YOUNG SCIENCE
Communicators Competition

WRITING CATEGORY RUNNER UP

SUPERBUGS: THE END OF AN ANTIBIOTIC ERA?

Yashini Naidoo

Growing up, I never understood the compulsion my mum had with washing her hands - at home in the kitchen, after the bathroom, out in public restrooms. Why did she insist that I do it? Her response: “Germs, they will make you sick”. Germs, some better known as bacteria, are microorganisms that exist in their millions in every environment. They outnumber every other kind of life form. Many are useful but some are dangerous, especially those that cause disease. Before the 20th century, infectious diseases were the main cause of mortality worldwide. Aggressive bacteria that were reproducing at alarming rates lead to serious illness and death.

Antibiotics, introduced in the early 1940’s changed the world by saving countless lives. The period from 1950 to 1960 was considered the ‘GOLDEN AGE’ of antibiotics as many of them used today were discovered back then. The success of antibiotics by the end of the 1960’s was so impressive that clinicians believed that the battle against bacterial infections was won. Soon after the clinical introduction of antibiotics though, antibiotic resistant bacterial strains began to surface. Antibiotic resistance threatened to turn back the clock by spreading at an alarming rate. Bacteria demonstrate resistance to antibiotics in many complex ways, but mostly from the over-use, abuse and a lack of enforced regulation of antibiotics. In the first decade of the 21st century, antibiotic resistance became a fast growing problem, with the front runners being ‘superbugs’. Superbugs are strains of bacteria that are resistant to several antibiotics, making them difficult to treat.

How has this problem translated in South Africa? We have a very high HIV/AIDS burden and, added to that, a high prevalence of risk factors for other communicable diseases such as TB. This results in a high occurrence of infectious diseases triggering the extensive use of antibiotics. The result: an increase in resistance. The over-use of antibiotics propagates the spread of antibiotic contaminants in the environment, specifically our water. One of the biggest problems South Africans faces currently is the availability of and accessibility to clean water. Many communities in SA only have access to water that is unprotected and unsafe for consumption. Around 26% of the sewage in SA is inadequately treated before being discharged into rivers and streams, causing a major threat to communities accessing this water. Studies from the University of Stellenbosch and the Medical Research Council have reported a massive increase of pharmaceuticals in surface waters. Among the many pharmaceutical classes found, antibiotics were present in large amounts.

Scientific studies suggest that approximately 75 to 90 % of antibiotics enter sewage systems and water resources. This is not just from human consumption. Antibiotics are used in livestock in the treatment and prevention of disease and to promote growth in healthy animals. Wastewater treatments do facilitate the breakdown of these compounds, however the toxicological effects of these compounds are not fully understood. Simply put, we are not sure how this affects people drinking contaminated surface water from

lakes, dams and rivers and how or if this accelerates the dissemination of antibiotic resistance. The recent water shortage in the country has the potential to exacerbate the problem because drought situations encourage fewer hygiene practices in favour of saving water. Less handwashing increases the transmission of bacterial infections like E. coli diarrheal disease. The treatment of infection results in the use and overuse of antibiotics which perpetuates this unending spiral of resistance.

What can we do to help the burden of antibiotic resistance? One of the biggest problems we face is the lack of awareness The World Health Organisation lists a few simple ways on how to help reduce the spread of resistance. For instance, do not demand antibiotics when visiting the doctor because antibiotics cannot be used for viral infections like influenza. Be certain to finish the course of antibiotics prescribed to you. Be sure to take antibiotics only when they are prescribed by a doctor and, finally, do not share antibiotics with others. Every November is world Antibiotics Awareness Week encouraging good antibiotic practices and this starts with us, furthermore, there is unprecedented importance in this statement: “wash your hands”.

About Yashini

Yashini Naidoo is a second year PhD student at the University of Pretoria. She is investigating antibiotic resistance in Namibian Desert Soil as part of a global effort to inform and assist the One Health concept in antimicrobial resistance.

She entered the competition for two reasons. Firstly, she is passionate about her research and it is important to her to contribute to society using science. Secondly, she thought she would take an opportunity and try a different and exciting challenge. She chose the topic because it forms part of her research and also because antibiotic resistance is a global crisis.

The important information that she would like readers to take from this is the impact of improper and over-use of antibiotics and how we, as a society, can help to alleviate this burden to an extent.

“I am thankful to the judges for helping me to promote awareness.”