Title Investigation of the Effect of Implementing a Host Response Test on SEP-1 Compliance

Authors

Christopher B. Thomas, Kristen Richard, Alyse Grantham, Tonya Jagneaux, Matt Sorrells, Hollis O'Neal

Background:
The Centers for Medicare & Medicaid Services (CMS) SEP-1 bundle was introduced to standardize the identification and management of sepsis. However, SEP-1 clinical criteria may exclude patients who could benefit from early intervention. This study evaluates the impact of implementing a host response (HR) test to inform SEP-1 inclusion criteria and its effect on compliance rates.

Methods:
This study was conducted in a large emergency department (ED) in Baton Rouge, LA, from July 2024 to December 2024. The HR test[1] was first implemented in August 2023, and in July 2024, sepsis disease-specific documentation was modified to incorporate the results of the HR test. The modified approach ensured appropriate documentation of SEP-1 inclusion to capture patients with a positive early diagnostic who did not yet meet SEP-1 clinical criteria while excluding patients with negative early diagnostic. The target compliance rate was set at 70%.

Results:
From July to December 2024, 100 ED patients per month were sampled for SEP-1 eligibility and compliance, except in September and December (99 patients). At baseline in July 2024, SEP-1 compliance was 61.2%. By September 2024, compliance surpassed the 70% target, reaching 72.7%, and by December 2024, it increased to 78.9% (Fig 1A). This increase in compliance was primarily driven by appropriate documentation of SEP-1 inclusion earlier than clinical criteria had previously allowed. In July 2024, 30 out of 100 patients met SEP-1 criteria and were treated, with 19 others qualified without treatment and 51 excluded. By September 2024, the number of qualifying patients increased to 40, with 15 additional qualified without treatment and 44 excluded. By December 2024, 45 patients met SEP-1 criteria, with 12 additional qualified without treatment and 42 excluded (Fig 1-B).

Conclusion:
Integrating an HR test into SEP-1 inclusion criteria may improve compliance by empowering providers to more rapidly identify septic and non-septic patients. This approach may enable centers to enhance SEP-1 metric performance.

