

Actionable Changes and Outcomes from Rapid Phenotypic Antimicrobial Susceptibility Testing in Hospitalized Patients with Bloodstream Infection



R. Yee¹, M. Spence², G. Jowsey¹, J. Lucar¹;

¹George Washington University School of Medicine and Health Sciences, Washington, DC, United States,
²George Washington University Hospital Washington, DC, United States

Background

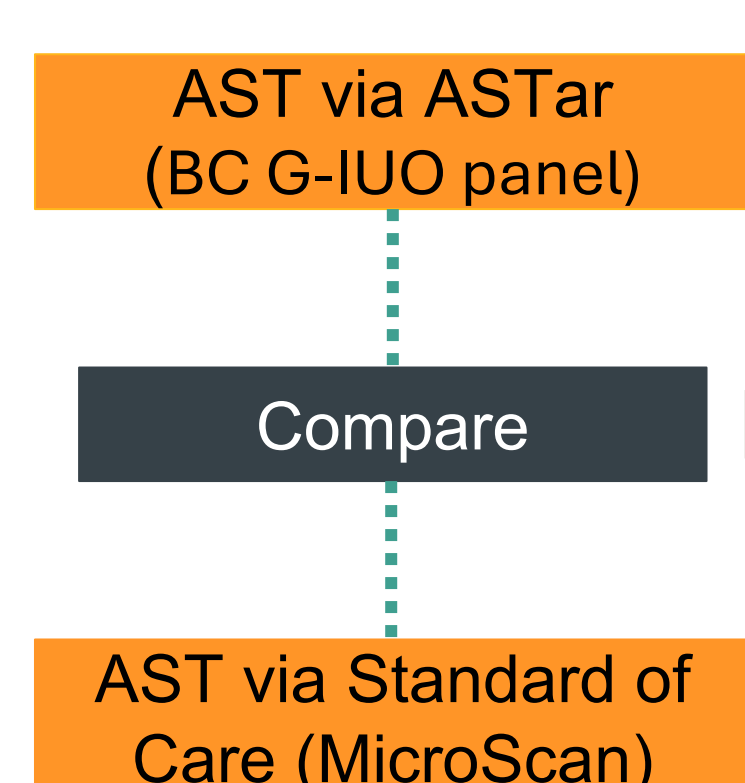
Bloodstream infections (BSI) are a leading cause of morbidity and mortality, particularly among critically ill hospitalized patients. Routine phenotypic antimicrobial susceptibility testing (pAST) relies on subculture from positive blood cultures (PBCs), which can delay actionable results by 48–72 hours. Performing antimicrobial susceptibility testing (AST) directly from positive blood culture (PBC) bottles enables earlier antimicrobial intervention, which may improve clinical outcomes by decreasing mortality, hospital stay duration, adverse drug events, and the emergence of antimicrobial resistance. Novel rapid pAST platforms, such as the Q-linea ASTar system, can perform pAST directly from Gram-negative (GN) PBCs and improve patient outcomes when combined with stewardship interventions. Rapid pAST platforms can also improve laboratory workflow and healthcare-related costs.

