Rapid identification and antimicrobial susceptibility testing of Gram-negative rod bacteremia: impact on duration of hospital admission

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Background

There are many emerging diagnostic assays that aim to provide rapid identification (ID) and antimicrobial susceptibility testing (AST) of microbial growth from sterile sites.

Although prior studies[1-3] have consistently demonstrated a decreased time to appropriate antibiotic therapy associated with the use of rapid assays, the clinical utility of these assays with respect to patient outcomes and health system utilization remains unclear.

Methods

The Accelerate Pheno™ rapid ID/AST system (RDT) was implemented in the clinical microbiology lab at two hospitals in an academic medical center in Providence, RI. RDT was run in parallel with our standard of care (SOC) ID/AST diagnostics (Vitek2, MALDI-TOF) for all blood cultures with Gram-negative rod (GNR) growth on initial staining.

The results of both the RDT and SOC assays were uploaded by the clinical microbiology lab to the medical record once available. The antimicrobial stewardship (AS) team was alerted to RDT results in real time and liaised with clinical care teams to discuss and advise on further management.

Length of stay (LOS) data was compared between cohorts with GNR bacteremia before and after the implementation of RDT assay with AS review.

1. Ehran et al. Clin Infect Dis. 2020. 2. Banerjee et al. Clin Infect Dis. 2020. 3. Dare et al. Clin Infect Dis. 2020.

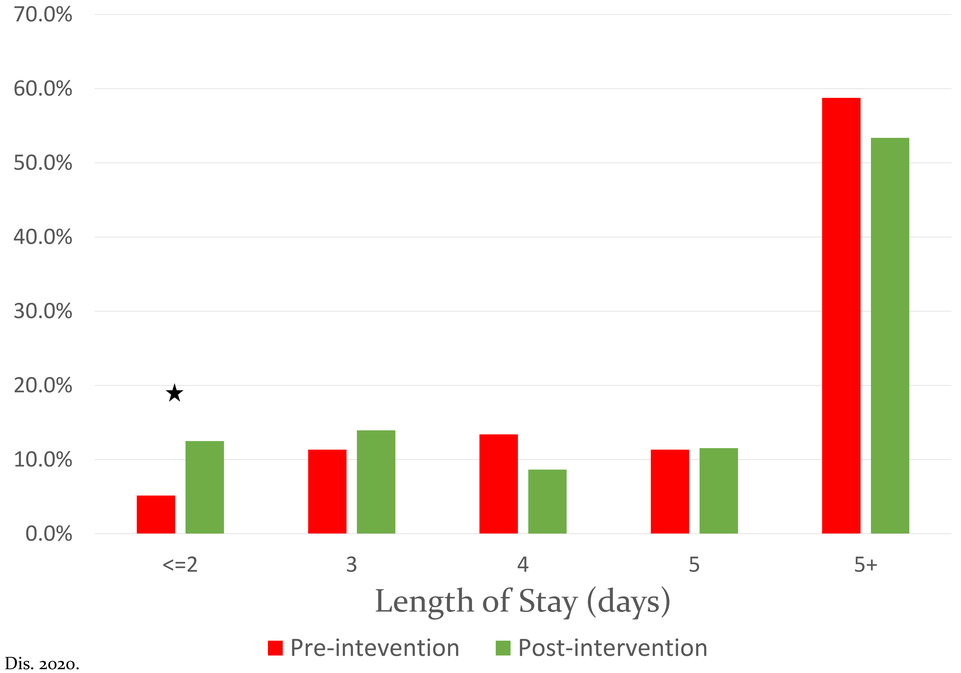
Microbiology and etiology of GNR bacteremia

Organism	N (%)
Escherichia coli	91 (44%)
Klebsiella spp	38 (18%)
Pseudomonas aeruginosa	15 (7.2%)
Enterobacter spp	9 (4.3%)
Proteus spp	9 (4.3%)
Other GNRs	7 (3.4%)
Polymicrobial	3 (1.4%)
NO ID*	35 (17%)

Syndrome	N (%)
UTI	106 (51%)
GI/hepatobiliary	43 (21%)
SSTI	11 (5.3%)
Pneumonia	9 (4.3%)
CRBSI	5 (2.4%)
Other	11 (5.3%)
Unknown	22 (11%)

*28/35 (80%) of "NO ID" results were due to growth of off-panel organisms

Duration of hospital admission for patients with GNR bacteremia



Results

The pre-intervention group included a historical cohort (from 2018) of 96 consecutive hospitalized patients with GNR bacteremia. The post-intervention group (from 2020) included 207 consecutive patients with GNR bacteremia hospitalized after the implementation of RDT with AS review.

The large majority of GNR bacteremia in the post-intervention group was due to E. coli (44%) or Klebsiella spp. (18%) and came from a urinary (51%) or GI/hepatobiliary source (21%).

Median LOS was 5.28 and 5.84 days for the pre- and post-intervention, respectively; the distribution in the two groups differed significantly (Mann-Whitney U = 8729, p = 0.045).

There was a significant increase in the percent of hospital admissions that were two days or less in the post-intervention group (12.5% v. 5.2%, p = 0.024).

Conclusions

The use of rapid ID/AST diagnostic assays with AS review may lead to shorter hospitalizations in select populations.