



## Multiple drug resistant pathogens

Michael W Popejoy \*

The overwhelming overuse of antibiotics in the 20<sup>th</sup> century and extending to today have created the opportunity for any number of pathogens to become ever more dangerous to human life and health on Earth. These potential modern infectious disease plagues are a direct result of the advances in medicine through the development and subsequent injudicious overuse of antibiotics globally to treat common infectious diseases. Physicians were well intentioned in prescribing antibiotics for their patients presenting with infectious disease symptoms; however, this practice has resulted in unintended consequences; and, that is the development today of what the media calls "superbugs." These superbugs are responsible for many deaths throughout the world with no immediate solution in sight.

Penicillin was developed during World War II and saved many lives from battle wound infections then it became ubiquitously prescribed for virtually all infections with the result that today's pathogens are largely resistant to all derivatives of Penicillin. The urgent search is continuing to discover and manufacture a new generation of antibiotics and antivirals to continue the ongoing fight to cure infectious diseases that have become increasingly resistant to the antibiotics currently available to physicians. However, will the same pathogens again mutate to become resistant to even the newest generation of antibiotics and antivirals? The answer is yes if physicians have not learned from their previous mistakes in the over application of these drugs to infections that may either resolve themselves without medication or stop prescribing antibiotics for viral infections that antibiotics has no effect whatsoever other than psychologically supporting

the patient with the thought that taking a pill is doing something to alleviate the symptoms.

For decades in the 20<sup>th</sup> century, Polio was a terrifying viral disease striking mostly children. It

seems as though the goal of medicine was to create a human species purified of pathogens with the unfortunate reality that many microbes are actually beneficial for health; but, the antibiotics are indiscriminate in their physiological action in the body. Unfortunately, antibiotics destroyed friendly bacteria alongside the target deadly bacteria causing disease; and in this process, many pathogens surviving the onslaught of antibiotics evolved and mutated into multiple drug resistant species that could not be eradicated by any of the currently existing generations of antibiotics. Tuberculosis was once considered an eradicated disease in many parts of the world; but, now it has emerged as a multiple drug resistant disease that is almost impossible to treat or cure. And, in the U.S., MRSA is a deadly killer with a rising incidence rate especially related to nosocomial infections as more patients are treated in hospitals in the U.S. than ever before.

Further exacerbating the dosing of patients by physicians with excessive antibiotics is the fact that agriculture globally now uses millions of tons of antibiotics every year to dose farm raised animals and fish and even vegetables and fruit. This is good business for pharmaceutical firms; but, these

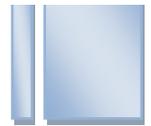
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antibiotics find their way into the human biome through ingested food and drinking water gathered from farm water run-off. Pathogens, through repeated exposure to antibiotics that does not kill them off have “learned” to survive at the molecular level in today’s antibiotic rich environment to evolve into what we know popularly as “super bugs.” Many antibiotics are not only over used, they are also misused in the sense that antibiotics are prescribed for patients actually exhibiting a viral infection; and, all antibiotics do in the body is kill off the friendly bacteria important to good health. The viral infection remains untreated by the medications.

In some countries, antibiotics are available to anyone from pharmacies or drug stores without a prescription. This is good business for those manufacturing and selling antibiotics and antivirals. Anyone with a cold or the flu can easily obtain useless antibiotics without medical guidance and end up hibernating a stronger species of both dangerous and beneficial bacteria in their bodies; and, these stronger specimens are then passed on to others through the infectious process. Also, many physicians prescribing a course of antibiotics for their patients are not taking time to carefully instruct their patients on the importance of taking the entire prescription as prescribed and not stopping the medication as soon as the patient feels better which happens too often. This lack of attention and communication between physician and patient results in colonies of bacteria that were not killed off by the antibiotic; and, the survivors have learned how to biologically resist the next case of the disease and the next dose of antibiotics; and, they are on their way to the next human through the usual vectors for infectious diseases. So, previously manageable diseases are now emerging as more dangerous and deadly unmanageable diseases for which no medication is known to work to slow the progression of the disease.

It is important to global public health that antibiotics should be controlled by government regulation through population health expert panels rather than by pharmaceutical firms that have a profit interest in the widespread use of their products. The same level of legal due diligence and oversight should be

exercised over antibiotics prescriptions as it exists today for opioid prescriptions in the U.S. It is also important that increased regulation and oversight globally be placed on agricultural use of antibiotics with aggressive enforcement standards.

The U.S. government has multiple Federal and state regulatory bodies in place to regulate prescription drugs; however, elected government officials do not earn votes and campaign contributions by enforcement actions that may impede the profit potential of major U.S. firms. This can cause a conflict of interest between an active effort on the part of government to regulate industry even when harm is caused and the profit potential of private sector industry in the U.S. Consequently, it is imperative that an international effort be mounted to control antibiotic overuse and misuse globally. Certainly, the World Health Organization could assume this role if it adopted a strong antibiotic policy position and made that position very public.

The potential danger of modern plagues for which we would have no relief is with us now and in the future if something is not urgently done to solve the problem and prevent its reoccurrence when new antibiotics and new antivirals become available on the world market. The world’s population health depends on it.