Methods

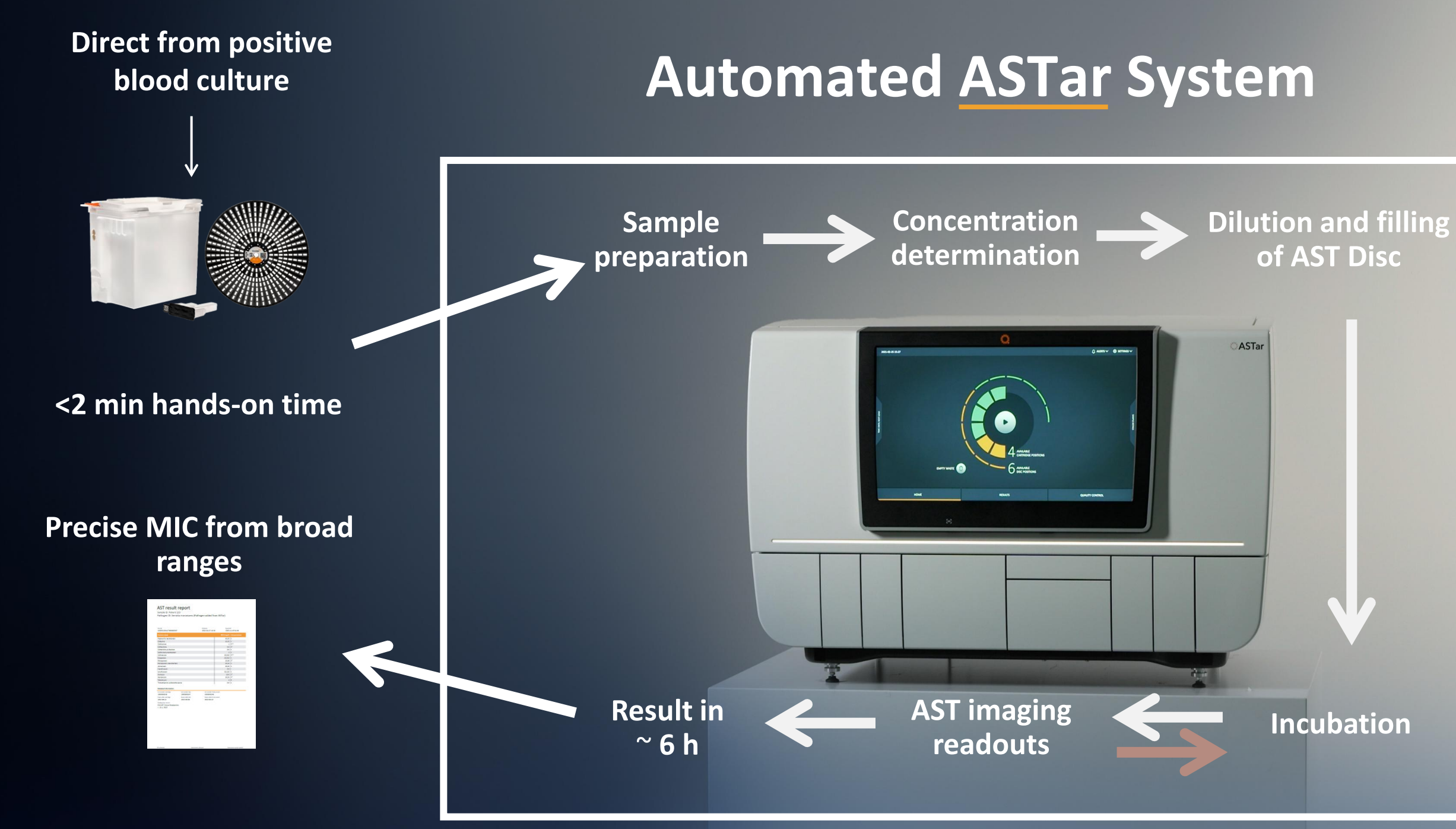
- Seventy-five PBCs (57 prospective, 18 spiked) were evaluated.
- AST results (using the Microscan Walkaway) generated from standard of care (SoC) PBC overnight subculture were compared to AST results generated from the Q-linea ASTar system.

Assessment:

- Performance comparison
- Time to actionable results
- Hypothetical clinical decisions: treatment adjustment type (retrospective clinical chart review)
 - Focus on inpatients with monomicrobial infections

