

Tissue adhesive and chlorhexidine gluconate interaction: Implications for vascular access device securement

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Response to:

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The growing evidence supporting tissue adhesive (TA), or medical-grade superglue, to promote vascular access security has resulted in rapid uptake in clinical settings.^{1,2} TA manufacturers are exploring different chemical compositions to optimize viscosity and strength while maintaining biocompatibility. However, TAs are being applied within already complex clinical situations. Many other chemicals are already being used, and interactions between current practices and emerging technologies need to be examined. We read with interest Di Puccio et al.'s¹ laboratory study demonstrating the safety of applying TA onto a range of uncoated polyurethane peripherally inserted central catheters (PICCs), without adversely affecting the catheter surfaces or mechanical strength. This safety data are reassuring for clinicians currently applying TA onto PICCs made of these materials; however, the interaction with silicone demonstrates further testing with anti-microbial and anti-thrombogenic materials is important.

Further guidance regarding the application of TA is necessary, to ensure its success in the heterogeneous clinical settings where TA is being applied. Chlorhexidine gluconate (CHG) is a vital antiseptic used in combination with alcohol for skin decontamination.³ What is currently unknown from the literature and clinical practice is whether there is potential for adverse interaction between TA and CHG at vascular access insertion sites.

From a chemical perspective, CHG may interact with TAs in two ways. First, the mechanism in which cyanoacrylate TA polymerizes is based on trace amounts of water on skin or in the air initiating the chemical reaction. Both the chlorhexidine and gluconate components of CHG have the potential to act similarly to water and commence the cyanoacrylate TA reaction process. Thus, in the presence of CHG, TA's hardening reaction may be accelerated

which could, theoretically, change the adhesive strength. The second potential interaction is with the alcohol component of CHG (usually isopropanol), which if not fully allowed to evaporate before application of TA may possibly also affect the chemical reaction. Preliminary experiments on healthy volunteers showed 2-octyl cyanoacrylate (Dermabond™; Ethicon, USA) reacted faster and with greater heterogeneity on skin freshly swabbed with 2% CHG with 70% isopropyl alcohol (SoluPrep™ Swab; 3M, USA), compared with non-swabbed skin. The same TA applied to swabbed then dried skin reacted faster than the non-swabbed control, but only at the skin surface.

Dermatitis injuries caused by inadequate CHG drying time prior to dressing application are common.⁴ Vascular access device insertion and dressing change procedures can be hurried, due to non-compliant patients (e.g. paediatrics) and staffing shortages. If TA becomes a primary securement method for vascular access devices, clinicians must ensure adequate CHG drying time, prior to TA application. Otherwise, this new innovation, instead of promoting device security, may possibly be associated with accidental dislodgement and consequential treatment disruption.

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References

1. Di Puccio F, Giacomarro D, Mattei L, et al. Experimental study on the chemico-physical interaction between a two-component cyanoacrylate glue and the material of PICCs. *J Vasc Access* 2018; 19: 58–62.
2. Chan RJ, Northfield S, Larsen E, et al. Central venous access device securement and dressing effectiveness for peripherally inserted central catheters in adult acute hospital patients (CASCADE): a pilot randomised controlled trial. *Trials* 2017; 18(1): 458.
3. Mimos O, Lucet JC, Kerforme T, et al. Skin antisepsis with chlorhexidine-alcohol versus povidone iodine-alcohol, with and without skin scrubbing, for prevention of intravascular-catheter-related infection (CLEAN): an open-label, multicentre, randomised, controlled, two-by-two factorial trial. *Lancet* 2015; 386: 2069–2077.
4. Broadhurst D, Moureau N and Ullman AJ. Central venous access devices site care practices: an international survey of 34 countries. *J Vasc Access* 2016; 17(1): 78–86.