

# Host-Protein Score (integrating TRAIL, IP-10, CRP) Distinguishes between Bacterial and Viral Infection in Suspected Sepsis Patients



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## 1. Background:

- **Sepsis is a life-threatening syndrome** caused by the host response to infection of bacterial, viral or fungal etiology
- **Early and appropriate treatment of a bacterial infection can help prevent development of bacterial sepsis**
- Standard of care for sepsis is immediate initiation of antibiotics
- In case of viral sepsis, this can lead to:
  - Unnecessary antibiotics use
  - Unwarranted side effects on the host microbiome
  - Excess healthcare costs
  - Antimicrobial resistance
- Recently, **the BV score**, measured in adult and pediatric serum samples on a new, rapid point-of-need platform called Key, **was cleared by FDA**.
- Development of BV on Key was **supported in part by DTRA and the Office of the Assistant Secretary of Defense for Health Affairs**, the latter through the Peer Reviewed Medical Research Program (PRMRP).
- It is intended for use in conjunction with clinical assessments and other laboratory findings as an aid to differentiate bacterial from viral infection. **Here we evaluate its ability to differentiate bacterial from viral infection in suspected sepsis patients.**

## 2. Methods:

- Sub-analysis of patients with suspected sepsis recruited prospectively in the Apollo study (NCT04690569).
- Eligibility required the attending physician's clinical suspicion of acute infection and reported fever.
- Suspected sepsis was defined as two or more SIRS criteria and a suspected bacterial or viral infection classified by expert adjudication.
- BV was measured using a platform generating a likelihood score (0-100). Based on pre-defined score thresholds, score < 35 indicates viral (or other non-bacterial) infection, 35 ≤ score ≤ 65 indicates equivocal and 65 > score indicates bacterial infection (or co-infection).
- BV performance was assessed against expert panel classifications.