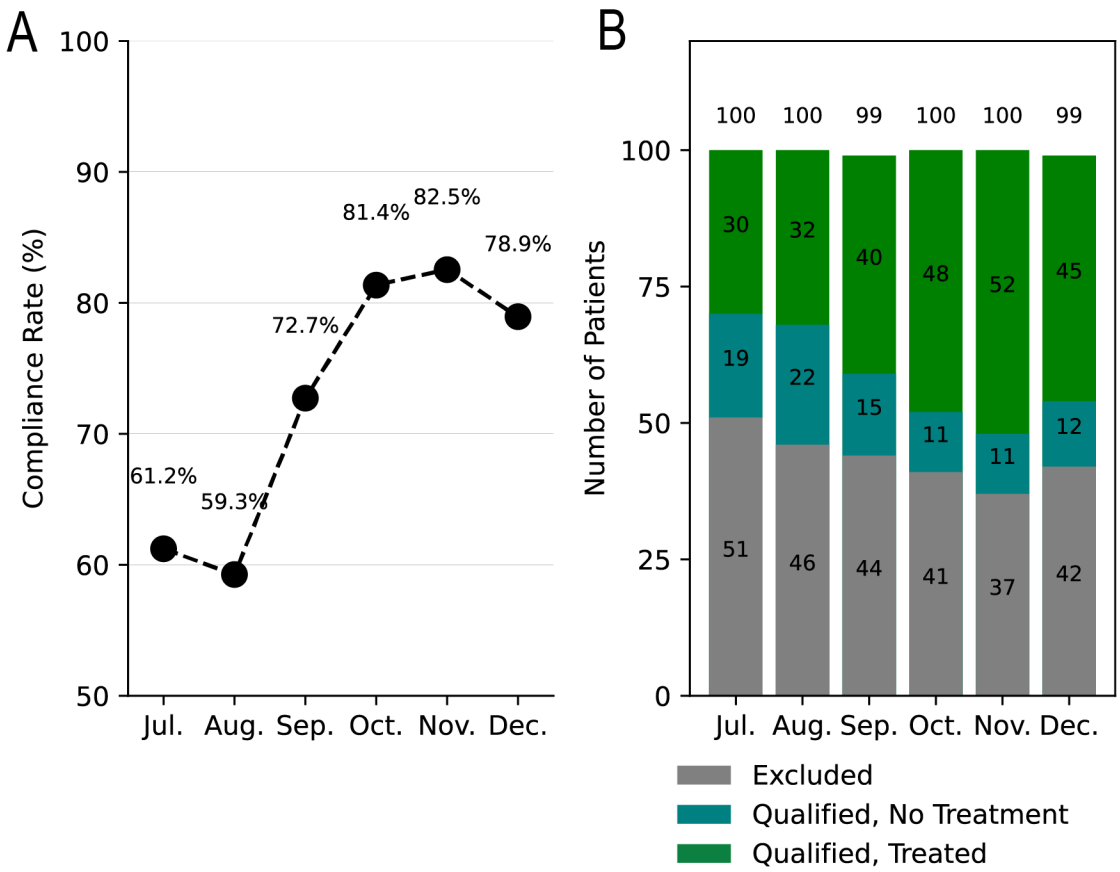


Figure 1. (A) SEP-1 compliance rate over time. (B) SEP-1 qualification and treatment status of patients in study cohort over time.

References

1. US FDA 510(k) Clearance Letter for IntelliSep Test. 2022.

Investigation of the Effect of Implementing a Host Response Test on SEP-1 Compliance

Christopher B. Thomas, Kristen Richard, Alyse Grantham, Tonya Jagneaux, Matt Sorrells, **Hollis O'Neal**

acep Scientific Assembly SALT LAKE CITY 25

Scientific Assembly SALT LAKE CITY 25

Disclosures

Hollis O'Neal served as the principal investigator on several Cytovale funded studies and consults for Cytovale Inc. as a senior medical advisor

Kristen Richard, Alyse Grantham, and Tonya Jagneaux consult for Cytovale Inc.

Matt Sorrells is an employee of Cytovale Inc.

Sepsis and SEP-1

- Sepsis is a dysregulated host immune response to infection, leading to life threatening organ dysfunction[1]
- A common cause of in-hospital death, **early identification and timely intervention is key**[2]
- The CMS SEP-1 bundle specifies interventions (e.g., blood cultures, antibiotics, lactate measurement, fluids) to be completed within 3 and 6 hours from **"Time Zero," which is the presentation time for severe sepsis or septic shock**
- CMS mandates that hospitals report **SEP-1 compliance** to ensure standardized sepsis care and improve outcomes

1. Singer JAMA 2016
2. Wang Crit Care Med 2017

The IntelliSep Test

90 sec
Hands-on Time

100uL
K2 EDTA Whole
Blood

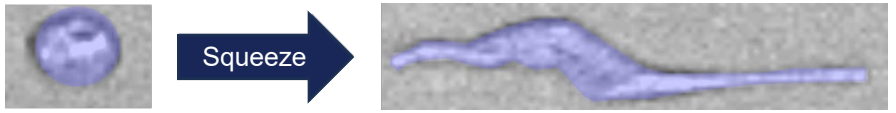
< 10 min
Blood to Score

FDA cleared semi quantitative cellular host response test to aid in **early detection of sepsis** with organ dysfunction manifesting within the first 3 days after testing

The IntelliSep test generates an IntelliSep Index value that falls within one of three discrete interpretation bands based on the probability of sepsis in **less than 10 minutes**

White blood cell from **non-septic** patient

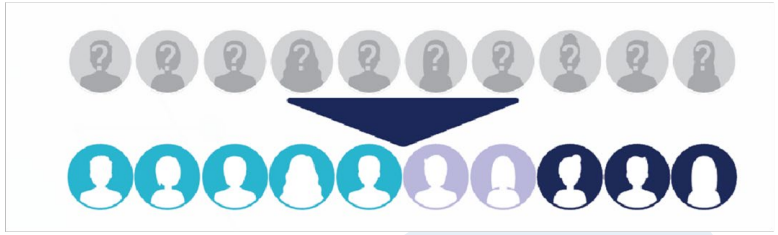
White blood cell from **septic** patient



