BACKGROUND
• Timely testing/treatment of Clostridium difficile (C. diff) infections essential; however unnecessary testing in those without true C. diff disease leads to overdiagnosis, particular in era of PCR-based testing
• Using current NHSN LabID surveillance, hospitals now potentially penalized for C. diff diagnosed after hospital day 3, classified as "hospital-onset" (HO) regardless of existence of true disease
• Ideally C diff testing should only occur in those with high risk/high pre-test probability1
  • Several methods of assessing C diff risk published2-3
  • As part of C. diff testing stewardship initiative, we sought to validate C. diff risk scoring using existing electronic health record (EHR) data

STUDY AIMS
• Validate risk scoring algorithm to predict positive C. diff testing
• Validate risk scoring algorithm to predict true C. diff disease

METHODS
Study design: Retrospective cohort study
Setting: 2-hospital, >1100-bed community-based academic healthcare system in northern Delaware
• 1-step PCR-based testing adopted Jan 2015

Interventions:
• Pilot paper-based C. diff risk scoring tool (Fig. 1) on several inpatient medical-surgical units
• Intended use after hospital day 3 to discourage testing low-risk patients
• Scoring tool modified from literature2 and included items readily available to frontline nursing (Figure 1)
• Created C. diff-specific analytic application using Health Catalyst clinical analytics platform over existing data warehouse (Cerner)
• Modified paper tool to Health Catalyst application
• Risk score calculated daily
• Only antibiotics received within system included (outpatient primary care practices began utilizing Cerner Dec 2017)
• Unable to accurately capture long term care facility (LTCF) stays

RESULTS
• 150,554 inpatient encounters
• 411 positive PCR tests for HO C. diff
• 138 (33% of all PCR+) met "true positive" definition

DISCUSSION
• Scoring tool performed with reasonable sensitivity and specificity to predict +C diff testing, but did not better predict true C diff disease
  • Only 1/3 of patients with + PCR met "true positive" definition
  • Limitations included:
    • Inconsistent documentation of diarrhea may underestimate true disease
    • Inability to include antibiotics exposures outside our EHR
    • Inability to include antibiotics exposures outside our EHR or LTCH admissions
• Scoring tool originally developed for ease of manual completion; however with Health Catalyst application entire EHR available
• Opportunity to include additional predictor variables:
  • Proton pump inhibitor (PPI) & other medications
  • Procedures such as abdominal surgery, hemodialysis, etc.
  • Possible protective effect of doxycycline
• Opportunity to use machine learning to extract additional predictor variables1
• Opportunity for natural language processing for other predictors of true disease (e.g., abdominal pain/tenderness noted on exam)

CONCLUSIONS
Using readily available EHR data, we developed a C. diff risk stratification tool that was able to predict C. diff positivity with reasonable distinction, but did not differentiate colonization from true illness.
Next steps include further refinement of the tool to include additional predictors and to better define true C. diff illness.

REFERENCES