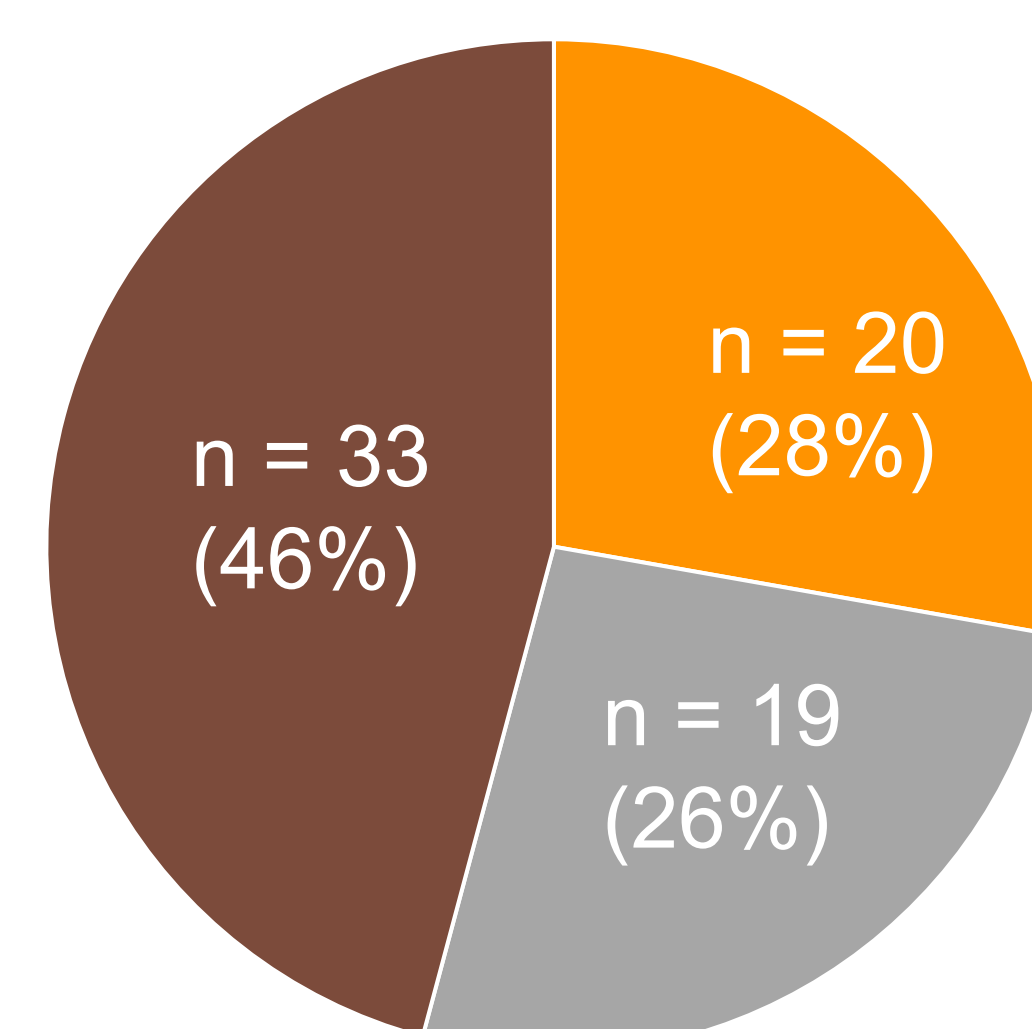


Automated ASTar System



Characterization of Patient Population

A majority of our enrolled study cohort was from hospitalized patients (inpatient ward and ICU)



