

# Interim results of a clinical and economic evaluation of a rapid AST system – the LIFETIMES study

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## The LIFETIMES study

Health and Economic Outcomes Research (HEOR) studies determine whether a new intervention outweighs existing treatments in terms of both cost and health outcomes<sup>1</sup>.

The ongoing LIFETIMES HEOR study is a prospective, interventional investigation of the clinical impact of AS<sup>T</sup>ar<sup>®</sup>, Q-linea's rapid AST system<sup>2</sup>, when treating patients with a Gram-negative bloodstream infection (BSI). Timely and cost-effective Antimicrobial Susceptibility Testing (AST) is crucial for effectively treating these patients<sup>3-6</sup>.

In this study, clinicians act upon AS<sup>T</sup>ar results by changing the antibiotic course or confirming appropriate empiric therapy. Here, we present interim data from the LIFETIMES study.

## Conclusion

- AS<sup>T</sup>ar had an impact on 14 out of 30 patients (47%)
- AS<sup>T</sup>ar shortens the median time from positive blood culture to AST result by 31.4 hours when compared to traditional BMD and 20 hours when compared to other automated systems
- AS<sup>T</sup>ar performance aligns with traditional BMD – overall EA and CA >90%

## Results

### AS<sup>T</sup>ar expedites the clinical workflow

For 30 patients with complete case reports and 28-day follow-up, the median time was calculated for all critical hospital and laboratory events. Interquartile ranges (IQR) are in brackets. AS<sup>T</sup>ar delivers actionable results significantly faster than other automated AST methods or traditional BMD (Fig 1).

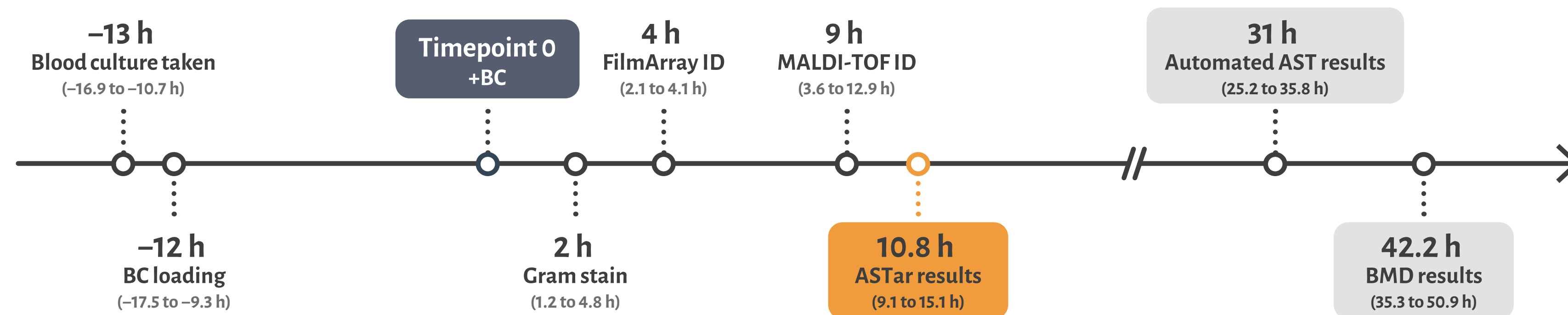


Fig 1. Median time to critical events (IQR).

### AS<sup>T</sup>ar delivers actionable results >31 hours faster than BMD

Patient samples underwent AST using AS<sup>T</sup>ar and traditional BMD methods. Median times from positive blood culture bottle (+BC) to AST results were compared between the paired samples. Median time (IQR) from positive BCB to AS<sup>T</sup>ar results: 10.8 (6.3 to 20.9) h. Median time (IQR) from positive BCB to BMD results: 42.2 (25.1 to 82.0) h. The overall median time difference between methods was 31.4 h (Fig 2).

