

Using Clear Valves and Flushing with 20ml in the Adult Population to Attain Zero Central Line Associated Blood Stream Infection Rate: A Prospective Surveillance

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ABSTRACT

Background: Evidence indicates: Clots form a tighter matrix when precipitates are present. Central venous catheters (CVC) with clots are at higher risk for infection. Positive displacement valves prevent blood from backing up the catheter on syringe disconnection. It is the goal of every facility to have zero Central Line Associated Blood Stream Infections (CLABSI) to prevent morbidity, mortality and excess cost of care. To achieve this goal, additional items were added to the Central Line Bundle (CLB): Clear positive displacement valves and flushing with 20ml of normal saline (NS) immediately after infusions or blood draws.

Methods: Prospective surveillance and enhanced central line care has been implemented through a dedicated IV Team (IVT) / PICC Team for the last six years. The team's interventions to reduce infection include in the order of appearance: Changing to a swabbable positive displacement valve, chlorhexidine patch, vigorous valve care education, switching to the clear version of same valve and flushing with 20ml of NS. Prospective BSI surveillance and case finding were the responsibility of the IV Team and the infection control team. Infection rates were tracked every 6 months using the National Healthcare Safety Network definitions. Data were tracked from January 2003 through December 2008.

Results: Since January 2007 the facility saw a steady reduction in CLABSIs after instituting clear valves and vigorous maintenance education of CVCs that includes flushing with 20ml of normal saline. The facility achieved a zero CLABSI rate in the year 2008. ($p < 0.05$). This is clinically significant.

Conclusions: A significant drop in CLABSIs occurred after the introduction of clear valves and a campaign reinforced with the clear valve cue to scrub the hub or change the valve and flush the catheter. Blood and debris is a growth media for bacteria. The care of CVCs that includes changing the valve if blood, precipitate, or debris are evident, coupled with flushing the catheter with 20ml NS to clear the catheter are associated with reduced infection rates. This is a clear enhancement to the CLB. If the valve is opaque, it does not trigger or reinforce the clear process to keep blood and debris out of the catheter.

BACKGROUND

- It is the goal of every infusion nurse and facility to have a zero Central Line Associated Blood Stream Infection (CLA-BSI) rate to prevent:
 - ~ Morbidity and Mortality
 - ~ Excess cost of care
- The central line bundle is a good start for insertion, we were looking for improvement and added additional items to come up with a Central Line Care and Maintenance Bundle (CLC&M Bundle)

- Evidence indicates:**
- ~ Clots form a tighter matrix when precipitates are present in the lumen in the catheter¹
 - ~ Central venous catheters with clots are at higher risk for infection^{2,3,4}
 - ~ Positive displacement valves prevent blood from backing up the catheter and decrease occlusion risk^{5,6,7}
 - ~ Education on CVC care improves patient outcomes including reducing CLA-BSI

METHODS

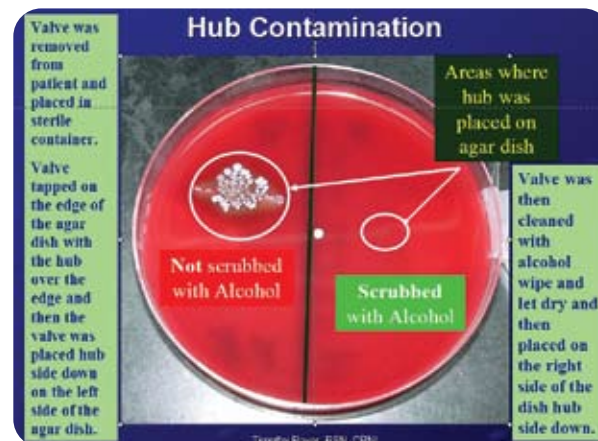
The team's interventions to reduce infection include in the order of appearance: Changing to a swabbable positive displacement valve, chlorhexidine patch, vigorous valve care education, switching to the clear version of same valve and flushing with 20ml of NS. Prospective BSI surveillance and case finding were the responsibility of the IV Team and the infection control team. Infection rates were tracked every 6 months using the National Healthcare Safety Network definitions.

