

A Host Protein Test Based on TRAIL, IP-10 and CRP for Differentiating between Bacterial and Viral Infection has Potential to Improve Patient Selection for Blood Culture Utilization

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Background:

Blood cultures can be useful in the diagnosis and management of patients with suspected infection. They are often utilized, even though their impact on patient management is coming into question. Since this test is resource intensive and associated with contamination rates that can range from 0.6% to 33% and potentially trigger unwarranted antibiotic treatment, there is increasing awareness of the need to select the appropriate patients for testing.¹ BV, a score for differentiating between bacterial and viral etiologies, is based on computational integration of the blood levels of three proteins (TRAIL, IP-10, CRP). Multiple studies have established BV's high diagnostic accuracy.² Here we evaluate its potential to reduce unwarranted blood cultures in children presenting to the the emergency department (ED).

Methods:

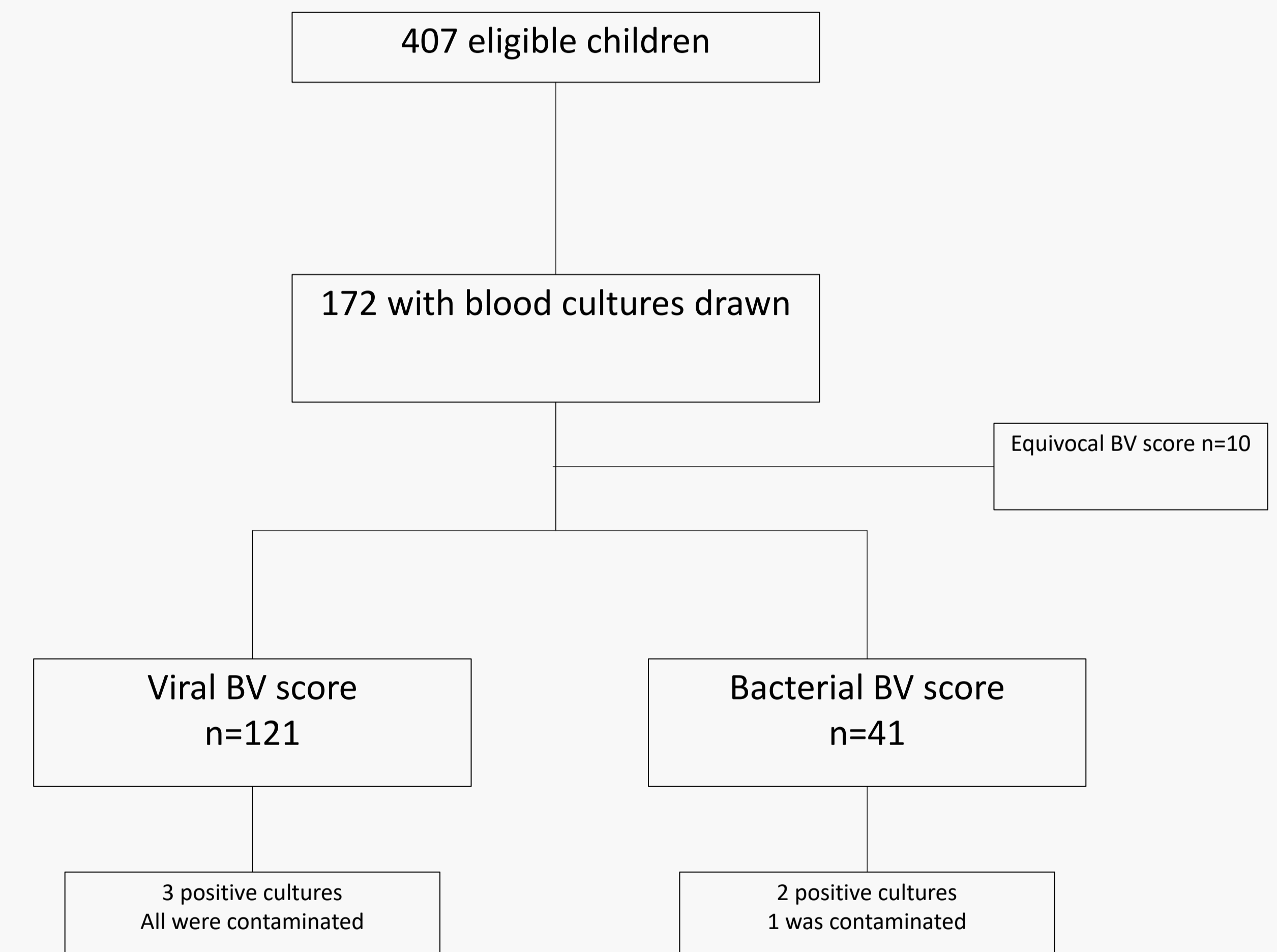
This study is a sub-analysis of febrile pediatric patients (≤ 18 years) recruited in the Apollo study (NCT04690569) who had blood cultures taken as part of routine care in the ED. Main exclusion criteria were unrelated febrile episode within two weeks or being immunocompromised. BV is interpreted based on pre-defined score thresholds, $0 \leq \text{score} < 35$ indicates viral (or other non-bacterial) infection, $35 \leq \text{score} \leq 65$ indicates equivocal and $65 < \text{score} \leq 100$ indicates bacterial infection (or co-infection).

Results:

Among 407 children enrolled, 172 had blood cultures taken as part of their ED evaluation. The median age was 2.3 years (interquartile range: 1.3-4.9 years), 47.7% were female, and 72.1% were admitted with a median duration of 4 days (interquartile range: 3-5.3 days). Among the 172 children, 121 had a viral BV scores, 41 had a bacterial BV scores and 10 had an equivocal BV scores. Out of the 121 viral BV score cases, 3 blood culture were positive, each considered as contamination. Out of the 41 bacterial BV score cases, 2 blood culture were positive, one case with growth of *Neisseria meningitidis* and the other one was a contamination.

Assuming a viral BV score would trigger a change in practice (i.e., no blood culture would be run by the laboratory), and an equivocal score would not impact practice, BV potentially reduces the number of blood cultures from 172 to 51 (70.3%).

Figure 1. Patient enrollment flow.



*Equivocal scores represent valid test results but do not provide etiological information.

Conclusion:

BV test has the potential to improve patient selection for blood culture testing in the acute care settings, raising the possibility of reducing laboratory burden as the laboratory could abort processing a culture order when the BV test yields a viral result.

References: 1. XXXXXXXX. 2. Oved et al PLOS ONE (2015); Van Houten et al Lancet ID (2016); Srgo et al Pediatrics (2017); Papan et al CMI (2021)