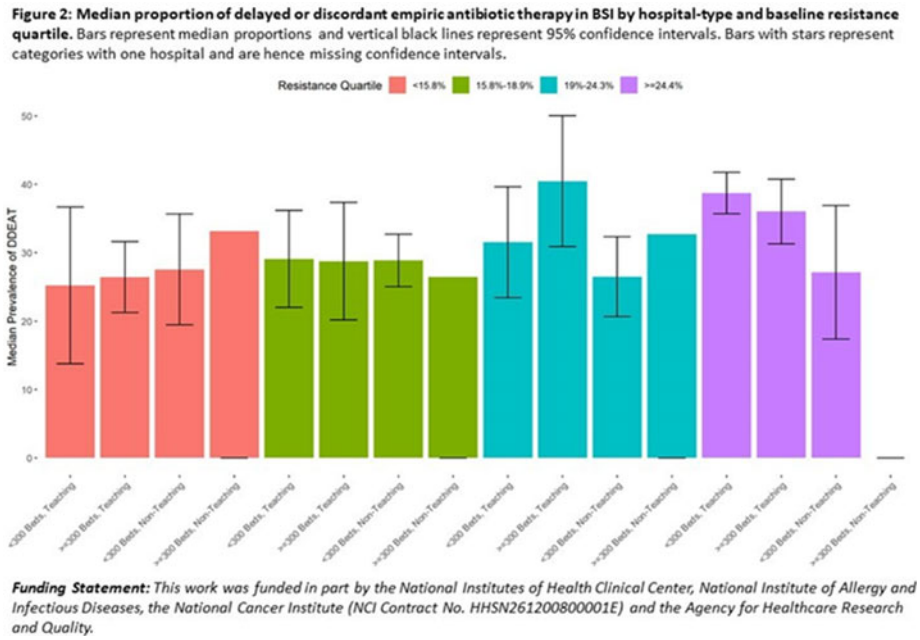

Fig. 2.

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Oral Presentation

Predicting Vancomycin-Resistant Enterococci (VRE) and Carbapenem-Resistant Organism (CRO) Colonization in the Intensive Care Unit

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Background: Rapidly identifying patients colonized with multidrug-resistant organisms (MDROs) upon ICU admission is critical to control and prevent the spread of these pathogens in healthcare facilities. Electronic health records (EHR) provide a rich source of data to predict the likelihood of MDRO colonization at admission, whereas surveillance methods are resource intensive and results are not immediately available. Our objectives were (1) to predict VRE and CRO colonization at ICU admission and (2) to identify patient subpopulations at higher risk for colonization with these MDROs. **Methods:** We conducted a retrospective analysis of patients aged ≥16 years admitted to any of 6 medical or surgical intensive care units (ICU) in the Johns Hopkins Hospital from July 1, 2016, through June 30, 2018. Perirectal swabs were collected at ICU unit admission and were tested for VRE and CRO. Patient demographic data, prior hospitalizations, and preadmission clinical data, including prior medication administration, prior diagnoses, and prior procedures, were extracted to develop prediction models. We employed the machine-learning algorithms logistic regression (LR), random forest (RF), and XGBoost (XG). The sum of sensitivity and specificity (ie, Youden's index) was selected as the performance metric. **Results:** In total, 5,033 separate ICU visits from 3,385 patients were included, where 555 (11%) and 373 (7%) admissions tested positive for VRE and CRO, respectively. The sensitivity and specificity of our models for VRE were 78% and 80% with LR, 80% and 82% with RF, and 77% and 87% with XG. Predictions for CRO were not as precise, with LR at 73% and 53%, RF at 81% and 48%, and XG at 69% and 61%. The XG algorithm was the best-performing algorithm for both VRE and CRO. Prior VRE colonization, recent (<180 days) long-term care facility stay, and prior hospitalization >60 days were the key predictors for VRE, whereas the primary predictor for CRO colonization was prior carbapenem use. **Conclusions:** We demonstrated that EHR data can be used to predict >75% of VRE positive cases with a <15% false-positive rate and ~70% of CRO cases with a <40% false-positive rate. Future studies using larger sample sizes may improve the prediction accuracy and inform model generalizability across sites and thus reduce the risk of transmission of MDROs by rapidly identifying MDRO-colonized patients.

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Oral Presentation

Prevalence and Epidemiology of Healthcare-Associated Infections (HAI) in US Nursing Homes (NH), 2017

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