- Staff Education on CVC Care and the Bundle Addition of a Positive Displacement Swabbable Valve demonstrate a successful reduction in CLABSIs^{8,9}

Date	Action Taken
June 2003	Change to swabbable positive displacement valve
January 2005	Maximal sterile barriers & CHG prep
July 2006	Chlorhexidine Gluconate (CHG) impregnated disk, increase use of PICCs in place of centrally inserted central catheters (CICVC), and a vigorous care and maintenance education program
January 2007	Started clear version of the same valve, as a cue, coupled with continuous Medical Center "Scrub the Hub" and Flushing with 20mls. of normal saline" Campaign.

- Prospective surveillance and enhanced central line care through a dedicated IV/PICC Team for the past 6 years.
- Prospective BSI surveillance and case finding were the responsibility of the IV Team and the infection control team.
- Infection rates tracked every 6 months using the NNIS and now the NHSN definitions.
- Data were tracked from January 2003 through December 2008

Swabbable Devices are a Must!



RESULTS

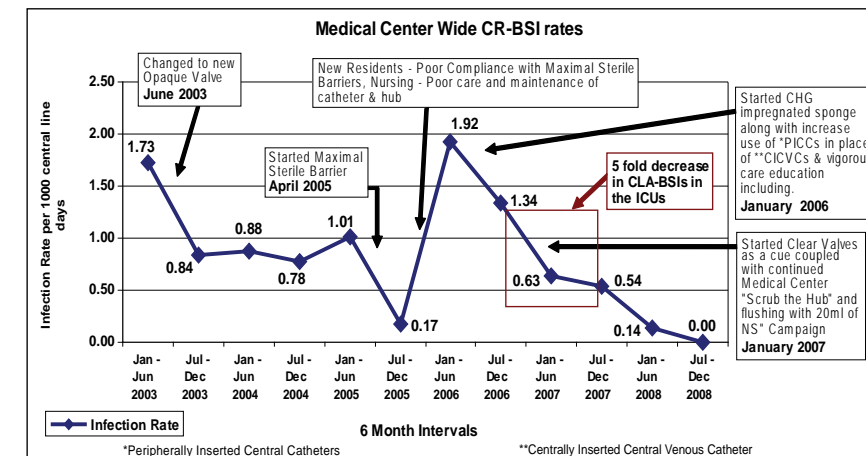
Since January 2007 the facility saw a steady reduction in CLABSIs after instituting clear valves and vigorous maintenance education of CVCs that includes flushing with 20ml of normal saline. **The facility achieved a zero CLABSI rate in the year 2008. ($p < 0.05$). This is clinically significant.**

- Over 13,000 in-patient central line days per year, includes CICVCs and PICCs
 - ~ Rates were calculated for the whole Medical Center
 - Intensive Care Units
 - Medical Surgical Units
 - Spinal Cord Injury Unit
 - Transitional Care Unit
- Using CHG disk along with a continuous vigorous education on the care of central lines produced a CLA-BSI rate from 1.92 to 0.63
- Increasing the use of PICCs in place of CICVCs, especially in the ICUs, decreased infection rates.
- Impressive continued drop to zero CLA-BSI rate was noted with the implementation of the use of clear positive displacement valves as a cue to clean, flush, or change the valve. P value < 0.05



Clear valves serve as a visual cue reminding nurses to complete best practice-priming, swabbing and flushing

- As of March 20, 2009 – 433 days with zero CLA-BSIs
- Cost savings of over \$241,000 for a five-fold decrease in CLA-BSI in the ICUs alone and 60% reduction in contaminated blood cultures (savings of \$125,000 in contaminated cultures and \$116,000 in bloodstream infections) as calculated, July 2007, VA Puget Sound Health Care System



CONCLUSIONS

Blood and debris is a growth media for bacteria. The care of CVCs that includes changing the valve if blood, precipitate, or debris are evident, coupled with flushing the catheter with 20ml NS to clear the catheter are associated with reduced infection rates. This is a clear enhancement to the CLB. If the valve is opaque, it does not trigger or reinforce the clear process to keep blood and debris out of the catheter.

- Decreases in CLA-BSI occurred with the use of:
 - ~ Maximal Sterile Barriers & CHG prep
 - ~ CHG impregnated disk
 - ~ Education program on catheter and hub/valve care
 - ~ Increase use of PICCs in the ICUs
 - ~ Dedicated IV/PICC Team

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