Poster # 2134

Impact of Accelerate Pheno™ System (AXDX) on Time to Antimicrobial Stewardship Intervention (ASTEW-I) in Patients with Gram-negative Bloodstream Infections (BSIs)

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Background

- Rapid diagnostic tests (RDTs) in combination with antimicrobial stewardship interventions have been shown to improve antimicrobial therapy-related outcomes in patients BSIs[1,2,3]
- AXDX has potential advantage over many approved RDTs in ability to provide both rapid pathogen identification (ID) and antimicrobial susceptibility test (AST) information directly from positive blood cultures
  - ID: fully automated fluorescence *in situ* hybridization (< 1.5 hours)
  - AST: morphokinetic cellular analysis (~7 hours)
- Published evaluation of AXDX has shown > 95% overall category agreement between AXDX and culture-based ASTs for Gram-negative pathogens[4]

Objectives

- Evaluate impact of utilization of the AXDX compared to our institutional standard of care (SOC) on time to simulated ASTEW-I and potential antimicrobial optimization in patients with Gram-negative BSIs
- Explore magnitude of impact of utilization of the AXDX based on varying degrees of stewardship support
  → 8 hour (0800-1600), 16 hour (0800-2400), & 24 hour (0800-0800) coverage

Methods

Design:

- Single-center prospective observational study with simulated interventions (figure 1)

Study population:

- Adult inpatients with Gram-negative rod bloodstream isolates between February and May 2017
- Excluded: < 18 years old, pregnant women, prisoners

Definitions:

- **Optimal antimicrobial =** most narrow-spectrum agent with acceptable activity against the pathogen isolated as per the AST results → validated by panel of 3 infectious disease specialists from ASTEW team
- **ASTEW-I =** modification of therapy guided by ASTEW team recommendations based on AST results
- **Time to simulated ASTEW-I =** time from blood culture order to simulated time of administration of first dose of optimal antimicrobial in response to ASTEW team intervention

Current institutional process for testing and reporting of positive blood cultures:

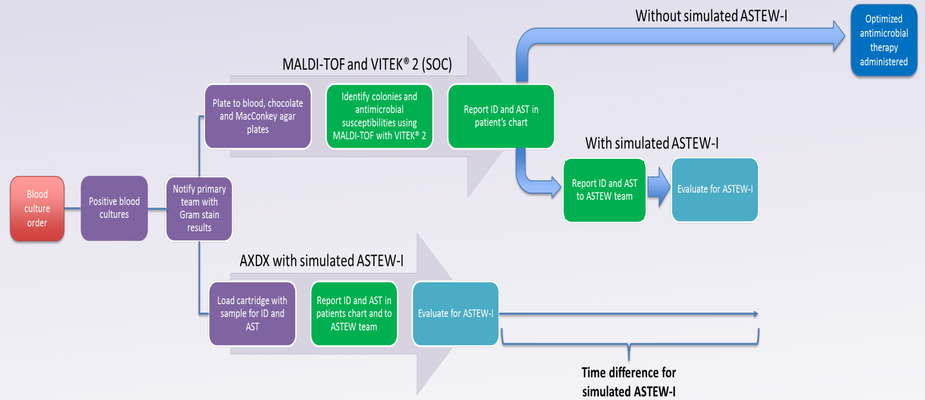
- **Gram stain positivity (BacT/ALERT®)**: laboratory personnel notify primary team by phone within 1 hour of alert and report results in electronic health record (EHR)
- **Pathogen ID (matrix-assisted laser desorption/ionization time-of-flight (MALDI-TOF))**: batched test results reported in EHR by laboratory staff up to 3 times on AM shift, once on PM shift, and once on 3rd shift
- **AST (VITEK® 2)**: batched test results analyzed by blood culture bench and uploaded to EHR once daily during the AM shift

Methods

Comparison of 3 models of ASTEW service support:

- **Current SOC**: No ASTEW team notification for AST results
  → ASTEW team available *as needed* on site from 0800 – 1600 Monday through Friday and available 24 hours a day by pager
- **Simulated revision to SOC protocol**: ASTEW team notified by microbiology lab of VITEK® 2 AST results at time of EHR upload (always on 1st shift)
  → ASTEW-I recorded 2 hours after notification
- **AXDX with simulated ASTEW support**: ASTEW team notified by microbiology lab of AXDX results
  → ASTEW-I recorded 2 hours after notification or from beginning of next active shift depending on extent of coverage

Figure 1. Study design



Results

Figure 2. Intention-to-treat protocol

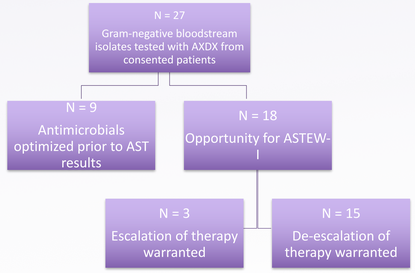
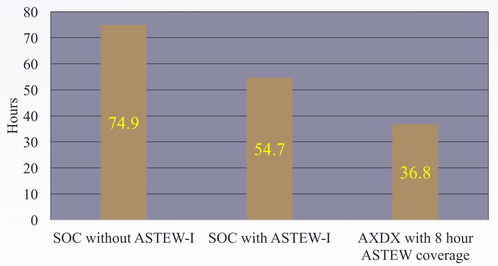


Figure 3. Mean time to antimicrobial optimization



Results

Figure 4. Mean decrease in time to simulated ASTEW-I from actual administration of optimal antimicrobial therapy

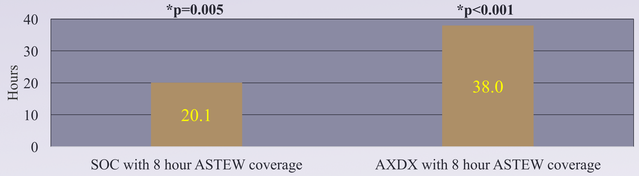
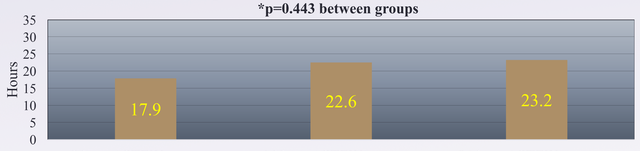


Figure 5. Mean time improvement for simulated ASTEW-I based on degree of stewardship coverage using AXDX compared to SOC



Conclusions

- ASTEW-I guided by AXDX significantly shortened the time to potential antimicrobial optimization compared to our institution's SOC in patients with Gram-negative BSIs
- Our simulation suggested that the addition of ASTEW support to current VITEK® 2 testing and routine notification would result in a meaningful reduction in time to antimicrobial optimization
- Extension of ASTEW coverage past 8 hours conferred only a modest additional reduction in time to antimicrobial optimization

Limitations

- Small sample size
- Our institutional SOC (i.e. batched testing, once-daily VITEK® 2 AST results) may limit generalizability

References

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2. MacVane SH, Nolte FS. Benefits of adding a rapid PCR-based blood culture identification panel to an established antimicrobial stewardship program. J Clin Microbiol 2016; 54:2455–2463.
3. Sothoron C, Ferreira J, Guzman N, et al. A stewardship approach to optimize antimicrobial therapy through use of a rapid microarray assay on blood cultures positive for Gram-negative bacteria. J Clin Microbiol 2015; 53:3627–3629.
4. Marschal M, Bachmaier J, Autenrieth I, et al. Evaluation of the Accelerate Pheno system for fast identification and antimicrobial susceptibility testing from positive blood cultures in bloodstream infections caused by gram-negative pathogens. J Clin Microbiol 2017; 55:2116 –2126.