BATTLING ANTIBIOTIC RESISTANCE:
CAN MACHINE LEARNING IMPROVE PRESCRIBING?*

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Abstract

Technological advances and the increasing availability of large-scale data are enabling economists to tackle important prediction policy problems. In health care, machine learning has shown promise for high stakes policy problems due to the pervasive lack of diagnostic information. Antibiotic prescribing under diagnostic uncertainty is a leading driver of antibiotic resistance which constitutes one of the biggest threats to global health. We investigate the channels through which predictions enable welfare-improving policies that reduce antibiotic misuse. For this, we train a machine learning algorithm on administrative and microbiological laboratory data from Denmark to predict diagnostic test outcomes for urinary tract infections. Based on predictions, we evaluate counterfactual policies to improve prescribing in primary care. Using a structural model of physician decision-making, we show how predictions can affect antibiotic prescribing by improving physician diagnostic information and by manipulating physician preferences. We find that machine learning can reduce antibiotic use by up to nine percent without reducing the number of treated bacterial infections.

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