

Optimizing Blood Culture Utilization in Solid Organ Transplant Recipients: A Diagnostic Stewardship Approach

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Disclosures

- I am a co-inventor on patents for gene expression classifiers of fungal infection.
- Royalties: McGraw Hill

All relevant financial disclosures have been mitigated.


Blood Culture Stewardship

- Definition: appropriate use of blood cultures to improve patient outcomes and resource utilization
- Goals:
 - Reduce unnecessary blood cultures
 - Avoid contamination events
 - Avoid potential harms
 - Resource saving: blood culture bottles, microbiology efforts, phlebotomy, costs

Blood Culture Bottle Shortage

8/16/2024    

The U.S. is currently experiencing a shortage of Becton Dickinson BACTEC blood culture media bottles. This shortage has the potential to disrupt patient care by leading to delays in diagnosis, misdiagnosis or other challenges in patients with certain infectious diseases, in addition to impacts on follow-up patient care and antimicrobial stewardship efforts. Related resources for health care providers, labs, facilities and health departments are provided below and will be updated if additional information becomes available.

The [Food and Drug Administration Office of Supply Chain Resilience](#)  is responsible for managing activities to anticipate and prevent disruptions to the supply chain for medical devices. If you are experiencing a significant shortage of BD BACTEC blood culture bottles, please contact FDA at deviceshortages@fda.hhs.gov.

- With Stewardship, blood culture utilization reduced by 30-40%.
- Lack of adverse effects:
 - No increase in patient mortality rates
 - No increase in hospital length of stay
 - No increase in patient readmissions
 - Continued compliance with Centers for Medicare & Medicaid Services (CMS) SEP-1 core measures



Prior Work

➤ Prior work: Emergency Department, Intensive Care Units

> [Infect Control Hosp Epidemiol.](#) 2024 Apr;45(4):452-458. doi: 10.1017/ice.2023.249. Epub 2023 Dec 11.

Implementation of a diagnostic stewardship intervention to improve blood-culture utilization in 2 surgical ICUs: Time for a blood-culture change

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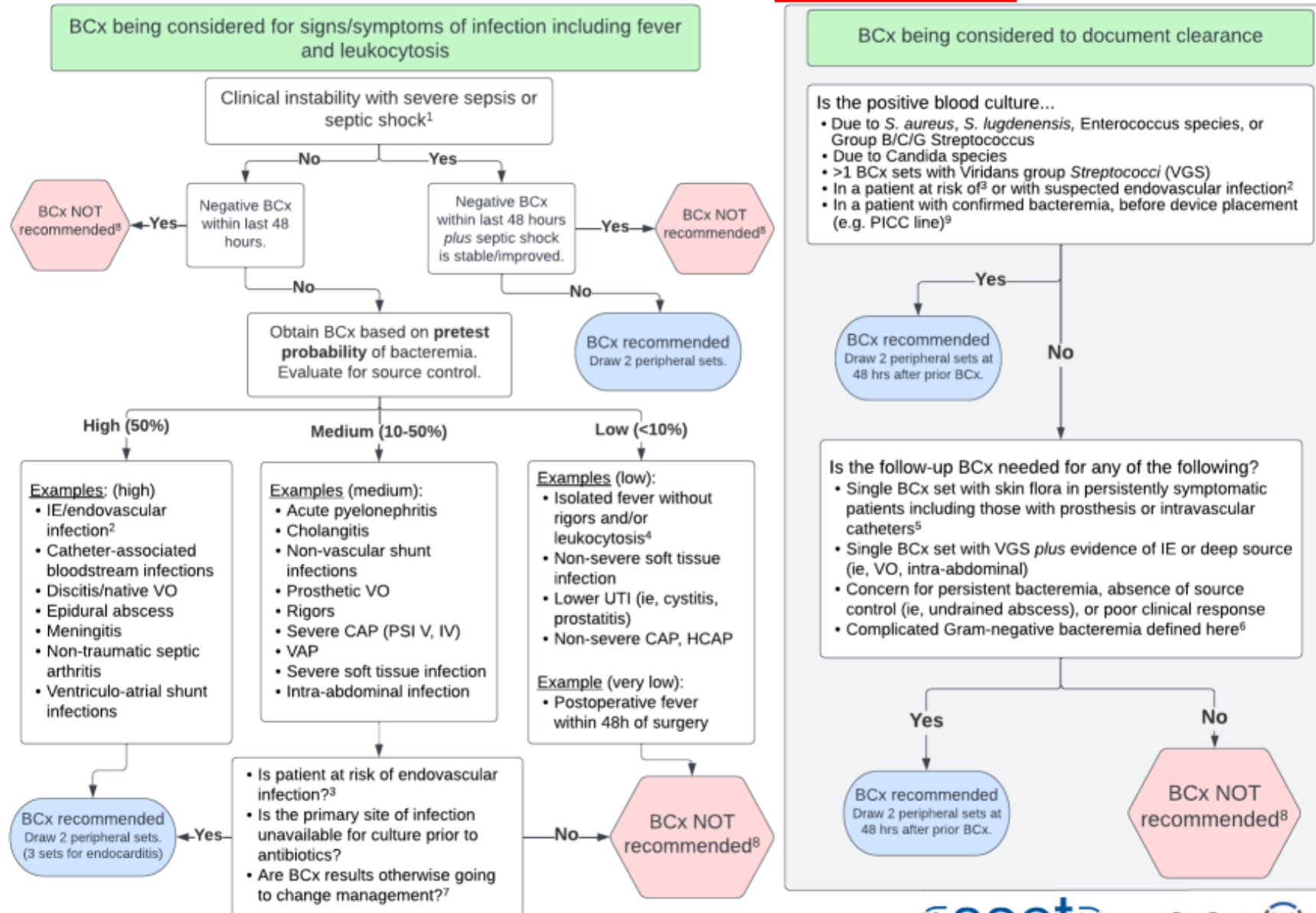
> [Am J Infect Control.](#) 2024 Sep;52(9):985-991. doi: 10.1016/j.ajic.2024.04.198. Epub 2024 May 6.

