Physiological Changes Due to Bloodstream Infection in Intensive Care Unit Patients Differ According to Transplant Status

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Introduction

- Both solid organ and hematopoietic stem cell transplant patients are at increased risk of bloodstream infection (BSI), which often leads to critical illness.
- BSI may manifest with different pathophysiology in transplant recipients (TRs) compared to non-transplant recipients (non-TRs) due to immune compromise.
- We aimed to identify trends in the pathophysiology of critically ill patients with BSI based on transplant status.

Methods

- We reviewed blood culture, vital sign, laboratory, and continuous monitoring data from patients admitted to the medical and surgical/trauma ICUs at the University of Virginia Medical Center from February 2011 to June 2015.
- We performed univariate logistic regression to evaluate trends in physiological features in both TRs and non-TRs in the 96 hours surrounding a positive blood culture.
- We then performed multivariate logistic regression to identify the abnormalities most strongly associated with a positive blood culture in the next 24 hours in TRs.

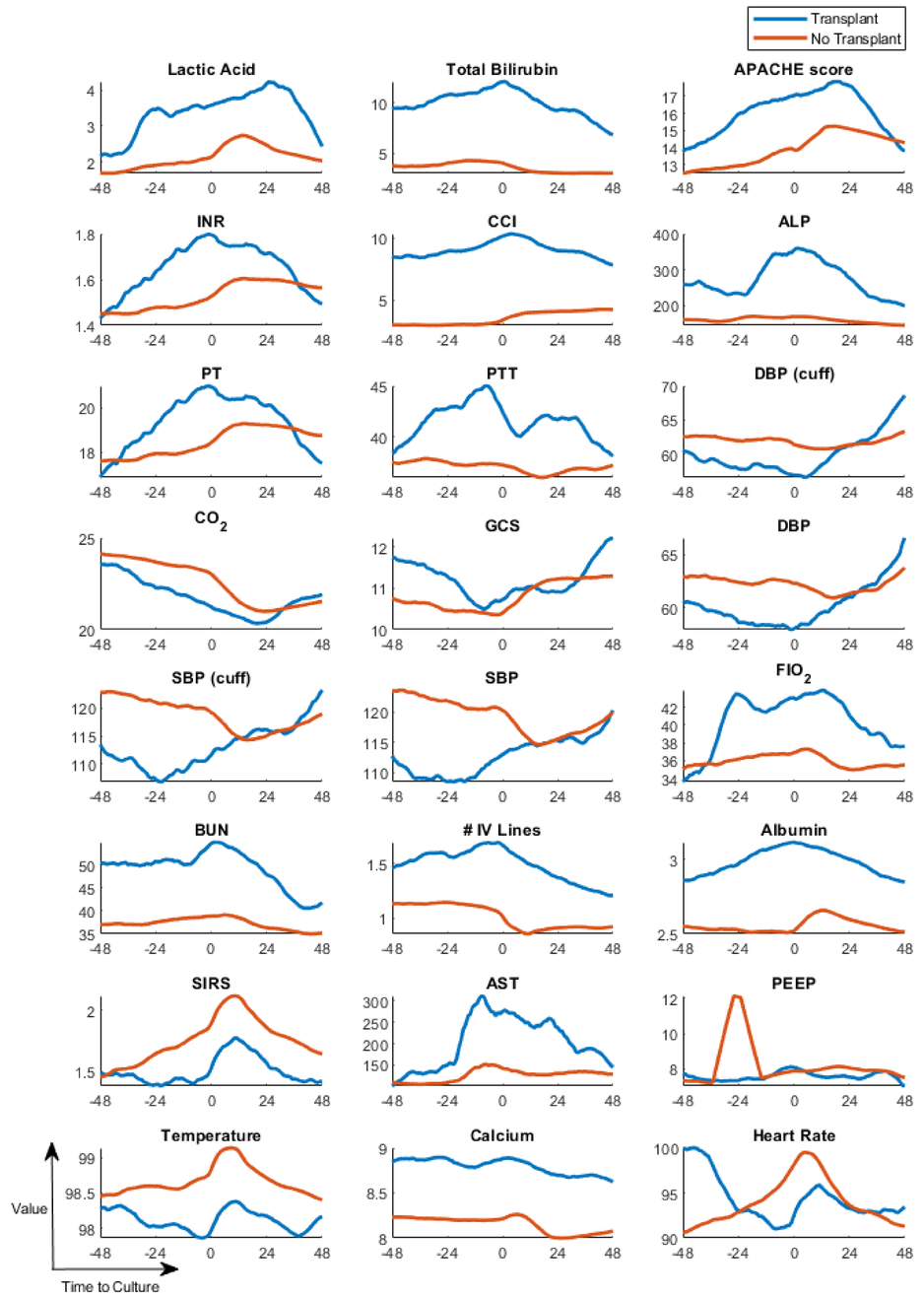

Figure 1. Trends in pathophysiological abnormalities of 9,954 critically ill patients in the 96 hours surrounding positive blood culture based on transplant status, 2011-2015. Each graph demonstrates the average value of the physiological variable (y-axis) over time relative to positive blood culture (x-axis). Blue curves depict trends in transplant patients; orange curves depict trends in non-transplant patients. 108 features were assessed; 24 features with the most change around the time of culture are depicted.

Results

- We analyzed 9,954 ICU admissions with 144 patient-years of data (1.3 million hourly measurements), including 15,577 blood culture instances.
- 125 of 1,068 (12%) blood culture instances were positive in TRs, compared to 1,051 of 14,509 (7%) instances in non-TRs.
- TRs with BSI had more abnormal pathophysiological features and different trends in several features (*i.e.* blood pressure, heart rate) than non-TRs (Fig. 1).
- The multivariable logistic regression model of BSI in TRs included, in decreasing strength of association: total bilirubin, systolic blood pressure, fraction of inspired oxygen, number of intravenous lines, and Charlson Comorbidity Index.

Conclusion

- Critically ill TRs have different pathophysiological manifestations of BSI compared to non-TRs.
- This may have implications regarding early detection and treatment of BSI in this immunocompromised population.

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