



Host-Protein Score (Integrating TRAIL, IP-10, CRP) Distinguishes Between Viral and Viral-Bacterial Co-infection in Adult Patients Testing Positive for Viral Detection

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Background:

Difficulty in determining respiratory tract infection (RTI) etiology can lead to antibiotic misuse. A limitation of viral testing is that it does not rule out bacterial co-infection. This study evaluates a recently FDA-cleared host-protein score's (MeMed BV score) ability to discriminate bacterial co-infection in patients testing positive by viral PCR and/or antigen.

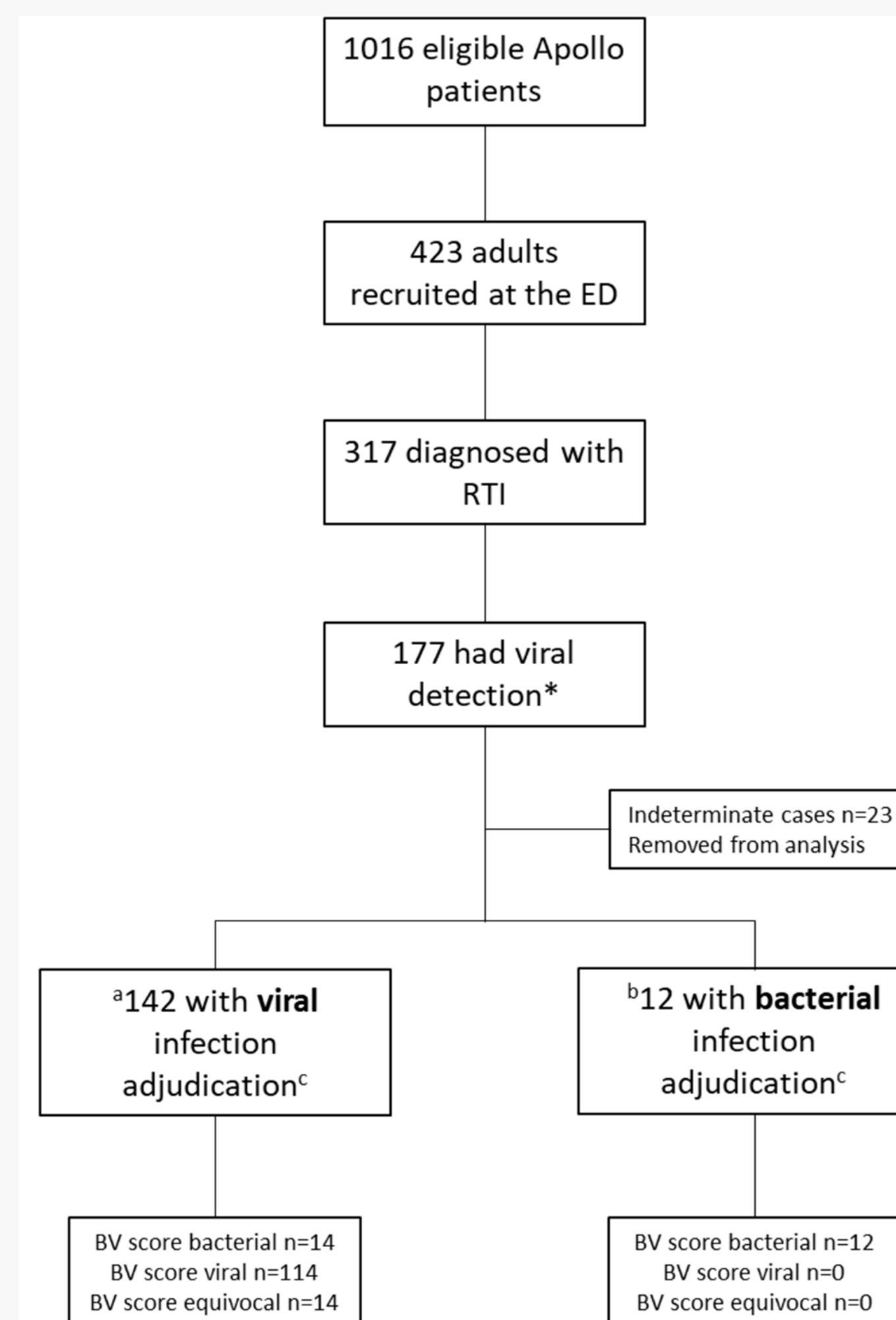
Methods:

This was a sub-analysis of adult Emergency Department (ED) patients enrolled in the Apollo study with discharge diagnosis of RTI (NCT04690569). Reference standard diagnosis was adjudicated by independent experts based on comprehensive patient data. BV results are defined as viral or other non-bacterial etiology ($0 \leq \text{score} < 35$), equivocal ($35 \leq \text{score} \leq 65$), and bacterial or co-infection ($65 < \text{score} \leq 100$). BV performance was assessed against the reference standard. To estimate BV's potential influence on antibiotic use, it was assumed antibiotic prescription in the medical record indicated diagnosis of a bacterial infection and that if a BV score (bacterial vs. viral) had been available at the point-of-need, it would have influenced the physician's decision-making. Equivocal results were assumed not to change practice.

