

In Search of Zero: Eight Years of Interventions Lead to Reduced CLABSI Rates

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ABSTRACT

Background:

Improved patient care and satisfaction are by-products of a successful Central Line Associated Bloodstream Infection (CLABSI) Reduction Program. Some estimates suggest that one in every ten patients with a central venous catheter will develop a catheter related bloodstream infection. For the patient, this is a serious complication causing longer hospitalization, increased exposure to antibiotics, and significantly higher morbidity and mortality. In 2001, a 51-bed Long Term Acute Care Hospital undertook an eight year journey to decrease their CLABSI rates in order to improve patient outcomes.

Objectives:

To utilize currently available technology to reduce CLABSI to lowest possible rate and to sustain the reduction.

Method:

This study was conducted as a prospective observational time series study. In 2000 the CLABSI rate at this LTACH was higher than the national benchmark. To reduce the CLABSI rate, several interventions were implemented at various time intervals and CLABSI rates were collected. Prospective BSI surveillance and case finding was the responsibility of the Infection Preventionist. Infection rates were tracked monthly using the National Healthcare Safety Network (NHSN) definitions.

Results:

Interventions implemented in 2001 included CHG eluting discs, CHG alcohol prep swabs, hand hygiene education and introduction of an alcohol based hand gel. By the end of 2001 the rate was below the national benchmark. In 2002, manufactured catheter securement devices were implemented. In 2002, infection rates dropped and again were below the national benchmark. In 2005 the facility experienced an increase in CLABSI rates. This was attributed to the increased use of Agency Nurses. In 2006 this practice was discontinued and a continuous education program required of all core nursing staff became a keystone of the CLABSI reduction program. In 2007 a trial of new IV pumps which introduced a new needleless access device was temporally associated with a CLABSI rate increase. In April 2008 the facility switched to a clear, swabable, positive displacement needleless access device. The rate for the last nine months of 2008, while the device was in use, decreased to 1.18 per 1,000 catheter days. A cost savings was realized due to a reduction in replaced lines, a reduction in contaminated blood cultures, and a decrease in the actual number of blood cultures being done. A cost savings due to a significant reduction in the use of alteplase, used for treating occlusions, was also realized.

Conclusions:

