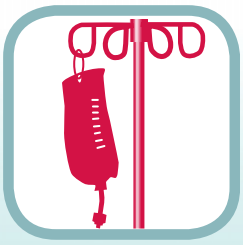
CENTRAL LINE-ASSOCIATED BLOODSTREAM INFECTION PREVENTION



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Goal

PREVENT CATHETER RELATED BLOODSTREAM INFECTIONS BY IMPLEMENTING COMPONENTS OF CARE CALLED THE "CENTRAL LINE BUNDLES"

What is new?

The major update to Prevent Central Line Infections Getting Started Kit is that the recommendations have been revised based on the CDC guidelines published in early 2011. The best practices are still grouped into **insertion and care bundles** (*formerly maintenance bundles*). The **insertion bundle** now includes consideration of the type of line as well as optimal site selection. The **care bundle** now includes consideration of different dressings if infection rates remain above target levels (zero!). Recommendations are now also provided for arterial line insertion. It should be noted that attribution of a bloodstream infection to a specific intravascular device (arterial or venous) is not always possible. Best practices for insertion and care of intravascular lines also need to consider non-infectious complications; the new guidelines discuss the use of ultrasound guidance.

Background

- Ninety percent of catheter-related bloodstream infections (CR-BSI) occur with central venous catheters (CVC's), which are increasingly used in acute care and outpatient settings. [1]
- CR-BSI mortality [controlled for underlying severity] is between 4% and 20% causing death in 500 to 4,000 patients per year. [2]
- CR-BSI prolongs hospitalization by seven days increasing costs by US $3,700 and $29,000. [3]
- CR-BSI can be prevented by maximal barrier precautions. The odds ratio was 2.2 to 6.6 times greater for infection without maximum barrier precautions. [4]

Intervention

Central Line Insertion Bundle

1. Hand hygiene
2. Maximal barrier precautions
3. Chlorhexidine skin antisepsis
4. Optimal catheter type and site selection
   a. Avoid the femoral vein in adults; subclavian preferred to minimize infection risk.
   b. Optimal catheter type and site selection in children is more complex with the internal jugular vein or femoral vein most commonly used. Site preference in children needs to be individualized.

Central Line Care Bundle

1. Daily review of line necessity, with prompt removal of unnecessary lines
2. Aseptic lumen access
3. Catheter site and tubing care

1 Mermel LA. Ann Intern Med.2000; 132(5):391-402.
2 Soufir L, et.al; Infect Control Hosp Epidemiol. 1999;20(6):396-401
3 Alexis M. Elward, et.al; Pediatrics 2005; 115; 868-872. Troy E. Dominguez, et. al; Critical Care Med 2001; 29:169-74. Philippe Eggimann, et. al; Microbes and Infection 2004; 6:1033–1042
4 Mermel LA, et.al; Am J Med. 1991; 91(3B):197S-205S. Raad, II, et. al; Infect Control Hosp Epidemiol. 1994; 15(4 Pt 1):231-238.

Intervention Measures

1. **Central line-associated primary bloodstream infection rate per 1000 central line-days**
   Goal: rate of CR-BSI will decrease by 50% in one year using the central line bundle. Once a hospital has gone more than 60 days between central line catheter-related bloodstream infections, the goal is for 150 or more days between central line infections.

2. **Central line insertion bundle compliance**
   Goal: 95% of all patients with central lines in the included units receive all elements of a Central Line Insertion Bundle.

3. **Central line care bundle compliance**
   Goal: 95% of all patients with central lines in the included units receive all elements of the Central Line Care Bundle. Historically, this level of reliability has been achieved by building an infrastructure using multidisciplinary rounds and daily goals

Other Resources

Marschall J, Mermel LA, Classen D, et al. Strategies to Prevent Central Line–Associated Bloodstream Infections in Acute Care Hospitals. Infect Control Hosp Epidemiol 2008;29:S22-S30.

O'Grady NP, Alexander M, Burns LA et al Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011 Centre for Disease Control. Available at http://www.cdc.gov/hicpac/pdf/guidelines/bsi-guidelines-2011.pdf, accessed Mar 21, 2012.

Success Stories

The Sir-Mortimer B. Davis-Jewish General Hospital, through the support and guidance of the Canadian ICU Collaborative, has implemented a variety of evidence-based prevention strategies to decrease catheter related blood stream infections (CVC-BSI). Using rapid change cycle methodology, central line insertion and care bundles have been implemented. Also, they have continuously identified areas of practice still needing improvement. A systematic chart review for each patient developing a CVC-BSI was done to highlight possible causes. The results from their efforts are encouraging. Over the past 15 months, they achieved 100% compliance with the insertion bundle and a steadily increasing compliance with the care bundle. In addition, they had zero CVC-BSI in the past 15 months. Their present goal is to hold onto the gains, sustain improvement and spread to other areas of the institution.

As part of the Canadian Collaborative to Improve Patient Care and Safety, a multidisciplinary team at the Stollery Children's Hospital in Edmonton undertook a quality improvement initiative to reduce catheter-related bloodstream infection (CR-BSI) in the Pediatric ICU. Using rapid change cycle methodology, they implemented the central line insertion and care bundles. The results from their efforts are encouraging. Over the past 10 months, they have achieved a 55% drop in their CR-BSI rate.

In October 2004, the IWK Pediatric Intensive Care Unit in Halifax participated in the Canadian Collaborative to Improve Patient Care and Safety in the ICU. The goal was to reduce the incidence of line-related sepsis in the pediatric population by 20% within 12 months. Within 10 months, the team presented results showing over a 50% reduction in central venous line sepsis rates.

Through the support and guidance of the Canadian ICU Collaborative pediatric stream, the B.C. Children's Hospital trove to decrease catheter related blood stream infections (CR-BSI) by 50% over a 12-month period. Using the PDSA cycle approach to quality improvement, this inter-professional group improved insertion and care practices resulting in a 70% decrease in CR-BSI's in the 10 months of 2005. This dropped their cumulative CR-BSI rate to below the NNIS rate. In addition, the insertion and care bundles have been adapted for the operating suites and radiology department. BCCH recently celebrated 13 months without a CR-BSI and are currently sitting at a cumulative CR-BSI rate of 0.45 per 1000 line days. Their present goal is to keep the momentum and hold onto the gains.