IntelliSep uses microfluidics, **deformability cytometry,** and ultra high-speed imaging to quantify biomechanical properties of white blood cells and assess the state of immune activation

The IntelliSep Index

Full ISI Range: 0.1-10.0



Band 1
Low Probability of Sepsis
(ISI: 0.1-4.9)

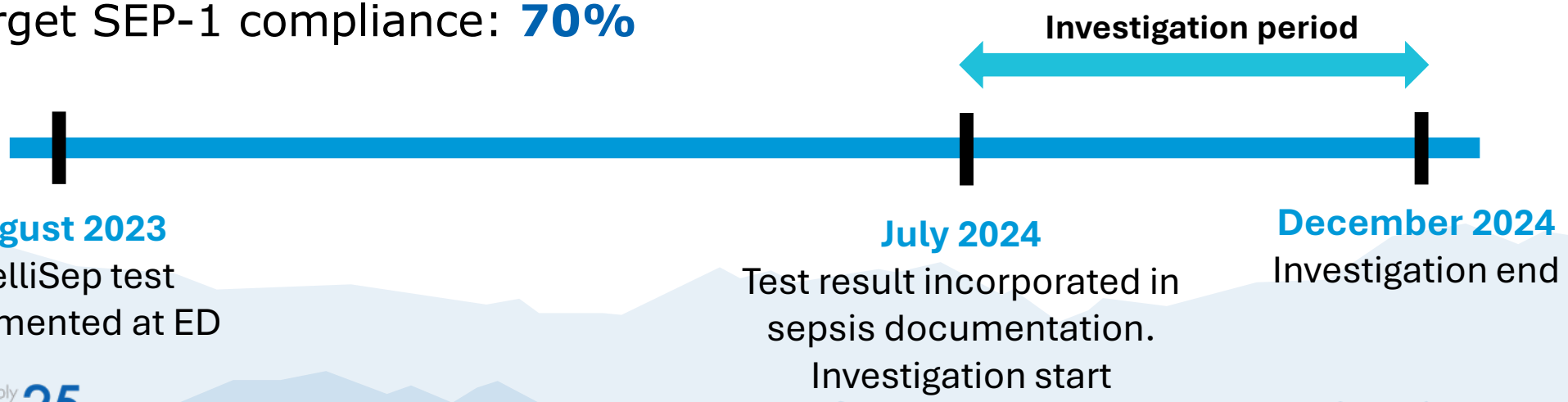
Band 2*
(ISI: 5.0-6.2)

Band 3
High Probability of Sepsis
(ISI: 6.3-10.0)

**All results should be interpreted in the context of the other clinical observations and laboratory test results for the patient.*

Study Design

- 598 patients from a large ED in Baton Rouge, LA
- Sepsis documentation **modified to include dot-phrases with IntelliSep result**
  - Band 1: Low suspicion of sepsis, can be used to exclude severe sepsis/septic shock from the denominator
  - Band 3: Severe sepsis/septic shock is suspected due to band 3 and other clinical factors. Trigger time zero for SEP-1
- Target SEP-1 compliance: **70%**



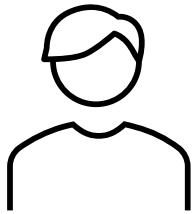
Dot Phrases Added for Documentation of IntelliSep Result

ISIBAND1: The IntelliSep has resulted as band 1 with a negative predictive value of 97% for the presence of sepsis. Severe sepsis/septic shock has been ruled out

ISIBAND3: Severe sepsis/septic shock is suspected due to the combination of clinical factors and band 3 IntelliSep result

Illustrative Example: Band 3 Patient

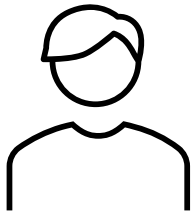
IntelliSep Band 3 result (new time zero): **3:40 pm**



Suspected Infection + **Band 3** (ISI = 9.5)

Lactate test, blood culture, antibiotics **4:00 pm**

Clinical criteria for time zero met under original sepsis documentation: **11:00 pm**

