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Letters to the Editor

Needleless connector decontamination: To use, or not to use, chlorhexidine?

To the Editor:

Since the introduction in the early 1990s of a needleless connector (NC) on vascular access devices to minimize the risk of needle stick injuries to healthcare workers, their use is now well established. Unfortunately, intermittent reports from facilities have shown an increase in bloodstream infections (BSIs) thought to be associated with NC use.^{1,2}

Well-established guidelines^{3,4} advise the use of chlorhexidine in 70% alcohol or povidone iodine wipes for decontamination of the NC prior to each access. If NC decontamination is ineffective or missed, significant numbers of microorganisms will remain on the NC. Slater⁵ et al. swabbed NCs attached to peripheral intravenous catheters that had not been decontaminated, and that were used on patients in medical wards, and found that 50% of NCs were contaminated with microorganisms commonly found on the skin or mouth. Holroyd et al.⁶ observed 44% bacterial contamination of central venous catheter hubs in an intensive care unit, with 2 of the 3 patients with BSIs having the same organisms present on the NC and in the blood, which firmly established the link between NC contamination and BSI.

The combined use of alcohol and chlorhexidine as a skin disinfectant prior to vascular device insertion is known to be superior to alcohol or chlorhexidine alone.^{7,8} As institutions implement alcoholic chlorhexidine for routine skin preparation, anecdotal reports indicate that some have also adopted alcoholic chlorhexidine as their routine NC decontaminant. This may be due to presumed superiority for this use or a desire to streamline product purchasing and storage. In our opinion, this requires some cautious thought. The properties of skin and NCs (plastic/silicone) differ markedly, and it is unclear what effect alcoholic chlorhexidine will have on the NC in terms of microorganism reduction and material compatibility.

Unlike skin decontamination, the superiority of alcoholic chlorhexidine for NC decontamination has not been established in the clinical environment compared to other antiseptics. Some *in vitro* evidence exists on the use of alcoholic chlorhexidine wipes for NC decontamination compared to 70% alcohol wipes or caps. Two studies found chlorhexidine in alcohol wipes to be superior to 70% alcohol wipes; however, when NCs were coated with serum, to mimic clinical use, serum exposure reduced the effectiveness of decontamination in all groups, including chlorhexidine in the alcohol arm.^{9,10} A small number of human studies have suggested that chlorhexidine in 70% alcohol wipes¹¹⁻¹³ is superior to 70% alcohol wipes to prevent infection, although none was randomized, increasing the risk of confounding and bias, and none included the effect on the physical NC as an outcome. Furthermore, alcoholic

chlorhexidine wipes have not been tested against alcohol-impregnated caps in human studies.

Alcoholic chlorhexidine leaves a residue on the external surface of the NC, and it is unclear if this assists in prolonged antimicrobial effect, as suggested by Hong et al.,¹⁴ or whether it potentially degrades the NC over time. With repeated use (multiple accesses of NCs every day), this residue may build up and become sticky and even attract adhesion of environmental materials to the NC surface. Also, if there is inadequate dry time, it is conceivable that some chlorhexidine may be injected/infused into the patient.

In 1998, the Food and Drug Administration issued a public notice about serious hypersensitivity reactions on the skin to chlorhexidine use. Although rare, chlorhexidine reactions can be life threatening¹⁵ and could increase in number if chlorhexidine becomes widely used for NCs. Naturally, it is important to establish, prior to use, if a patient has a sensitivity to any skin antiseptic, but this does not always occur. Another issue is regulatory approval. For example, the Australian Therapeutics Goods Administration has not licensed alcoholic chlorhexidine wipes for use on devices such as NCs, as it has for their use as a skin antiseptic. This does not mean that alcoholic chlorhexidine wipes cannot be used for NC decontamination; however, questions about their use remain unanswered, with no packaging information to guide practice.

A final consideration is cost. Alcohol wipes that contain chlorhexidine are typically more expensive than wipes that contain alcohol alone (e.g. 70% alcohol prep pads, AUD\$3.69 for 200; 2% chlorhexidine in 70% alcohol prep pads, AUD\$4.69 for 200, both Reynard, Artamon: <https://www.pharmacydirect.com.au/>; accessed January 17, 2018). While these are low-cost products, the sheer volume used annually means that small purchase differences can substantially increase institutional costs.

To streamline skin preparation and NC decontamination product ranges, many healthcare facilities have already changed to NC decontamination with alcoholic chlorhexidine wipes. Given the potential issues surrounding the use of chlorhexidine in alcohol wipes for NC decontamination, it would be prudent to conduct further laboratory and clinical studies to determine if chlorhexidine is in fact superior to other antiseptics and if there are any adverse effects on patients or the NC materials.

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Julie Flynn, MAdvPract (HCR), PhD(c)
Cancer Care Services, Royal Brisbane Hospital & Women's Hospital,
Brisbane, Australia

Alliance for Vascular Access Teaching & Research (AVATAR) Group,
Menzies Health Institute Queensland, School of Nursing and
Midwifery, Griffith University, Brisbane, Australia

Karen Slater, MHP&TM*
Griffith University, Brisbane, Australia
Princess Alexandra Hospital, Brisbane, Australia

* Address correspondence to Karen Slater, MHP&TM, Alliance for Vascular Access Teaching & Research (AVATAR) Group, Menzies Health Institute Queensland, School of Nursing and Midwifery, Griffith University, Brisbane, Australia.
E-mail address: karen.slater@health.qld.gov.au (K. Slater).

Marie Cooke, PhD
Alliance for Vascular Access Teaching & Research (AVATAR) Group,
Menzies Health Institute Queensland, School of Nursing and
Midwifery, Griffith University, Brisbane, Australia

Claire M. Rickard, PhD
Alliance for Vascular Access Teaching & Research (AVATAR) Group,
Menzies Health Institute Queensland, School of Nursing and
Midwifery, Griffith University, Brisbane, Australia

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