ID # 197

# The Clinical Impact of Early Detection of ESBL-Producing Enterobacterales with PCR-Based Blood Culture Assays

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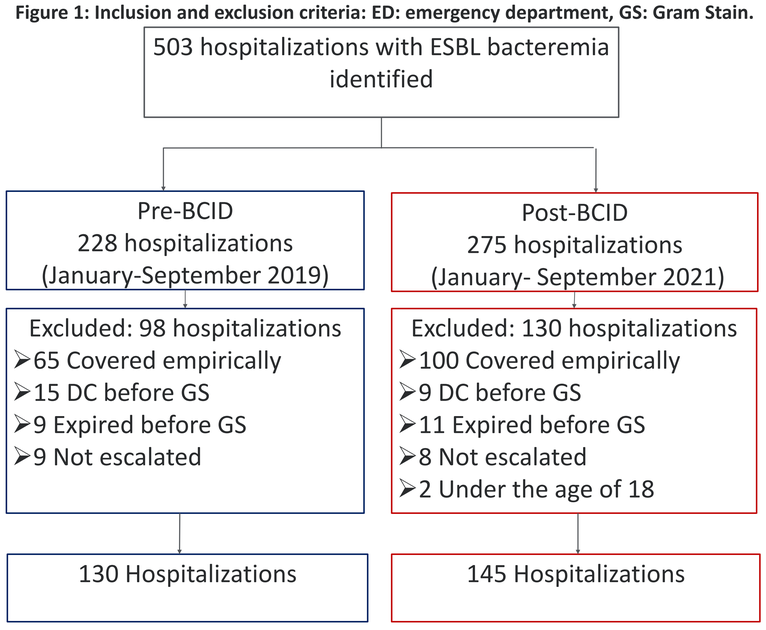
## Introductions

- Bloodstream infections (BSIs) due to extended spectrum beta-lactamase (ESBL) producing Enterobacterales can cause significant morbidity and mortality.
- Starting January 4, 2021, Northwell microbiology lab implemented Genmark Dx® ePlex® Blood Culture Identification (BCID) Panels with the capability to detect blaCTX-M-Type gene.
- Our primary outcome was to assess the impact of BCID on time to appropriate therapy; secondary outcomes were to assess the clinical impact on mortality, 30-day readmission, length of stay (LOS) and total duration of antimicrobial therapy.

## Methods

- An 11 hospital, pre/post retrospective analysis of adult patients hospitalized with ESBL Enterobacterales BSI was performed.
- Patients with ESBL Enterobacterales bacteremia were compared pre- and post-implementation of Genmark BCID.
- Time to appropriate therapy was calculated from Gram Stain (GS) result to escalation to a carbapenem.
- In-hospital mortality, length of stay (LOS), and total duration of antimicrobial therapy were analyzed for each cohort.
- Data were analyzed using T-test and Chi-square statistical methods.

**Figure 1: Inclusion and exclusion criteria: ED: emergency department, GS: Gram Stain.**




## Results

**Figure 2: Time to appropriate therapy, measured from time of GS result to time of escalation to a carbapenem drug order.**

