QUANTAMATRIX

Clinical Case

Prospective evaluation of a rapid antimicrobial susceptibility test (QMAC-dRAST) for selecting optimal targeted antibiotics in positive blood culture

Jeong-Han Kim, Taek Soo Kim, Hyun gul Jung, et al. 2019, Journal of Antimicrobial Chemotherapy. doi:10.1093/jac/dkz168

SNUH SEOUL NATIONAL UNIVERSITY HOSPITAL

OXFORD ACADEMIC
Journal of Antimicrobial Chemotherapy
BRITISH SOCIETY FOR ANTIMICROBIAL CHEMOTHERAPY

Summary

Rapid AST is far superior then MALDI-TOF MS for optimal targeted therapy

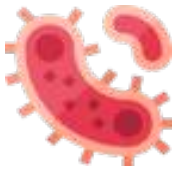
Blood infections and associated complications like sepsis are responsible for over 11 million deaths per year worldwide, one death every 2.8 seconds.
The QMAC-dRAST solution provides Antimicrobial Susceptibility Testing (AST) results in as low as 4 hours on positive blood cultures.

We have demonstrated in this study that among the 359 patients analyzed through their blood culture samples, MALDI-TOF MS may frequently be inadequate for guiding ID physicians to select optimal antibiotics, especially in cases of infection with resistant organisms. With the increasing number of resistant organisms encountered in clinical practice, the introduction of rapid AST can help increase the selection of optimal targeted antibiotics during the early period bacteremia.

Purpose

Technical comparison & optimal antibiotic selection

Resistant organisms represent a huge health problem worldwide, and researchers are looking for new technologies to counteract it. Usually, MALDI-TOF MS are used for empirical antibiotic selection.



However, limited data are available regarding the usefulness of MALDI-TOF MS in common resistant organisms compared with AST system. The aim of this study is to prospectively evaluate the usefulness of rapid AST (QMAC-dRAST), compared with MALDI-TOF MS, for optimal antibiotic selection by infectious disease (ID) physicians in patients with bacteremia including polymicrobial infection.

Methodology

We made a prospective evaluation of the usefulness of QMAC-dRAST for optimal antibiotic selection, by comparing the results that we obtained from it with the results of MALDI-TOF MS analysis.
359 patients with Positive Blood Culture (PBC) were included for analysis, among which 328 monomicrobial infections and 31 polymicrobial infections.
ID physicians prospectively decided on antibiotic regimens with consensus at each time point of receiving results of Gram stain, MALDI-TOF MS and rapid AST, the last of which was performed using QMAC-dRAST.

QUANTAMATRIX

Methodology

These antibiotic treatments for QMAC-dRAST results were sorted in three categories for resistant strains (Optimal targeted, Ineffective, Appropriate), and four categories in addition of Unnecessary broad-spectrum for susceptible strains:

Optimal targeted	**Unnecessary broad-spectrum**	**Ineffective**	**Appropriate**
The most effective and narrowest spectrum antibiotic treatment for the pathogen(s)	Antibiotic treatment that is effective against the pathogen(s), but has broad-spectrum actvity requiring de-escalation	Antibiotic treatment to which the pathogen(s) have intermediate susceptibility or are resistant	Antibiotic treatment to which pathogen(s) are susceptible

Results

If we consider Gram stain and MALDI-TOF results, the proportion of optimal targeted antibiotic results and appropriate antibiotic results are significantly lower on resistant strains than susceptible strains.
Ineffective treatment for resistant strains remains high and MALDI-TOF (31,8%) does not bring significant decrease compared to Gram stain (33,5%).
QMAC-dRAST improves results in all categories for monomicrobial PBC but resistant strains show the highest improvement rates compared to MALDI-TOF:

