

**Safer Healthcare Now! interventions**

- AMI - Acute Myocardial Infarction
- CLI - Central-line associated Bloodstream Infections
- Falls - Falls Collaborative in Long-term care
- MedRec - Medication Reconciliation (Acute care and Long-term care)
- MRSA - Antibiotic-resistant organisms (AROs)/Methicillin-resistant *Staphylococcus aureus*
- RRT - Rapid Response Teams
- SSI - Surgical Site Infections
- VAP - Ventilator-associated Pneumonia
- VTE - Venous thromboembolism

**Pilot Projects:**

- Medication reconciliation in home care
- Prevent adverse drug events related to high-risk medications in paediatrics

**Goal**

Prevent catheter-related bloodstream infections by implementing the components of care called the "central line bundles"

*A "bundle" is a collection of processes needed to effectively and safely care for patients undergoing particular treatments with inherent risks. Several interventions are "bundled" together and, when combined, significantly improve patient care outcomes.*



**Background**

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

**Intervention**

**Central Line Insertion Bundle:**

- Hand hygiene
- Maximal barrier precautions
- Chlorhexidine skin antisepsis
- Optimal catheter site selection
  - The subclavian vein is the preferred site for non-tunneled catheters in adult patients
  - Optimal catheter 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 Maintenance Bundle:**

- Daily review of line necessity and prompt removal of unnecessary lines
- Dedicated lumen for Total Parenteral Nutrition (TPN)
- Accessing the lumens aseptically
- Checking entry site for inflammation with every change of dressing

**NOTE:** Compliance with the central line bundles can be measured by simple assessment of the completion of each item. The approach has been most successful when all elements are executed together - an "all or none" strategy - as demonstrated by the Canadian ICU Collaborative Pediatric teams.

<sup>1</sup> Mermel LA. Ann Intern Med.2000; 132(5):391-402.  
<sup>2</sup> Soufir L, et.al; Infect Control Hosp Epidemiol. 1999;20(6):396-401  
<sup>3</sup> Alexis M. Elward, et.al; Pediatrics 2005; 115; 868-872. <http://www.pediatrics.org/cgi/content/full/115/4/868>  
 Troy E. Dominguez, et. al; Critical Care Med 2001; 29:169-74  
 Philippe Eggimann, et. al; Microbes and Infection2004; 6:1033-1042  
<sup>4</sup> 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 intensive care units receive all elements of a Central Line Insertion Bundle
3. **Central line maintenance bundle compliance**  
Goal: 95% of all patients with central lines in the included intensive care units receive all elements of the Central Line Maintenance Bundle. Historically, this level of reliability has been achieved by building an infrastructure using multi-disciplinary rounds and daily goals

## Other Resources

- O'Grady NP, et al. "Guidelines for the prevention of intravascular catheter related infections". Centers for Disease Control and Prevention. MMWR Recomm Rep. Aug 9 2002; 51(RR-10):10 [www.cdc.gov/mmwr/PDF/rr/rr5110.pdf](http://www.cdc.gov/mmwr/PDF/rr/rr5110.pdf)
- Cook D. et al. "Central venous catheter replacement strategies: a systematic review of the literature". *Crit Care Med* 1997;25;1417-24.

## 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 maintenance 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 12 months, they achieved 100% compliance with the insertion bundle and a steadily increasing compliance with the maintenance bundle. In addition, they had zero CVC-BSI in the past 5 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 maintenance 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 strove 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 maintenance 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 maintenance 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.