JBI EVIDENCE SUMMARY

CENTRAL VENOUS ACCESS DEVICE (ADULTS AND PEDIATRIC POPULATIONS): SKIN PREPARATION AND SKIN ANTISEPSIS

Search date

26/07/2022

Author

Kylie Porritt BN, GradDipNursSc(Cardiac), MNSc, PhD

Publication date

29/07/2022

Question

What is the best available evidence regarding skin preparation and skin antisepsis when performing site care for a central venous access device (CVAD) in adults and pediatric populations?

Clinical Bottom Line

Central venous access devices include peripherally inserted central catheters, tunneled and nontunneled central venous catheters (CVCs), and implanted vascular access device.[1] The use of a CVAD is an important part of the management of many critically and chronically ill patients; however, infection is one of the main problems with the use of the device.[2] Effective skin antisepsis is one strategy used to assist with the prevention of catheter related infection.[2]

- A systematic review was conducted to examine the effectiveness of skin antisepsis as part of site care for a CVC in adults and children. In terms of reducing catheter related blood stream infections, the findings reported very low certainty evidence for the use of chlorhexidine versus povidone-iodine, chlorhexidine in aqueous solution versus povidone-iodine in aqueous solution and chlorhexidine in alcohol versus povidone-iodine aqueous solution. There was moderate evidence for the use of chlorhexidine in alcohol versus povidone-iodine in alcohol. Regarding all-cause mortality there was low certainty evidence for the use of chlorhexidine in aqueous solution versus povidone-iodine in aqueous solution, and chlorhexidine in alcohol versus povidone-iodine in aqueous solution. The authors concluded that the low-quality evidence suggests antiseptic solutions containing chlorhexidine may provide some additional benefit to reduce catheter related infections compared to solutions containing povidone-iodine, but further research was warranted.[2] (Level 1)
- An evidence-based, expert consensus guideline related to the standards of care for infusion therapy states that site care, including skin antisepsis, should be performed when the integrity of the dressing or skin underneath the dressing is compromised. The skin should be properly prepared to ensure optimal skin health and dressing adherence. The guideline provides the following recommendations for practice in relation to skin preparation and skin antisepsis.[1] (Level 1-5)
  - The patient's history to any allergy or skin sensitivity should be evaluated prior to skin antisepsis. (Level 3)
  - To facilitate dressing adherence, the excess hair should be removed. Single, patient use scissors or disposable clippers are recommended; do not shave as this may increase the risk for infection. (Level 1)
  - Aseptic non touch technique is always adhered to when providing site care. (Level 5)

- To perform skin antisepsis, apply the preferred agent of alcohol-based chlorhexidine solution using a single use sterile applicator. (Level 1)
  - If chlorhexidine is contraindicated an iodophor (eg, povidone-iodine) or 70% alcohol may be used. If there is a contraindication to alcohol chlorhexidine, aqueous chlorhexidine may be considered. (Level 4)
- Special consideration applies to preterm neonates, low birth weight neonates and within the first 14 days of life:
  - Use povidone-iodine, alcohol-based or aqueous chlorhexidine solution. (Level 1)
  - Both aqueous and alcohol-based chlorhexidine should be used with caution due to risks of chemical burns to the skin. The guideline states there is no evidence to support one antiseptic solution as superior for safety or efficacy in neonates. (Level 3)
  - Tincture of iodine should be avoided due to the potential harmful effect on the neonatal thyroid gland. (Level 1)
  - Antiseptics should be removed once the procedure is complete using sterile water or saline. (Level 3)
- Manufacturer's directions should be followed in relation to product application and dry times. The solution should be allowed to dry naturally; there should be no wiping, fanning or blowing on the skin. (Level 5)

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 13 randomized controlled trials; participant numbers varied from 50 to 480, a total of 3,446 catheters were assessed.[2]
- Evidence-based, expert consensus clinical practice guideline.[1]

Best Practice Recommendations

- Assessment of the patient's history to any allergy or skin sensitivity should be evaluated prior to skin antisepsis. (Grade B)
- Excess hair should be removed using single patient use scissors or disposable clippers; do not shave. (Grade A)
- Always adhere to aseptic non touch technique when providing CVAD site care. (Grade A)
- An alcohol-based chlorhexidine solution is recommended when performing skin antisepsis. If chlorhexidine is contraindicated an iodophor (eg, povidone-iodine) or 70% alcohol may be used. If there is a contraindication to alcohol chlorhexidine, aqueous chlorhexidine may be considered. (Grade B)
- Special considerations to skin antisepsis are recommended for preterm neonates, low birth weight neonates and within the first 14 days of life; a povidone-iodine, alcohol-based or aqueous chlorhexidine solution is recommended, caution is required when using aqueous and alcohol-based chlorhexidine due to the risk of chemical burns; avoid tincture of iodine due to the potential harmful effect on the neonatal thyroid gland; antiseptics should be removed once the procedure is complete using sterile water or saline. (Grade B)

- Manufacturer's directions should be followed when performing skin antisepsis in relation to product application and dry times. (Grade B)

- Skin antisepsis solution should dry naturally once applied; do not wipe, fan or blow on the skin. (Grade B)

References

1. Gorski LA, Hadaway L, Hagle ME, Broadhurst D, Clare S, Kleidon T, et al. Infusion therapy standards of practice, 8th Edition. J Infus Nurs. 2021; 1(44): S1-S224.
2. Lai NM, Lai NA, O'Riordan E, Chaiyakunapruk N, Taylor JE, Tan K. Skin antisepsis for reducing central venous catheter-related infections. Cochrane Database Syst Rev. 2016;7(7):CD010140.

Author(s) potential or perceived conflicts of interest are collected and managed in line with the International Committee of Medical Journal Editors (ICMJE) standards.

How to cite: Porritt, K. Evidence Summary. Central Venous Access Device (Adults and Pediatric Populations): Skin Preparation and Skin Antisepsis. The JBI EBP Database. 2022; JBI-ES-5101-1.

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.