# Potential Impact of Rapid Phenotypic Antimicrobial Susceptibility Testing on Antimicrobial Therapy in Patients with Gram-Negative Bloodstream Infections

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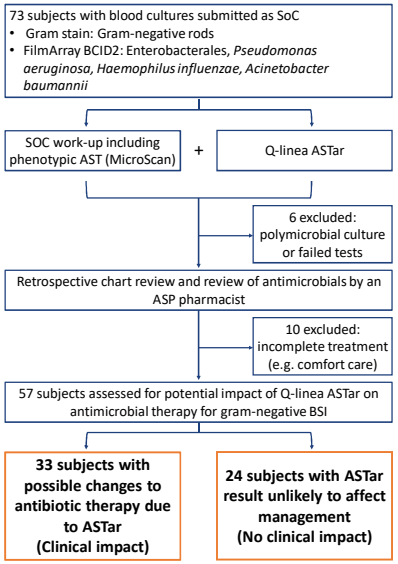
## Introduction

Collaboration between the clinical microbiology lab and antimicrobial stewardship program (ASP) is critical for guiding clinicians to appropriate selection of antimicrobials.[1] The utilization of rapid diagnostics can drive antimicrobial stewardship strategies and allow clinicians to develop more precise and individualized treatment pathways. Q-linea ASTar is a rapid antimicrobial susceptibility testing (AST) system that provides MIC results and susceptible/intermediate/resistant interpretation from positive blood cultures within 7 hours (h), compared to days using Standard of Care (SoC) methods.[2] The purpose of this study is to characterize the potential impact of ASTar on antimicrobial therapy for patients with gram-negative bloodstream infections (BSI).

## Methods

- Single-center, non-interventional retrospective chart review study on patients with pre-existing positive blood cultures obtained as part of standard of care platforms
- Q-linea ASTar performed in parallel with SoC methods, but not reported for clinical use
- The primary objective is to assess the hypothetical impact on ASP prescribing practices of BSI based on ASTar vs. SoC including whether the rapid AST report could have led to a faster time to optimized therapy (TTOT)




## Results

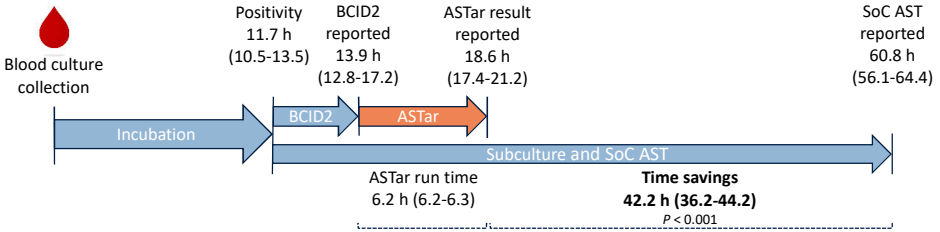



**Figure 1. Time to result for SoC AST and ASTar results**. SoC steps are depicted as blue arrows. SoC AST time represents real-time data for the culture of study subjects. The clinical laboratory only reports BCID2 07:00-23:00; SoC AST results are reported 07:00-15:00. Because the ASTar was not performed in real-time, the ASTar time was calculated by assuming the ASTar was setup following BCID2 completion and would only be reported during daytime hours. Results are reports as median hours from collection (interquartile range).

