

PREVENTION OF CENTRAL LINE ASSOCIATED BLOODSTREAM INFECTION (ADULTS, PEDIATRIC AND NEONATAL): BUNDLE OF CARE APPROACH

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Question

What is the best available evidence regarding the effectiveness of a bundle of care approach for the insertion and daily management of central vascular access devices (CVADs) to prevent central line associated bloodstream infections (CLABSI) in the adult, pediatric and neonatal population?

Clinical Bottom Line

Central line associated bloodstream infections are responsible for the many hospital acquired infections causing substantial morbidity, mortality and increased costs to the hospital system. They occur in both adults and children but are more common in the pediatric population.^{1,2} Prevention is considered crucial for all age groups with a central vascular access device (CVAD).¹ A bundle of care is a group or set of evidence-based practices or interventions when implemented collectively are aimed at improving processes and patient outcomes.^{1,2} There is growing evidence that a bundle of care approach for the insertion and management of CVADs may be more effective than single intervention in preventing CLABSI.

- A systematic review was conducted to evaluate the effectiveness of a CVAD bundle of care (insertion and/or maintenance) in the prevention CLABSI for critically ill patients of all ages. An insertion bundle was defined to include at least maximal sterile barrier precautions and a chlorhexidine-based solution to clean skin. A maintenance bundle was defined to include at least hand hygiene, daily evaluation of the catheter and disinfection before manipulation. The findings from meta-analysis demonstrated that a bundle of care approach was more effective at preventing CLABSI overall and within all population groups and settings (adult intensive care unit (ICU), pediatric intensive care unit (PICU) and neonatal intensive care unit (NICU)). The authors noted the limitations in study designs and standardization in reporting outcomes but noted sub-group analysis demonstrated the quality of the studies did not impact the intervention effect. The authors conclude that the use of an insertion or maintenance bundle is effective at reducing CLABSI, and that findings of this review and previous reviews support this. The authors suggest future research should be directed at the implementation of a bundle of care approach.¹ (Level 3)
- A systematic review was conducted to evaluate the efficacy of a bundle of care approach to reduce CLABSI in infants with an indwelling central line in a neonatal unit. A bundle of care was defined as any intervention with multiple interacting components. The findings from meta-analysis demonstrated a significant reduction (approximately 60%) in CLABSI rates post the introduction of a care bundle. The most common technical interventions included in the bundle of care were skin preparation protocol,

maximal standard barrier precautions and daily assessment of the need for the catheter. The most common professional components included education and training, use of a checklist, audit and feedback. The authors concluded that a bundle of care approach reduces CLABSI rates however there was no clear evidence on which specific elements should be included in the bundle.² (Level 3)

- An intravascular therapy clinical practice guidelines recommends the implementation of a bundle of care approach during insertion and daily management of a CVADs. They further suggest the following components should be included in the insertion bundle, hand hygiene, skin antisepsis using alcohol-based chlorhexidine, maximal sterile barrier precautions, preference for upper body insertion site to reduce risk of infection.³ (Level 4)

Characteristics of the Evidence

This summary is based on a structured search of the literature and selected evidence-based health care databases. The evidence included in this summary is from:

- A systematic review of 96 studies (before and after with control group or interrupted time series) with a participant total of 2,216 adults, 79 pediatric, 75 neonatal.¹
- A systematic review of 24 studies (five observational, 19 before and after studies).²
- An evidence-based practice guideline.³

Best Practice Recommendations

- Bundles of care for the insertion and daily management of CVADs are recommended for all age groups to reduce and prevent CLABSIs. However, there is insufficient evidence to determine the number or type of interventions or practices that should be included in the bundle; clinical expertise is recommended. (Grade B)

References

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For details on the method for development see Munn Z, Lockwood C, Moola S. The development and use of evidence summaries for point of care information systems: A streamlined rapid review approach. *Worldviews Evid Based Nurs*. 2015;12(3):131-8.

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