EXPLORATIVE COST-EFFECTIVENESS ANALYSIS OF A RAPID ID/AST BIOMÉRIEUX SOLUTION FOR PATIENTS WITH BLOODSTREAM INFECTION.

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Summary

An explorative cost-effectiveness analysis of a rapid ID/AST solution in the management of patients with bloodstream infection compared to standard of care (SoC) was conducted from a French payer perspective. A decision-analytic model was developed, based on the published literature and clinical expert validation, comparing both health outcomes and direct healthcare costs of a hypothetical BSI in-hospital patient cohort diagnosed with and without a rapid ID/AST solution (results within 6 hours vs. 24-48 hours with SoC). A short-term time horizon until discharge or death was applied and the incremental cost-effectiveness ratio was calculated to estimate the cost per death averted. The model showed that using a rapid ID/AST solution was cost-saving and lifesaving when compared to SoC in BSI management. One-way sensitivity analyses showed the robustness of the model.

INTRODUCTION

Bloodstream infections (BSI) may progress to sepsis and septic shock. This life-threatening escalation is a serious health issue causing millions of averted deaths globally and a heavy economic burden on healthcare systems. Timely diagnosis and appropriate antibiotic therapy of BSI are essential to prevent sepsis and septic shock and improve patient outcomes.

The objective of this analysis was to demonstrate value for money of rapid pathogen identification and antimicrobial susceptibility testing (ID/AST) solutions in the management of patients with BSI compared to the standard of care (SoC) in diagnostic.

METHODS

A decision-analytic model (Figure 1) was developed based on recent published literature and expert validation. A hypothetical cohort of 20,000 hospitalized patients with BSI was followed since time of positive blood culture (PBC) until hospital discharge or death. The cohort was equally divided into two diagnostic pathways:

- **Control arm**: using conventional methods for ID/AST, 19% of BSI patients receive inappropriate antibiotic treatment (IAAT) and 42% evolve to sepsis.[1]
- **Intervention arm**: using a rapid ID/AST solution provides an actionable result to administer appropriate antibiotic treatment (AAT) within one-shift, reducing the proportion of patients evolving to sepsis to 28.4%.

For each arm, the risk to evolve towards sepsis and mortality risks[2] were computed. The costs of management of BSI, sepsis and septic shock were integrated into the model with length of stay (LoS) for each condition in general ward and in intensive care unit (ICU). The robustness of the model was tested using one-way sensitivity analyses.

