.

"Unlike COVID-19, antibiotic resistance remains a largely faceless pandemic. It's not a single enemy that is as easily identifiable. But make no mistake, continued abuse of antibiotics is a direct threat to you, your family and your friends, and constitutes one of the world's greatest public health crises."

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