

IMPACT OF MATRIX-ASSISTED LASER DESORPTION/IONISATION-TIME OF FLIGHT MASS SPECTROMETRY ON ANTIBIOTIC OPTIMISATION IN CRITICALLY ILL PATIENTS WITH GRAM-NEGATIVE PNEUMONIA

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Objectives: Rapid identification using matrix-assisted laser desorption/ionization-time of flight mass spectrometry (MALDI-TOF) has previously been shown to reduce time to optimal antimicrobial therapy and mortality in patients with bacteremia. No studies have evaluated the influence of MALDI-TOF on clinical outcomes in patients with pneumonia. The objective of this study was to evaluate the impact of MALDI-TOF on antimicrobial optimisation in the treatment of critically ill patients with gram-negative pneumonia.

Methods: Retrospective, quasi-experimental single-center study of adult patients admitted to the surgical intensive care unit (ICU) or neurosciences ICU with pneumonia due to a gram-negative organism during pre-implementation (September 1, 2011-December 31, 2011) and post-implementation (September 1, 2012-December 31, 2013) periods. Pneumonia was defined by a positive quantitative bronchoalveolar lavage (BAL) with greater than 10,000 CFU requiring antimicrobial therapy. In the pre-implementation period, organism identification was via traditional microbiological methods, while the post-implementation period additionally employed MALDI-TOF. Pre- and post-implementation groups were compared with a primary endpoint of time to antimicrobial optimisation. Optimisation was defined as de-escalation of gram-negative antibiotic coverage or broadening of therapy for other gram-negative pathogens. Secondary endpoints included time to effective antimicrobial therapy based on in vitro susceptibility, duration of mechanical ventilation, and ICU and hospital length of stay. Continuous variables are presented as median [interquartile range] and were compared using the Mann-Whitney U test. Nominal variables are presented as frequencies and were compared using the Fisher's exact test.

Results: Sixty-four patients were included in the analysis (29 pre- and 35 post-implementation). Patient characteristics were similar at baseline. Time to optimisation was significantly reduced by over 24 hours in the post-implementation group ($p=0.001$). No differences in time to effective therapy, duration of ICU or hospital length of stay were observed. The post-implementation group required shorter duration of mechanical ventilation, although this did not reach statistical significance.

Conclusion: These data indicate that rapid identification of gram-negative organisms from BAL culture using MALDI-TOF significantly reduces the time to antimicrobial optimisation in critically ill surgical and neurosciences patients. Further evaluation to correlate clinical outcomes benefits and cost efficacy of MALDI-TOF for rapid identification of organisms from respiratory cultures is warranted.

	Pre- implementation (n=29)	Post- implementation (n=35)	p- value
Age (years)	53 [40-64]	58 [37.5-69.5]	0.798
Male, n (%)	22 (75.9)	29 (82.9)	0.489
ICU Type, n (%)			
Surgical	21 (72.4)	29 (82.9)	
Neurosciences	8 (27.6)	6 (17.1)	0.314
Mechanical ventilation at time of BAL, n (%)	28 (96.6)	32 (91.4)	0.620
ICU length of stay (days)	20.1 [15.9-30.6]	16.9 [10.9-23]	0.113
Hospital length of stay (days)	24 [17.7-39.9]	22.7 [17.5-29.5]	0.462
Duration of mechanical ventilation (days)	16.7 [11.5-25.7]	11.4 [5.7-18.2]	0.06
Time to effective therapy (hrs)	1 [0-25.1]	3.5 [0.3-16.3]	0.423
Time to optimised therapy (hrs)	71.1 [49.4-80.2]	44.6 [23.6-60.7]	0.001