# *Using Natural Language Processing to Improve Antimicrobial Stewardship*

Translational Science Benefits Model
**IMPACT PROFILE**

This project used a natural language processing model, a type of machine learning that allows computers to understand human language, to review antibiotic prescriptions quickly and reliably across hundreds of medical records. Our model could help guide future antibiotic decisions and support antimicrobial stewardship.

## The Challenge

Empiric antimicrobial therapy is used to treat suspected infections before the specific cause of disease is known. Reviewing antibiotic prescriptions can help clinicians make informed decisions to effectively treat patients and reduce the risk of antimicrobial resistance. However, reviewing this information manually can take dozens to hundreds of hours. Automated, reliable, and timely processes for reviewing medical records are needed to ensure clinicians have the information they need to prescribe the correct empiric antibiotics to their patients. Such processes are especially important for supporting antibiotic decisions in fast-paced environments like emergency departments.

## The Approach

This study used natural language processing to quickly and reliably assess antibiotic prescription information across hundreds of medical records. Specifically, this project trained a machine learning model to determine if patients received the correct empiric antibiotic for skin infections.

## The Impact

Our study developed and tested a natural language processing model that reliably, promptly, and accurately reviewed medical records and assessed empiric antibiotic treatments in patients with skin infections. This model has the potential to save clinicians hundreds of hours while offering a pathway to help improve antibiotic decisions for patients and support antimicrobial stewardship. Ultimately, this work could improve patient outcomes and reduce the significant societal and economic burdens associated with antimicrobial resistance.

## RESEARCH HIGHLIGHTS

**This research project:**

- Developed a machine learning model that achieved **97%** sensitivity and **95%** specificity in determining which antibiotic a patient should be treated with empirically
- Supported **antimicrobial stewardship** efforts by establishing efficient, sustainable processes for reviewing antibiotic prescriptions

## Key Benefits

This project has **clinical**, **community**, and **economic** benefits.


The natural language processing model developed in this study could be used to monitor adherence to antibiotic guidelines.


Potential to improve empiric antimicrobial therapy by providing clinicians with antibiotic prescription information quickly and reliably.


Potential to reduce the significant societal and economic costs associated with antimicrobial resistance.

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