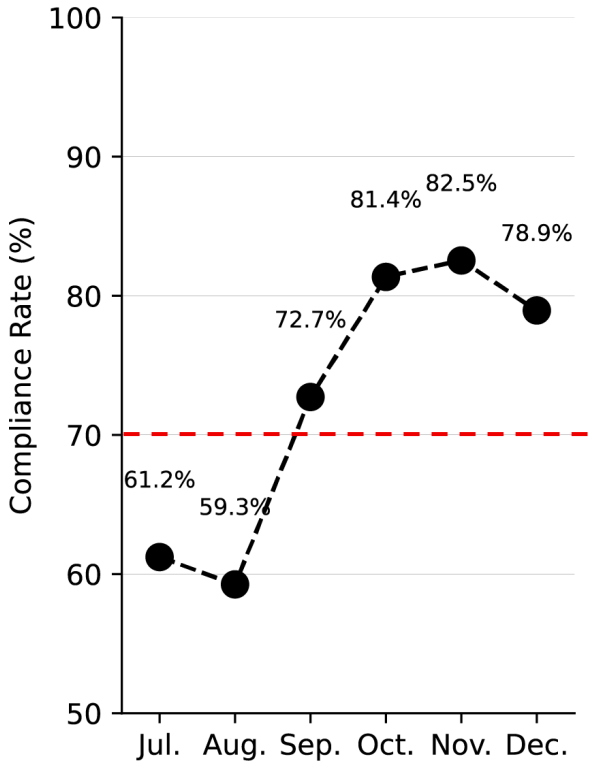


Suspected Infection + SIRS criteria met + organ dysfunction

Under original sepsis documentation, time of suspected sepsis would be 11pm, and the lactate measurement **would not have counted in the numerator for SEP-1 compliance**

With Band 3 triggering time zero, **this now meets the SEP-1 3-hour bundle**

Increase in Compliance



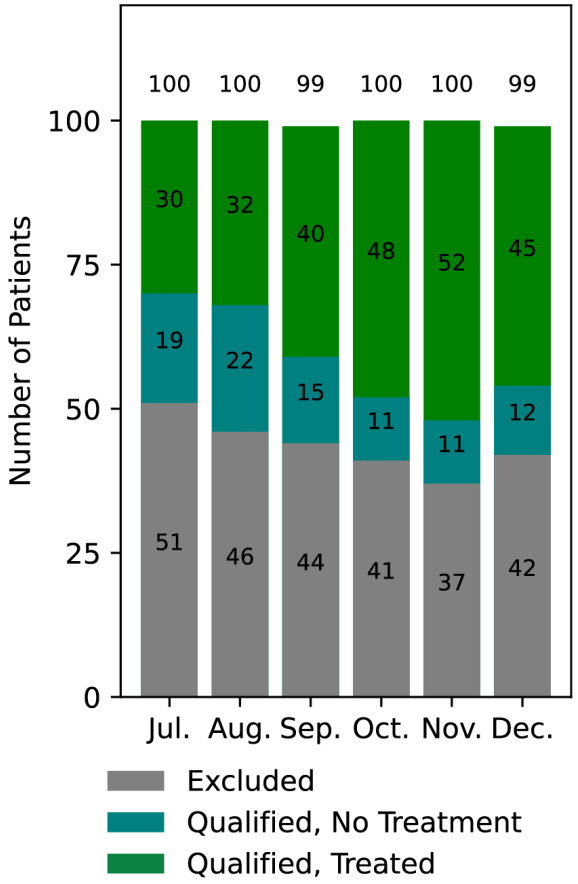
Baseline compliance in July 2024 was **61.2%**

By September 2024, compliance was 72.5%, **surpassing 70% target** (red dashed line)

In December 2024, increased to **78.9%**

Increase in compliance primarily driven by modified documentation that allowed SEP-1 inclusion earlier than previously allowed

Decrease in Untreated Qualified Patients



In **July 2024**, out of the 100 patient sample, **19 patients** who met the modified SEP-1 inclusion criteria did not receive treatment in time as per SEP-1

By **December 2024**, that number went down to **12 patients**

Conclusions

- Integrating the IntelliSep test into SEP-1 inclusion criteria may **improve SEP-1 compliance** through optimization of the denominator (included patients) and enhancement of the numerator (treated patients)
- Empowers providers to **identify septic and non-septic patients faster**