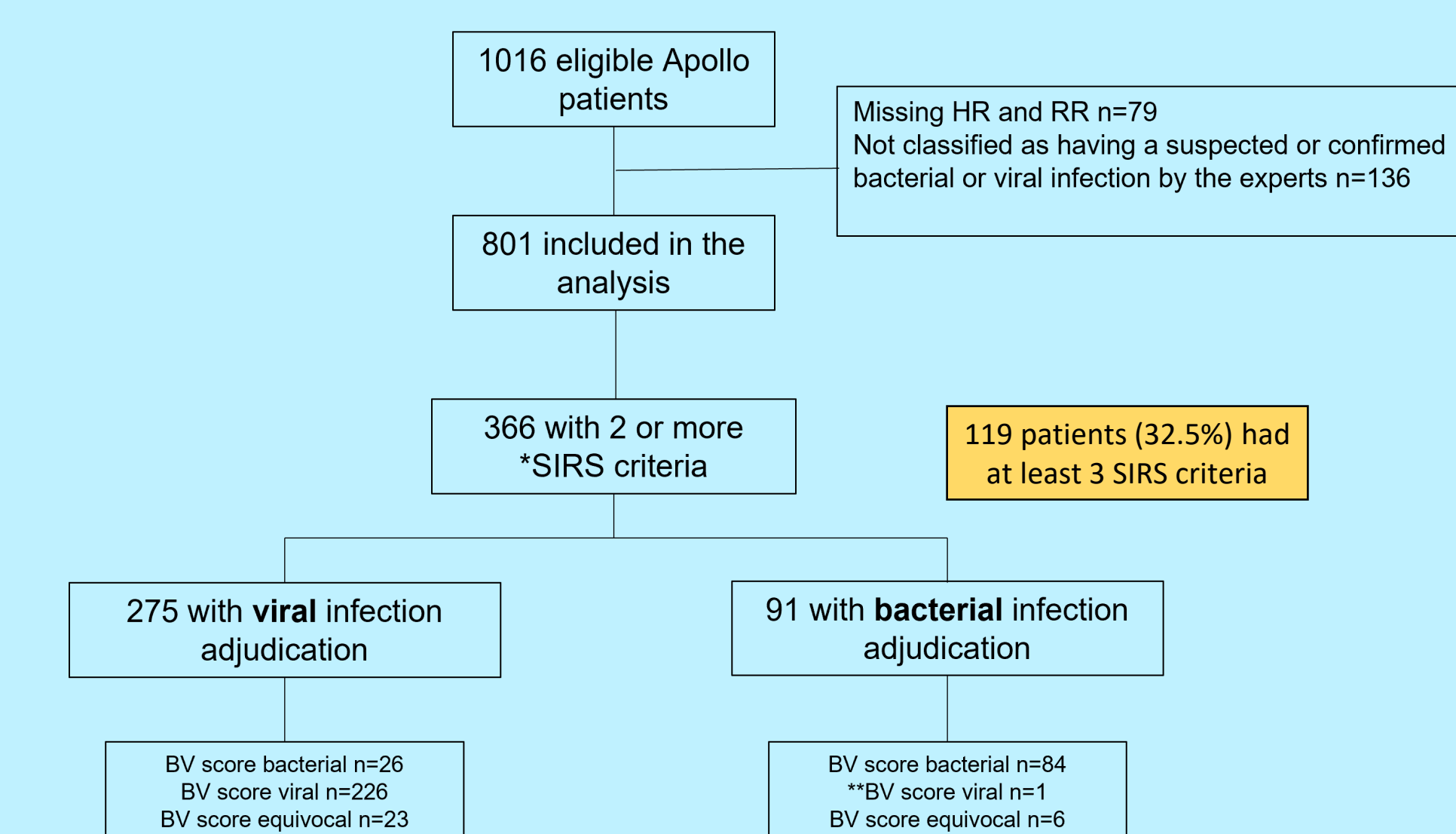


## 3. Study population:

For this sub-analysis, out of 1016 eligible Apollo patients, **366 patients had ≥2 SIRS criteria and suspected bacterial or viral infection (Fig. 1)**

- 217 adults, median age 41.8 yr (IQR: 29.2-61)
- 149 children, median age, 2.4 yr (IQR: 1.4-5.4).
- 39.6% admitted, median stay 4 days (IQR: 3-6)
- Discharge syndromes included: lower respiratory tract infection (32.5%); upper respiratory tract infection (45.9%); urinary tract infection (1.6%); CNS (0.3%); other (21.6%)

Fig. 1: Suspected sepsis cohort



\* SIRS Criteria for adults: Singer et al. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). JAMA (2016) ; SIRS criteria for children: Mathias et al. Pediatric Sepsis, Curr Opin. Pediatr. (2016) ; Sepsis definition: LaRosa, Sepsis (2010)  
\*\* This was a 9 y/o child presenting within 2 days of fever with a sore throat and pharyngeal erythema; rapid strep A test was negative, antibiotics were prescribed, and the child was discharged.

