

Povidone-Iodine use in Peripheral Intravenous & Central Line Catheter Insertion

The Clinical Services Team has created this document to answer the clinical question regarding the use of povidone-iodine to prepare the skin for peripheral intravenous and central line insertion in the event that chlorhexidine cannot be utilized.

Device

Povidone-iodine is a skin antiseptic used for disinfection. Povidone-iodine quickly leads to cell death through penetration and oxidation of proteins, nucleotides, and fatty acids of a microorganism. Because of its small size, it is effective against gram-positive and negative bacteria, fungi, protozoa and various enveloped and non-enveloped viruses. Increased exposure time demonstrates activity against some bacterial spores, mature bacterial and fungal biofilms, *in vitro* and *ex vivo*.¹

Clinical Practice Guidelines

A 2002 guideline from the Centers for Disease Control and Prevention (CDC) recommended tincture of iodine, an iodophor (e.g. povidone iodine) or 70% alcohol as alternatives to 2% chlorhexidine-based preparations in cutaneous antisepsis prior to catheter insertion. The guidance stated that all antiseptics should remain on the insertion site and air dry before catheter insertion. It specified that povidone-iodine should remain on the skin for at least two minutes or longer if it is not yet dry prior to insertion.²

According to the American Society of Anesthesiologists Task Force on Central Venous Access, the selection for antiseptic solution recommendation is to use chlorhexidine-containing solutions for skin preparation in adults, infants, and children. However, if there is a contraindication to chlorhexidine, povidone-iodine or alcohol may be used.³ The Centers for Disease Control and Prevention (CDC) offers a summary of recommendations for the prevention of intravascular catheter-related infections and provides the following guidance concerning skin preparation⁴:

1. Prepare clean skin with an antiseptic (70% alcohol, tincture of iodine, an iodophor or chlorhexidine gluconate) before peripheral venous catheter insertion [82]. **Category IB**
2. Prepare clean skin with a >0.5% chlorhexidine preparation with alcohol before central venous catheter and peripheral arterial catheter insertion and during dressing changes. If there is a contraindication to chlorhexidine, tincture of iodine, an iodophor, or 70% alcohol can be used as alternatives [82, 83]. **Category IA**
3. No comparison has been made between using chlorhexidine preparations with alcohol and povidone-iodine in alcohol to prepare clean skin. **Unresolved issue**
4. No recommendation can be made for the safety or efficacy of chlorhexidine in infants aged <2 months. **Unresolved issue**
5. Antiseptics should be allowed to dry according to the manufacturer's recommendation prior to placing the catheter [82, 83]. **Category IB**

Note: 1A-Strongly recommended for implementation and strongly supported by well-designed experimental, clinical, or epidemiologic studies. 1B-Strongly recommended for implementation and supported by some experimental, clinical, or epidemiologic studies and a strong theoretical rationale; or an accepted practice (e.g., aseptic technique) supported by limited evidence. No recommendation means it is an unresolved issue for which evidence is insufficient or not consensus regarding efficacy exists.

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The Infusion Nurses Society offers guidance on using an iodophor (e.g., povidone-iodine) solution or 70% alcohol solution as a vascular access site preparation and skin antiseptic in the event of a **contraindication to chlorhexidine solution**. The product used should dry naturally without wiping, fanning, or blowing the skin following manufacturers' indications for use and directions to determine appropriate product application and dry times.

It is essential **to avoid using tincture of iodine in preterm neonates, low birth-weight infants, and those within the first 14 days of life** due to the risk for harmful effects on the neonatal thyroid gland. The use of povidone-iodine, alcohol-based or aqueous chlorhexidine solution is acceptable in the neonate population. However, the use of both aqueous and alcohol-based chlorhexidine should be used with caution due to chemical burn risks. Studies have not established one antiseptic solution as superior for safety or efficacy in neonates. Regardless of antiseptic utilized in neonates, it should be removed after the procedure is complete using sterile water or saline.⁵

Clinical Evidence

Most of the recent literature reviews the effectiveness of chlorhexidine over povidone-iodine and does not specifically evaluate the drying times. The following may provide some insight as to appropriate dry times, but the above recommendations refer to the instructions for use from the manufacture, and should supersede noted research below.

- A meta-analysis comparing skin antiseptics in venous puncture site disinfection for blood cultures reviewed 26 studies and concluded that the comparison of chlorhexidine vs. iodine compounds was not conclusive. Additionally, alcohol in isolation was not inferior to iodinated products for contamination prevention in venous-puncture drawn cultures. Alcohol and povidone-iodine were of no benefit. Blood culture false-positive results were lower in alcoholic chlorhexidine solutions vs. aqueous povidone-iodine. The researchers reported dry times of 15-30 seconds for alcoholic chlorhexidine, 30 seconds for iodine tincture, and povidone-iodine required approximately 2 minutes.⁶
- Regarding access ports, one study demonstrated the incidence of infection caused by central venous catheters was significantly reduced using povidone-iodine over 83% ethanol to sterilize a port before access. The dry time used in the study was 2 minutes.⁷
- A small (N-53) non-peer-reviewed quasi-experimental study investigated the effectiveness of 10% povidone-iodine solution after a 30-second or 2-minute dry time on microbial count reduction at the point of peripheral intravascular catheter insertion. The researchers found no differences in contamination between the two study groups.⁸

Summary/Considerations:

It is apparent from the information above that chlorhexidine is the preferred skin antiseptic for site preparation in peripheral intravenous and central line insertions. It is also noted that if this preparation cannot be used, povidone-iodine, used as described in the manufacturer IFU, is an acceptable alternative. HealthTrust has a product feature summary for surgical prepping solutions which outlines the IFU for each of the povidone-iodine solutions with site links embedded if further information is desired. This document is available in the contract launch package on the member portal. If you do not have access to the member portal please contact your local supply chain administrator or HealthTrust Account Manager to request a copy of this document.

References

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