Abstract 2366

Using T2Dx and rapid AST with blood culture pre-sampling for combined ID and AST before blood culture positivity

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Background: Rapid diagnostic methods are important for antibiotic stewardship and for improving quality of care in severe disease like sepsis. New culture-independent methods for identification (ID) within hours directly from blood are becoming available, such as T2Bacteria – however, blood cultures (BC) remain necessary for bacteria isolation and follow-up analysis such as antibiotic susceptibility testing (AST). QuickMIC is a rapid diagnostic tool under development, capable of AST at very low bacterial concentrations. Here we evaluate a combined rapid ID+AST diagnostic workflow using T2Bacteria and the QuickMIC AST system.

Materials/methods: Two diagnostic workflows were simulated, "standard" using blood culture followed by MALDI-TOF MS (MSID) and AST by broth microdilution (BMD); or "rapid" using T2Bacteria followed by AST using QuickMIC. *Escherichia coli* (n=5), *Klebsiella pneumoniae* (n=9), *Acinetobacter baumannii* (n=6), *Pseudomonas aeruginosa* (n=5), and *Staphylococcus aureus* (n=13) clinical strains were inoculated in horse blood and BC started simultaneously with T2Bacteria. After T2Bacteria positive identification, the BC bottle was presampled for rapid AST. After BC positivity, samples were subcultured and MSID was performed. Specificity, sensitivity and turnaround time were compared between the two workflows, and QuickMIC results were compared to BMD with regards to categorical agreement.

Results: The rapid diagnostic workflow was significantly faster than the standard workflow (9.5±2.5h vs. 52.9±0.4h, $p<0.001$), and significantly faster for Gram-negative (GN) compared to Gram-positive (GP) bacteria (7.4±0.6h vs 12.2±0.4h, $p<0.001$). For 68% of the samples, the rapid ID+AST result was available before BC positivity (86% for Gram-negatives, 45% for Gram-positives). For 100% of the samples, rapid ID+AST was available before MSID. Diagnostic sensitivity/specificity at the species level were 94.7%/99.5% and 97.4%/100% for T2ID and MSID, respectively. QuickMIC (GN/GP panel) results took on average 167±15 min, and categorical agreement to BMD was 82% (GN) and 83% (GP).

Conclusions: We conclude that QuickMIC has the potential to be a suitable companion diagnostic to T2Bacteria for delivering rapid ID+AST results. The value of same-shift results for improved antibiotic stewardship and quality of care is high, and further evaluation beyond this pilot study will be conducted.

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