2-2012

Effect of a Multidisciplinary Team Approach to Eradicate Central Line Associated Blood-Stream Infections (CLABSI)

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Repository Citation

Walz, J. Matthias; Ellison, Richard T. III; Flaherty, Helen; McIlwaine, John; Mack, Deborah Ann; Whyte, Kathleen; Landry, Karen; Baker, Stephen P.; Heard, Stephen O.; and CCOC Research Group, "Effect of a Multidisciplinary Team Approach to Eradicate Central Line Associated Blood-Stream Infections (CLABSI)" (2012). Anesthesiology and Perioperative Medicine Publications. 123.  
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Comments
Poster presentation at the Society of Critical Care Medicine’s 41st Critical Care Conference in Houston, Texas, February 4-8, 2012.

This poster is available at eScholarship@UMMS: https://escholarship.umassmed.edu/anesthesiology_pubs/123
Effect of a Multidisciplinary Team Approach to Eradicate Central Line Associated Blood-Stream Infections (CLABSI)

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Abstract # 583

Introduction: CLABSI remains a significant problem in the intensive care unit. Hypothesis: A multidisciplinary approach for the insertion and care of central lines will prevent central line associated bloodstream infections (CLABSI). Methods: A Critical Care Operations Committee was formed to transform care in eight intensive care units (ICUs) at an academic medical center in 2004. The goal was to reduce CLABSI. Using evidence-based medicine, a clinical practice guideline was developed that incorporated the use of maximum barrier precautions, chlorhexidine skin preparation, avoidance of the femoral insertion site, dedicated catheter cart, a patient identifier, and antibiotic prophylaxis. A central line bundle was adopted and monitored. Additionally, CLABSI rates were adjusted by the hospital epidemiologist and CVC days were tracked. Results: CLABSI rates were reduced from 2004 to 2011 (p<0.001). From 2005 to 2010, CLABSI rates were significantly reduced (p<0.001). From 2006 to 2011, the CLABSI rate dropped from 3.46 to 1.12 (p<0.05). Conclusions: Our multidisciplinary approach to the care of central line insertion and care was associated with a significant reduction in CLABSI rates. The neuro-trauma unit has one of the highest CLABSI rates in the medical center yet has one of the lowest APACHE III scores. The lower CLABSI rate may likely be the result of better adherence to catheter insertion and care. This observation is most likely the result of better adherence to catheter insertion and care. The neuro-trauma unit has one of the highest CLABSI rates in the United States per year was 80,000. Since that time, both behavioral and physiological interventions have resulted in reductions in CLABSI rates. For example, an estimated 25,000 fewer CLABSI occurred in 2009 in US ICUs than occurred in 2001. Hand hygiene, education programs4 and use of maximum barrier precautions5 and check lists6 are some of the behavioral changes that have resulted in reductions in CLABSI. Technological advances include aqueous or alcoholic chlorhexidine solutions for skin preparation and chlorhexidine impregnated central venous catheters for site care and antibiotic or impregnated catheters7. Although these aforementioned studies showed significant reductions in CLABSI, the rates remain relatively low. In this study we describe our approach toward reducing CLABSI rates in the intensive care units at UMass Memorial Medical Center, Worcester, MA.

Methods

In 2004, a critical care operations committee (CCOC) was formed at UMass Memorial Medical Center with the intent of providing standardized care to our critically ill patients by developing clinical practice guidelines based on the best published medical evidence8. This committee is multidisciplinary and includes physicians, nurses, patient care technicians, hospital administrators and patient representatives. One of the earliest developed committees was the Critical Care Optimal Care committee (CCOC) that reviewed the rate of CLABSI. Interventions (Table 1) that were incorporated into the initiative over time included an education program (that also emphasized hand hygiene), use of a dedicated catheter that has all of the necessary equipment assembled from the start, use of maximum barrier precautions, pre-procedural time out, use of a check list during catheter insertion, empowering the bedside nurse to stop the procedure if the steps in the checklist were not followed, incorporation of chlorhexidine solutions for skin preparation and chlorhexidine sponges for catheter dressings, tracking of high risk catheters (i.e. those were inserted during emergencies or in the femoral vein), treating a CLABSI as a critical event and holding a root cause analysis for each one to discuss the cause, use of the subclavian vein as the preferred site of catheter insertion, documentation of the catheter insertion with a standardized procedure note, and daily assessment as to the need of the central venous catheter. The catheter was monitored for infection by the infection control nurses and was put into a database that was managed by the ICU data coordinator. Definitions of CLABSI were those published by the Centers for Disease Control and Prevention (Table 2). A panel of physicians that was led by the hospital epidemiologist adjudicated cases of suspected CLABSI. Data were sent to the CCOC on a quarterly basis and to the individual ICUs on monthly basis by means of an electronic newsletter. In addition, the data could be viewed on the CCOC intranet website. The number of catheterizations was modeled using general linear models with first and second order slopes for each type of catheter type to detect linear trends and change points. The CLABSI infection rates were evaluated with a Poisson test. The trend in catheter blood infection rates was modeled with Poisson regression. The distributional assumptions of methods were evaluated using the Kolmogorov-Smirnov goodness of fit test for normality and by visual inspection of frequency histograms. Descriptive statistics and regression models fit to the appropriate design. Poisson regression was performed using LogFcat. Linear models were fit using the Mixed procedure (SAS).

From 2004 to 2011 the rate of CLABSI declined from 5.86 to 0.6 infections per 1000 catheter days (p<0.001). There was a steady and significant downward trend (r=0.96, p<0.01) from 2004 to 2011 (Figure 1). The number of catheterizations differed significantly by type, with approximately eight times as many CVCs being performed than PICCs (Table 2, p<0.001). From 2004 to 2009 catheter usage significantly increased whereas from 2010 to 2011 it dropped significantly (p<0.0015). However, the number of PICCs did not significantly change in frequency over time (Figure 2). Table 3 shows the longest CLABSI-free time and APACHE III scores for individual units. Microbiology data are presented in Table 5.

References