Patient Demographics and Clinical Presentation

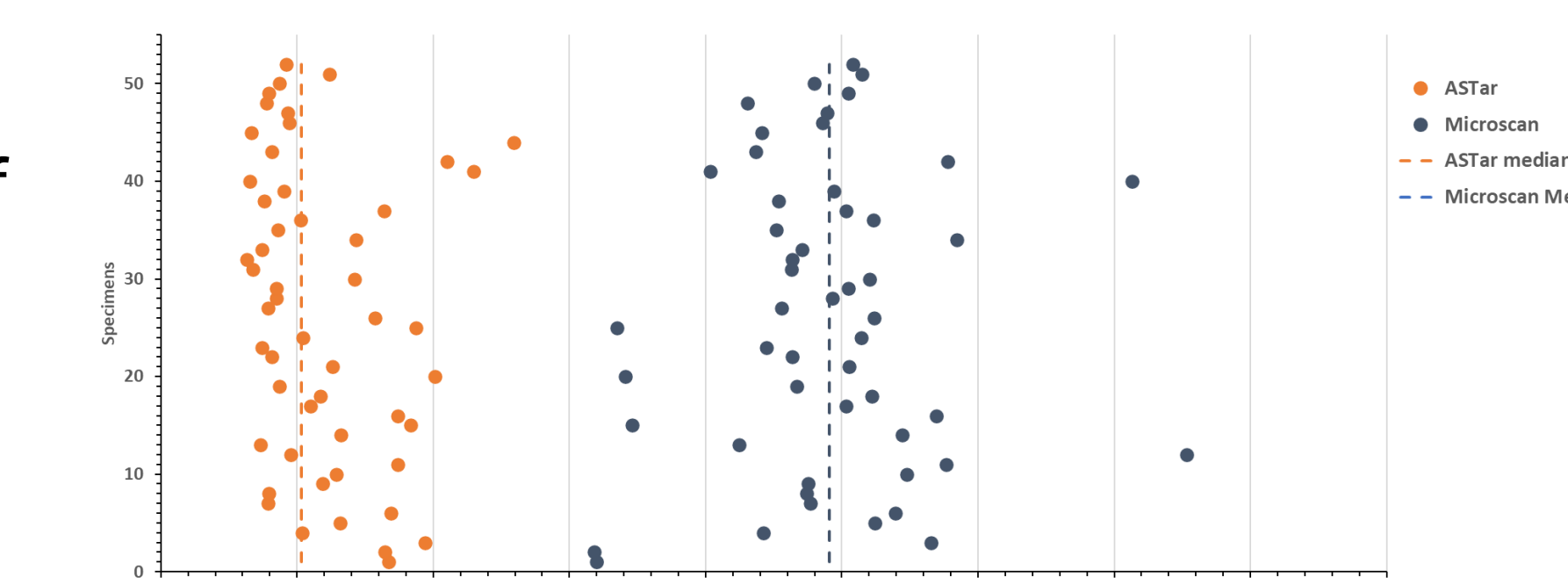
Clinical characteristics	n, %	p-value
Male	37/72, 52%	
Blood stream infection <i>with</i> known primary source	42/72, 58%	
Blood stream infection <i>without</i> known primary source	15/72, 21%	
Sepsis <i>with</i> septic shock	19/72, 26%	
Sepsis <i>without</i> septic shock	30/72, 42%	
Immunocompromised	21/72, 29%	
• Hospitalized	16/21, 76%	0.778
• ED	5/21, 24%	
Sepsis associated complications (or acute kidney injury)	38/72, 53%	
• Hospitalized	25/38, 66%	0.29
• ED	13/38, 34%	
WBC count (x 10 ³ /microliters)	12.2	
• Hospitalized	10.8	0.04
• ED	16.7	
SOFA scores	3	
• Hospitalized	4.3	<0.001
• ED	7	

