Evaluation of the Implementation of Rapid Cerebral Spinal Fluid Diagnostic Test for Meningitis and Encephalitis at a Large Academic Institution

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Background

- Meningitis and encephalitis are central nervous system (CNS) infectious diseases associated with significant morbidity and mortality in adult populations.
- Traditional approaches of culture and pathogen-specific polymerase chain reaction (PCR) tests are limited by slow turnaround time and low diagnostic yield.
- The FilmArray Meningitis and Encephalitis (M/E) panel is a multiplex PCR test targeting a combination of 14 viruses, bacteria, and yeasts.
- The M/E panel was first introduced at LVHN in February, 2016.

Objectives

This study aims to determine how the M/E panel affects clinical outcomes including: time to diagnosis, appropriate antibiotic deescalation, days of therapy, and mortality.

Methods

Retrospective analysis of patients with CSF culture from 2/23/2015 to 2/22/2016 (Pre-Intervention) and M/E panel and CSF culture from 2/23/2016 to 2/22/2017 (Post-Intervention).

Review EMR for: demographics, length of stay, type of CSF studies, CSF collection date and time, CSF result date and time, antibiotics administered, antibiotic initiation and discontinuation date and time.

Perform descriptive statistics to compare the pre and post-intervention groups regarding: time to diagnosis, time to antibiotic deescalation, days of therapy, mortality.

Results

Table 1. Negative CSF Test Results

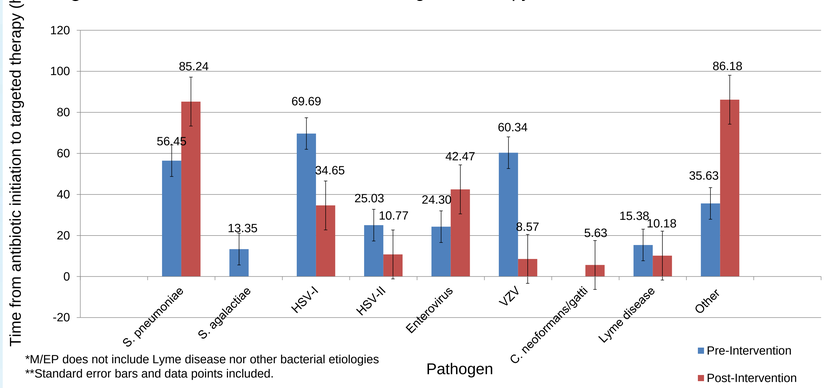
	Pre-group (N=97)	Post-group (N=74)
Mean Time to Antibiotic Deescalation (SD)	81.7 (85.5)	70.0 (93.2)
Mean Days of Therapy (SD)	3.4 (3.6)	2.9 (3.9)
Mean # CSF Tests Ordered (Range)	4.7 (1-13)	3.8 (2-13)
Mean Length of Stay Days (Range)	7.9 (1-33)	9.5 (2-57)

Key: ICU, Intensive Care Unit; CSF, cerebrospinal fluid.

Table 2. Positive CSF Test Results

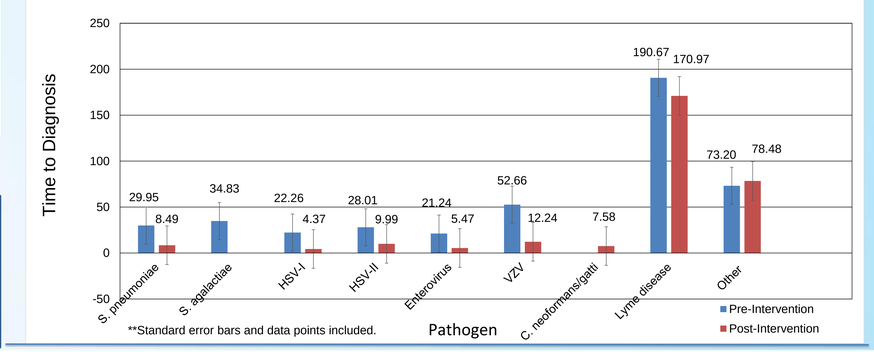
	Pre-group (N=23)	Post-group (N=20)
Mean Time to Targeted Antibiotic (SD)	32.9 (25.9)	27.7 (32.2)
Mean Time to Diagnosis in Hours (SD)	39.1 (40.3)	21.2 (39.0)
Mean # CSF Tests Ordered (Range)	5.0 (2-10)	2.9 (2-5)
Mean Length of Stay Days (Range)	7.6 (1-28)	9.0 (3-52)

Figure 2. Time from Antibiotic Initiation to Targeted Therapy for **Positive CSF Test Results**



*M/EP does not include Lyme disease nor other bacterial etiologies
**Standard error bars and data points included.

Figure 3. Time to Diagnosis for **Positive CSF Test Results**



**Standard error bars and data points included.

Results/Discussion

- Time to diagnosis decreased in the post-intervention group for all pathogens included on the M/E panel.
- The post-intervention group had a reduced time from antibiotic initiation to discontinuation (70.0 h vs 81.7 h) and reduced antibiotic days of therapy (2.9 d vs 3.4 d) for negative CSF results
- The post-intervention group had an overall decreased mean time to targeted therapy (27.7 h vs. 32.9 h) and reduced mean time to diagnosis (21.2 h vs. 39.1 h) for positive CSF results.
- The post-intervention group had a reduced average number of CSF tests (3.6 vs. 4.7).
- Notably, this translated into an increase in the average patient charge: $1,339.79 vs. $1,458.45, but a decrease in the average supply cost ($434.26 vs $314.29) in the post-intervention group.

Conclusions/Recommendations

- The implementation of the M/E panel has resulted in improved time to diagnosis, time to antibiotic deescalation for negative CSF tests and time to targeted antibiotic therapy for positive CSF test results
- Future research using a larger sample size is needed to determine if there is a change in outcomes data including: length of stay, ICU stay, and mortality.

References/Acknowledgments

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