Diagnostic accuracy of multiplex RT-PCR compared to standard bacterial culture for tracheal aspirates in children with suspected pneumonia.


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BACKGROUND

- Bacterial lower respiratory tract infection (LRTI) is a significant cause of morbidity and mortality in children who require mechanical ventilation (MV).
- Diagnosis is made with bacterial cultures of lower respiratory tract specimens.
- The current approach of testing is limited:
  - Resource intensive nature
  - Low sensitivity and specificity (colonization)
  - Time to grow and identify bacteria that may delay appropriate antibiotic administration
- Available multiplex real-time polymerase chain reaction (RT-PCR) assays for detection of bacteria have potential to provide rapid results and lead to more targeted antibiotic management

OBJECTIVES

1. Evaluate concordance between bacterial culture and RT-PCR in critically ill children requiring mechanical ventilation.
2. Calculate time to effective and optimal antibiotics from the time clinical culture was obtained relative to the expected 3-hour turnaround time of the Biofire panel.

METHODS

- Patients ages 31 days to 17 years who required MV for ≥ 72 hours (n = 126)
- Research tracheal aspirates collected <48 hours after intubation evaluated using the Biofire Pneumonia Panel (RT-PCR based panel of 15 typical bacterial pathogens)
- Inclusion criteria: concomitant clinical and research tracheal aspirate samples available (n = 54)
- Compared RT-PCR to bacterial culture results from clinically obtained tracheal aspirates collected <48 hours after intubation.
- Chart review: antibiotic administration and timing of culture results, time to effective (activity against organism) and optimal (appropriate for organism) antibiotics

RESULTS

- Table 1. Subject Characteristics
- Figure 1. Organism by bacterial culture compared to Biofire Pneumonia Panel RT-PCR
- Figure 2. Agreement between culture and Biofire Pneumonia Panel RT-PCR
- Figure 3. Timeline: culture results, time to antibiotics, turnaround time of RT-PCR

SUMMARY

- Compared to bacterial culture of TA samples, RT-PCR identified bacterial DNA in a greater number of patients but was not able to detect all bacteria found on culture.
- Most organisms as most organisms found on culture were not detectable by RT-PCR, were non-pathogens, or were polymicrobial.
- Overall agreement between culture and RT-PCR was variable by organism in children with suspected lower respiratory tract infection.
- RT-PCR could have decreased time to optimal antibiotics in the majority of patients

CONCLUSIONS

- RT-PCR (Biofire Pneumonia Panel) represents a potential adjunctive diagnostic tool to decrease time to optimal antimicrobial therapy.
- However, RT-PCR may increasingly detect colonization and not true infection.
- Limitations: testing not performed on same sample, relatively small sample size

DISCLOSURES

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