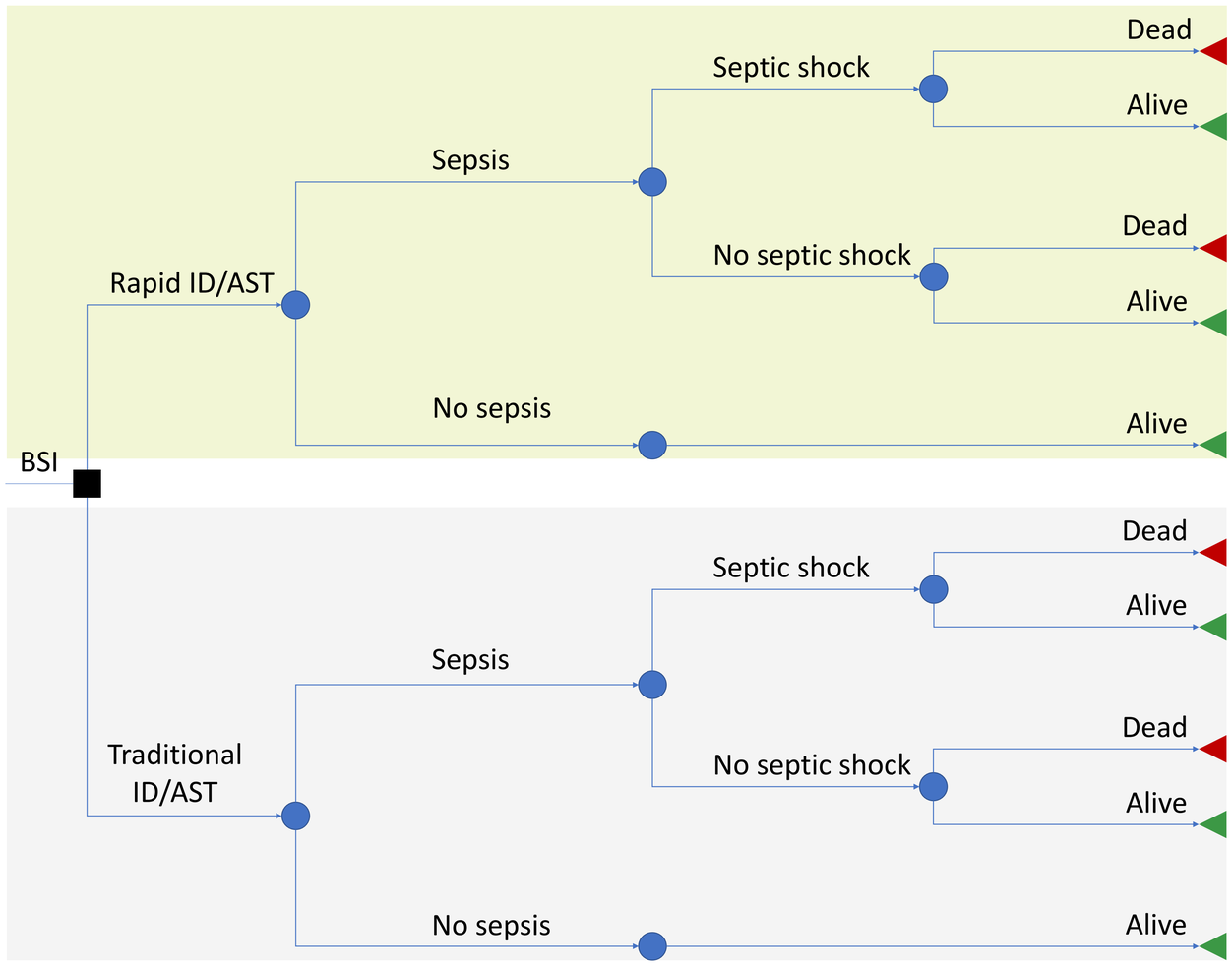

Figure 1: Overview of the decision tree model.

RESULTS

The use of a rapid ID/AST solution was **cost-saving and lifesaving** when compared to SoC in BSI management by starting earlier with appropriate treatment.

Table 1: base-case results.

	Standard of care	Rapid ID/AST	Difference
Health outcomes			
Sepsis cases (%)	*27.7*	*18.8*	*- 8.9*
Septic shock cases (%)	*14.3*	*9.7*	*- 4.6*
Overall mortality (%)	*11.7*	*7.9*	*- 3.8*
Economic outcomes			
Average LoS per patient (days)	*11.6*	*10.1*	*- 1.5*
Average ICU stay (days)	*3.4*	*2.3*	*- 1.1*
Total cost per patient (€)	*8,426*	*7,632*	*- 794*

One-way sensitivity analyses demonstrated the robustness of the base-case results (Figure 2).

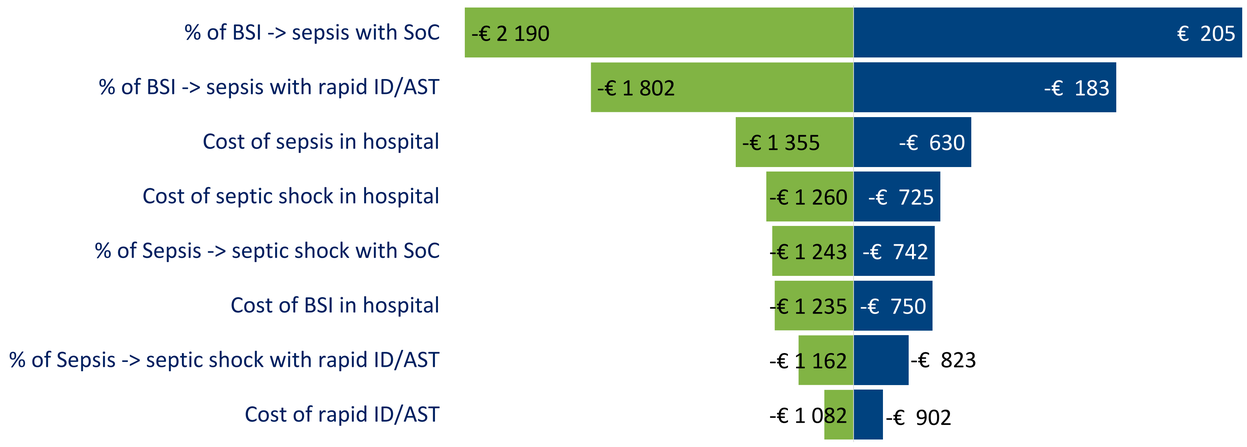

Figure 3: Tornado diagram – cost per patient

DISCUSSION

Our model indicates that the introduction of a rapid ID/AST solution to manage in-hospital patients with BSI is a dominant/cost-saving strategy compared to SoC by reducing time to appropriate/targeted treatment. As a result, when clinicians will act upon these fast results in a real clinical setting, overall inappropriate empiric antibiotic prescriptions will be reduced which is then expected to decrease deterioration into sepsis and may have a positive impact on the burden of antimicrobial resistance (AMR) in the long-term.

Finally, the results of this explorative model, demonstrating both high medical and economic value, are in line with the WHO AMR priority recommendations[5] to use rapid AST methods from blood culture.

REFERENCES

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