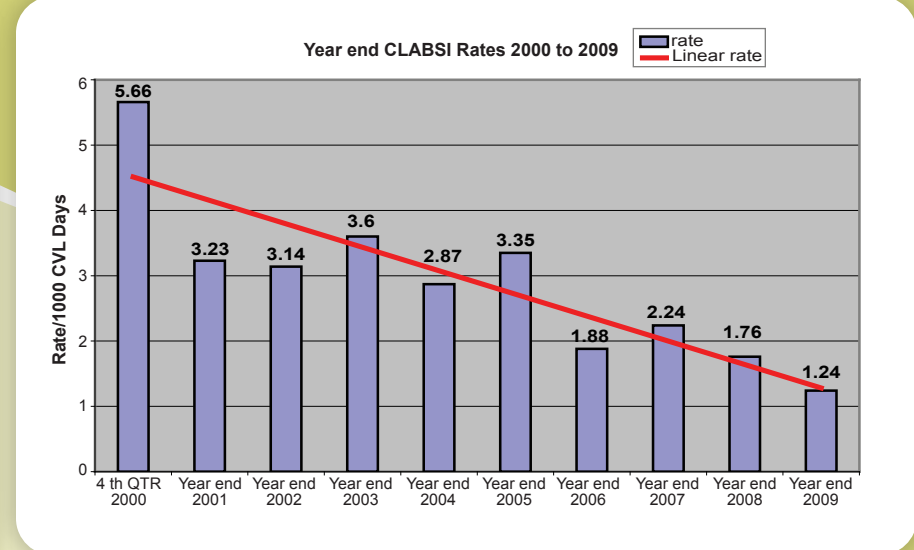
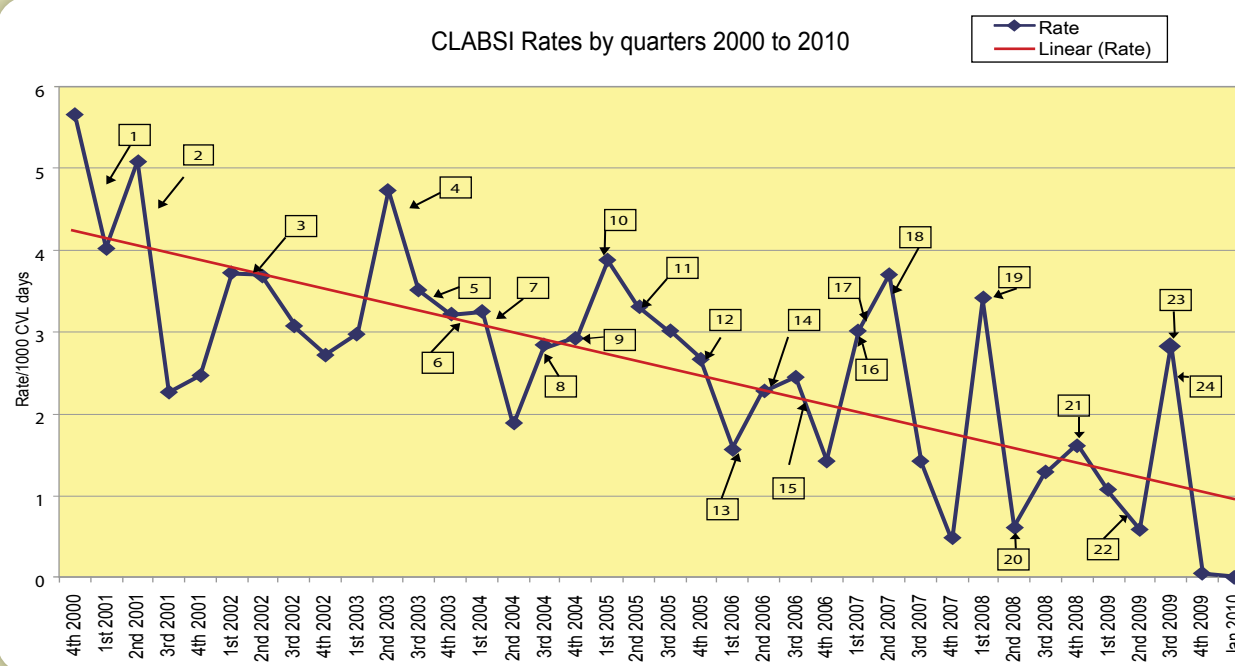
Most devices will initially lead to short term results. The value of any intervention to an effective CLABSI reduction program is a sustainable positive result. With the clear, positive displacement swabable connector in place for sixteen months the results have proven to be sustainable. As of the end of July 2009, the CLABSI rate at this facility was 0.98 per thousand central line days.

METHOD

Interventions were made during an eight year prospective observational and surveillance study. Over 62,000 central line catheter days of prospective surveillance and case finding was performed by the same Infection Preventionist over an eight year period. CLABSI rates included central lines in the entire hospital, not just the Intensive Care Unit, and infections were calculated using the standard formula of number of infections per 1000 central line days. The NNIS and then the NHSN definitions were used for determining all infections during the eight years. All positive blood cultures were reviewed.

CONCLUSIONS

The key to any successful program to lower the CLABSI rates in any hospital is not just bringing in products. An aggressive educational program that promotes best practices is essential. Each intervention instituted by the Infection Preventionist helped to lower the infection rates in the facility but it was the final intervention of introducing the clear, swabable, positive displacement valve combined with repeated education on the use of the device, the causes of CLABSI and initiation of a "scrub the hub" program that resulted in the final drop of rates to zero. The design of the clear valve provides a visible cue that shows blood, precipitate or debris left in the valve that can promote bacterial growth. The design also allows for more thorough cleaning of the device, thus reducing the risk of introduction of contamination into the line.