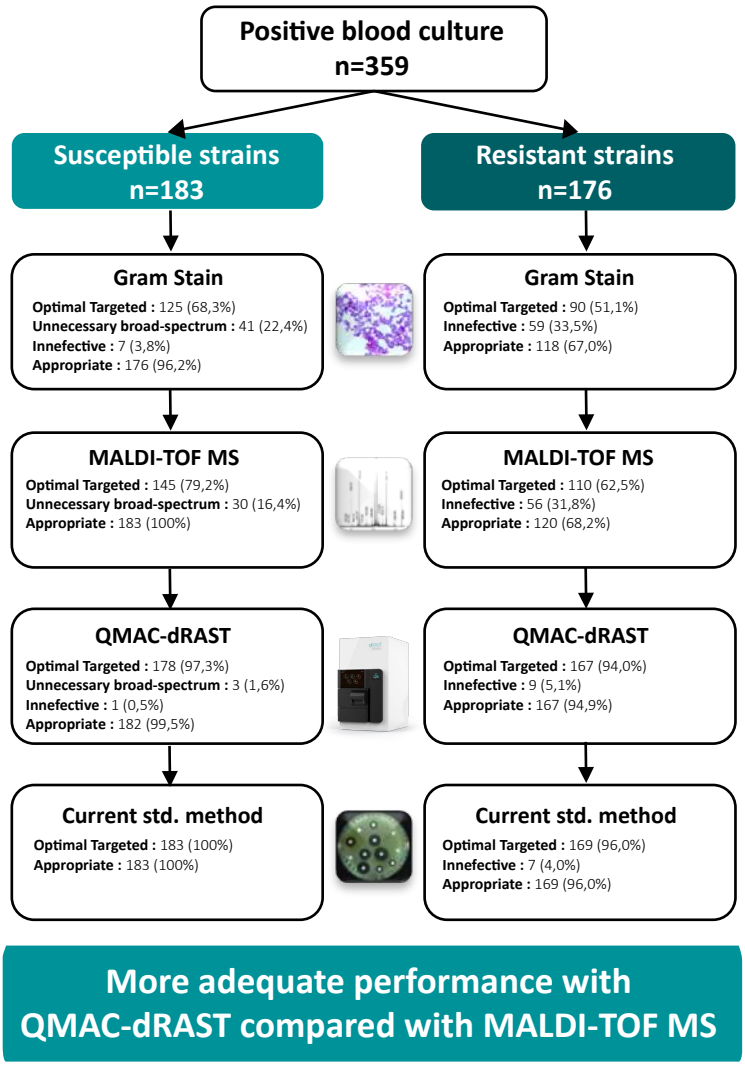
- Optimal targeted treatment:
52% of increase with QMAC-dRAST

- Appropriate treatment:
39% of increase with QMAC-dRAST

- Ineffective treatment:
83% of reduction with QMAC-dRAST

- Unnecessary broad spectrum treatment:
90% of reduction with QMAC-dRAST in susceptible strains.

Finally, QMAC-dRAST results obtained for optimal targeted and appropriate antibiotic treatment are practically similar to current standard conventional method results.
Concerning polymicrobial PBC infections not characterized on Gram stain, QMAC-dRAST is able to generate optimal antimicrobial therapies on 74% of these samples. This then proves ability of QMAC-dRAST to handle a vast majority of polymicrobial PBC infections not characterized on Gram stain.



More adequate performance with QMAC-dRAST compared with MALDI-TOF MS

Conclusion

With increasingly common resistant organisms, rapid AST is needed to identify optimal targeted antibiotic therapies early in bacteremia and significantly reduce ineffective treatment.
Futhermore, It contributes to limit the rise of antimicrobial resistance by reducing unnecessary broad-spectrum treatment for susceptible organisms.
Last, QMAC-dRAST handles a vast majority of polymicrobial PBC infections not characterized on Gram stain.

QuantaMatrix Europe
Villejuif BioPark
1, mail du Pr Georges Mathé
94800 Villejuif- France

contact-europe@quantamatrix.com
+33 (0) 9 75 29 18 65
www.quantamatrix.com

Ref: MKT-EDRA2EN B