Is Zero Central Line-Associated Bloodstream Infections Rate Sustainable? A Five Year Perspective
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Aim:
The purpose of this study is to evaluate whether reductions in Central Line-Associated Bloodstream Infection (CLABSI) rates is sustainable long-term in the Neonatal Intensive Care Unit (NICU), and to identify key determinants of this sustainability in our unit.

Setting:
The NICU at the Floating Hospital for Children at Tufts Medical Center is a level IIIc NICU and a tertiary referral center that cares yearly for over 500 babies with critical medical and surgical conditions either inborn, or at affiliated community sites.

Mechanisms and Methods:
During a five year period (July 2008 to December 2013), we conducted and implemented multiple safety programs and QI measures, while closely monitoring CLABSI rates. We reviewed the incidence of CLABSI in the NICU temporally to the implementation of new practice policies and procedures during this time (Figure 1).

Measures:
Compliance with bundle elements was retrospectively reviewed over this five year period. We used Statistical Process Control methodology (Figure 2, Figure 3) to evaluate for significant changes.

Data/Results:
Adoption of standardized care practices including bundles and checklists was associated with a significant reduction of CLABSI rate to zero for extended periods of time. Overall, our CLABSI rates decreased from 4.1 per 1000 line days in 2009 (13 infections; 3163 line days), to 0.94 per 1000 line days in 2013 (2; 2115), which represents a 77% reduction over a five year period. Ongoing training, surveillance and vigilance with catheter insertion and maintenance practices, and improved documentation prompted a reduction of our CLABSI rate to zero for more than 500 consecutive days to date in our unit.

Discussion:
Very low rates of CLABSI are achievable, however maintaining a zero CLABSI rate long term continues to be challenging. Our five year analysis indicates the importance of how measures are implemented in order to maintain a low CLABSI rate. Strict adherence to best catheter-care practices, excellent documentation, frequent auditing, and continued training, were essential factors contributing to the long-term sustainability of a zero CLABSI rate in our NICU.
FIGURE 1. CLABSI Rates in the NICU at Tufts Medical Center - 12-month Rolling Average Chart. Data reflect all central line days and CLABSIs – dotted line. Comparison is NHSN pooled mean CLABSI rate for level III NICUs (last publication in December 2011 reflects 2010 data) – solid line.
FIGURE 2. CLABSI Rates by Quarter in the NICU at Tufts Medical Center – $u$-chart. Data reflect all central line days and infections (umbilical lines and central lines).
FIGURE 3. Days Between CLABSIs in the NICU at Tufts Medical Center – $g$-chart. Data reflect all central line days and infections (umbilical lines and central lines).