

Multiplex PCR pneumonia panel in critically ill patients with respiratory failure: a real-world experience

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Background

Whilst pneumonia is a leading cause of respiratory failure and intensive care unit (ICU) admission, non-infectious mimics, e.g. autoimmune, malignancy, interstitial lung diseases and cryptogenic organising pneumonia, are common. Multiplex PCR panels are introduced intended for the diagnosis of pneumonia.

Method

Consecutive patients presenting to 2 district general hospital ICU with respiratory failure received BioFire FilmArray Pneumonia panel (FAPN) (bioMérieux, Marcy-l'Étoile, France) from 1 Oct 2024, in a before-and-after intervention spanning 1 Jan 2024 to 30 Jun 2025. To evaluate real-world performance of FAPN, a consensus panel reviewing clinical, laboratory and radiological information, determined the cause of respiratory failure in post-intervention patients clinically suspected with pneumonia, defined with PF ratio <300mmHg with ≥1 quadrant involvement on CXR. Utility of FAPN in detecting non-infectious mimics was calculated by sensitivity and specificity.

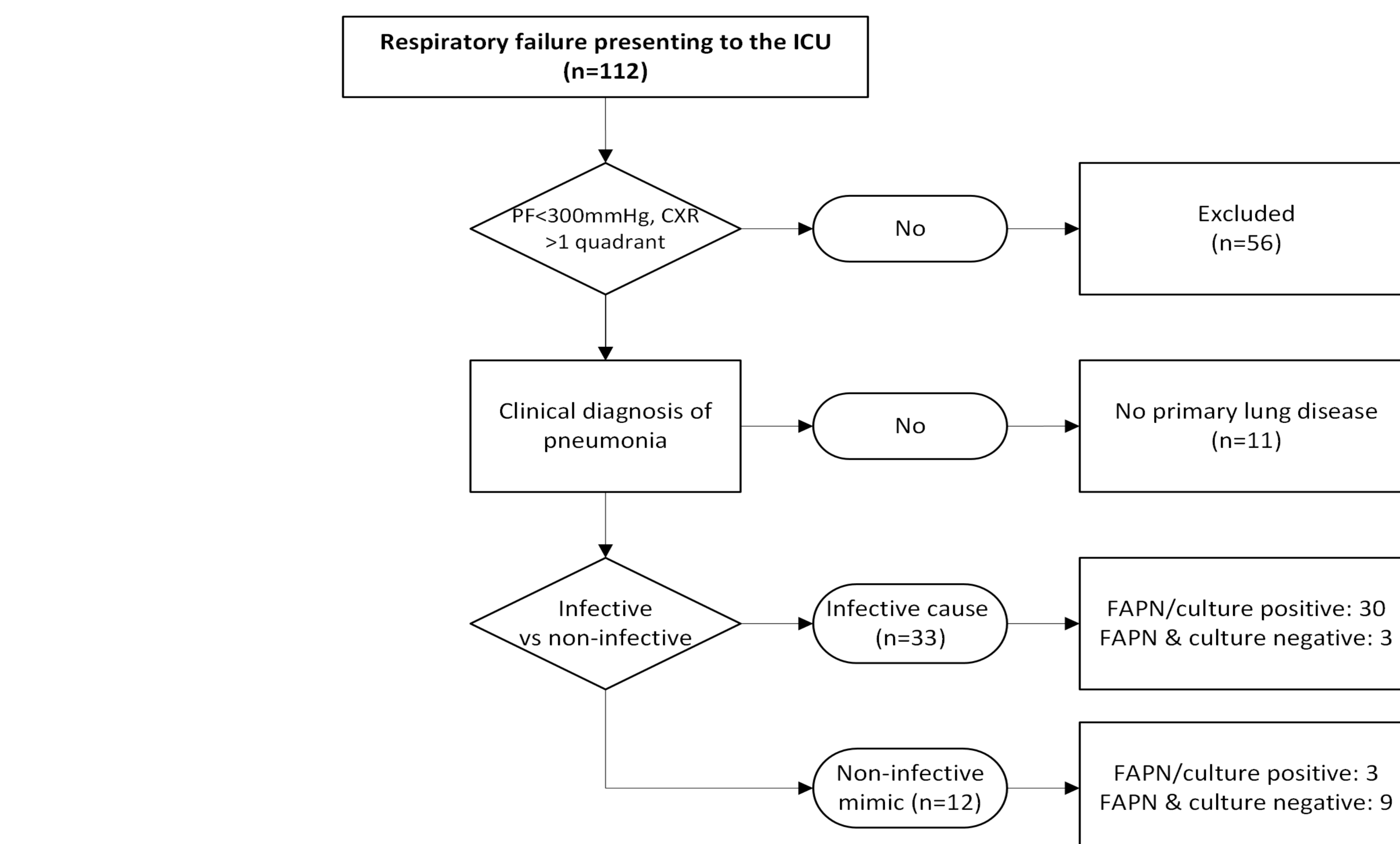


Figure 1: Flowchart describes a clinical algorithm incorporating FAPN and standard respiratory specimen cultures for the diagnosis of pneumonia compared to true pneumonia as determined by a consensus panel.

