**Implementation and Evaluation of Lactose and Oxidase Testing on the Time to Appropriate Antimicrobial Therapy**

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**Background:** The prompt identification of bacteria from blood samples is an important diagnostic process that plays a key role in improving patient morbidity and mortality. Patients who experience a delay in appropriate antibiotic therapy, have a higher risk of in-hospital mortality or discharge to hospice when compared to patients who experience no delay.1 Delaying pathogen identification may also contribute to increasing antibiotic resistance, due to prolonged use of broad spectrum antibiotics.

The gold standard for blood pathogen identification are cultures and sensitivities, however, definitive identification often requires 48-72 hours.2 Recently, lactose and oxidase testing were implemented as a method to distinguish Gram-negative rod (GNR) bacteremia earlier in the course of therapy. To the best of our knowledge, the time to pathogen identification and initiation of appropriate antimicrobial therapy, by means of lactose and oxidase testing, has not yet been studied.

**Objectives:** The primary objective of this study was to evaluate the time to appropriate antimicrobial therapy after the implementation of lactose and oxidase testing.Secondary objectives included: hospital length of stay, 30-day mortality, and hospital readmissions within 30 days.

**Methods:** This was a retrospective, quasi-experimental cohort study of hospitalized patients with culture proven GNR bacteremia, conducted at a community hospital in Richmond, Virginia. Patients were identified using blood culture results. The pre-implementation cohort included patients from June to November 2020 and the post-implementation cohort included patients from June to November 2021. Patients were included in the study if they were 18 years or older, with positive blood cultures for GNR, admitted to an in-patient unit, admission of 72 hours or longer, and had lactose and oxidase testing performed if they were in the post-cohort. Patients were excluded if they had a positive blood culture for any Gram-positive organism(s), had cultures from sites other than blood that resulted with a different organism, had polymicrobial growth within the same set of blood cultures, or if they were made comfort care within 72 hours of positive blood cultures. The time to appropriate antibiotic therapy was assessed from the time when blood cultures were drawn to the time of the first administration of an appropriate antibiotic. Antibiotics were considered appropriate if they displayed documented in vitro susceptibility with the narrowest spectrum of coverage. The Mann-Whitney U test was performed to analyze continuous data and the Fisher’s exact test was performed to analyze nominal data. The alpha level was set at 0.05, with a power of 80%.

**Results:** There were 56 patients included in the pre-cohort and 68 patients included in the post-cohort. The median time to appropriate antibiotic therapy was 67.4 hours in the pre-cohort and 64.3 hours in the post-cohort (*p* = 0.596). The median length of stay was 6 days for both the pre and post-cohorts. There was no significant difference in 30-day mortality (0/56 vs 4/68, *p* = 0.13) and hospital readmissions within 30 days (13/56 vs 9/68, *p* = 0.16) between the cohorts.

**Conclusion:** Lactose and oxidase testing did not have a significant effect on the time to appropriate antimicrobial therapy. However, this study was not without limitations which may have impacted the results. Provider awareness and interpretation of lactose and oxidase reporting seemed to be the most impactful limitation.