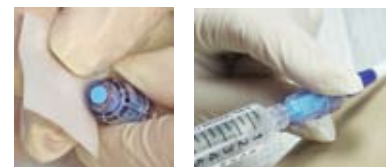


INTERVENTIONS

Number	Intervention
1	February 2001: New Infection Preventionist (IP) started March 2001: Hand hygiene product changed from that containing PCMX to product containing Triclosan and introduced alcohol based hand gel
2	June 2001: Introduced new products for central line dressing changes. Included CHG/Alcohol skin prep, CHG eluting patch and bio-occlusive dressing over insertion site 2,3,4,5
3	May 2002: Dressing changes not being done correctly. All RN's retrained and demonstrated competency for doing dressing changes per hospital policy
4	May 2003: Staff re-educated on use of dressing change products
5	July 2003: Use of manufactured securement device for central lines begun 6,7
6	November 2003: Hemodialysis line related infections noted. HD nurses not following facility protocol for dressing changes. Staff nurses take over doing dressing changes using the CHG/Alcohol prep and CHG eluting patch. No further HD catheter related infections after intervention
7	January 2004: All central line insertions monitored by assisting nurse for Best Practices to insure physician using gowns, gloves, caps, masks and drape instead of towels for insertion of central lines. Daily Rounding by IP to directly observe lines for proper dressing changes 8
8	July 2004: Upward trend in infections prompts immediate increase in monitoring of dressings and lines by IP, DQM, CNO and COO for compliance with policy and procedure for central line dressing changes
9	October 2004: All RN and LPN retrained on proper use of all devices and supplies for CVL dressing changes and competencies done. Nurses required to report dressing change date (on dressing) to charge nurse as part of end of shift report to increase awareness of dressing change schedule and compliance
10	February 2005: CHG eluting patches found to be placed upside down. Increased census necessitated increased use of Agency staff who were unfamiliar with proper use of devices used for dressings. Staff re-educated in February and March, including agency nurses, on proper dressing change protocols
11	June 2005: Changed from using CHG/Alcohol sponge prep to CHG/Alcohol prep pad for prepping caps prior to accessing line due to increased flexibility of prep pad, improving ability to properly prep entire hub and not just the diaphragm of the cap
12	November 2005: Blood Stream Infection PI Team chartered. Core LPN's and Agency nurses no longer allowed to do CVL dressing changes. All Core RN staff attended mandatory education on causes of blood stream infections and re-competenced on use of all products for CVL dressings. Added new order set to electronic medical record that prompted nurses when dressing changes were needed
13	January 2006: Multi-dose vials of flush solutions changed to unit dosed syringes after finding vials were not being dated when opened
14	April 2006: Core LPNs educated and competency done for CVL dressing changes. Competenced LPNs permitted to do CVL dressing changes. May and June 2006: Successfully recruited more core RN staff who were trained and competenced on use of products and dressing change protocols
15	July 2006: Use of agency nurses totally discontinued. All blood cultures monitored and nurses whose blood draws were contaminated received Just-in-Time education on proper techniques. Drape used for central line insertion changed to large drape in accordance with Maximum Barrier recommendations in the IHI Bundle 9
16	January 2007: Nurse found not doing CVL dressing changes. Reprimanded and re-educated. New IV pump trial started utilizing a line that had to be opened to place a port into the line for secondary infusions. IP was not included in decision to trial pump nor informed of new product trial
17	March 2007: Nursing staff told by representative from pump manufacturer that they could use the adapter for the pump tubing as a cap on unused lines
18	June 2007: Product was discovered by IP in June when doing annual education on blood stream infections. Devices immediately removed and tubing replaced with one that already had the port integrated into the line
19	January 2008: Previous pump tubing requiring adapter back in facility due to an ordering error by purchasing department February 2008: Use of clear, swabable, positive displacement cap trial begins. Education of staff on use of device done on all shifts on the Med-Surg unit as well as the ICU. 10,11 March 2008: Pump tubing discovered in March when staff asked if new cap could be used in line for the pump. Pump trial ended and pumps removed from facility
20	April 2008: Clear cap chosen to replace previous neutral pressure caps after 68% savings on use of alteplase realized because lines were not clotting off as with the neutral pressure cap previously used
21	September 2008: Educators return on request to re-educate staff after caps found not properly flushed and blood remained in cap
22	Represents 120 days without a CLABSI (February to June 2009)
23	July - September 2009: New RN's including new graduate nurses hired
24	October 2009: One CLABSI on 10/19, educators returned 10/22. All RN and LPN re-educated on use of product. No CLABSI for rest of year, and through January 2010



When these devices are partnered together they create a new standard of care by dramatically reducing the incidence of catheter-related complications.¹



A clear needleless access device reminds nurses to complete best practices - priming, swabbing and flushing

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BIOGRAPHY

Lee Steinger, RN, CIC is an Infection Preventionist at Kindred Hospital-Tucson in Tucson, Arizona, a 51 bed, (including a 4 bed ICU) Long Term Acute Care Hospital. She is responsible for all the infection prevention and control activities for Kindred Hospital-Tucson. Lee is a member of the Society of Healthcare Epidemiology of America (SHEA), the Association for Professionals in Infection Control and Epidemiology (APIC), and is Board Certified in Infection Control.

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