Central Line Associated Blood Stream Infection Prevention with Use of Disinfection Caps: A Scoping Review

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Purpose
- This scoping review aims to compare central line bloodstream infection (CLABSI) rates with and without the use of disinfection caps for the duration of catheter use in intensive care patients.
- Secondary objectives are to determine whether disinfection caps will decrease CLABSI rates and whether the current practice of daily chlorhexidine (CHG) baths, weekly dressing changes, and checklists will result in fewer CLABSI rates.

Background
- CLABSI is defined as a bloodstream infection in patients with central lines for 48 hours before infection onset, with the infection being unrelated to a separate source or site (Blot et al., 2014).
- Patients in the ICU often require central lines for lifesaving measures, but these lines also pose a great risk for infection.
- Central line infections increase mortality and ICU length of stay as well as cause a burden on the hospital system.
- The annual cost of a CLABSI is over $1 billion in the United States, averaging up to $56,000 per patient (Martino et al., 2017).
- The use of disinfecting caps can reduce the amount of CLABSI.
- CLABSI risk is 13.7 times higher without disinfecting caps (Ogulmen et al., 2020).
- Disinfecting cap usage showed an infection decrease from 12.7% to 5.5% (Wright et al., 2012).

Methods

Eligibility criteria
- Research conducted from August 2019 to September 2021; research or quality improvement studies performed within the last 9 years; or studies utilizing compared rates with and without cap usage, quality improvement measures, implementation of caps, handwashing, dressing changes, CHG baths, and checklists.

Selection of sources of evidence
- Articles included those that showed benefits of disinfecting caps to reduce CLABSI rates, along with checklist bundles, daily CHG baths, and central line dressing changes. A detailed annotated literature review was performed, and 10 articles were ultimately chosen for this scoping review.

Results
- The UTHSC online library was utilized for article selection from evidence-based journals and databases. The search for CLABSI infection prevention yielded over 50 results that were placed in a table for review. After an extensive literature review, the team chose a total of 10 relevant articles.
- Out of the 10 articles, two were Level I, three were Level II, three were Level III, and two were Level VI. They are a mix of meta-analysis, RCTs, non-RCTs, quasi-experimental, quality improvement projects, and systematic reviews.
- Individual sources of evidence are as follows:
  - Kamboj et al. (2015) found a 34% decrease in hospital-acquired CLABSI.
  - Martins et al. (2017) found that a study of pre- and post-trial showed reduced rates from 7.3 per 1000 days to 3.04 per 1000 days.
  - Ogulmen et al. (2020) also found a significant difference in rates when caps were used versus unused.
  - Voor in't Holt et al. (2017) found the use of caps had a "P < 0.001" indicating significant reduction in CLABSI with the use of maintenance bundles.
- All articles referenced showed a reduction in central line-associated bloodstream infections with the use of passive disinfecting caps. The findings also suggest the use of central line bundles/checklists, which include the use of chlorhexidine wipes/soaps for daily baths and impregnated central line dressings.

Implications for Practice
- Our findings show that the use of passive disinfecting caps reduces the number of central line-associated bloodstream infections.
- Continued quality improvement and maintenance bundles were also shown to be essential in the reduction of CLABSI rates.
- In the majority of the studies, the patients surveyed were critically ill and required interventions, making them more susceptible to infection.
- Limited information on strictly disinfecting caps usage was found, as most institutions have already adopted maintenance bundles as best practice.

Conclusion
In patients at higher risk of infections, such as ICU, oncology, or renal patients, there is a benefit in using passive disinfecting caps. In the 10 articles reviewed, each demonstrated a significant improvement in CLABSI rates when disinfecting caps were used in addition to standard maintenance bundles. Continued quality improvement research is needed, as the articles show that rates improve with continued QI in addition to disinfecting caps and bundles.

References