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Utilization of Rapid Molecular Diagnostic Pneumonia Panel in Critical Care Units: Single Centre Experience in Malaysia

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Background

It is often complex to determine the etiology of lower respiratory tract infections (LRTIs), leading to delay in appropriate antimicrobial administration[1]. Culture-based methods are laborious with poor sensitivity and long turnaround time for finalizing complex cultures and susceptibility profiles[2]. Therefore, molecular methods become an attractive alternative to conventional culture methods to detect bacterial pathogens by providing more sensitive results rapidly to assist in making earlier clinical decisions[3]. In this study, the results of rapid molecular diagnostic pneumonia panel in patients with LRTI in critical care units were evaluated.

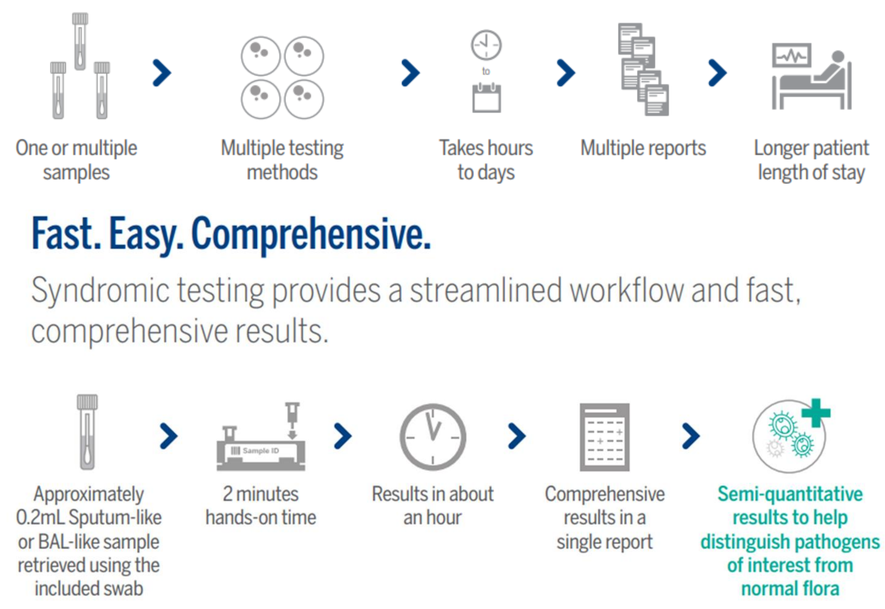

Figure 1 shows the flows of respiratory sample(s) subjected to traditional testing methods and Pneumonia panel plus.

Method

This observational cohort study involved identical cohort comparison between routine respiratory sample culture (standard practice) and pneumonia panel plus test (Rapid Molecular testing) from 2022 to 2024.

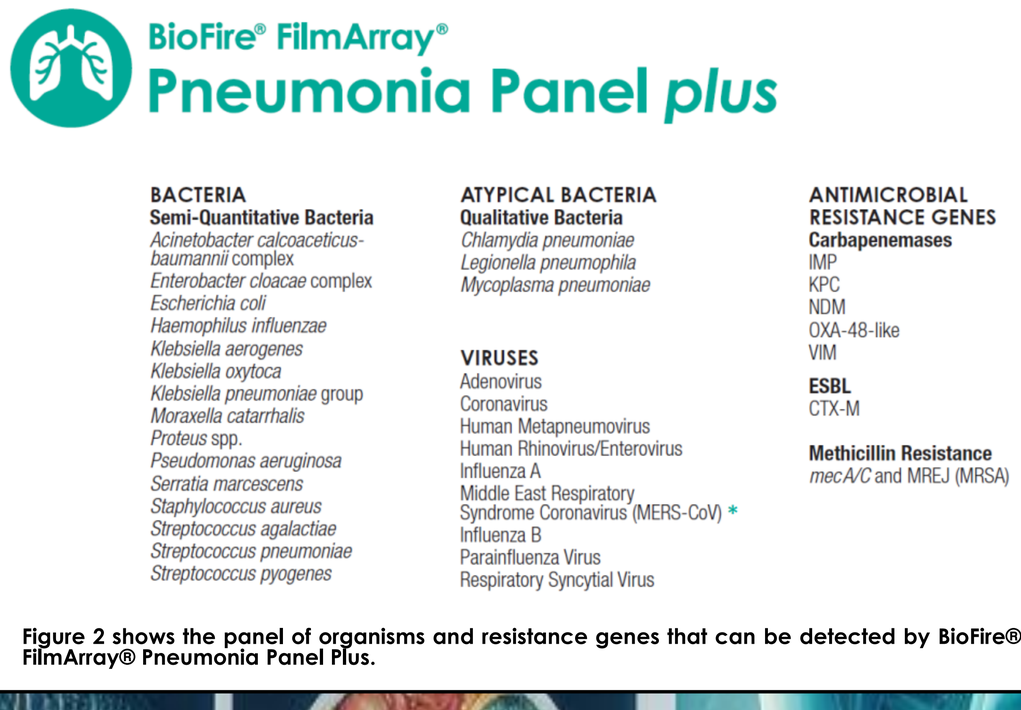

Figure 2 shows the panel of organisms and resistance genes that can be detected by BioFire® FilmArray® Pneumonia Panel Plus.

Conclusion

Pneumonia panel plus test was associated with significant reduced turnaround time than routine cultures method, with additional benefit of rapidly detecting resistance genes from the organism. Pneumonia panel plus test increased the number of positive samples with typical bacteria, but the semi-quantitative reporting algorithm does not describe the correlation between the different bin values and colonization versus infection.