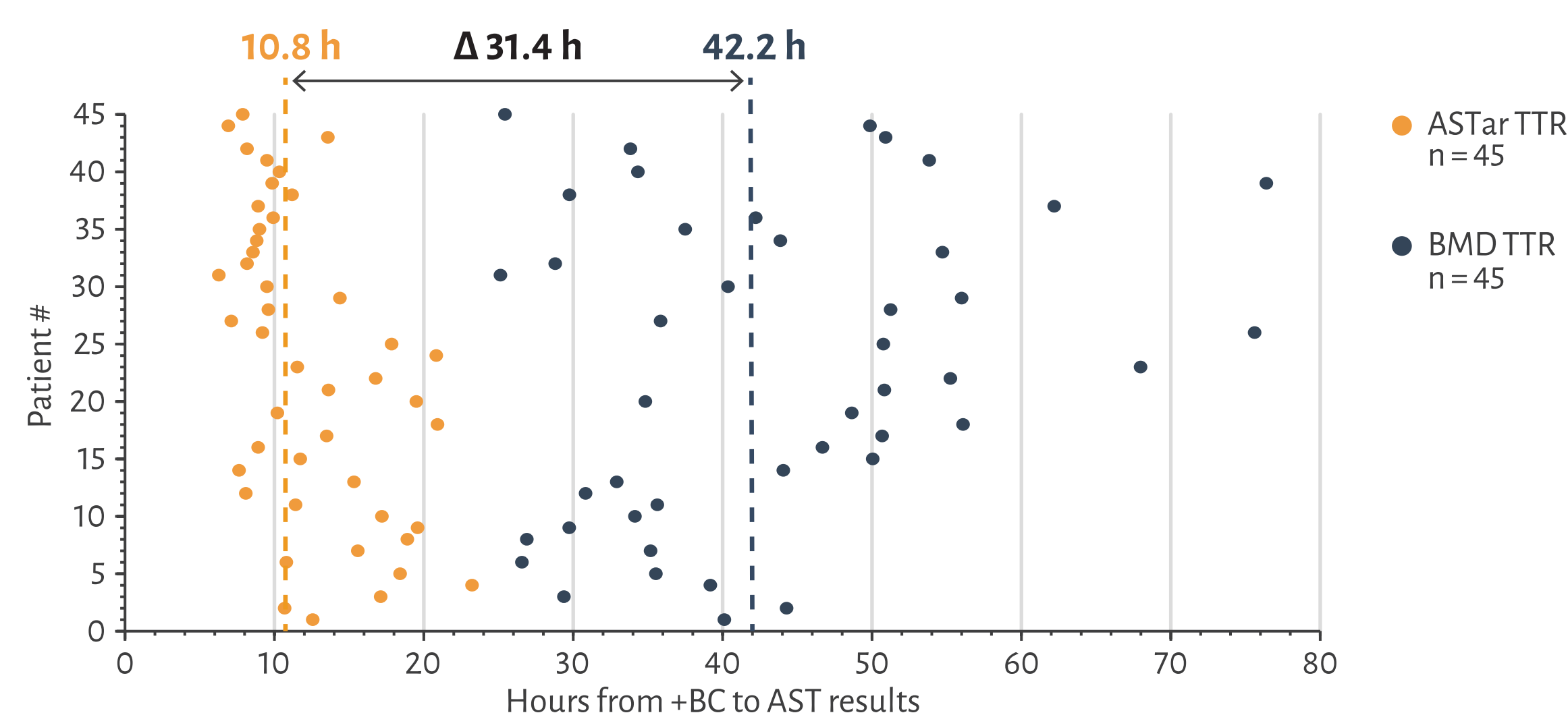


Fig 2. Paired patient samples from AS<sup>T</sup>ar and BMD AST. Median time (IQR) from +BC to AST results.

### AS<sup>T</sup>ar drove antibiotic change in 47% of patient cases

We investigated how timely AST results via AS<sup>T</sup>ar influenced treatment adjustment. In 47% of patients (14/30), AS<sup>T</sup>ar prompted antibiotic changes, with the specific type of change dependent on the individual case. As demonstrated, AS<sup>T</sup>ar can guide multiple types of antibiotic adjustment. In 53% of patients (16/30), AS<sup>T</sup>ar confirmed prior therapy (Fig 3).

