ABSTRACT

Background: Previous reports on molecular rapid diagnostic testing (mRDT) do not consistently demonstrate improved clinical outcomes in bloodstream infections (BSIs).

Methods: We searched PubMed, CINAHL, Web of science, and EMBASE through May 2016 for BSI studies comparing clinical outcomes by mRDT and conventional microbiology methods.

Results: Thirty-one studies were included with 5,920 patients. Risk of mortality was significantly lower with mRDT as compared to conventional microbiology methods (OR 0.66, 95% CI 0.54-0.80) yielding a NNT of 20. The risk of mortality was slightly lower with mRDT in studies with antimicrobial stewardship programs (ASPs) (OR 0.64, 95% CI 0.51-0.79) and non-ASP studies failed to demonstrate a significant decrease in risk of mortality (OR 0.72, 95% CI 0.46-1.12). Significant decreases in mortality risk were observed with both Gram-positive (OR 0.73, 95% CI 0.55-0.97) and Gram-negative organisms (OR 0.51, 95% CI 0.33-0.78) but not yeast (OR 0.90, 95% CI 0.49-1.67). Time to effective therapy decreased by a weighted mean difference of 5.03 hours (95% CI -8.60 to -1.45) and length of stay decreased by -2.48 days (95% CI -3.90 to -1.06).

Conclusions: For BSIs, mRDT was associated with significant decreases in risk of mortality in the presence of an ASP, but not in its absence. Additionally, mRDT decreased time to effective therapy and length of stay. mRDT should be considered as part of the standard of care in BSIs.

BACKGROUND

The clinical outcomes benefits of molecular rapid diagnostic testing (mRDT) in bloodstream infections (BSIs) are not well characterized.1,2

METHODS

• We searched Pubmed, CINAHL, Web of Science, and Embase from inception through May, 31 2016 for bloodstream infection studies in English comparing clinical outcomes between mRDT and conventional microbiology methods.

• Key words included bacteremia, bloodstream infection, spectrometry, matrix-assisted laser desorption/ionization, MALDI-TOF, microarray, PCR, nucleic acid, PNA, molecular, polymerase chain reaction, length of stay, mortality, morbidity, diagnosis, and outcome.

• Conference abstracts were reviewed from IDWeek, ICAAC, and ECCMID.

• Outcomes collected included overall mortality, mortality by presence of ASP (infectious disease physician or pharmacist responding to results), mortality by organism type, time to effective therapy, and length of stay.

• Analysis performed using random-effects model for pooled odds ratios or weight mean differences in RevMan and R.

RESULTS

• Data were extracted for analysis from 31 studies meeting inclusion/exclusion criteria which included 5,920 patients.

• The majority of the studies were quasi-experimental with the exception of 2 RCTs and 3 case-control studies.

• Only 2 studies were reported as from the community hospital setting.

• Gram-positive (54.8%) and gram-negative (22.6%) organism studies represented the majority of the data.

• Presence of an ASP was represented in most studies (20/31; 64.5%).

• Risk of mortality was significantly lower with mRDT as compared to conventional microbiology methods (OR 0.66, 95% CI 0.54-0.80) yielding a NNT of 20 (Figure 1). Mortality decrease was not significant in the absence of ASP.

• Significant decreases in mortality risk were observed with both Gram-positive (OR 0.73, 95% CI 0.55-0.97) and Gram-negative organisms (OR 0.51, 95% CI 0.33-0.78) but not yeast (OR 0.90, 95% CI 0.49-1.67).

• Length of stay decreased by -2.48 days (Figure 2) and time to effective therapy decreased by -5.03 hours (Figure 3).

CONCLUSIONS

• mRDT was associated with decreased mortality overall and among ASP studies but not in studies without ASPs.

• mRDT decreased mortality among gram-positive and gram-negative infections.

• LOS and time-to-effective therapy also decreased with mRDT.

• For BSI, mRDT should be considered as part of the standard of care.

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