Results

Clinical Outcomes Generated by ASTar

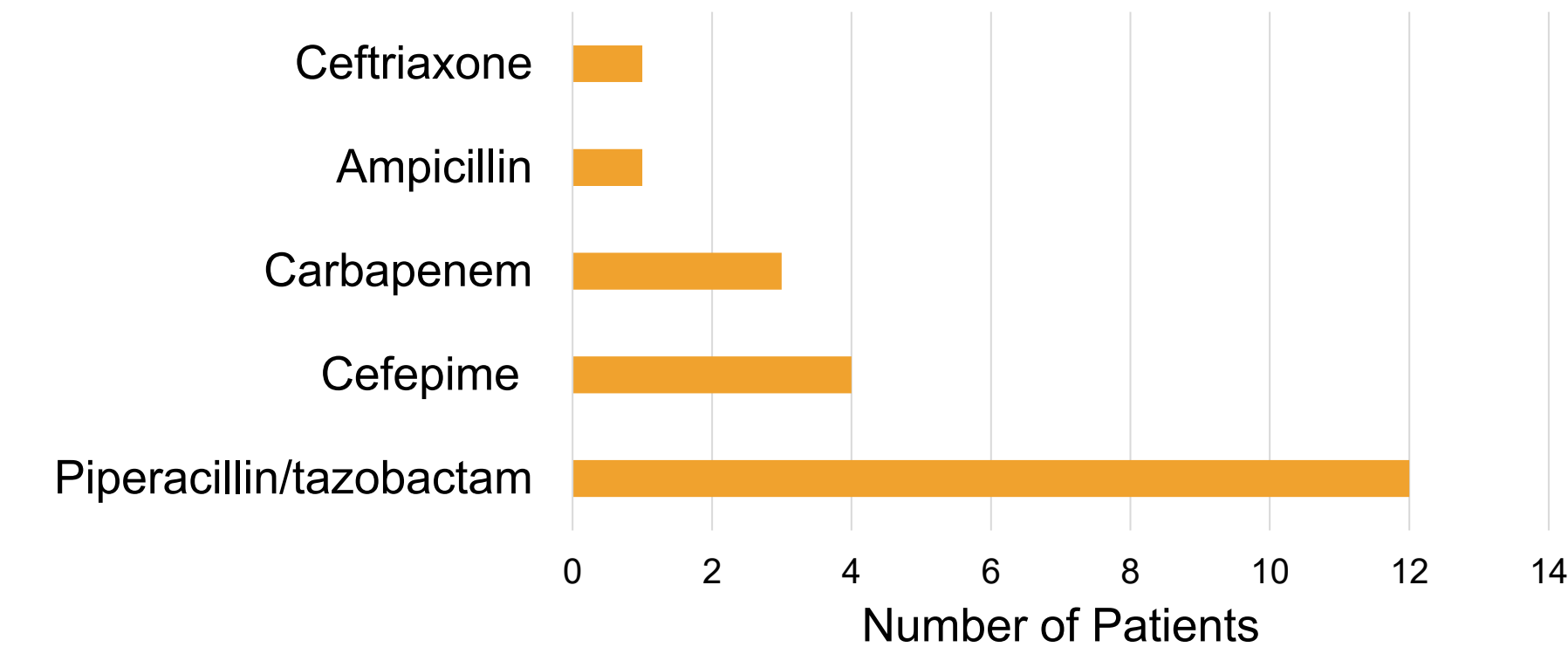
Laboratory Outcomes

- Decreased the time-to-phenotypic AST after initial positive Gram-stain result by >36 hours compared to the standard of care workflow (p<0.00001)
- Categorical agreement: 93.1% (1331/1429)
- Essential agreement: 96.7% (1384/1431)



