

Time to Positivity in Blood Cultures at a Free-Standing Level IV NICU

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Background:

In the Neonatal Intensive Care Unit (NICU) setting, subtle clinical deterioration of the infant, combined with the lack of specificity in clinical signs to identify true infection often triggers an evaluation for sepsis, where cultures are obtained, and empiric antibiotics are initiated. Limiting the duration of antibiotic exposure has potential benefits in curtailing antimicrobial resistance and reducing unwanted adverse effects.

We aimed to determine the time to positivity (TTP) of blood cultures in a free-standing level IV NICU over a 6-year period, with the goal to reassess our antimicrobial practice in the NICU.

Methods:

Data were extracted from the Children's Hospital Colorado data warehouse for all patients admitted to the NICU, who had a positive blood culture between January 2013 to December 2018. These patient's charts were reviewed for both microbiologic and clinical data. TTP was calculated based on date and time culture was collected, compared to the date and time growth was first reported. Micro-organisms were categorized into absolute pathogens, potential pathogens (e.g., CoNS, other strep), common contaminants, yeast and other less frequently identified organisms.

Results:

A total of 309 positive blood cultures were identified from 268 individuals. The mean gestational age was 34.68 weeks with an average birthweight of 2353g. Overall TTP median and interquartile range (IQR) was 21.1 (14.35, 25.35) hours. The median (IQR) TTP for gram-positive absolute pathogens and gram-negative absolute pathogens were 16.32 (12.97, 22.38) and 12.62 (11.29, 14.36) hours, respectively. Of the 309 positive culture results, 295 (95%) had been initiated with antibiotics; 110 (37%) were later deemed as contaminant, and treatment discontinued. Central line associated bacterial infection was documented in 35 cases (11%). Death within 4 weeks of culture positivity was recorded in 25 (9.5%) cases.

Conclusions:

The majority of gram-positive and gram-negative pathogens were identified within 24h of blood culture collection. A substantial number of cases were later categorized as contaminants, highlighting the importance of correct sterile technique when obtaining cultures. These findings highlight opportunities for antimicrobial stewardship to limit antibiotic exposure in the NICU. The high mortality within 4 weeks of blood culture positivity warrants further study.

