Abstract

Background

VAP diagnosis is imprecise, treatment often delayed & associated with increased mortality (mortality: MV + MR = 30%) and hospital costs.

Quantitative culture (QCx) of bronchoalveolar lavage (BAL) is usually obtained only after VAP is suspected. Surveillance with multiple BALs is associated with increased mortality and more antibiotic-free days & fewer deaths. However, surveillance QCx requires 48-72 hours for results from conventional labs. Surveillance QCX does not provide a diagnosis before VAP develops.

Introduction: Clinical diagnosis of VAP is imprecise. Conventional microbiological identification and antimicrobial resistance testing techniques delay treatment and are associated with increased mortality, morbidity, and antimicrobial costs. C-reactive protein, a biomarker of acute-phase reactants, is strongly correlated with severity of illness in mechanically ventilated (MV) patients at risk for VAP. Surveillance BAL samples in ICU patients identified a higher bacterial burden and predicted antibiotic resistance, compared with BAL samples collected during clinical pneumonia (VAP). Surveillance BAL samples may identify patients at-risk for VAP.

Hypothesis

• Prospective non-randomized clinical trial - Medical ICU, academic community ICUs. Inclusion: adults ≥ 18yrs, 72h of intubation and anticipated MV >48h. Exclusion: moribund state or pregnancy.

Methods

Mini-BAL Surveillance & Safety

1. Inclusion criteria: remains the same. 2. Exclusion criteria: remains the same. 3. Mini-BAL Surveillance (Combicath, Plastimed) was performed on Day 1, 3, 5, 7, 9, 10 of MV. Samples were processed using a novel technique (microfluidics, microfluidics, flows) for targeted detection of pathogenic bacteria. 4. Surveillance QCX was performed on Day 1, 3, 5, 7, 9, 10 of MV. 5. Surveillance QCX samples were sent to a central laboratory for analysis.

Results

 Patients enrolled: 34

VAP surveillance mini-BAL performed: 77

ICU LOS (days): Median (IQR) 18 (6-15.2)

ICU mortality (30d): 20 (6)

BACcel phenotyping (BACcel™)

• Positive microbiological identification and major drug resistance (MDR) surveillance in patients at risk for VAP.

Micro ID: Clinical Correlations

• Clinical micro ID data provided to ICU clinicians for medical decision making.

Conclusions

• Mini-BAL based surveillance for VAP is both feasible and safe in ventilated at-risk patients.

MADM-based microbiological surveillance for VAP is sensitive (86%) and specific (97%), and is associated with a significant reduction in time to clinically available bacterial ID and resistance (approx 40-66h lead time) for multiple organisms and resistance types.

• In 7 of 63% mini-BAL samples with a target organism above threshold by QCX, MADM-based ID would have resulted in inappropriate antibiotic therapy.

• MADM is a promising approach for rapid surveillance in patients at risk for VAP.

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