

Active hand warming eases peripheral intravenous catheter insertion

Lenhardt R, Seybold T, Kimberger O, Stoiser B, Sessler DI. Local warming and insertion of peripheral venous cannulas: single blinded prospective randomized controlled trial and single blinded randomized crossover trial. *BMJ* 2002;325:409-12.

Background: The insertion of intravenous catheters into peripheral veins is probably the most commonly performed invasive medical procedure in hospitals. Not infrequently, the procedure can be difficult, requiring several attempts and causing distress to patients.

Question: Does active local warming with a specially designed mitt ease the insertion of peripheral intravenous catheters?

Design: The main part of this study was a single-blinded randomized prospective controlled trial in a university hospital in Austria. Neurosurgical patients who were clinically stable (American Society of Anesthesiologists score of 1 or 2) were recruited. A carbon fibre warming unit, in the form of a cylindrical mitt, was designed for the study. The mitt was placed over the left hand and forearm of each study subject for 15 minutes before catheter insertion. Subjects were randomly allocated to either "active warming" (in which the mitt was warmed to 52°C) or "passive insulation" with the unwarmed mitt. All catheter insertions were attempted by a single nurse anesthetist, who was unaware of the study hypothesis.

The primary end point was the success rate for insertion of an 18-gauge catheter into a vein on the dorsum of the left hand. Secondary end points included the time required for successful catheterization, visibility of the veins, skin temperature and patient comfort.

A second part of the study involved a

similar intervention with a crossover design among a group of patients with leukemia who were undergoing chemotherapy. In this group the mitt was placed over the left hand and forearm for 10 minutes.

Results: All 100 neurosurgical patients who were enrolled completed the main study: 50 subjects were randomly allocated to active warming and 50 to passive insulation. The baseline characteristics were similar between the 2 groups, including the number of patients whose veins were visible and palpable before application of the mitt (12 subjects in each group).

After the mitt was applied for 15 minutes, veins were more often visible and palpable in the active warming group than in the passive insulation group (35 v. 15, $p < 0.001$). Only 3 patients in the active warming group required a second attempt at catheter insertion, as compared with 14 patients in the passive insulation group ($p = 0.008$). The average time to successful catheterization was reduced by almost half in the active warming group (36 v. 62 seconds, $p = 0.002$). Surface skin temperature over the hand was raised 7°C on average, but this was well tolerated by the patients. Similar results were observed in the group of 40 leukemia patients enrolled in the second part of the study.

Commentary: Although this was intended to be a blinded study, it is

likely that the nurse anesthetist was aware of differences in skin temperature among the patients. Whether this knowledge biased the perception of vein visibility and confidence in the procedure can only be speculated. The authors suggest that the observed difference in outcomes was more likely a result of local warming rather than investigator bias.

Implications for practice: This study represents the first randomized controlled trial to confirm the beneficial effect of local hand warming on the success rate of this commonly performed procedure. Although the mitt used in the study is not yet available commercially, alternative methods of local warming, cited by the authors, include the use of a warmed wet cloth or immersion of the hand in warm water.¹ These strategies may be particularly useful for patients with "difficult" veins, such as those undergoing chemotherapy.

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Reference

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