



PREVENTING CATHETER RELATED BLOODSTREAM INFECTION

Expected Practice:

- ☑ Cleanse hands with waterless cleaning solution or, if visibly soiled, with soap and water before and after patient contact.
- ☑ Disinfect clean skin utilizing friction with an appropriate antiseptic (preferably 2% chlorhexadine) before catheter insertion and during site care.
- ☑ Utilize full barrier precautions when inserting central venous access devices.
- ☑ Educate all staff inserting and caring for intravascular catheters, assess competency of same at regular intervals, advocate adherence to standards of care.
- ☑ Replace peripheral IV sites in the adult patient population at least every 96 hours but no more frequently than every 72 hours. Leave peripheral venous catheters in children until IV therapy is completed, unless complications (e.g., phlebitis and infiltration) occur.
- ☑ Replace IV tubing at least every 96 hours but no more frequently than every 72 hours.
- ☑ When adherence to aseptic technique during intravascular catheter insertion cannot be ensured (i.e. prehospital, code situation), replace the catheter soon as possible, but within 48 hours.

Supporting Evidence:

- A substantial proportion of hospital-acquired infections result from cross-contamination from the hands of healthcare workers. Alcohol-based hand rub, compared with traditional handwashing with unmedicated soap and water or medicated hand antiseptic agents, may offer better results because it requires less time, acts faster, and is less likely to irritate skin. Thus, the CDC recommends the use of alcohol-based hand rubs between patient contacts as an adjunct to traditional handwashing alone.^{1,2,3}
- Chlorhexidine gluconate solutions utilized for vascular catheter site care reduce catheter related bloodstream infections and catheter colonization more effectively than povidone-iodine solutions. Moreover, 80% of resident and transient skin flora are found in the first five epidermal layers of the skin. There is clinical evidence to support the efficacy of applying antiseptics with sufficient friction to assure that the solution reaches into the cracks and fissures of the skin. There is no evidence that supports use of traditional concentric prepping technique. Although a 2% chlorhexidine-based preparation is preferred, tincture of iodine, an iodophor, or 70% alcohol can be used. Allow any solution used to dry before the catheter is inserted.^{1,4,5}
- Compared with peripheral venous catheters, CVCs carry a substantially greater risk for infection; therefore, the level of barrier precautions needed to prevent infection during insertion of CVCs should be more stringent. Maximal sterile barrier precautions (e.g., cap, mask, sterile gown, sterile gloves, and full body sterile drapes) during the insertion of CVCs substantially reduce the incidence of CRBSI compared with standard precautions (e.g., sterile gloves and small drapes)^{1,3,2,10} There are some studies that demonstrate infection rates are lower when the subclavian site is used. Selection of central line insertion site, however, is based on patient risk factors.
- Healthcare workers who insert and care for intravascular devices should receive formalized education and training in indications for intravascular catheterization, proper placement, maintenance, and infection control. Educational programs focusing on central venous catheter insertion and care have lead to a substantial decrease in cost, morbidity, and mortality attributable to central venous catheterization. Ongoing education and reinforcement of appropriate technique serve as a reminder of current best practices, and studies demonstrate that consistent reinforcement of aseptic technique leads to decreased CRBSI.^{1,8,9,10,11}
- Studies of peripheral intravenous catheters show that there is not a substantial difference in phlebitis rates between catheters left in place 72 hours and those left in place 96 hours. There is no evidence to support that routine replacement of central venous catheters is more effective in decreasing blood stream infections than replacing central venous catheters as needed.^{1,12}

- Studies show that IV tubing containing crystalloids can be replaced every 72 – 96 hours. If monitoring using a transducer system, replace the transducer, tubing, flush device and flush solution every 96 hours. ^{1,13}

What You Should Do:

- Ensure that your units have written practice documents such as a policy, procedure or standard of care that include use sterile technique with full barrier precautions when central venous access devices are inserted.
- Ensure that your units have written practice documents such as policy, procedure or standard of care that address frequency of peripheral IV site rotation and tubing change.
- Establish a process for education and routine evaluation of all staff inserting and caring for intravascular devices.
- Review your unit's rate of catheter related blood stream infection rate and if needed establish an interdisciplinary team, including but not limited to staff nurse, advance practice nurse, infection control nurse (officer), and a physician.
- Develop a process for *daily evaluation for need* of any central venous catheters.