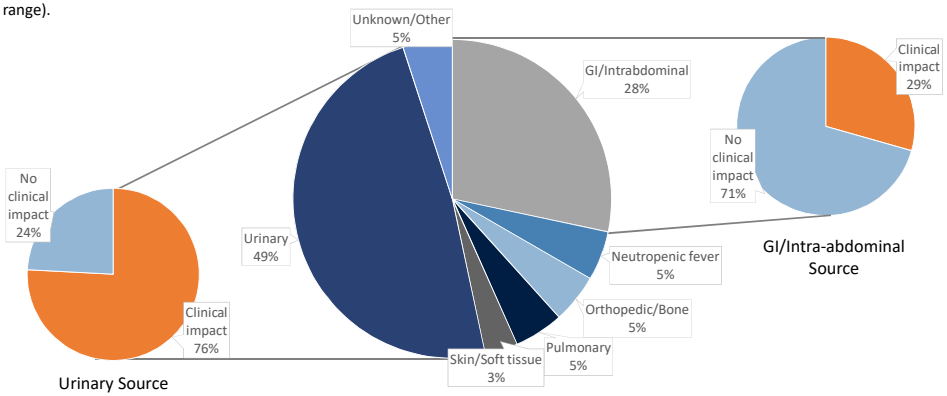



**Figure 2. Source of bloodstream infection.** The percentage of patients likely to have an impact of ASTar on antibiotic therapy for those with urinary (left) or GI/intra-abdominal (right) sources is shown.

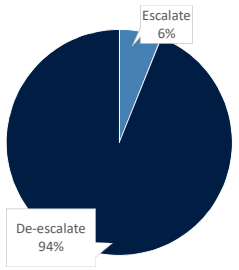



**Figure 3. Potential early interventions with ASTar.** 31/33 subjects with a potential impact of ASTar on therapy may have had earlier de-escalation of antibiotic therapy.

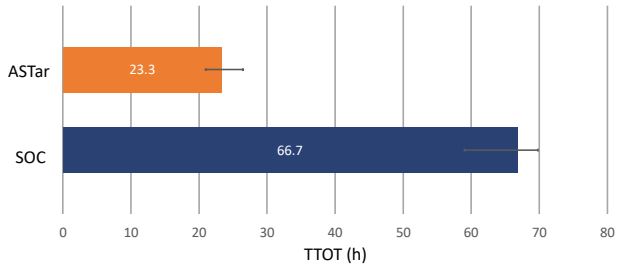



**Figure 4. Time to optimized therapy (TTOT) for patients with potential clinical impact.** Data shown as median with IQR ($P < 0.001$). The TTOT was defined as the time from blood culture collection to most narrow and effective therapy received by the patient. The hypothetical TTOT with ASTar was calculated using the time difference between ASTar and SoC results accounting for the time delay between AST results and actual intervention.

## Discussion

- ASTar generated AST results from a positive blood culture 42.2 h faster than SoC methods.
- Of 57 included subjects with gram-negative BSI, 29 had a urinary source.
- Of 29 patients with a urinary source, 22 (75.8%) had a potential for clinical impact from ASTar and 21 (72%) may have had earlier de-escalation relative to SoC AST.
- Hypothetical time to optimized therapy (TTOT) was shorted by over 40 h for patients with both urinary and non-urinary sources.
- Limitations of this study include the retrospective, single-center, non-interventional design, and small sample size.
- Potential barriers to clinician willingness to act on rapid AST results include hesitation to de-escalate early in the patient's course and/or before AST from the source of bloodstream infection is available.
- This study used a non-FDA cleared investigational version of ASTar software.

## Conclusions

- ASTar results may have allowed changes in therapy prior to the release of SOC results.
- Potential impacts of ASTar was most likely to occur in patients with a urinary source. Patients that required broad antibiotic coverage were not likely to be affected by ASTar.
- The most common potential intervention from ASTar was de-escalation.

## Future directions

- Evaluate the performance of ASTar relative to SoC methods
- Prospective, real-time application of rapid AST with intervention from ASP

### References

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2. Göransson J, Sundqvist M, Ghaderi E, Lisby JG, Molin Y, Eriksson E, Carlsson S, Cederlöf A, Ellis L, Melin J. Performance of a System for Rapid Phenotypic Antimicrobial Susceptibility Testing of Gram-Negative Bacteria Directly from Positive Blood Culture Bottles. J Clin Microbiol. 2023 Mar 23;61(3):e0152522. doi: 10.1128/jcm.01525-22. Epub 2023 Feb 28.

### Acknowledgments

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