Bugs that Resist Drugs

SYED ZAIN AL-MAHMOOD

Sadia Afroze hasn't been able to hold down food for three days. The 23-year-old student of Stamford University is retching violently, and has a high fever. Her skin has broken out in reddish-purple rashes. Her doctor suspects typhoid, and has prescribed antibiotics. But Sadia isn't responding. As her temperature soars, so does the anxiety of her parents.

A Culture & Sensitivity test finally provides the clue. Sadia does indeed have typhoid fever, but the microbe that has infected her is resistant to ciprofloxacin, the standard antibiotic prescribed for the disease. Her physician switches to cefotaxime, a newer drug, and Sadia slowly improves over three weeks.

"Drug resistance is a major problem in clinical practice these days," says Dr. Mujibur Rahman, Associate Professor of Urology at Sikder Medical College. "Things are particularly bad when it comes to antibiotics such as Ciprofloxacin and Cotrimoxazole which have long been our main defense against respiratory and urinary tract infections. Many of our frontline antibiotics are now becoming ineffective."

Ever since Sir Alexander Fleming discovered Penicillin in 1928, medical science has held the upper hand over bacterial infections. Diseases such as tuberculosis, cholera and pneumonia -- once dreaded killers -- were gradually tamed. Newer and better drugs strengthened the hand of physicians. But now the microbes are fighting back.



Drug-resistant bacterial infections are on the rise all over the world. Microbes are adapting to the commonly used antibacterial drugs, and resistant strains are developing through a process of natural selection. The problem is exacerbated by several factors, including abuse, underuse or misuse of antimicrobials, poor patient compliance, and poor quality of available drugs. The situation is particularly dangerous in countries like Bangladesh where the indiscriminate use of antibiotics is widespread.

Incurable diseases such as AIDS and new-fangled infections such as Swine Flu may grab the headlines, but for many medical professionals the main worry is the comeback of old enemies. Respiratory infections, tuberculosis, malaria and diarrhoeal diseases are major killers that have exhibited resistance to first-line antibiotics. In many cases the level of resistance has forced doctors to turn to more expensive second-line and third-line drugs. This raises the frightening prospect that the world will run out of treatment options if microorganisms develop resistance to these cures.

One of the diseases that pose a looming threat is tuberculosis. Although effective vaccination and treatment regimens stabilised TB worldwide, scientists warn that drug-resistant TB is on the rise, especially in developing countries. One in three humans globally already carries the TB bacteria, though it usually remains latent and may only cause illness when their immune system becomes weakened.

For pharmacologists drug resistance is nothing new. During the Second World War in which penicillin revolutionized battlefield medicine, the death rate from pneumonia was less than 1% compared to the First World War where it was as high as 18%. Unfortunately, it took very little time for select bacteria to begin building a resistance to this "miracle drug". In less than a decade, as many as three-fifths of all staphylococcal infections had become Penicillin resistant.

Ever since, the pharmaceutical industry has been fighting to stay one step ahead of the microbes. Scientists have long warned that antibiotics, though a potent weapon, tend to be blunted with overuse or misuse. The indiscriminate use of antibiotics fuels the growth of resistant strains. When a patient uses an antibiotic for less than the prescribed regimen, the surviving bacteria develop resistant traits. Through a process of natural selection the resistant genes are transferred to offspring, creating a whole new resistant strain.

In most countries, the administration of antibiotics is strictly controlled. Only a registered physician can prescribe an antibiotic and only a qualified pharmacist can fill the prescription. In Bangladesh, anyone can walk into a pharmacy and ask for a drug.

"Antibiotics should not be available over the counter," says Prof Abdur Rashid, Dean of the Faculty of Pharmacy at Dhaka University. "Lifesaving drugs should not be dispensed as lightly as cough syrups."

The downside to this lax practice is already apparent. Many "superbugs" that can fight off antibiotics have emerged, posing a significant threat to public health.

"Urinary tract infections with the E. *coli* bacteria could be treated cheaply and easily with trimethoprim or fluoroquinolones," says Dr. Mujibur Rahman. "Nowadays