The invaders mutated so they aren’t killed anymore
A survey of the public’s knowledge and beliefs regarding antibiotics

Rebecca R. Carter1,2, Jiayang Sun1,2, & Robin L. Jump3,5

1Center for Statistical Research, Computing and Collaboration (SR2c) 2Department of Epidemiology and Biostatistics, Case Western Reserve University, Cleveland, OH
3Geriatric Research Education and Clinical Center (GRECC) 4Infectious Disease Section, Louis Stokes Cleveland Veterans Affairs Medical Center (VAMC), Cleveland, OH
5Division of Infectious Diseases and HIV Medicine, Department of Medicine, Case Western Reserve University, Cleveland, OH

HYPOTHESIS
We hypothesized that while the public perceives antibiotic resistance as a problem, they will not understand the connection between antibiotic misuse or overuse and selection for antibiotic resistant bacteria.

METHODS AND PROCEDURES
We developed and tested a 13-item instrument asking participants about their beliefs and knowledge that conceptualize appropriate antibiotic use.

One question asked respondents to explain in their own words the meaning of antibiotic resistance.

Respondents were recruited with the Amazon Mechanical Turk crowdsourcing platform.

Inclusion criteria included: 1) English speaking, 2) United States address, 3) Over 18 years of age.

STATISTICAL ANALYSES
Exploratory Data Analysis (EDA). EDA statistics we considered here were the counts and descriptive analyses of the categorical responses. Response counts were calculated based on cross-tabulation, ratio, and frequency tables.

Likert Analysis. An ordinal 5-point Likert scale was defined to evaluate the knowledge and beliefs of the participants. Outcomes were computed on a range of "strongly agree", "agree", "neutral", "disagree", and "strongly disagree".

Framework Analysis (FA). For the free-text response participants gave their own definition of antibiotic resistance. Researchers extracted dominant themes through a combination of manual evaluation and analytic strategies via text-mining, term frequency matrices, and term network graphs.

OUTCOME HIGHLIGHTS
If taken too often, antibiotics are less likely to work in the future.
Antibiotics kill bacteria.
It is possible to build an immunity to antibiotics.
Antibiotics can kill bacteria that normally live on the skin and in the gut.
Resistance is a problem in US hospitals.
Antibiotic resistant bacteria could infect me or my family.
The use of antibiotics for livestock leads to resistant bacteria in meat that can make people sick.
Antibiotic resistance is a problem.
Antibiotics kill viruses.
Antibiotics work on most coughs and colds.
A course of antibiotics should be stopped when you feel better.
It is OK to keep leftover antibiotics and use them later without advice from a doctor.

OPINION ON APPROPRIATE USE
How appropriate are antibiotics as the best choice to treat the following symptoms?

CONCLUSIONS
People outside of healthcare are aware that antibiotic misuse contributes to antibiotic resistance but do not consider it to be an important problem.

Misperceptions revealed by the free-text responses suggest specific educational targets to improve the public’s understanding of selection for antibiotic resistant bacteria.

REFERENCES

Corresponding Author: Robin.Jump@va.gov or robinjump@gmail.com