Perils of Manufactured Diseases

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Introduction: Superbugs

• In 1928, penicillin was discovered—the first true antibiotic.

• From then until now, we have steadily developed stronger and stronger antibiotics, which eliminate harmful bacteria and are constantly used to cure people of infections that one hundred years ago would have meant death.

• The problem: Antibiotics often cannot kill all bacteria—if it kills 99.99% of bacteria, then the 0.01% that survived will have a mutation providing built-in immunity to the antibiotic. This 0.01% will then reproduce asexually, creating offspring guaranteed to also have immunity.

• In this way, by developing stronger and stronger antibiotics, we eliminate the weakest bacteria but the strongest of the bunch is able to propagate and potentially thrive.
Introduction: Superbugs

• Fast forward to the present-day: our strongest antibiotics are only a small step ahead of the strongest bacteria, and the bacteria is gaining ground:
Example: Colistin-Resistant Bacteria

- It was found that in China, a gene known as MCR-1 is spreading among bacteria there. Possession of the MCR-1 gene implies resistance to an antibiotic known as colistin, which is widely used as a last-resort after all other antibiotics have failed.

- The MCR-1 gene has since been found in both animals and humans in the United States, provoking fear that if this bacteria were to “fuse” its traits with another antibiotic resistant bacteria, CREs (carbapenem resistant Enterbacteriaceae), the results could be catastrophic as colistin is generally the only treatment for CREs.
What do We Do About Superbugs?

• The best we can do about superbugs is to continue to perform research and try to discover and develop more and more potent antibiotics to combat them.

• In performing research on advanced diseases, viruses, bacteria, etc., we open the door to potentially exposing ourselves to them, and this can be especially dangerous when we are manufacturing diseases more potent than anything one could find in nature.
Example: H5N1 “Avian Flu”

- [https://www.youtube.com/watch?v=cb-iEOqkRvc](https://www.youtube.com/watch?v=cb-iEOqkRvc)
- Watch 0:00-2:45
Summary: H5N1 Avian Flu

- Bird flu (as it is commonly known) has a 60% mortality rate, but it has only claimed about 400 victims largely because the virus as of this moment can only pass from infected bird species to humans; it cannot pass from human to human.

- Scientists in laboratories in the US and the Netherlands developed new strains of the disease that can be readily transmitted from human to human so that they could study it and be better prepared.

- Fears are that if terrorists got their hands on either the research or the virus itself, the results could be catastrophic.

- Another issue brought up is the potential for an accidental mishap in a laboratory.
Laboratory Accidents with Deadly Pathogens

• If there has been one constant in regards to laboratory safety and proper procedure, it has been a lack of safety and breaches in procedure which put people at risk.

• “More than 100 labs experimenting with potential bioterror agents have been cited by regulators at the CDC and USDA for serious safety and security failings since 2003”

• “The USDA says it has conducted 48 investigations that have resulted in $116,750 in fines.”
“Vials of bioterror bacteria have gone missing. Lab mice infected with deadly viruses have escaped, and wild rodents have been found making nests with research waste. Cattle infected in a university's vaccine experiments were repeatedly sent to slaughter and their meat sold for human consumption. Gear meant to protect lab workers from lethal viruses such as Ebola and bird flu has failed, repeatedly.”
Example: SARS in China

• In 2004, an outbreak of Severe Acute Respiratory Syndrome occurred in China and was linked to the Chinese Institute of Virology in Beijing.

• Two researchers were independently infected within two weeks and subsequently spread the infection.

• In total there would be four separate escapes from this lab of the virus and two other escapes in Singapore and Taiwan about a year prior to these.

• Only one death—mother of one of the researchers who cared for her ill child.

• In a more potent virus, an outbreak could be much more disastrous.
Laboratory Accidents

- SARS’s 9.6% mortality rate, while quite significant, pales in comparison to H5N1’s 60% mortality rate, showing how studies of especially hazardous agents can be, to put it nicely, counterproductive.

- It seems to be mostly due to good luck (so far) that there has been no terrible laboratory-based outbreak. The mistakes are consistently made, and as of now they have been able to contain them, but that by no means guarantees the ability to contain it in the future.

- And these are only accidents—let’s consider the case where these agents fall into the hands of terrorists.
• Biological Weapons are highly attractive to terrorists, since a potent bioweapon agent released into a densely populated public could lead to pandemic results which would cost considerable numbers of human lives and render even more ill and suffering.

• If terrorists had access to either the research made for dangerous agents such as the man-made strain of H5N1 virus or the man-made polio virus, or worse yet—the actual virus itself, the results would almost certainly be deadly if not catastrophic.

• Most countries have signed the BWC Treaty banning biological weapons, but potential bioterror agents are still developed for “prophylactic” purposes. In other words, so long as it is being used for research, countries can possess dangerous (with the potential of being weaponized) pathogens.
Example: Anthrax Letters

- 5 were killed and 17 others sickened when letters laced with anthrax began appearing in US mail in 2001.

- After a lengthy and complicated investigation, it is believed that Dr. Bruce Ivins, “a biologist and anthrax researcher at the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) at Fort Detrick, Md., was the perpetrator.”
Solutions?

• We are in a pickle now where without research, viruses and bacteria will continue to mutate naturally and we will not be able to stop them; however, this research poses serious and equally deadly consequences if any mistakes are made (and unfortunately, mistakes seem to be human nature).

• Do we stop research and destroy man-made viruses being held in captivity or do we continue research and take our chances with terrorists and human error causing potential catastrophe?

• Is there a realistic middle ground?
References


