

Clinical Case

Direct rapid antibiotic susceptibility test (dRAST) for blood culture and its potential usefulness in clinical practice

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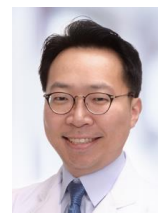
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Summary

38 % of Patients with better treatment, sooner

Blood infections and associated complications like sepsis are responsible for over 10 million deaths per year worldwide, one patient every 3 seconds.

The dRAST solution provides Antimicrobial Susceptibility Test (AST) results within 6 hours on positive blood cultures.



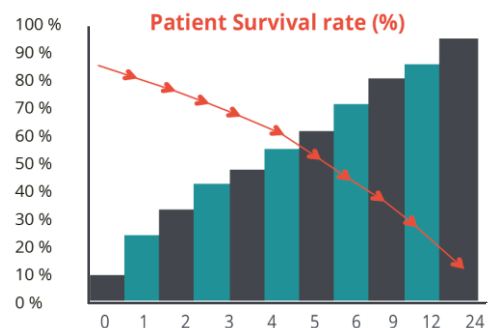
In comparison with a conventional AST method, dRAST provides a Minimal Inhibitory Concentration (MIC) and SIR interpretation 24 to 48 hours sooner.

We have demonstrated in this study that out of the 119 patients analyzed through their blood culture samples after identification of the bacteria with the MALDI-TOF method, thanks to dRAST AST results, 19 patients could have received a better adapted antibiotic treatment. 1 to 2 days earlier de-escalation could have been possible for 27 (81.8 %) patients based on dRAST results.

Purpose

Technical validation & optimal antibiotic therapy

For a patient with blood stream infection with associated complications, every hour counts. Broad-spectrum antibiotic treatments may cause the emergence of multi-resistant germs. In this context, the possibility to obtain an AST result sooner is a major improvement.



This study aimed to assess the accuracy of dRAST and evaluate its potential usefulness for improving selection of appropriate antibiotic in real clinical practice settings.



Methodology

We evaluated the accuracy of dRAST by comparing the antibiotic treatments that should have been administered based on dRAST results and the broth microdilution (BMD) test and its potential usefulness via simulation.

124 patients presenting bacteria blood infection were included in this study. 5 patient samples showed low score on MALDI-TOF and were then excluded, limiting the study to 119 patients. A Gram stain was performed on all positive blood cultures.

AST results were compared using broth microdilution method. The AST analysis, bacteria identification and translation into appropriate antibiotic treatment were assessed by an infection specialist for the results obtained on broth microdilution and for the results obtained with dRAST solution. The therapies were sorted in 4 categories:

- Optimal targeted therapy
- Optimal broad spectrum therapy
- Non-optimal therapy
- Ineffective therapy

Optimal targeted

administration of antibiotics to which the organisms were susceptible and considered as the most effective and narrowest spectrum treatment.

Optimal broad spectrum

administration of antibiotics to which organisms were susceptible and effective but that had broad-spectrum activity requiring de-escalation

Non-optimal

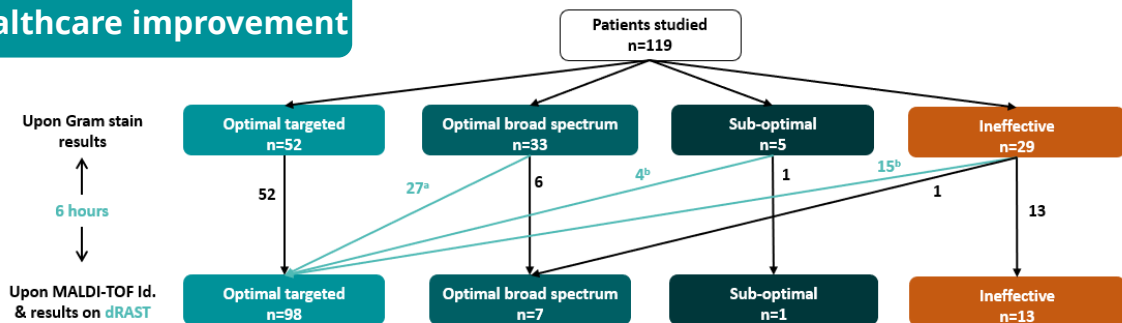
administration of antibiotics to which organisms were susceptible and that were considered inferior to first-line antibiotics (e.g. vancomycin for methicillin-S *Staph. aureus*)

Ineffective

administration of antibiotics to which organisms had intermediate susceptibility or were resistant, or no treatment at all

Results

Availability of results
50 hours sooner for
healthcare improvement



For 49 of 52 patients (94.2 %) with Gram-positive blood infection and 66 of 67 patients (98.5 %) with Gram-negative blood infection, antibiotic treatments based on dRAST results were confirmed by broth microdilution.

Among 34 patients with ineffective or suboptimal treatment, 19 (55.9 %) could have received optimal treatment 1 to 2 days earlier with dRAST results. Among 33 patients given unnecessary broad-spectrum antibiotics, 1 to 2 days earlier de-escalation could have been possible for 27 (81.8 %) patients based on dRAST results.

dRAST results were available in average 50 hours earlier than conventional methods currently used in routine in our lab.

Conclusion

The introduction of dRAST could increase the use of optimal antibiotics and reduce unnecessary broad-spectrum antibiotic use in the early period of bacteraemia.

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