

## Technique is important for alcohol-based surgical hand antisepsis

**Matthias Maiwald**<sup>1,2,3,4</sup> MD, PhD, FRCPA, D(ABMM)

<sup>1</sup>Department of Pathology and Laboratory Medicine, KK Women's and Children's Hospital, Singapore.

<sup>2</sup>Department of Microbiology, National University of Singapore, Singapore.

<sup>3</sup>Duke-NUS Graduate Medical School, Singapore.

<sup>4</sup>Corresponding author. Email: [matthias.maiwald@kkh.com.sg](mailto:matthias.maiwald@kkh.com.sg)

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Dear Editor,

Surgical hand antisepsis ('surgical scrubbing') has been the topic of a recent article in this journal,<sup>1</sup> as well as of several recent posts on the Australasian College for Infection Prevention and Control (ACIPC) email list 'Infexion Connexion'.<sup>2</sup> The article and the list discussion focused on the use of alcohol-based hand rubs for this purpose, which is a relatively new development in the Australian setting as opposed to 'traditional' surgical hand antisepsis with water and detergent-based antiseptics such as chlorhexidine or povidone-iodine antiseptic soaps. I would like to add another aspect to the discussion; this is the issue of correct technique, including appropriate hand and arm surface coverage, when using alcohols for surgical hand antisepsis.

Alcohols for surgical hand antisepsis have three main advantages. First, they create far greater microbial reduction on hands and arms than is possible with any detergent-based antiseptics.<sup>3</sup> In particular, products that meet the stringent European standard EN 12791, whereby an agent is compared to the reference of 60% (v/v) n-propanol, typically produce logarithmic (log) reductions between 2 and 3, with sustained values at 3 h under surgical gloves of around 2, where the baseline is normal resident hand flora before antisepsis.<sup>4–6</sup> Second, alcohols with added emollients are generally better tolerated on hands and skin than detergents, particularly when frequent antisepsis is necessary.<sup>7,8</sup> Third, the time requirements for alcohol-based antisepsis are shorter; most products require only 3 min (this is also the time specified in standard EN 12791), and there are now newer products that achieve equivalent microbial reduction in only 1.5 min of application.<sup>5,9</sup> However, although microbiological principles and biological plausibility strongly support greater rather than lesser microbial reduction, so far there are no clinical trials showing that this translates into fewer surgical site infections. Alcohol-based as well as detergent-based surgical hand antisepsis has been incorporated into recent guidelines by the US Centers for Disease Control and Prevention (CDC),

the Association of periOperative Registered Nurses (AORN) and the World Health Organization (WHO).<sup>10–12</sup>

There are two types of settings with regard to surgical hand antisepsis: (1) settings where alcohol-based agents have been predominantly or exclusively used for many decades, such as countries in central Europe, and (2) settings where detergent-based antisepsis has been the predominant method, such as Australia or the USA. In settings where something is frequently practised, in particular in the operating room environment, a practice becomes highly ritualised and is taught to new personnel and supervised (often fiercely) by experienced senior nurses or surgeons. Such practices then become engrained and assume elements that are not easily conveyed by textbooks or the scientific literature. In my own surgical internship in Germany, surgical hand antisepsis (termed 'surgical hand disinfection') was practised as follows. For the first procedure of the day, we did a hand and forearm wash with soap and water, including brushing or scraping only under the fingernails. Then, hands and forearms were dried using a sterile standard towel (remaining water on hands would compromise the efficacy of alcohol). This was followed by a 5-min alcohol hand rub (with a liquid product) whereby the alcohol was repeatedly and liberally dispensed from a wall-mounted, elbow-driven dispenser and rubbed onto hands and forearms, such that they were literally kept wet with alcohol and all surfaces covered for the entire period. The alcohol was then left to dry by evaporation.

Current recommendations no longer require washing hands before using alcohol, and the application times have become shorter. The WHO guidelines<sup>12</sup> state that prior hand washing is only necessary when hands are visibly dirty and that for most products, 3 min of application are sufficient. The guidelines recommend approximately 3 × 5 mL (total 15 mL) for the procedure, but they emphasise that it is important to keep hands and arms wet during the entire procedure. In any case, this technique is fundamentally different from regular ward-based hand antisepsis according

to the WHO 5 Moments<sup>12</sup> and will require significant readjustment by those who are new to it. The large overall applied volume also means that alcohol gels appear less suitable than liquid preparations, because gels usually cause more buildup of residual substances, and many gels are antimicrobially less effective than liquid products.

A recent report from the USA<sup>13</sup> highlights a cluster of surgical site infections that was associated with improper use and 'cutting corners' while using a newly introduced alcohol-based surgical hand antisepsis protocol. The alcohol product had to be withdrawn from that institution. It appears that there was a lack of organisational culture and knowledge supporting proper use. Several other articles from non-traditional settings for alcohol antisepsis<sup>8,14</sup> raise serious concern, as they specify unusually small amounts of alcohol antiseptic; only three applications of 2 mL each (total 6 mL) were performed. Although there is no known threshold of effective volume for surgical hand antisepsis, it appears highly unlikely that both hands as well as forearms could be sufficiently covered with alcohol for the entire period of antisepsis when using such small amounts. If there is no complete surface coverage for parts of the procedure, this means that the action of the antiseptic is interrupted. Because of the ritualised nature of operating room practices and some of the non-textbook aspects of the procedure, institutions looking at introducing the practice may want to look closely at the technical aspects of the procedure, and dedicate staff, such as senior operating room nurses or surgeons, to train and supervise others.

## Conflicts of interest

None declared.

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