

A Real-Time Online Tool for Root Cause Analysis of Bloodstream Infections in the NICU

The Problem

- Elimination of nosocomial bloodstream infections (BSIs) has become a quality priority across the medical center, including in the Neonatal Intensive Care Unit (NICU).
- Root cause analysis (RCA) of adverse events, including BSIs, is essential to this goal, by using events to identify contributing factors and opportunities for improvement.
- RCA would ideally be performed as soon after the event as possible, and are traditionally performed through face-to-face meetings with the involved clinical staff. This relies on clinical staff remembering to report positive cultures to leadership, it is labor intensive for all, and even on the day of an event, it is unlikely that all of the targeted staff will be available.
- Many departments utilize Morbidity & Mortality (M&M) conferences for in-depth review of adverse events. These often occur weeks after event, and can be difficult for staff to attend.

Aim/Goal

Develop a real-time, automated RCA system for BSI events that would allow for input from all involved clinical staff through a process that required minimal time and effort.

The Team

- Leads: Munish Gupta, Dave Miedema
- Neonatology: Dmitry Dukhovny, Rosanne Buck, Brenda Sheridan
- Infection Control: Sharon Brodie Wright, Fatima Muriel, David Yassa

Interventions

(1) Automated real-time reporting of positive cultures

- Tool developed using Microsoft Access.
- Tool queries microbiology database daily at 6am for new positive blood or CSF culture results in all patients in the newborn nursery or NICU.
- Any positive results are automatically emailed to defined distribution list.

(2) On-line RCA surveys

- Surveys were based on similar tools developed by Sharon Brodie Wright for BSIs in adults.
- Surveys developed in performance manager.
- Surveys are discipline specific: separate surveys for RNs, NP/PAs, and MDs.
- Surveys ask range of questions related to central line use and other infection risk factors.
- Surveys are sent to all staff involved in care of patient in 72 hours prior to positive culture.
- Information gathered from surveys is then reviewed by leadership and at M&M.

The Results/Progress to Date

Sample Email Output from Reporting Tool

New Infection Data
 Miedema,David E. (BIDMC - Neonatology)
 Sent: Thu 10/13/2011 6:02 AM
 To: Miedema,David E. (BIDMC - Neonatology); Gupta,Munish (HMFP - Neonatology)
 Message | MicrobiologyInfections.xls (12 KB)
 There is new infection data

spec_dt	mm	pat_name	spec_type_desc	report_final_dt	org_name
xxxxxxx	xxxxx	xxxxxxx	BLOOD CULTURE - NEONATE		GRAM POSITIVE COCCUS(COCCI)

Snapshots of Selected Questions from RCA Surveys

Performance Manager

NICU Nosocomial Infection Review Tool: NP/PA/Fellow Survey

Please complete the following survey regarding your patient with a positive culture. Please answer all of the questions if possible; if you do not know and cannot find the answer to a question, please leave it blank. This information will ONLY be used for quality and safety purposes, and your input is EXTREMELY important. Thank you.

0. Your name: _____

INFORMATION ON INFECTION

13. Do you consider this positive culture to most likely be a true infection or a contaminant?
 True Infection
 Contaminant

14. What do you think was the most likely source of the positive culture?
 Central-line associated infection
 Peripheral IV associated infection
 Ventilator associated pneumonia
 Necrotizing enterocolitis
 Perinatal early-onset sepsis
 Contaminant
 Other (if other, answer next question)

15. If you answered 'other' to question 14, please describe. _____

16. Were antibiotics started or changed at time of drawing of positive blood culture?
 Antibiotics started
 Antibiotics changed
 Antibiotics continued without change
 Antibiotics discontinued
 No antibiotics given at that time

17. Were antibiotics started or changed at time of blood culture initially being reported positive?
 Antibiotics started
 Antibiotics changed
 Antibiotics continued without change
 Antibiotics discontinued
 No antibiotics given at that time

INFORMATION ON CENTRAL LINE

16. Was a central line in place at the time of drawing of the positive culture? (If yes, please answer questions 17-19 below. If no, please go to question 20.)
 Yes
 No

17. Which of the following were run through the central line in the 48 hours prior to the time of the positive culture? (check all that apply)

PN
 IL
 IVF (other than PN or IL)
 Medications (continuous infusion)
 Medications (intermittent doses)
 Blood products
 Heparin only
 Other (describe below)

If other, please describe. _____

18. Please estimate the total number of times the line was accessed for medications and blood sampling during the 48 hours prior to the time of the positive culture. (round up for each.)

OTHER INFORMATION

20. Please estimate the number of times skin was punctured in the 48 hours prior to positive culture. Consider blood draws, IV attempts, bedside glucose measurements, IM or SQ injections, etc.

21. Were any other clinical concerns noted, not described above, that may have contributed to this infant's risk of infection?

22. Why do you think this patient developed an infection? (can leave blank if thought to be contaminant)

Lessons Learned / Next Steps

- Since system development, reporting tool has worked perfectly.
- Since system development, only one nosocomial BSI has occurred. Surveys were sent to staff by email, and were completed by 2 MDs, 2 NP/PAs, and 3 RNs. Feedback suggested surveys were relatively easy to complete, although could be simplified. Responses from survey contributed to robust discussion of event at M&M.
- Tools will continue to be used for RCA of future BSI events, with ongoing revision of surveys based on staff feedback.
- Similar systems are in development for other events, including codes and deaths.

