**Treatment**

**Chlorhexidine reduced catheter tip colonisation more than 10% povidone-iodine in critically ill neonates**


**QUESTION:** In critically ill neonates, does a chlorhexidine dressing reduce central venous catheter (CVC) tip colonisation and bloodstream infection (BSI) more than 10% povidone-iodine (PI)?

**Design**

Randomised (allocation concealed), blinded [data analysts]*, controlled trial with follow up to catheter removal and culture plus 48 hours*.

**Setting**

6 level III neonatal intensive care units in 4 university teaching hospitals and 2 community hospitals in the US.

**Patients**

705 critically ill neonates (mean gestational age 31 wks, 57% boys, 63% white) who would likely require a CVC for ≥48 hours. Because of severe localised contact dermatitis from the chlorhexidine dressing in infants 22.5 to 26.5 weeks gestational age with a catheter inserted ≤8 days after birth, criteria were modified part way through the study to exclude similar infants. Follow up was between 93% and 100%.

**Intervention**

Neonates were allocated to 1 of 2 groups. In the chlorhexidine group (n=335), the insertion site was cleansed for ≥30 seconds with 70% isopropyl alcohol and allowed to dry. The catheter was then inserted under sterile conditions and covered with the chlorhexidine dressing (polyurethane absorptive foam containing chlorhexidine gluconate, 250 μg/mg) and then a polyurethane dressing. In the 10% PI group (n=370), the insertion site was cleansed for ≥30 seconds with 10% PI and allowed to dry. The catheter was then inserted under sterile conditions and covered with a polyurethane dressing. Primary nurses and physicians independently decided to remove catheters. Skin swabs and catheter tips and hubs were cultured at catheter removal. Dressings were changed every 7 days except for surgical catheter dressings in the 10% PI group, which were changed twice weekly.

**Main outcome measures**

Catheter tip colonisation, BSI without a source, and catheter related bloodstream infection (CRBSI).

**Main results**

Analysis was by intention to treat. Rate of catheter tip colonisation was lower in the chlorhexidine group than in the 10% PI group for all catheters combined (table) and for percutaneous catheters (p=0.002), but not for surgical catheters (p=0.83). Groups did not differ for BSI without a source and CRBSI for all catheters combined (table) and for percutaneous and surgical catheters (p > 0.44 for all comparisons). 15% of neonates weighing ≤1000 grams in the chlorhexidine group and none in the 10% PI group developed localised contact dermatitis.

**Conclusions**

In critically ill neonates, a chlorhexidine dressing reduced central venous catheter tip colonisation, but not bloodstream infection, more than 10% povidone-iodine. Some infants weighing ≤1000 grams developed localised contact dermatis from chlorhexidine.

*Information provided by author.

---

**Chlorhexidine v 10% povidone-iodine (PI) for reducing infection rates in neonates**

<table>
<thead>
<tr>
<th>Outcomes (all catheters) at time of assessment</th>
<th>Chlorhexidine</th>
<th>10% PI</th>
<th>RRR (95% CI)</th>
<th>NNT (CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catheter tip colonisation</td>
<td>15%</td>
<td>24%</td>
<td>40% (10 to 50)</td>
<td>11 (9 to 42)</td>
</tr>
<tr>
<td>CRBSI</td>
<td>3.8%</td>
<td>3.2%</td>
<td>20% (50 to 170)</td>
<td>Not significant</td>
</tr>
<tr>
<td>BSI without a source</td>
<td>15%</td>
<td>14%</td>
<td>10% (20 to 50)</td>
<td>Not significant</td>
</tr>
</tbody>
</table>

BSI = bloodstream infection; CRBSI = catheter related bloodstream infection. Other abbreviations defined in glossary; RRR, RRI, NNT, NNH, and CI calculated from data in article.

**COMMENTARY**

The incidence of CVC infection and associated septicemia is high in critically ill neonates, resulting in substantial morbidity and mortality. Research studies have examined the use of 10% PI as a skin antiseptic agent before CVC insertion, and have reported the systemic absorption of iodine causing hypothyroxaemia in low birthweight infants. Responding to these concerns, the study by Garland et al evaluated the effectiveness of a novel chlorhexidine dressing in reducing catheter tip colonisation by comparing it with the conventional 10% PI skin scrub.

Methodological strengths of the study include a randomised design resulting in similar baseline characteristics between groups, clearly defined criteria for CRBSI and BSI without a source, and few infants lost to follow up. Limitations include a lack of reporting of blinding and not reaching the calculated sample size for statistical power, thus limiting the ability to detect a difference in rates of CRBSI and BSI.

The authors were forced to change their inclusion criteria midway through the study because 5.9% of infants in the chlorhexidine group developed contact dermatitis. Unfortunately, the youngest, smallest neonates (<28 wks gestational age and <1000 g) who are at highest risk of CRBSI and hypothyroxaemia through exposure to PI are also most likely to suffer local contact dermatitis from the chlorhexidine dressing.

This study provides evidence for the advanced practitioner to consider this novel, beneficial approach of using chlorhexidine to reduce the catheter tip colonisation rate, specifically with larger, older critically ill infants requiring a CVC for ≤14 days. The results contribute to our knowledge of catheter related bacteraemia; however, aside from strict adherence to aseptic practices during catheter insertion and subsequent care, few interventions have been shown to reduce BSI rates.

---


---

[For correspondence: Dr J S Garland, St Joseph’s Hospital, Milwaukee, WI USA. jsgarland@hotmail.com]
Chlorhexidine reduced catheter tip colonisation more than 10% povidone-iodine in critically ill neonates

Evid Based Nurs 2002 5: 73
doi: 10.1136/ebn.5.3.73

Updated information and services can be found at:
http://ebn.bmj.com/content/5/3/73

These include:
References
This article cites 4 articles, 2 of which you can access for free at:
http://ebn.bmj.com/content/5/3/73#BIBL

Email alerting service
Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Topic Collections
Articles on similar topics can be found in the following collections
Dermatology (118)

Notes

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/