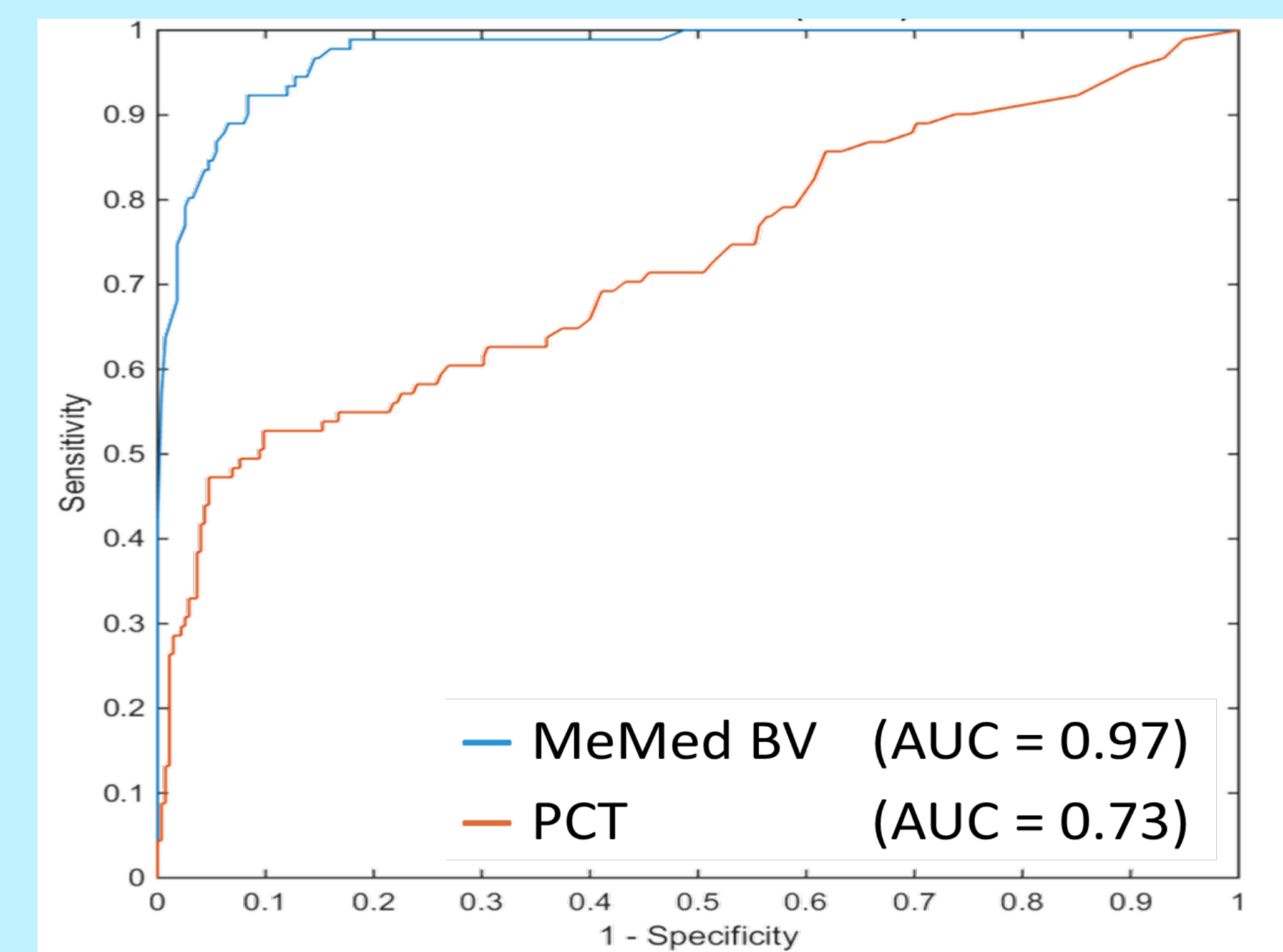
## 4. BV diagnostic accuracy:

BV demonstrated high diagnostic accuracy:

- **Sensitivity: 98.8%** (95%CI: 93.6-100.0)
- **Specificity: 89.7%** (95%CI: 85.3-93.2)
- **Negative Predictive Value (NPV): 99.6%** (95%CI: 97.0-99.9)
- Equivocal rate 7.9%

**BV outperformed PCT** significantly in differentiating etiology (Fig. 2).

Fig. 2: BV outperforms PCT in differentiating etiology in suspected sepsis cohort (n = 366)



## 5. Conclusions:

- MeMed BV accurately distinguished bacterial (including bacterial and viral co-infection) from viral infection in ED patients with ≥2 SIRS criteria. This new tool has potential to help with timely identification of bacterial infection, enabling prompt treatment. MeMed BV accurately rules out bacterial infection, allowing potential reduction of antibiotic overuse in this population.
- **Military relevance:** BV has potential to facilitate management of service members and their dependents, leading to better outcomes and improved military readiness.

**Disclaimer:** MeMed BV is not cleared for diagnosing sepsis, or for distinguishing Systemic Inflammatory Response Syndrome (SIRS) from sepsis or for predicting severity of infection.