Need More Information or Help?

- Talk with a clinical practice specialist for additional information / assistance at www.aacn.org then select PRN.

REFERENCES:

1. O'Grady NP, Alexander M, Dellinger EP, Gerbeding JL, Heard SO, Maki DG et al, Guidelines for the Prevention of Intravascular Catheter-Related Infections. *Am J Infect Control*, 2002 Dec;30(8):476-89
2. Rosenthal K. Guarding against vascular site infection: Arm yourself with the latest knowledge on equipment and technique to protect patients from catheter-related bloodstream infections. *Nur Management*, (35) OR Insider:4-9, November 2004.
3. Pittet D, Hugonnet S, Harbath S, et al. Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. *Lancet* 2000;356:1307-9
4. Clemence MA, Walker D, Farr BM. Central venous catheter practices: results of a survey. *Am J Infect Control* 1995;23:5--12.
5. Chaiyakunapruk N, Veenstra DL, Lipsky BA, et al. Chlorhexidine compared with povidone-iodine solution for vascular catheter-site care: a meta-analysis. *Ann Intern Med* 2002 ;136:792–801
6. Mermel LA, McCormick RD, Springman SR, Maki DG. The pathogenesis and epidemiology of catheter-related infection with pulmonary artery Swan-Ganz catheters: a prospective study utilizing molecular subtyping. *Am J Med* 1991;91(suppl):S197--S205.
7. Raad II, Hohn DC, Gilbreath BJ, et al. Prevention of central venous catheter-related infections by using maximal sterile barrier precautions during insertion. *Infect Control Hosp Epidemiol* 1994;15:231--8.
8. Gnass SA, Barboza L, Bilicich D, Angeloro P, Treiver W, Grenovero S, Basualdo J. Prevention of central venous catheter-related bloodstream infections using non-technologic strategies. *Infect Control Hosp Epidemiol*. 2004 Aug;25(8):675-7
9. Sherertz RJ, Ely EW, Westbrook DM, et al. Education of physicians-in-training can decrease the risk for vascular catheter infection. *Ann Intern Med*. 2000;132:641-648.
10. Coopersmith CM, Rebmann TL, Zack JE, Ward MR, Corcoran RM, Schallom ME, Sona CS, Buchman TG, Boyle WA, Polish LB, Fraser VJ. Effect of an education program on decreasing catheter-related bloodstream infections in the surgical intensive care unit. *Crit Care Med*. 2002 Jan;30(1):59-64.
11. Berenholitz SM, Pronovoist PJ, Lipsett PA, Hobson D, Earsing K, Farley JE, et al. Eliminating catheter-related bloodstream infections in the intensive care unit. *Crit Care Med*. 2004 Oct;32(10):201-20.
12. Josephson A, Gombert ME, Sierra MF, Karanfil LV, Tansino GF The relationship between intravenous fluid contamination and the frequency of tubing replacement. *Infect Control* 1985;258:177-81
13. Gillies D, O'Riordan L, Wallen M, Rankin K, Morrison A, Nagy S. Timing of intravenous administration set changes: a systemic review *Infect Control Hosp Epidemiol*. 2004 Mar;25(3):240-50

Other Articles of Interest:

1. Henna, H., Raad, I., and Darouiche, R.: "New approaches for prevention of intravascular catheter-related infections," *Infect Med*. 18(1):38-48, 2001.
2. Kline, A. "Pediatric catheter-related bloodstream infections – latest strategies to decrease risk," *AACN Clinical Issues*.16(2):185-198, 2005.
3. McGee, D. and Gould, M. "Preventing complications of central venous catheterization", *N Engl J Med*. 348(12):1123-1133, 2003