中文題目：臨床應用快速多重病原聚合酶連鎖反應 PCR 於肺炎患者下呼吸道感染的病因診斷
英文題目：Clinical utilization of rapid multiplex PCR identifying lower respiratory tract infection etiology in post-treatment patients with pneumonia

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Background:

Aetiological diagnosis of lower respiratory tract infections (LRTI) can be challenging and complicated due to the wide range of potential pathogens and the non-sterile environment of the respiratory tract. The optimal management of pneumonia should rely on the early identification of the pathogen and the administration of targeted antimicrobial therapy. In this study, we aim to evaluate the clinical value of the rapid pneumonia multiplex PCR panel BioFire FilmArray Pneumonia Panel (PN panel) through implementing on suspected cases of community-associated pneumonia (CAP) and comparing with routine microbiologic cultures.

Method:

This was a prospective observational study conducted from September 2021 to May 2022. A total of 30 patients suspected of CAP were enrolled in this study. Clinical respiratory specimen particularly sputum transported within less than 2 hours to the microbiology laboratory for Gram stain and culture were screened for common respiratory pathogens using BioFire FilmArray Pneumonia PN Panels (BioFire Diagnostics, LLC, Salt Lake City, UT) following the instructions of the manufacturers. All patients have received antimicrobial agents prior to collection of the respiratory samples. The PN panel is an automated multiplex PCR test for rapid detection of lower respiratory tract pathogens including 15 bacteria were reported semi-quantitatively at 10^4, 10^5, 10^6, $\geq 10^7$ copies/mL, 3 atypical bacteria, 8 viruses and 7 genetic markers of antibiotic resistance in approximately 1 hour.

Results:

A total of 30 patients were enrolled in this study. All were adults and had a mean age (range) of 75.4 (42–99) years. Twenty-six (86.7%) patients were enrolled from the emergency department, while four (13.3%) were hospitalized patients, including two admitted to the intensive care unit.

The detection rate by the PN panel 76.7% (23/30) was higher compared to 25% (7/28) when standard microbiological cultures were done. Of the 21 respiratory specimen with no reported pathogen from standard microbiological culture, 1 had no bacterial growth, 6 isolated yeast-like pathogens and 14 were reported to have mixed flora. Bacterial pathogens were detected by PN panel in 5/6 (83.3%) samples that isolated only yeast-like organisms. Specific respiratory pathogens were reported in 10/14 (71.4%) samples that were reported to have mixed flora. Bacteria were the most common pathogens detected by the PN panel. CTX-M was the most common resistance gene and was detected in 3/30 (10%) of the respiratory samples. Detection of more than 1 bacterial pathogen was found in 16 patients (53.3%).

Conclusion:

Our evaluation suggests that BioFire FilmArray pneumonia multiplex PCR was highly sensitive. Compared with standard microbiological cultures, PN panel in adults with CAP was associated with identification of more potential LTRI pathogens, reduction in time to detection of these pathogens and their associated antimicrobial resistance genes.

The increased sensitivity of the panel over culture methodologies in patients with post-antimicrobial exposure is crucial in the management of CAP.