Blood culture algorithm implementation in emergency department patients as a diagnostic stewardship intervention

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➤ Data is limited on blood culture algorithms in solid organ transplant recipients

Indications for Blood Culture Collection in Immunocompetent Adults



Methods

- Period under study: February 2022 – January 2024
- Single academic medical center
- Retrospective review after blood culture algorithm implementation
- Patient charts were reviewed to categorize blood culture events (BCEs) as appropriate, inappropriate, or lacking documentation.

Definitions

- **Blood Culture Event (BCE):** 1 or more blood culture sets on same calendar day
- **Inappropriate Blood Culture:** Blood culture set drawn that is documented for a clinical scenario in which “Blood culture NOT recommended” in the algorithm
- **Blood Culture Results:**
 - **True Negative:** no growth recorded in any of the blood culture sets
 - **True Positive:** growth recorded in at least one bottle from at least one culture set taken and treated with antibiotics
 - **Contaminant:** growth recorded in at least one bottle from the blood culture sets taken, but not felt to be clinically significant by the clinical team and NOT treated with antibiotics

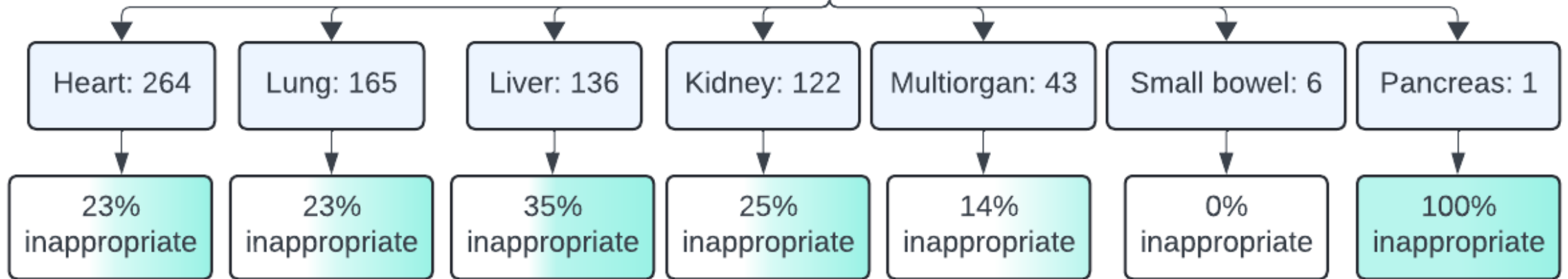
Results

- Of 737 BCEs in solid organ transplant (SOT) recipients, 552 (75%) were appropriate, **185 (25%) were inappropriate**.
- Adjudication of all BCEs revealed **648 (88%) negative cultures**, 61 (8%) true positives, and 28 (4%) contaminants.
 - All true positives were identified as appropriate.
- Within the subset of inappropriate BCEs (n=185), **178 (96%) yielded negative cultures**, while 7 (4%) were contaminants.

