Introduction:
Rapid diagnosis of acute infections and sepsis is critical in Emergency Departments (EDs). Current tests have slow turnaround times, low sensitivities, and/or signals from contaminant or commensal organisms. Empirical antimicrobial treatment may result in severe adverse events and contributes to antimicrobial resistance. Diagnostics to distinguish bacterial from viral infections and noninfectious etiologies support clinicians in efforts toward antimicrobial stewardship.

Methods:
In a prospective, non-interventional study in the EDs of 6 sites in Greece (PROMPT study NCT03295825), we evaluated HostDx Sepsis, a host response test for suspected acute infections and suspected sepsis. HostDx Sepsis measures 29 human mRNA targets and employs advanced machine learning to differentiate patients with bacterial and viral infections, and noninfectious etiologies. Adult patients presenting with suspected acute infection and at least one vital sign change were enrolled. Whole blood RNA was quantified using NanoString nCounter. Predicted probabilities of bacterial and viral infection were calculated (BVN-1 algorithm). Patients were adjudicated in a retrospective chart review by 3 independent infectious disease specialists blinded to HostDx Sepsis results.

Results:
Among 396 patients adjudicated as bacterial (56), viral (45), noninfected (1), or indeterminate (294) the Area Under the Receiver Operating Characteristics (AUROC) of HostDx Sepsis for predicting bacterial vs. viral/non-infected patients was 0.92, and AUROC for viral vs. bacterial/non-infected patients was 0.87 (Fig.).

Conclusion:
Our results indicate that HostDx Sepsis distinguishes bacterial from viral infections and other etiologies with high accuracy. HostDx Sepsis is currently developed as a rapid point-of-care device with a turnaround-time of less than 30 minutes. HostDx Sepsis may therefore assist ED doctors in making appropriate treatment decisions earlier, towards the ultimate goal of antimicrobial stewardship.
HostDx Sepsis scores for (A) bacterial and (B) viral infection for patients with bacterial, viral, and non-infected status as determined by consensus physician adjudication.