

Abstract

Antibiotic resistance is the ability of bacteria to become immune to certain types of antibiotics. Antibiotic resistance is caused by bacteria that develop mutations allowing them to survive the antibiotic. These bacteria multiply, and thus give rise to an antibiotic-resistance strain. The rise of antibiotic-resistant bacteria has resulted in a steady decline in the effectiveness of antibiotics. A major factor contributing to the increased virulence of bacteria is the suboptimal use of antibiotics to treat infections that are not bacterial in nature. According to the CDC, in 2016, 154 million antibiotics were prescribed but one in three of those prescriptions were unnecessary. This has severely hampered the effectiveness of many frequently used antibiotics and limited the tools that clinicians have to treat their patients.

Background

Each year, about 23,000 people die from a direct result of antibiotic-resistant bacteria, while others die because of complications due to these “Superbugs.” In addition to improper prescribing of antibiotics, the lack of proper patient education on the use of antibiotics and misuse of antibiotics has contributed significantly to the rise in drug-resistant bacteria. The goal of this study is to find out why antibiotics are misused and determine how we can fix this problem. Due to the steady increase of fatalities caused by antibacterial resistance and the sub-optimal usage of antibiotics, there is also a greater need for a resource to help organize antibiotic information with the hope of reducing the improper usage.

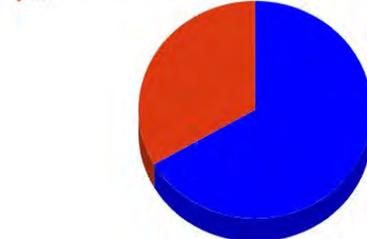
Aims

- **Aim 1: Survey**
 - To determine what people know about antibiotics and better understand why antibiotics are misused.
- **Aim 2: App**
 - Propose an electronic notification system that informs patients when to take their antibiotics and gives access to information on antibiotics.
- **Aim 3: Integrated Program**
 - Propose an addition to the existing electronic medical record system (EPIC), to give medical professionals an easy access to a comprehensive list of a patients’ antibiotic prescriptions, in order to prevent giving out the wrong antibiotic or repeating the same one multiple times.

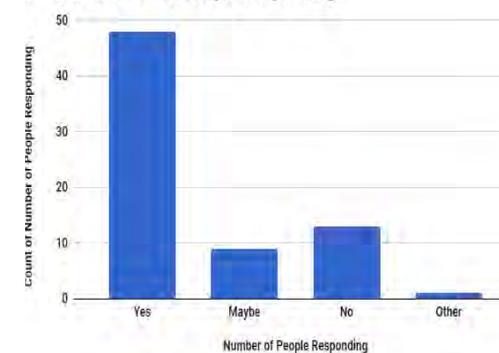
Results

Over one third of the students responding to our survey said they did not finish the complete course of their antibiotics as they were prescribed. Of those respondents, almost half said they would be interested in using an app to help them better comply with their antibiotic therapy.

Have you ever stopped taking your antibiotics early?



Count of Number of People Responding



Methods

We used a mixed method approach and utilized meta-analysis to gather background information. We also conducted a survey to collect quantitative data on antibiotic usage and prescription compliance. We will use this data to propose and develop and app that will allow access to specific information on the prescribed antibiotic. Also, the current patient database in hospitals is inefficient in tracking patient antibiotic usage history resulting in the patient being prescribed the same antibiotics multiple times. This can potentially result in the build-up of antibiotic resistance. Modifying the existing record keeping system allows antibiotic history to be easily accessible to providers. From this, we will be able to keep track of the patient's antibiotic use preventing too many repeats of certain antibiotics. This can be done with little or no effort from the medical professional.

Future work

- Development of an app to improve patient education and remind about taking full course
- Make changes to existing patient charts to make it easy for doctors to see what antibiotics have been prescribed earlier.

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References

Antimicrobial Resistance.” *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 10 Apr. 2017, www.cdc.gov/drugresistance/threat-report-2013/index.html
Rudgard, Olivia. “Life Expectancy Has Dropped Because of Antibiotic Resistance, Says ONS.” *The Telegraph*, Telegraph Media Group, 1 Dec. 2017, www.telegraph.co.uk/news/2017/12/01/life-expectancy-has-dropped-antibiotic-resistance-says-ons/