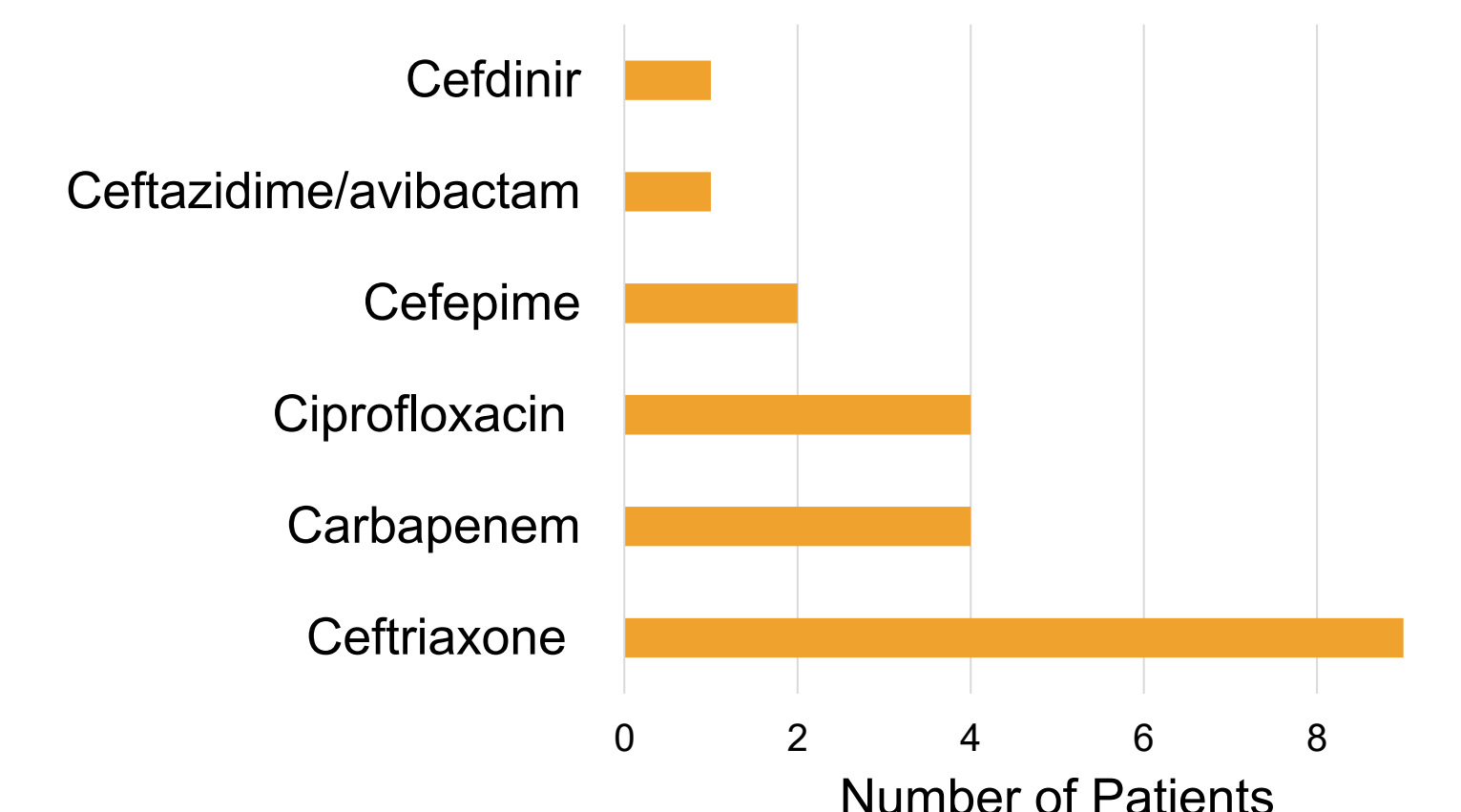
Changes to Clinical Outcomes

Most common empiric therapy was pip/tazo

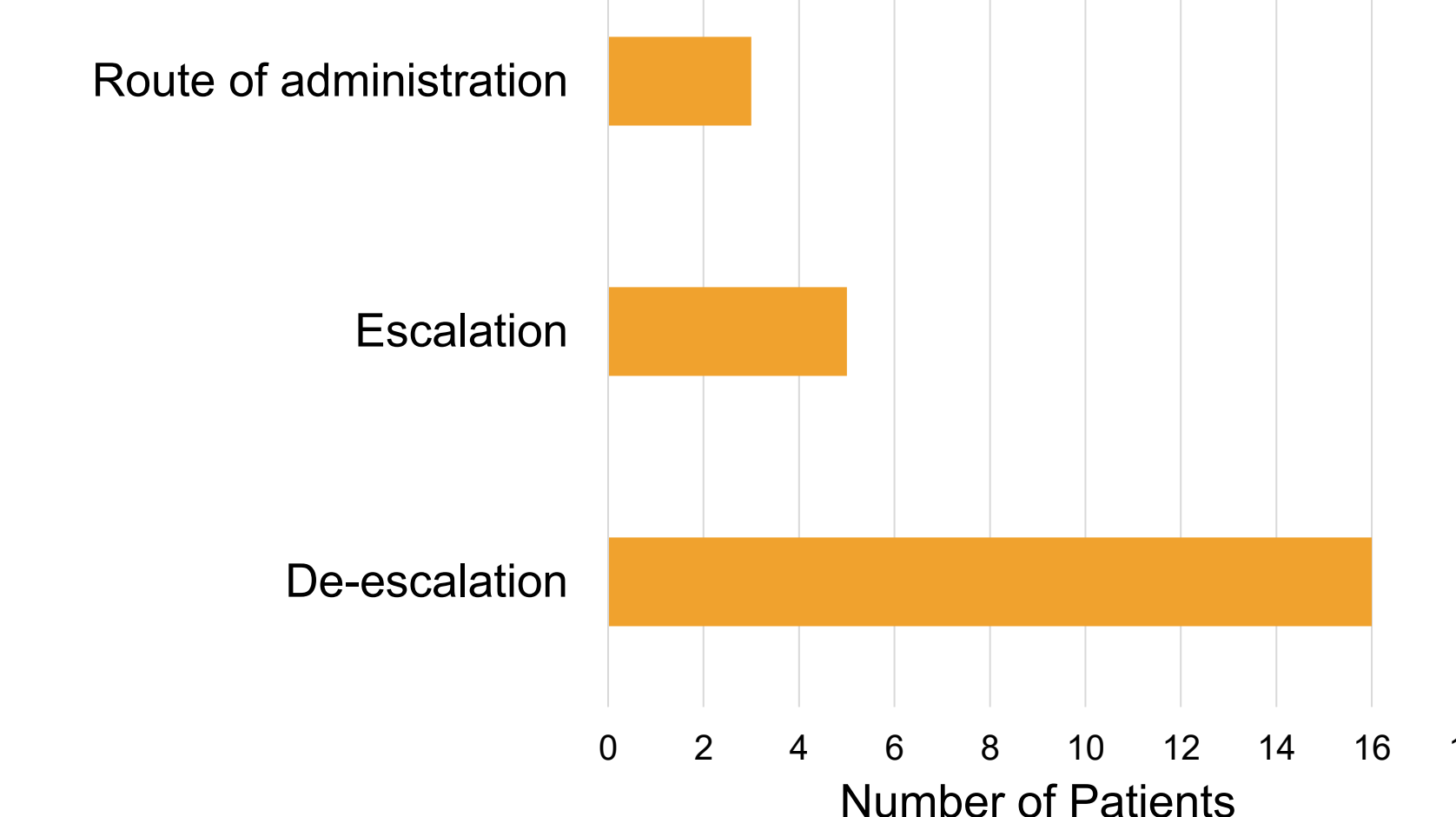


- SOC pAST resulted changes in empiric therapy in 74% of hospitalized patients
- Concordance of antibiotics prescribed based on ASTar results compared to SOC was 58%
- Common clinical outcomes could be exposure to fewer antibiotics (64%), fewer side effects (28%), and change to oral antibiotics (26%), which was more commonly seen in non-ICU, hospitalized patients (OR: 4.3)