References

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Results

Out of the respiratory samples (N=62) collected,

Figure 3 Mean Turnaround Time reduction from 46.5 hours to 2 hours using Pneumonia Panel Plus

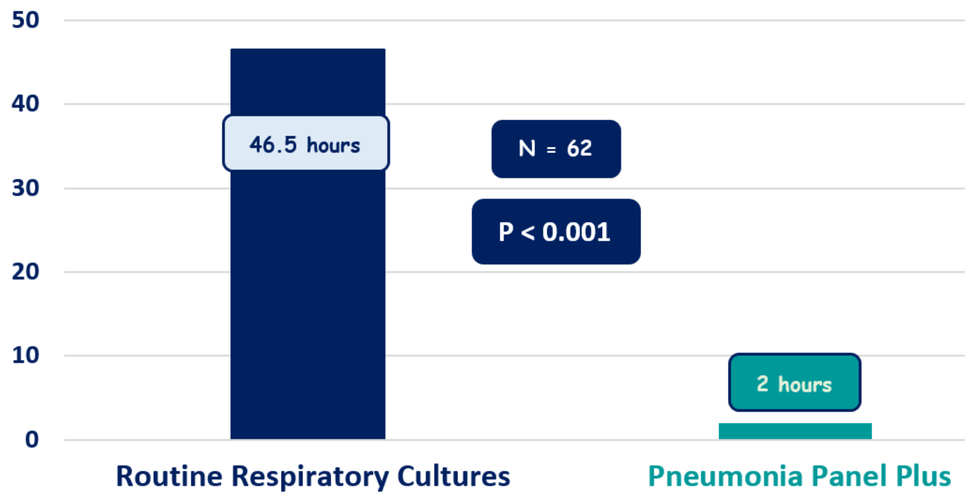


Figure 4
Organisms detected by the Pneumonia Panel Plus
78 organisms from 62 samples

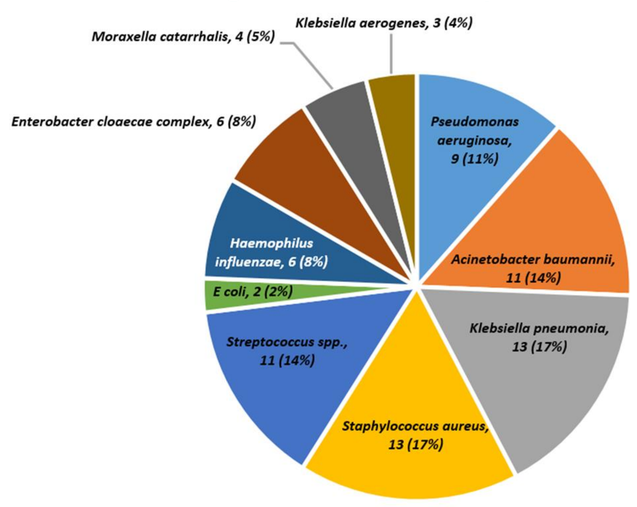
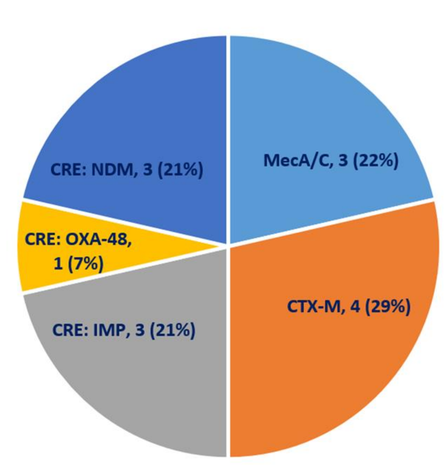
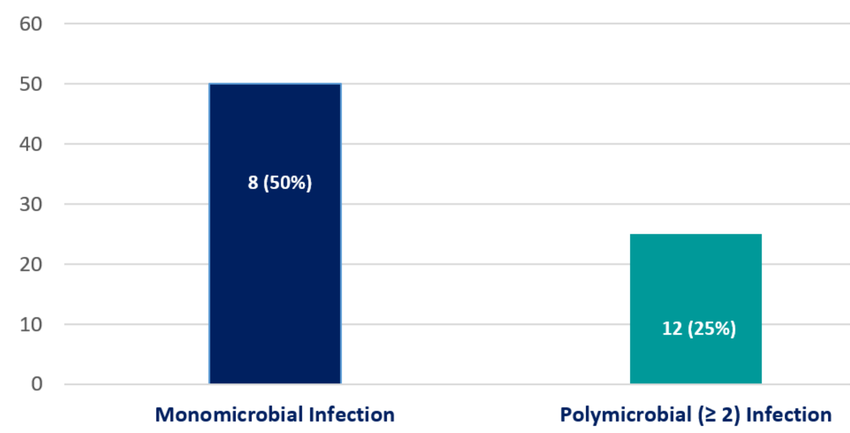


Figure 5
Resistance genes detected by Pneumonia Panel Plus
(14 genes from 62 samples)



Klebsiella spp. (21%) and *Staph. aureus* (17%) were the most common pathogens detected by the panel. This testing also captured 14 resistance genes, including CTX-M (N=4), MecA/C (N=3), CRE-NDM (N=3), CRE-IMP (N=3) and CRE-OXA-48 (N=1).

Figure 6 Percentage of Concordance between Pneumonia panel plus with Routine Respiratory Cultures (%)



Pneumonia panel plus increased the number of positive samples with semi-quantitative reporting manner (ranging from 10^4 to 10^7 copies/mL). Organisms with low bacterial burden (≤10^5copies/mL) were unlikely to grow in actual cultures.

Limitation: Pneumonia Panel Plus is unable to detect *Burkholderia cenocepacia*, *Stenotrophomonas maltophilia, PJP and yeast infection*.

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