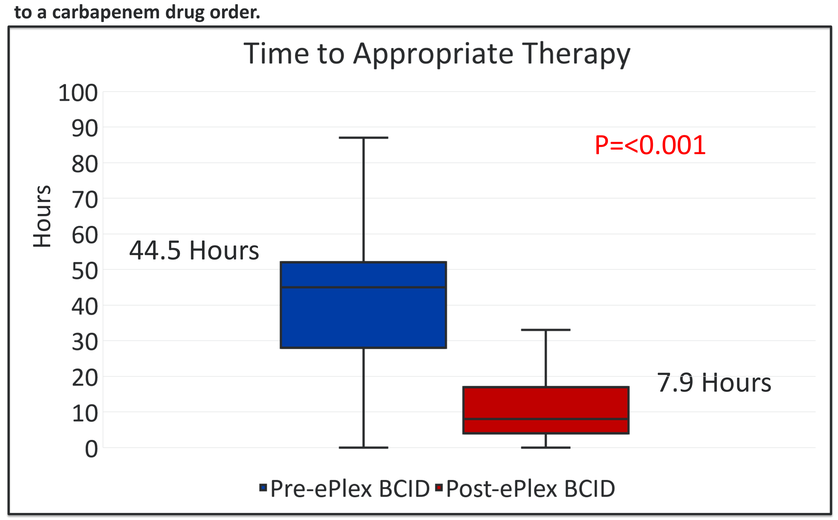



**Figure 3: Total days of antimicrobial therapy in patients who were escalated to a carbapenem**

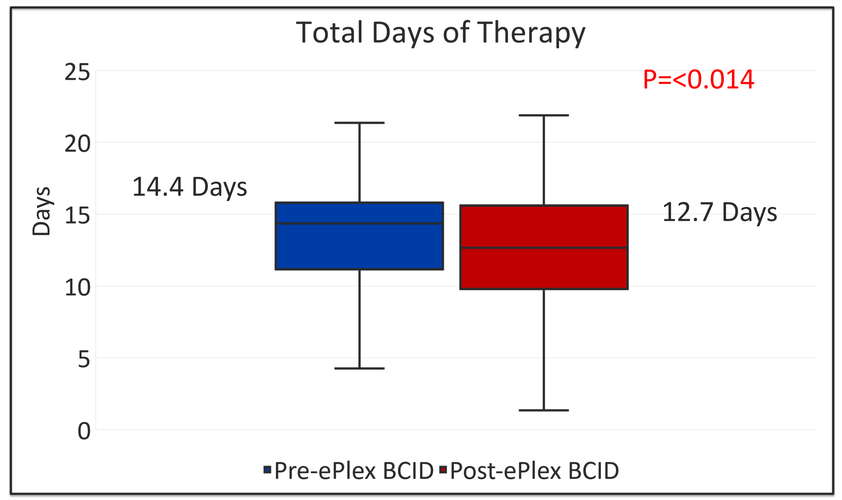



**Table 1: Study cohort demographics and outcomes. Comorbidities based on ICD10 diagnoses at time of discharge, and chart review.**

| | Pre BCID (n=130) | Post BCID (n=145) | p-value |
|---|---|---|---|
| **Demographics** | | | |
| Age, mean (IQR) | 71 (62-83) | 72 (65-85) | 0.517 |
| Female sex No.(%) | 62 (48%) | 63 (44%) | 0.544 |
| **Comorbidities** | | | |
| Diabetes mellitus | 55 (42%) | 64 (44%) | 0.807 |
| Cardiovascular disease | 35 (27%) | 44 (30%) | 0.539 |
| Any malignancy | 27 (21%) | 37 (26%) | 0.392 |
| Immunosuppression | 23 (18%) | 13 (9%) | 0.047 |
| Dementia | 22 (17%) | 34 (24%) | 0.230 |
| Cerebrovascular disease | 18 (14%) | 21 (15%) | 1 |
| **Clinical Outcomes** | | | |
| **Time to appropriate therapy, median(IQR), hours** | **44.5 (27.3-51.4)** | **7.9 (3.9-16.2)** | **<0.001** |
| **Duration of total antimicrobial therapy, median (IQR), days** | **14.4 (11.3-15.8)** | **12.7 (9.8-15.6)** | **0.014** |
| Expired | 8 (6.15%) | 10 (6.9%) | 1 |
| LOS, median (range) | 9 (6-13) | 10 (6-15) | 0.400 |
| 30-day readmission | 10 (7.69%) | 19 (13.1%) | 0.170 |

- No significant difference was observed in demographics or clinical characteristics between the study groups (Table 1).
- Significant reductions were demonstrated in:
  - Median time to appropriate therapy between the pre-ePlex BCID and post-ePlex BCID groups 44.5 to 7.9 hours, p<0.001 (Figure 2)
  - Total duration of antimicrobial therapy between the pre-ePlex BCID and post-ePlex BCID groups 14.4 days to 12.7 days, p=<0.001 (fig 3)
- No significant reduction in LOS, mortality or 30-day readmission was observed.
- **Limitations:** Retrospective study design and inability to control for potential impact of the COVID-19 pandemic.

## Conclusions

- In patients with ESBL-producing Enterobacterales BSIs, timely detection of blaCTX-M-Type gene by BCID provides valuable information for early initiation of appropriate and effective antimicrobials.
- Despite the decrease in time to appropriate therapy, and total antibiotic use, no significant improvement in mortality or LOS was observed.

## Acknowledgement

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