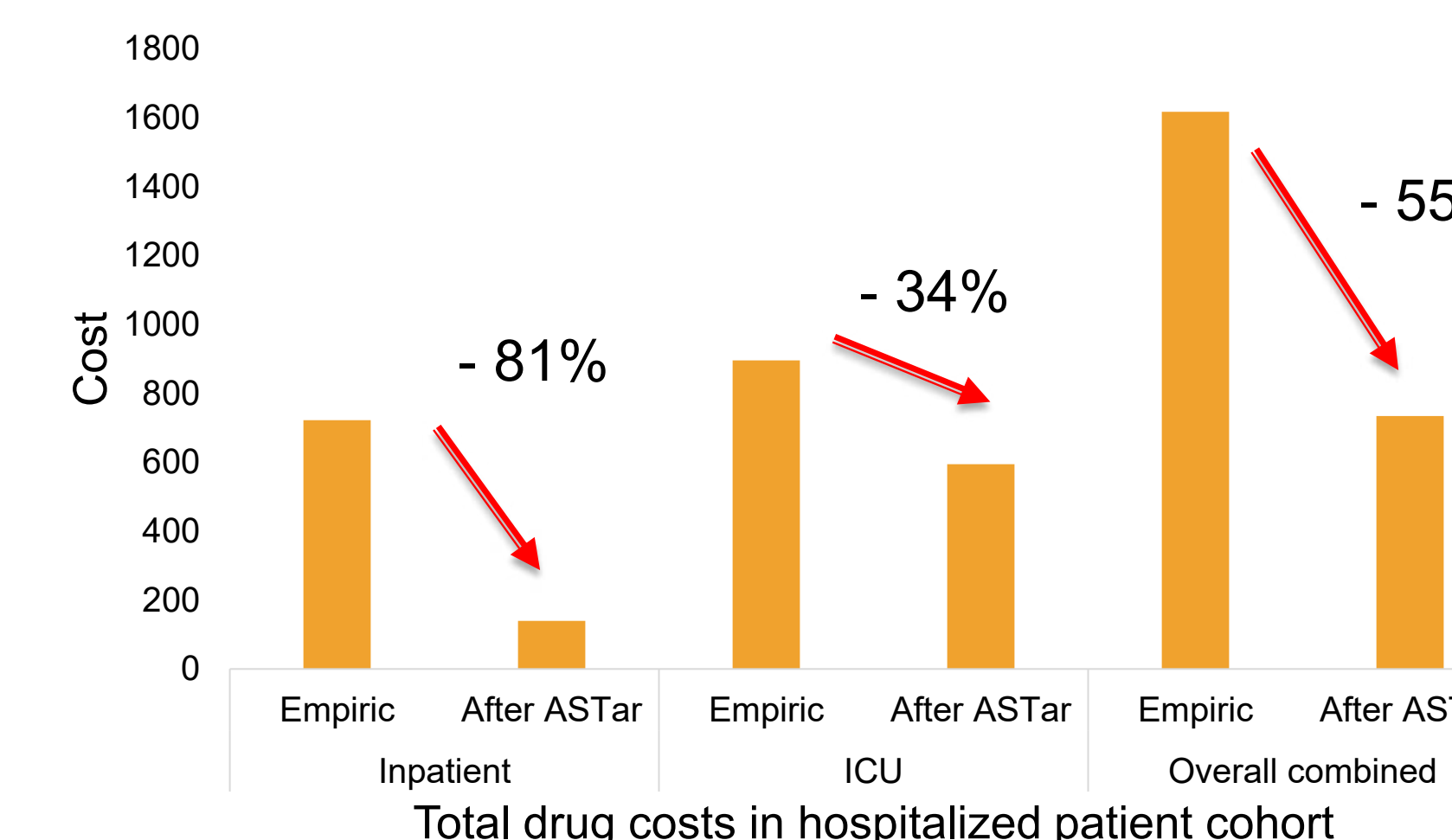
Majority can be switched to ceftriaxone



Majority of change is de-escalation



Reduction in total drug costs in our hospitalized cohort



Rapid pAST results from ASTar could lead to a 55% total reduction in drug costs across our hospitalized patients, with significant greater savings in non-ICU patients (81% vs 34%, p<0.02)

Conclusions

- The Q-linea ASTar produced results with high agreement to standard of care results but ~1.5 days earlier.
- At our institution, rapid phenotypic AST platforms may potentially lead to therapeutic changes for patients with Gram-negative bacteremia.
- AST profiles generated from rAST platforms can allow clinicians to choose treatment concordant with our standard of care treatment plans.
- Clinical outcomes such as antimicrobial optimization (de-escalation, route of administration) and overall drug costs can be downstream benefits of ASTar.
- Technologies accelerating AST results combined with hospital antimicrobial stewardship efforts continue to show promise in improving patient outcomes in our inpatient population cohort.

References

- Banerjee R, Humphries R. Rapid Antimicrobial Susceptibility Testing Methods for Blood Cultures and Their Clinical Impact. *Front Med (Lausanne)*. 2021.
- Messiaen AS et al. Impact of reporting rapid susceptibility results in Gram negative bloodstream infections: a real world prospective study. *Eur J Clin Microbiol Infect Dis*. 2025
- Hattab S et al. Rapid Phenotypic and Genotypic Antimicrobial Susceptibility Testing Approaches for Use in the Clinical Laboratory. *Antibiotics (Basel)*. 2024

Acknowledgments

- Q-linea for research support