Results

One hundred and sixteen patients were included (pre-intervention 60, post-intervention 56). Among post-intervention patients with suspected pneumonia (n=45), sensitivity and specificity of “negative FAPN and sputum culture” to diagnose mimics were 75% (95%CI: 50-100%) and 91% (95%CI: 81-100%) respectively. In multivariable logistic regression, FAPN was associated with reduced probability of antibiotic escalation (OR 0.70, p <0.01). The PPV of bacterial targets in FAPN was 0-100%, median 35%. For bacteria detected in 10⁴CFU/mL, 10⁵CFU/mL, 10⁶CFU/mL and 10⁷CFU/mL by FAPN, 8%, 7%, 48%, and 57% were identified in culture correspondingly.

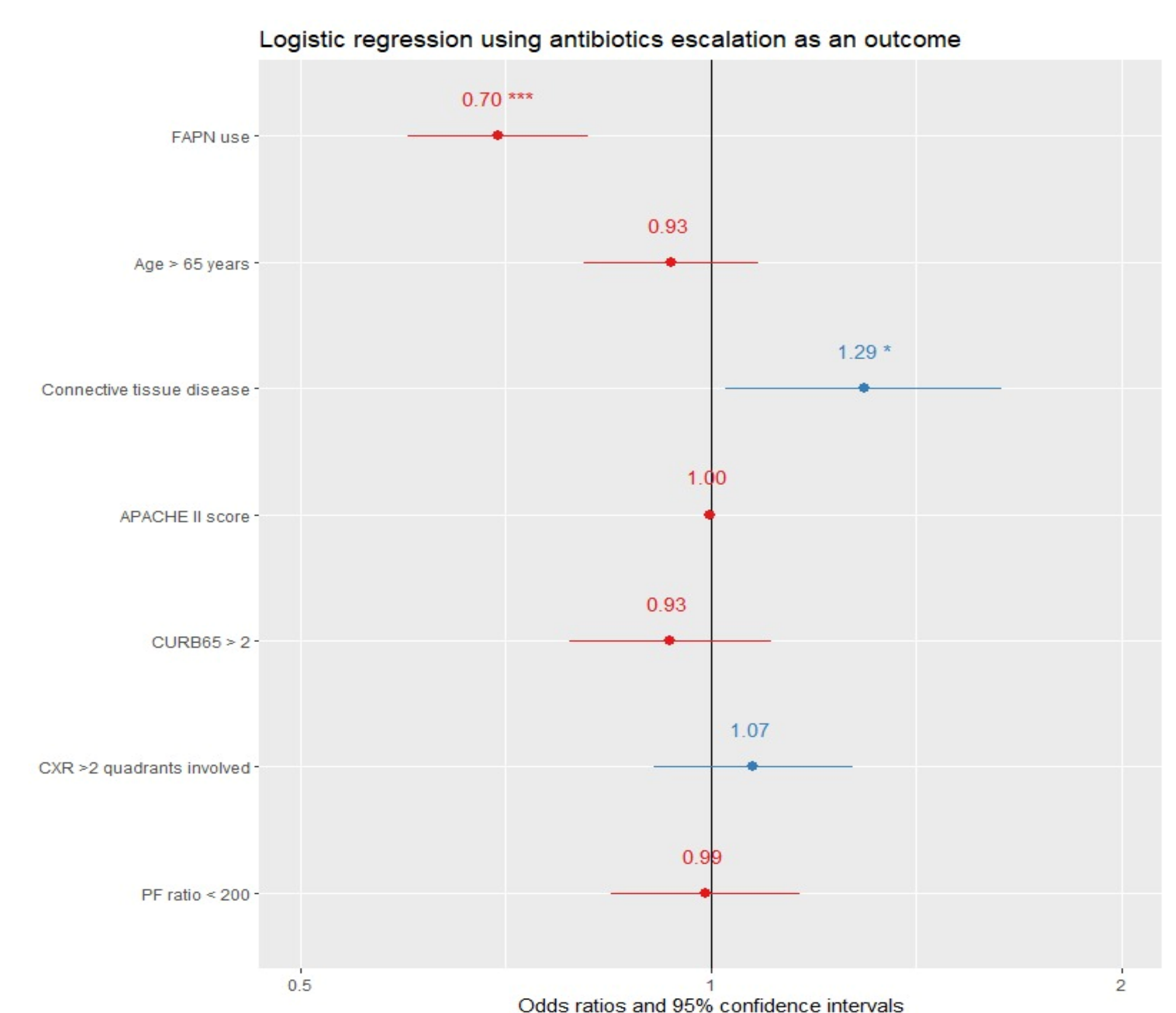


Figure 2: Describes the multivariable logistical regression using antibiotic escalation as an outcome, defined by antibiotic spectrum score

Conclusions

For patients suspected with pneumonia, “negative FAPN and sputum culture” result should prompt investigation of such non-infectious mimics. FAPN was associated with reduced antibiotics escalation but has low PPV in identifying bacterial targets.