

Sepsis screening in very low birth weight infants using heart rate characteristics monitor

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Background: Sepsis has a high rate of mortality and morbidity among Very Low Birth Weight infants. A heart rate characteristics (HRC) monitor was developed based on diminished heart rate variability and transient decelerations observed in septic infants. It uses electrocardiograph findings to calculate the risk of developing a septic event within the next 24 hours.

Objective: The objective of this study is to analyze the performance of the HRC monitor as a sepsis screening tool.

Design/Methods: A retrospective cohort study was designed to retrieve data from all VLBW infants who were subjected to HRC monitoring in the NICU at Cincinnati Children's Hospital and Medical Center during the period from January 2015 to May 2016. Infectious events were included if they prompted at least 5 days of antibiotics. They were categorized in two groups: culture proven infection when blood, urine, cerebral-spine fluid or peritoneal fluid were culture positive or clinical sepsis.

Results: 62 patients were included in the study and the clinical characteristics are described in the Table 1. 73808 scores were registered in the electronic medical record. The most frequent event related to score increase was infection as 45% of the positive days occurred during treatment for culture positive or clinical infection. Noninfectious related causes events included 5 minutes Apgar score under 7 (39%), same day medical procedure (15%), grade III or greater IVH (10%), tachyarrhythmia (2%). 51 infectious events occurred and included 19 culture proven infections and 32 clinical sepsis episodes. There were 9 cases of bloodstream infection; the most frequent agent was *Klebsiella pneumoniae*. There were 9 cases of UTI and the most frequent agent was *Enterobacter* species. In 32% of the infectious events picked up by the monitor, the clinical symptoms were not yet present when the score started to rise. The monitor had a sensitivity of 71%, a specificity of 89%, a positive predictive value of 10% and a negative predictive value of 99% in detecting the infectious events.

Conclusion(s): The HRC monitor had a sensitivity of 71% for all the infections but it performed better for the culture proven cases with a sensitivity of 79%. The greatest advantages of the monitor are the capacity of providing a non-invasive and continuous screening for infection and the ability to detect 32% of the infectious events before the onset of clinical symptoms. The high negative predictive value of 99% reflects the continuous screening for a relatively rare event.