Antibiotic Resistance: The Silent Crisis - Abstract

New bacterial resistance mechanisms are emerging and spreading globally, threatening our ability to treat common infectious diseases. A growing list of infections, such as pneumonia, tuberculosis, and gonorrhea, are becoming harder, and in some cases, impossible to treat as antibiotics become less effective. The emergence of antimicrobial resistance (AMR) has also caused an increase in medical costs for patients to receive the required treatment they need as well as pressures for funding researchers to develop new antibiotics that are effective against resistant bacteria. The lack of therapeutics has consequently led to an increase in mortality rates and infection, and the rising cost of treatment. It was predicted by the "Review on Antibiotic Resistance" that 10 million deaths will be attributed to AMR each year by 2050 (O'Neill, 2014). This projection is evidence that AMR is not confined to national borders as resistant bacteria have the ability to spread between ecosystems thereby making the entire world vulnerable. From a global perspective, the urgency to find a solution to mitigate the advancement of AMR is at its peak.

This research aims to answer the question of how AMR can be combated, and the role human behavior has played in the pervasiveness of AMR, including whether the socialization of antibiotics has perpetuated the overuse/misuse of these drugs. In this study, a survey was administered to college students to further understand current awareness of proper antibiotic use as well as behaviors that relate to the use of antibiotics. This provided an instantaneous snapshot of where knowledge surrounding antibiotics is lacking. It also exposed the possible correlation between the misuse of antibiotics and lack of access to appropriate socialization or education on such medications. The results of the survey indicate that this pool of participants was aware of the proper use of antibiotics and the issues related to AMR, suggesting that educated patients have the ability to make informed decisions about proper antibiotic use.

Another factor that correlates antibiotic resistance with human behavior is the role that pharmaceutical companies play in perpetuating antibiotic use. With growing rates of antibiotic resistance, it is imperative that new antibiotics are developed that are effective at fighting infection. For this study, an elite interview was conducted with Dr. Jon Sprague, a pharmacologist who works closely with policies surrounding the legality of drug development. During this interview, the role of pharmaceutical and production companies, and the limitations that exist in developing novel drugs was investigated. The key finding was that pharmaceutical companies do have the capacity to create new antibiotics; although the process is difficult, it is possible. Dr. Sprague speculated that the cause of misdiagnosis is likely correlated with prescriptions being made with limited patient information. More important and often overlooked in the United States, is the pressure of patient satisfaction surveys pushing for more antibiotic prescriptions.

The results of this research indicate that education about proper antibiotic use and the rise of AMR is effective for facilitating correct drug use. While poverty and lack of access to

antibiotics may play a critical role in misuse in certain regions of the world, evidence from this study suggests that even for those with access to education about proper uses of antibiotics, AMR continues to rise due to problems such as the demand-driven overprescription of antibiotics. In those contexts, education is clearly an effective method for mitigating the role of patients in contributing to AMR. In addition, although the development of novel antibiotics is dwindling, it is not for lack of ability. Pharmaceutical companies have the tools and techniques needed for novel drug development, however, this has been hindered by funding constraints and the lack of incentive for private industry to commit to such a costly endeavor. The nature of the problem demands that it be addressed at an international as well as national scale. Global action plans will be effective only if they address the following three facets: antibiotic resistance on an individual level, the regulation of antibiotic use and resistance trends by governing bodies, and the provision of funding for innovation and research in medicine. Though the process of resistance in bacteria is not reversible, its effects can still be mitigated.