

## Reducing the Rate of CLABSI through Antimicrobial Impregnated Catheters

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### **Clinical Question:**

In adult patients with central line venous access, does the use of antimicrobial impregnated catheters compared to non-antimicrobial impregnated catheters reduce the risk of central line associated blood stream infections?

### **Sources of Evidence:**

Lai, N.M., Chaiyakunapruk, N., Lai, N.A., O’Riordan, E., Cheng Pau, W.S., & Saint, S. (2016). Catheter impregnation, coating or bonding for reducing central venous catheter-related infections in adults. *Cochrane Database of Systematic Reviews* 2016, (3), 1-181. doi: 10.1002/14651858.CD007878.pub3.

Rutkoff, G.S. (2014). The influence of an antimicrobial peripherally inserted central catheter on central line-associated bloodstream infections in a hospital environment. *Journal of the Association for Vascular Access*, 19 (3), 172-179. doi: 10.1016/j.java.2014.06.002

Storey, S., Brown, J., Foley, A., Newkirk, E. Powers, J., Barger, J., & Paige, K. (2016). A comparative evaluation of antimicrobial coated versus nonantimicrobial coated peripherally inserted central catheter on associated outcomes: A randomized controlled trial. *American Journal of Infection Control*, 44(6). 636-641. doi:10.1016/j.ajic.2015.11.017

Vassallo, M., Dunais, B. & Roger, PM. Antimicrobial lock therapy in central-line associated bloodstream infections: a systematic review *Infection* (2015) 43: 389-398. <https://doi.org/10.1007/s15010-015-0738-1>

### **Synthesis of Evidence:**

Four articles were reviewed as evidence in this report. There is one randomized control trial, one quasiexperimental, and two systemic reviews included.

Storey et al. (2016) was a randomized control trial. This study was conducted to examine if an impregnated chlorhexidine PICC line reduces the amount of CLABSI and VTE in patients versus a non-impregnated chlorhexidine PICC line. The study included 60 participants placed randomly into a group. Thirty subjects had a chlorhexidine PICC line and 30 subjects had a non-chlorhexidine PICC line. The participants were over the age of 18 and had a PICC line placed in the cardiovascular thoracic, medical intensive care, or the oncology unit. To detect CLABSI, labs including organism cultures, complete blood counts, neutrophils, white blood cells, and platelets were drawn by a PICC line team. The results showed there was no significant difference between the PICC line used and developing CLABSI or a VTE.

Rutkoff (2014) reported on a quasiexperimental study that looked to determine the effect of an antimicrobial peripherally inserted central catheter (PICC) on the incidence of CLABSI in adult hospitalized patients at a California hospital requiring this therapy. The study included 257 patients in the nonintervention group and 260 patients in the intervention group. It used primary data collection

for the intervention group and secondary data collected from retrospective chart reviews for the nonintervention group. The intervention group received therapy with an antimicrobial PICC line, while the non-intervention group received central line therapy without an antimicrobial PICC. Data collected included line days, patient age, and CLABSI rate. PICC associated blood stream infections were found to be less frequent in patients with the antimicrobial PICC in comparison to the patient's with a non-microbial PICC. The nonintervention group had a total of 8 infections, and there was one infection found with the intervention group.

Lai, Lai, Cheng Pau, & Saint (2016) was a systemic review of 57 randomized control trials with 16784 participants. The purpose of this review was to examine the effectiveness and safety of antimicrobial impregnated catheters. The patients were all 18 years and older in various units in hospitals like ICU, oncology, and medical-surgical. The trials showed that patients that had antimicrobial impregnated catheters had a lower rate of infection and bacterial colonization. There was no clinical difference in sepsis and death rates. There was the most decrease rates of central line related infections and bacterial colonization in patients in the ICU. There was high quality evidence for the major outcomes of central line related catheter infections and a moderate quality of evidence for catheter colonization.

Dunais, Roger, and Vassallo (2015) conducted a systemic review of 53 case-control studies. The study reviewed literature concerning the use of antimicrobial lock therapy (ALT) in the treatment of central-line associated blood stream infections. The article reviewed several different types of lock therapy and which organisms responded best to therapy. The goal was to salvage the catheter rather than having to remove it and place a new one. The results of this study concluded that the most promising situation for ALT to succeed in salvaging a catheter appears to be coagulase-negative Staphylococcus infection, which is the main causative agent of CLABSI. Daptomycin, Tigecycline, Ethanol and Taurolidine appear as the best options for treating CLABSI.

### **Conclusion:**

Overall, the collection of studies revealed that the use of antimicrobial impregnated catheters works towards decreasing the rate of CLABSI in patients. The study performed by Storey et al. (2016) revealed no clinical significance, but this could be due to the small sample size (60 participants) included for the research.

### **Implications for Nursing Practice:**

There is existing evidence that portrays a beneficial outcome to the use of antimicrobial impregnated catheters in practice. Along with the use of sterile/clean technique when providing interventions in regards to central line/PICC therapy, antimicrobial impregnated catheters can reduce the patient with CVC therapy's risk for developing a central line-associated blood stream infection.