Impact of a Primary Neonatal Line Insertion Team on Catheter Related Blood-Stream Infections

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Background:

Nosocomial infections are a significant contributor to the mortality, morbidity and cost of hospitalized patients. Of great concern is the incidence of catheter related blood-stream infection (CRBSI), which accounts for an estimated cost of $34,508/episode.

This quaternary, Level III-C Neonatal Intensive Care Unit (with an average daily census of 57), recognized a trend of elevated CRBSI within this patient population that was higher than similar centers. To address this trend, we presented the concept of implementing a unit-based primary line insertion team, as an evidence-based measure.

Postulation: Fewer members inserting and maintaining lines will facilitate standardization of best practice guidelines, ultimately decreasing CRBSI and subsequently the morbidity and mortality associated with these line infections.

Methodology:

A proposal for two full time nurses, dedicated for a unit-based line insertion team was presented and accepted by hospital administration. A job description was created and interviews were conducted. One nurse hired had experience in placing PICC lines and has trained the other team member. Rates of infection per 1000 catheter days were measured monthly according to the guidelines of the National Nosocomial Infections Surveillance System (NNIS). The primary measure tracked was positive blood stream infections. When a positive result was reported, the line team used the NNIS definitions to determine if the infection was a primary or a secondary infection.

Intervention:

A unit-based primary line insertion team was implemented to decrease CRBSI in our NICU. Evidence from the literature, in conjunction with CDC guidelines, were bundled and used to develop protocols aimed at reducing CRBSI. Numerous practice changes regarding central line insertion and maintenance have taken place based on these findings. In addition, the line team evaluated staff compliance with established protocols and reinforced critical behaviors within the unit.

Implementation:

Bundled Intervention Timeline

A – August – December 2007
- Line team established
- Full barrier precautions and use of ChloraPrep for insertion
- Daily dressing evaluations of all CVL's
- PRN dressing changes using ChloraPrep and Biopatch
- Implementation of insertion checklist

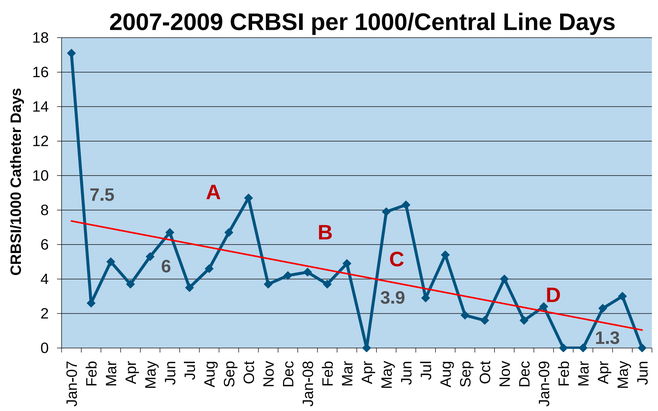
B – February 2008
- Daily rounds to evaluate need for all heparin locked (HL) central lines
- Standardized times for mechanical valve hub changes
- Moderate physician and nursing support and buy-in for removal of HL lines

C – June 2008
- Communicating number of infection free days back to staff and providing feedback regarding current infection rate
- E-mail review of each blood stream infection with staff

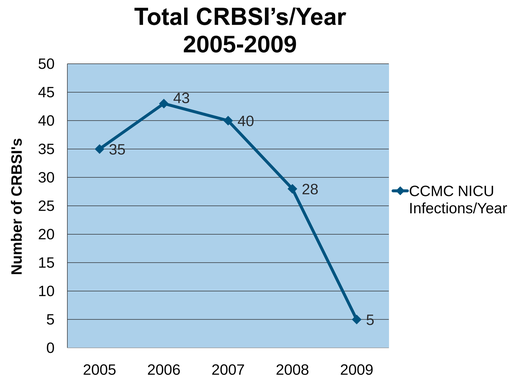
D – January 2009
- LED ticker posted in nursing lounges provides real time feedback of infection free days
- GREAT physician and nursing support for prompt removal of HL lines

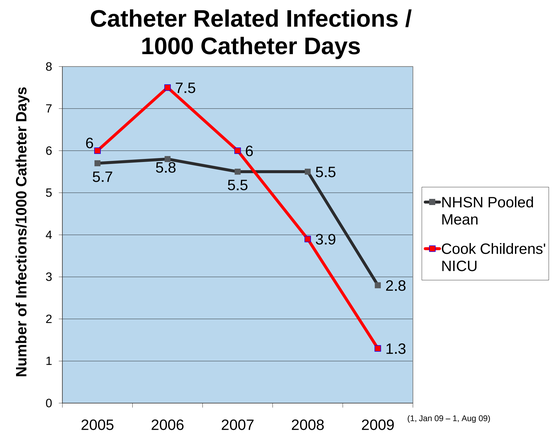
Outcomes:

Infection rates before, during and after implementation of interventions were gathered. A historical control period (1 January 2005 through 31 December 2006) was established for comparison. The infection rate at that time was ~ 7.5/1000 central line days.



NOTE: The NNIS definition changed in January 2008 to control for possible blood culture contamination, ie., false positive vs. true positive





Conclusion:

- The goal of this project was to implement a unit based line insertion team in order to facilitate the reduction of CRBSI by 50% within the first year. We achieved a 49% reduction by the first year.
- Line infection rates have decreased 82% in the two years since the implementation of the team.
- There has been an estimated cost savings of $525,000 during the first two years of implementation.
- There is strong evidence that having a primary team focused on line insertions and infection rates can have a significant impact on infection rates.
- Further research needs to be done to determine if translation of this model would be successful in similar NICU's

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