

Research Explained

Examining variation in interstage mortality rates across the National Pediatric Cardiology Quality Improvement Collaborative: Do lower mortality centers have lower risk patients?

Background

Founded in 2006, the National Pediatric Cardiology Quality Improvement Collaborative uses collaborative learning and quality improvement methods to improve outcomes for infants with hypoplastic left heart syndrome (HLHS). NPC-QIC recently reported a reduction in overall interstage (the time between stage 1 and stage 2 surgeries) mortality within the collaborative from 9.5% to 5.3% but it is not known whether there are differences in mortality across centers. The goals of this study were: 1) look at NPC-QIC center mortality rates and differences in ways different centers care for patients, and 2) compare individual patient characteristics, specifically high-risk patients, between lower and higher mortality centers to determine whether some centers care for lower risk patients.

Summary of What Was Done and What was Found

The investigators used the NPC-QIC registry to identify patients from participating centers that had more than 25 patients enrolled. The investigators defined “lower mortality centers” as those centers who had 25 babies in a row survive from the first stage discharge to the second stage admission. There were 7 lower mortality centers who had a total of 331 patients and an overall mortality rate of 2.7%. “Higher mortality centers” were defined as those with an overall mortality rate greater than 10%. There were 4 higher mortality centers with a total of 173 patients and an overall mortality rate of 13.3%. The main analysis compared lower and higher mortality centers’ baseline patient characteristics present at birth because of the potential for differences in center practices to affect later characteristics, such as need for a breathing tube before the first stage operation.

When the investigators looked at the baseline patient characteristics, the only difference between the groups was that postnatal diagnosis was less common in lower mortality centers (18.4%) as compared to higher mortality centers (31.8%). There were no differences in sex, race, ethnicity, gestational age, birth weight, primary and secondary cardiac diagnoses, or the presence of major genetic syndromes. To answer the question of whether the lower rates of postnatal diagnosis at lower mortality centers accounted for the difference in mortality as compared to the higher mortality centers, the investigators did a specific analysis. They still found that lower mortality centers had a lower rate after accounting for the difference in postnatal diagnosis rates. When looking at characteristics that may be affected by center practices, the investigators found many differences. For preoperative characteristics, lower mortality centers had lower rates of breathing tubes, heart rhythm problems, and acidosis (marker of the heart and lungs not working well). When the investigators did the specific analysis to account for these differences between centers, lower mortality centers still had a lower mortality rate. There were many differences in operative and postoperative characteristics, such as type of stage 1 performed and time to extubation.

Limitations of the Study

1. All NPC-QIC studies have some limitations since not all centers participate in NPC-QIC, not all parents provide consent, and because errors in data entry are possible.
2. The definition of lower and higher mortality centers may be a coincidence of statistics rather than a true difference. Comparing center mortality rates is very difficult given the small number of HLHS babies at any one center and because interstage deaths are rare.

What it all means

This study showed that the difference in mortality rates between centers with lower mortality and centers with higher mortality does not seem to be due to differences in baseline patient characteristics or preoperative characteristics. Because the investigators found many differences in operative and postoperative characteristics, this difference in mortality may be due to differences in center practices starting in the operating room and continuing through discharge from stage 1. Future NPC-QIC studies

could potentially answer these questions by focusing on differences in care delivery in the intensive care unit and operating room.