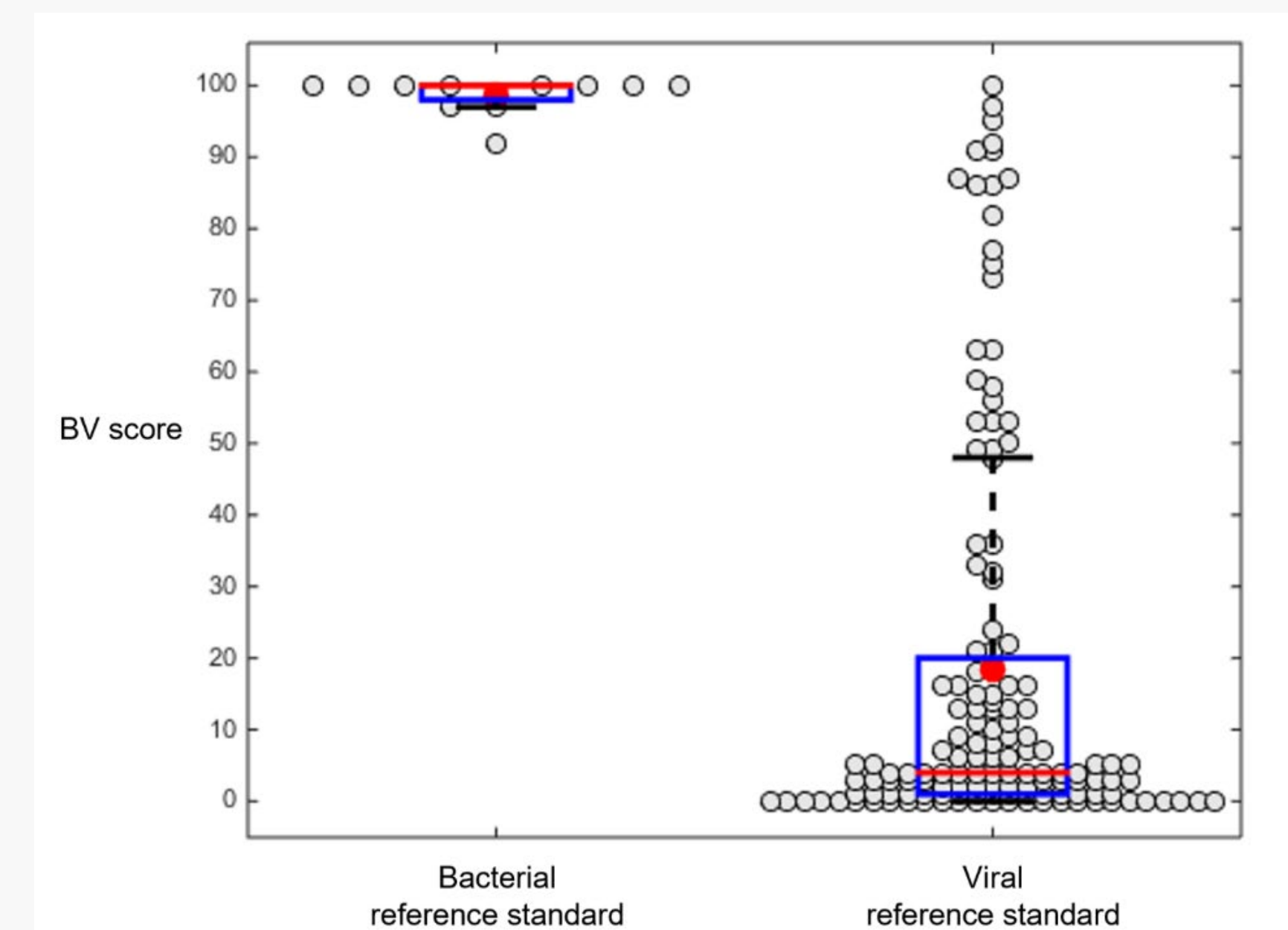
Results:

Of 423 adults (median age, 50.7 years, interquartile range 35.8-63.9; 47% female) recruited at the ED, 154 were diagnosed with RTI (58.4% upper, 41.6% lower) and had at least one viral detection. Twelve were reference standard bacterial, all correctly receiving bacterial BV scores. The 12 bacterial patients were more likely to be admitted (66.7% vs. 12.7%; $p < 0.001$). BV yielded sensitivity 100% (95%CI: 73.5-100.0) and specificity 89.1% (95%CI: 82.3-93.9), with 9.1% equivocal cases. BV is estimated to potentially reduce antibiotic treatment of viral infections 2.8-fold (from 50% to 17.6%; $p < 0.001$), without causing antibiotic withholding from patients with bacterial infections.

Patient enrollment flow



BV distinguishes viral from viral-bacterial co-infection



^aViral PCR/antigen detection: Adenovirus n=4; Coronavirus HKU1, NL63, 229E, OC43 n=6; Rhinovirus/Enterovirus n=28; Influenza n=100; Parainfluenza 1/2/3/4 n=6; Respiratory syncytial virus n=7.
^bViral PCR/antigen detection: Adenovirus n=1; Rhinovirus/Enterovirus n=5; Influenza n=4; Respiratory syncytial virus n=2.
^cA bacterial or viral reference standard diagnosis required at least 2/3 experts adjudicate the same etiology with confidence $\geq 90\%$ or all 3 with confidence $\geq 70\%$.

Conclusions:

BV discriminated bacterial co-infection in adult patients with viral PCR/antigen detection and has potential to reduce antibiotic overuse up to 3-fold.