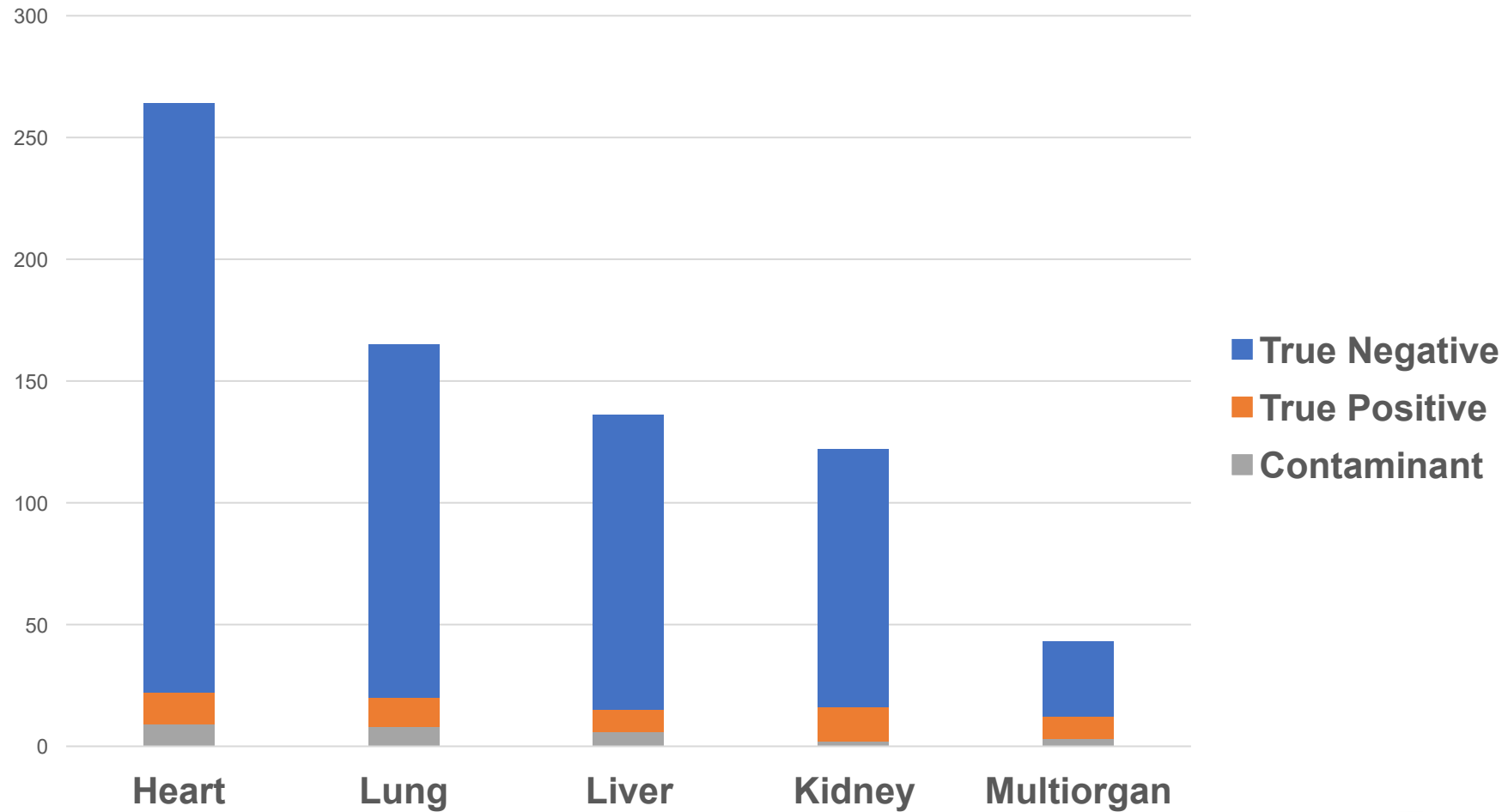
Results

Total BCEs: 737
Unique Patients: 447

Transplants



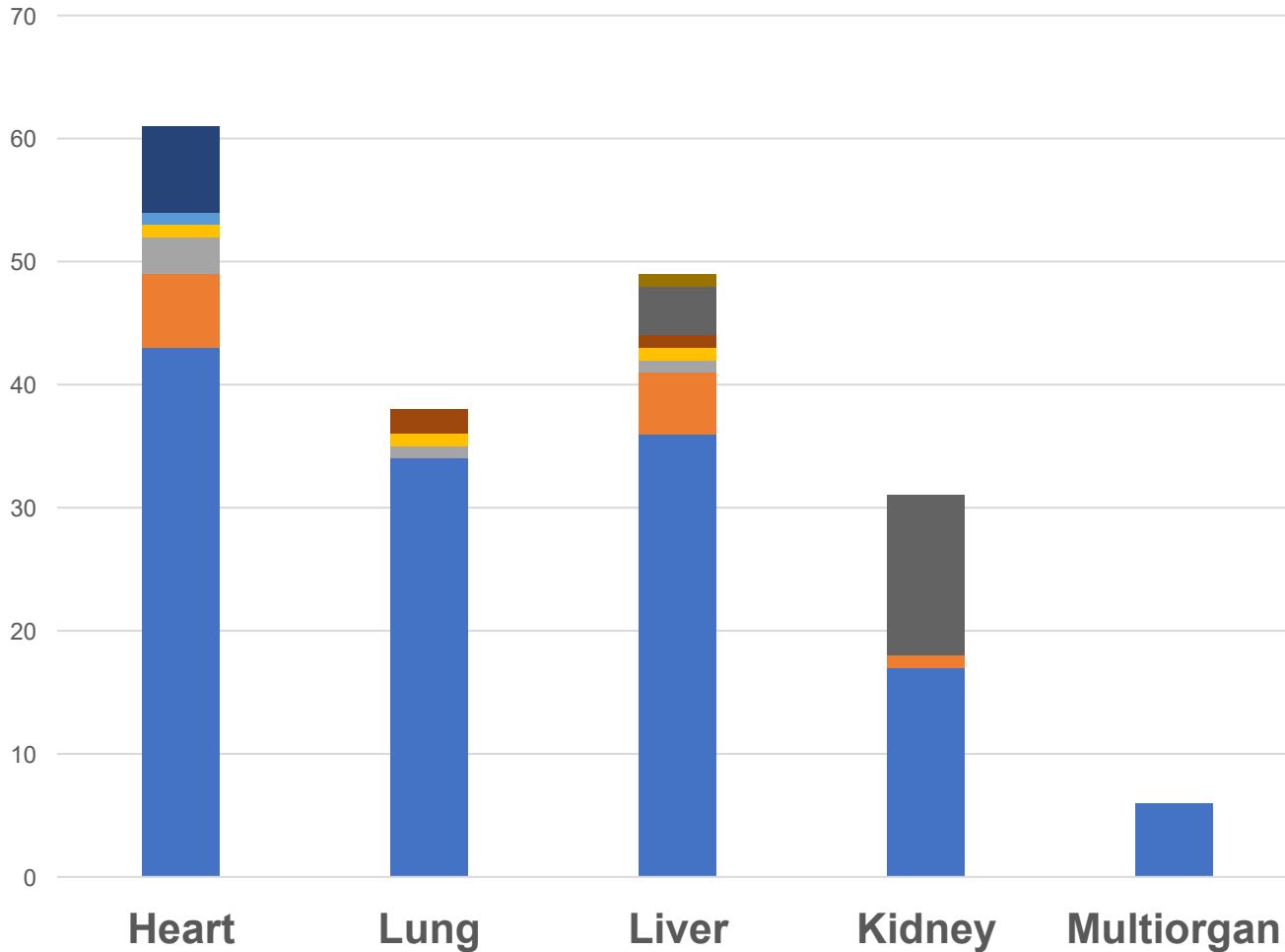
Blood Culture Event Results



Results

- Range of BCEs **from time of transplant** was 0 to 11,657 days (~32 years).
 - Median 225 days (IQR: 24-1846 days)
- 23 BCEs occurred due to **donor blood culture positivity** at the time of transplant.
 - 22 BCEs resulted in a negative blood culture in the recipient.
 - The 1 positive recipient blood culture was not the same organism as the donor blood culture.

Indications for Inappropriate BCEs



■ Pre-operative screening

■ Lower urinary tract infection

■ Documenting clearance outside of protocol indication

■ Unclear indication

■ Severe pneumonia, outside of protocol indication

■ Post-op fever

■ Non-severe SSTI

Conclusions

- This is an exciting, relevant, and evolving topic, especially given the present blood culture bottle shortage.
- The algorithm did not miss any true positives.
- Reconsider the practice of routinely drawing blood cultures due solely to positive donor cultures alone.
 - Will need a larger sample size for further analysis.

Conclusions

- **Limitations:** single-center, retrospective study. Did not look for safety signals within the group.
- **Next steps:** Apply prospectively (changes pre- and post- blood culture shortage and its resulting implications)

Acknowledgments and Questions

- Co-Authors
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- Solid organ transplantation colleagues