When Rapid Molecular Blood Culture Testing Fails To Identify The Organism: Microbiology And Patient Outcomes

Ascension St. John Hospital

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Introduction

- Verigene™ is a rapid nucleic acid test used to aid in targeted antibiotic selection in positive blood cultures.
  - Identifies certain Gram positive and negative bacteria along with common beta lactam resistant markers.
  - Average time to result is 2 - 2.5 hours.
- Not calibrated to detect all pathogens.
  - Result will say 'organism could not be identified'.
- All Verigene ™ results are reviewed by a pharmacist to evaluate antimicrobial optimization.

Purpose

- To describe the organisms Verigene™ could not identify and the clinical outcomes of the patients.

Outcomes

Primary

- To identify the organisms that grow when Verigene™ reports as indeterminate

Secondary

- Determine the change in antibiotics based on Verigene™ result of indeterminate
- Determine the percent of appropriate antibiotic changes
- Describe the patients' discharge disposition
- Determine the incidence of 30-day readmission rate and identify the reason for readmission

Materials and Methods

Design

- Single-center, retrospective cohort study conducted at Ascension St. John Hospital
- All patients with Verigene™ 'non-detected' results during May 19, 2020 to June 30, 2021.

Definitions

- Antibiotics are considered appropriate if they cover the organism identified in final culture.
- Adverse events are defined as reactions related to the antibiotic such as rash, C. diff, etc.

Approved by the ASJH Institutional Review Board

Results

Figure 1. Enrollment Flow Diagram

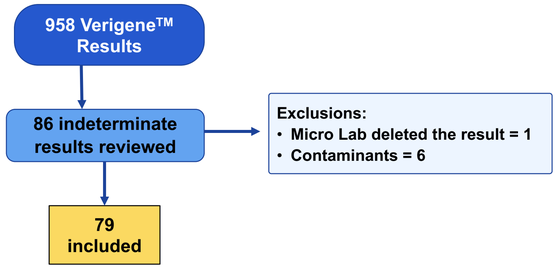
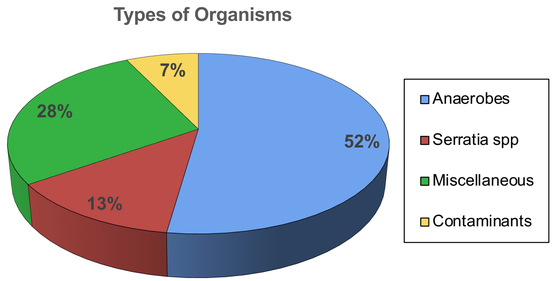


Table 1. Patient Characteristics

n	79
Female (%)	40(50.6)
Mean Age (years)	65.3 ± 16.12
Mean Weight (kg)	81.8 ± 32.48
Patients with Antibiotic Allergy	26
Mean Charles Comorbidity Index	3.06 ± 2.46

Figure 2. Organisms Identified



Miscellaneous = Both gram positive cocci and gram-negative bacilli including *S. viridans, coagulase-negative staphylococci, P. aeruginosa, H. influenzae, S. maltophilia.*

Figure 3. Therapy Changes

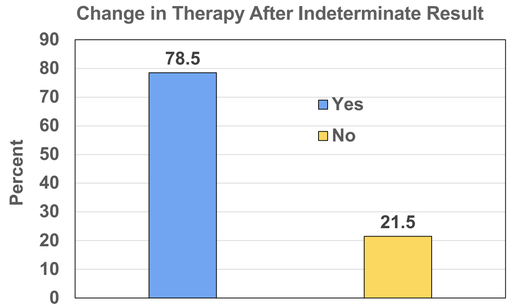
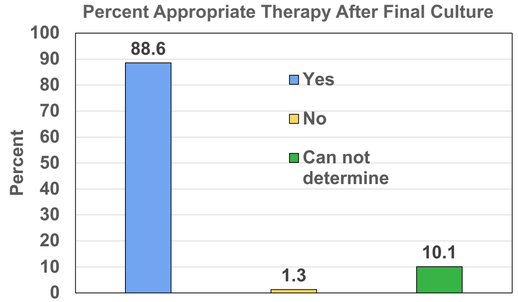
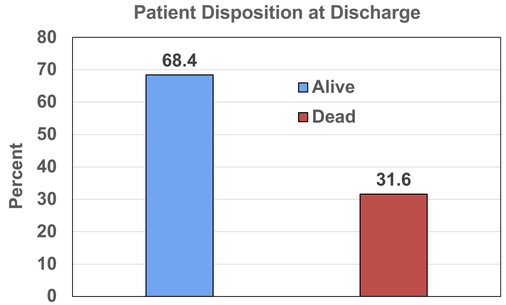


Figure 4. Appropriateness of Therapy Change



- Inappropriate antibiotic therapy secondary to:
- Inappropriate length of treatment after final culture resulted in 1 patient
- Can not determine appropriateness due to:
- Death prior to final culture resulted in 8 patients

Figure 5. Discharge



Summary

- Out of the 54 patients who were discharged alive,
  - 20.3% were readmitted within 30 days of discharge
  - 9.2% of those readmissions were due to an infection.
- Infection was the reason for readmission due to:
  - Clostridium difficile in 2 patients
  - Stump infection in 1 patient who refused amputation
  - Infected graft and bacteremia in 1 patient
  - Infected sacral decubitus ulcer with no bacteremia in 1 patient

Conclusion

- The majority of Verigene™ results that were not able to be identified were anaerobic bacteria and *Serratia* species
  - Consider adding anaerobic coverage when result is indeterminate
- Most patients received appropriate therapy changes and were discharged alive.

Limitations

- Retrospective chart review
- Limited sample size

Future Directions

- Future studies are needed to evaluate the best approach to adjusting antimicrobial therapy when Verigene™ results are indeterminate.

References

1. Bork JT, et al. Rapid Testing using the Verigene Gram-negative blood culture nucleic acid test in combination with antimicrobial stewardship intervention against Gram-negative bacteremia. Antimicrob Agents Chemother 2015;59:1588-1595. doi:10.1128/AAC.04259-14.
2. Society for Healthcare Epidemiology of America; Infectious Diseases Society of America; Pediatric Infectious Diseases Society. Policy statement on antimicrobial stewardship by the SHEA, IDSA, PIDS. Infect Control Hosp Epidemiol. 2012 Apr;33(4):322-7. doi: 10.1086/665010. PMID: 22418625.
3. Barlam TF, et al. Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America. Clin Infect Dis. 2016 May 15;62(10):e51-77. doi: 10.1093/cid/ciw118. Epub 2016 Apr 13.