



# University of HUDDERSFIELD

## University of Huddersfield Repository

Assadian, Ojan and Leaper, David J.

Preoperative skin antisepsis – it ain't what you do but the way that you do it

### Original Citation

Assadian, Ojan and Leaper, David J. (2016) Preoperative skin antisepsis – it ain't what you do but the way that you do it. *Journal of Hospital Infection*, 94 (4). pp. 399-400. ISSN 0195-6701

This version is available at <http://eprints.hud.ac.uk/id/eprint/29665/>

The University Repository is a digital collection of the research output of the University, available on Open Access. Copyright and Moral Rights for the items on this site are retained by the individual author and/or other copyright owners. Users may access full items free of charge; copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational or not-for-profit purposes without prior permission or charge, provided:

- The authors, title and full bibliographic details is credited in any copy;
- A hyperlink and/or URL is included for the original metadata page; and
- The content is not changed in any way.

For more information, including our policy and submission procedure, please contact the Repository Team at: [E.mailbox@hud.ac.uk](mailto:E.mailbox@hud.ac.uk).

<http://eprints.hud.ac.uk/>

## **Preoperative skin antisepsis – it ain't what you do but the way that you do it.**

Ojan Assadian

Professor for Skin Integrity and Infection Prevention, University of Huddersfield, UK

David Leaper

Emeritus Professor of Surgery, University of Newcastle, UK

In 2010, the New England Journal of Medicine published a randomized controlled trial (RCT) which reported the use of preoperative skin antisepsis using 2% chlorhexidine gluconate/70% isopropyl-alcohol (applied with a disposable, purpose-built, sponge applicator and a “scrubbing” technique), or an aqueous 10% povidone-iodine based preparation (applied as a paint), for prevention of surgical site infection (SSI) <sup>1</sup>. Thirty nine of 409 patients in the 2% CHG/70% IPA study arm (9.5%) and 71 of 440 patients in the 10% PVP-I study arm (16.1%) developed an SSI after clean and clean-contaminated abdominal procedures (RR = 0.59; 95% CI: 0.41 – 0.85; P=0.004).

The study led to extensive discussion about the methodology of preoperative skin antisepsis and SSI prophylaxis. The limitation of a comparison of aqueous PVP-I with alcoholic CHG in particular has been highlighted <sup>2</sup>. We agree with this latter observation as it is widely accepted that alcoholic chlorhexidine, and not aqueous chlorhexidine solution alone, is superior to aqueous povidone-iodine in preventing SSIs in clean and clean-contaminated surgical procedures. The clinical effectiveness of CHG, compared with PVP-I skin antisepsis, must be determined in equivalent circumstances for formulation (aqueous or alcoholic) and modality of application (use of a scrubbing technique using a purpose-built applicator or by a simple painting technique).

To strengthen this latter point another similar RCT, also published in the NEJM, adds important insight into this conundrum <sup>3</sup>. This RCT compared the effect of preoperative skin antisepsis using 2% CHG/70% IPA or 8.3% PVP-I/ 72.5% IPA, but using a similar disposable applicator for delivery of each antiseptic prior to Caesarean delivery. Twenty three of 572 (4.0%) patients in the 2% CHG/70% IPA study arm, and 42 of 575 (7.3%) patients in the 8.3% PVP-I/72.5% IPA study arm developed an SSI (RR = 0.55; 95% CI: 0.34 – 0.90; P=0.02). The authors concluded that adding chlorhexidine in alcoholic solution, rather than

povidone-iodine in alcoholic solution, resulted in a significantly lower risk of SSI after clean surgery.

However, in addition to attention to the ingredients of the antiseptic solutions used in the two RCTs, aqueous or alcoholic chlorhexidine or povidone-iodine, there is now an opportunity for a comparison of the method of application: using either a packaged antiseptic sponge applicator or simple painting of the surgical site skin. If the patients who had aqueous 10% PVP-I applied as a paint as in the first RCT<sup>1</sup> are compared with those who had 2% CHG/70% IPA solution applied with an applicator and scrubbing technique<sup>3</sup>, the inferiority to prevent SSI using aqueous 10% PVP-I paint is confirmed again (RR = 0.22; 95% CI: 0.13 – 0.36; P < 0.001). Conversely, if the cohort in the first RCT, who had skin preparation with 2% CHG/70% IPA solution applied with an applicator, is compared with the similar cohort in the Tuuli study, who had skin preparation with 8.3% PVP-I/ 72.5% IPA applied with the identical applicator, there is no statistical significant difference in the frequency of SSI (RR = 1.34; 95% CI: 0.83 – 2.16; P=0.26). It is too early to undertake a Forest plot based on only two RCTs but when they are combined there is a clear superiority for the use of 2% chlorhexidine in alcohol when applied with a sponge applicator.

Although our observation has a number of limitations, including different case-mix and surgical procedures, we conclude that not only which antiseptic in alcohol is applied is important, but also the way it is applied. Perhaps the use of a disposable, sponge applicator enhances delivery of an alcoholic skin preparation, whether it contains chlorhexidine or povidone iodine, deeper into the skin appendages, thereby giving a longer exposure to the antiseptic and help to reduce bioburden not just on the skin surface.

### **References:**

1. Darouiche RO, Wall MJ, Itani KMF, Otterson MF, Webb AL, Carrick MM, Miller HJ, Awad SS, Crosby CT, Mosier MC, AlSharif A, Berger DH. Chlorhexidine–Alcohol versus Povidone– Iodine for Surgical-Site Antisepsis. *New England Journal of Medicine* 2010; 362: 18-26.
2. Maiwald M, Chan ESY. The forgotten role of alcohol: a systematic review and meta-analysis of the clinical efficacy and perceived role of chlorhexidine in skin antisepsis. *PLoS One* 2012; 7: e44277.
3. Tuuli MG, Liu J, Stout MJ, Martin S, Cahill AG, Odibo AO, Colditz GA, Macones GA. A Randomized Trial Comparing Skin Antiseptic Agents at Cesarean Delivery. *New England Journal of Medicine* 2016; 374: 647-55