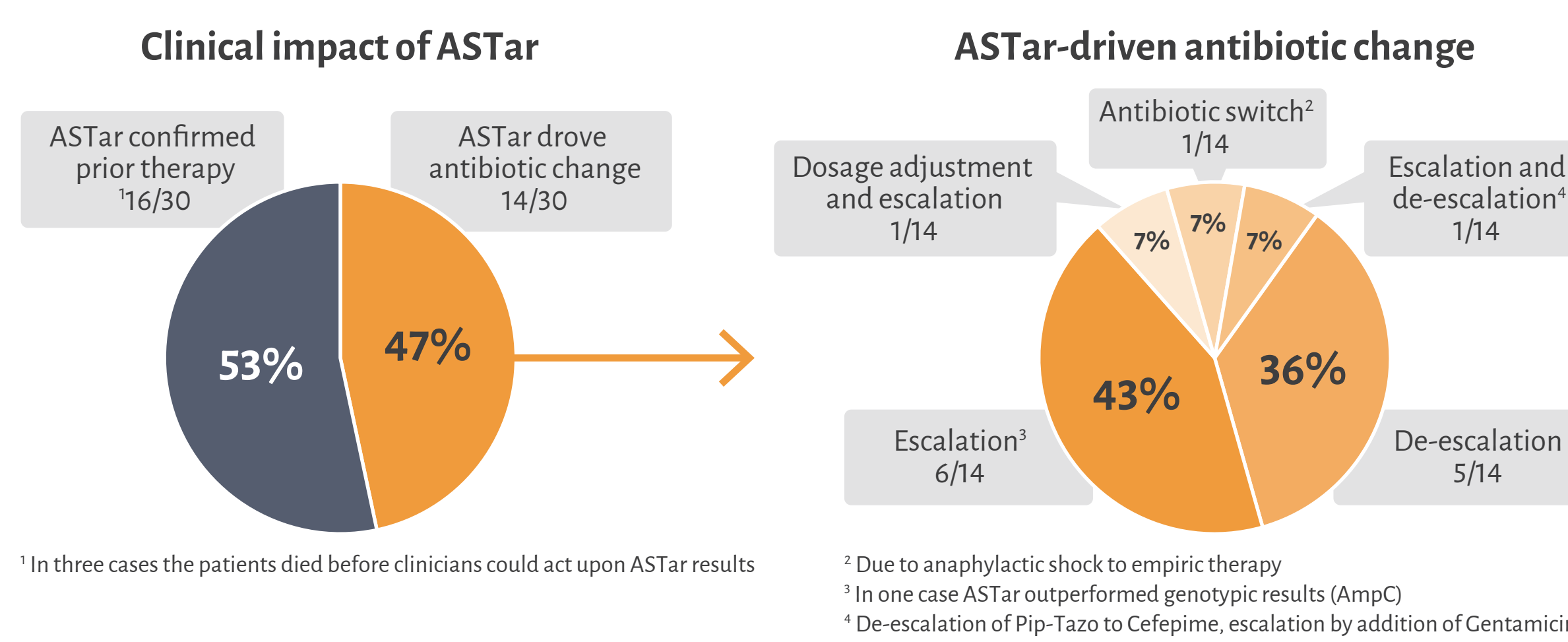


Fig 3. Overview of the clinical impact (antibiotic change) and the type of antibiotic change driven by AS<sup>T</sup>ar.

### AS<sup>T</sup>ar performs above 94% total EA and above 94% total CA

AS<sup>T</sup>ar BMD data was interpreted and assessed using EUCAST breakpoints and maintained a high agreement with reference BMD methods. The measured total EA was 94.5%, CA was 94.8%, and error rates were within the acceptable range (<3%) (Table 1 and 2).

Table 1. Overall performance data. Essential Agreement (EA), Categorical Agreement (CA), Very Major Discrepancy (VMD), and Major Discrepancy (MD).

AS <sup>T</sup> ar vs. traditional BMD			
EA #/tot (%)	CA #/tot (%)	VMD #/tot (%)	MD #/tot (%)
534/565 (94.5%)	526/555 (94.8%)	1/91 (1.1%)	8/436 (1.8%)

Table 2. Performance data for all antibiotics used in the study.

Antimicrobial agent	AS <sup>T</sup> ar vs. traditional BMD	
	EA #/tot (%)	CA #/tot (%)
Amikacin	41/44 (93.2%)	42/44 (95.5%)
Amoxicillin-Clavulanic acid	18/21 (85.7%)	18/21 (85.7%)
Ampicillin	2/2 (100%)	2/2 (100%)
Aztreonam	9/9 (100%)	9/9 (100%)
Cefepime	33/35 (94.3%)	32/35 (91.4%)
Cefotaxime	6/6 (100%)	6/6 (100%)
Ceftazidime	31/38 (81.6%)	30/38 (78.9%)
Ceftazidime-Avibactam	38/41 (92.7%)	40/41 (97.6%)
Ceftolozane-Tazobactam	39/40 (97.5%)	40/40 (100%)
Ceftriaxone	24/26 (92.3%)	26/26 (100%)
Cefuroxime	3/3 (100%)	3/3 (100%)
Ciprofloxacin	40/43 (93.0%)	40/43 (93.0%)
Colistin	15/17 (88.2%)	17/17 (100%)
Ertapenem	27/27 (100%)	27/27 (100%)
Gentamicin	32/33 (97.0%)	33/33 (100%)
Levofloxacin	31/31 (100%)	20/23 (87.0%)
Meropenem	43/45 (95.6%)	42/45 (93.3%)
Piperacillin-Tazobactam	40/41 (97.6%)	38/41 (92.7%)
Tigecycline	6/6 (100%)	6/6 (100%)
Tobramycin	20/21 (95.2%)	20/21 (95.2%)
Trimethoprim-Sulfamethoxazole	36/36 (100%)	36/36 (100%)

## Materials and methods

- The HEOR study spans four sites across Italy, a country with high rates of antimicrobial resistance
- ICU patients with a Gram-negative BSI are prospectively enrolled in this study. 45/160 patients are enrolled thus far – all of which were used for performance evaluation and 30 of which were used for clinical impact evaluation
- AST results from AS<sup>T</sup>ar and standard of care (BMD) methods have been compared
- MICs are interpreted following EUCAST clinical breakpoints version 13.0<sup>7</sup>

**Primary objectives:** measure time to optimal antimicrobial therapy or time to awareness of appropriate non-modifiable empiric therapy.

**Secondary assessments:** time saved, type of treatment adjustment, and duration of antimicrobial therapy.

## References

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