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Local warming of the hand and lower arm improved successful peripheral venous cannulation and reduced insertion time

Lenhardt R, Seybold T, Kimberger O, et al. ***Local warming and insertion of peripheral venous cannulas: single blinded prospective randomised controlled trial and single blinded randomised crossover trial.*** *BMJ 2002;**325**:409–10.*

QUESTION: Does local warming of the hand and lower arm facilitate insertion of peripheral venous cannulas?

Design

Randomised (allocation concealed), blinded (clinicians and outcome assessors) controlled trial and randomised (allocation concealed), blinded (clinicians and outcome assessors) crossover trial.

Setting

Neurosurgical unit and haematology ward of a university hospital in Vienna, Austria.

Patients

100 neurosurgical patients (mean age 53 y, 53% women) who had a physical status score of 1 or 2 (healthy or mild and well controlled systemic disease, American Society of Anesthesiologists) were included in the randomised trial, and 42 patients (mean age 63 y, 52% women) with leukaemia who were scheduled for ≥2 sessions of chemotherapy at least 1 week apart were included in the randomised crossover trial. All neurosurgical patients and 95% of patients with leukaemia were included in the analysis.

Intervention

Neurosurgical patients were allocated to active warming with a carbon fibre warming mitt (Thermamed, Bad Oeynhausen, Germany) warmed to 52°C and placed over the left hand and forearm in the preoperative area (n=50) or to passive warming (mitt not heated) (n=50). The mitt was removed after 15 minutes, and patients were asked to clench their left hands. A tourniquet was applied 10 cm proximal to the wrist, and patients relaxed their hands. One nurse anaesthetist attempted to insert an 18 gauge cannula into a vein on the back of the left hand.

Patients with leukaemia were initially allocated to active warming for 10 minutes (n=20) or passive warming (n=22), and the alternative treatment was applied at the next chemotherapy visit. A haematology resident (junior physician) attempted to insert the cannula.

Main outcome measures

Insertion success rates, time from the start of searching for an appropriate vein (after tourniquet application) to successful insertion of the cannula (confirmed by administration of a crystalloid solution without signs of infiltration), skin irritation, and patient discomfort.

Main results

In neurosurgical patients, the insertion success rate was higher in the active warming group than in the passive warming group (table), and insertion time was 26 seconds shorter (36 *v* 62 s, p=0.002). In patients with leukaemia, insertion success rates were higher in the active warming group than in the passive warming group (95% *v* 73%, $p < 0.001$), and insertion time was 20 seconds shorter (95% CI 8 to 32). No skin irritation was observed, and no patients reported discomfort.

Conclusion

Local warming of the hand and lower arm increased the rate of successful insertion of peripheral venous cannulas and reduced insertion time in neurosurgical patients and patients with leukaemia.

*Active warming v passive warming before insertion of peripheral venous cannulas (neurosurgical patients only)**

Outcome	Active warming	Passive warming	RBI (95% CI)	NNT (CI)
Successful insertions on first attempts	94%	72%	31% (10 to 62)	5 (3 to 13)

*Abbreviations defined in glossary; RBI, NNT, and CI calculated from data in article.

COMMENTARY

Venous cannulation is a common procedure with a relatively high first time failure rate—one that would be unacceptable in other invasive procedures. Most practitioners could relate at least a few "horror" stories of patients with difficult access, and no doubt, more than a few patients view cannulation with some trepidation. When troubleshooting difficult peripheral intravenous access, the use of warmth in various forms is frequently recommended. Lenhardt *et al*, in 2 studies, offer the first evidence of the superiority of this practice over standard insertion.

The designs of the studies were good. Randomisation was secure with an audit confirming the integrity of the allocation sequence. Loss to follow up was minimal. Efforts were made to blind the nurse anaesthetist and residents to group assignment; however, complete blinding was impossible due to the obvious change in hand temperature. Although some subjectivity exists in the method used to determine vein scores, outcomes such as time to insertion, number of failed first attempts, and skin temperature provide quantitative evidence of benefit.

It is clear that use of the Thermamed mitt increases skin temperature and reduces cannulation failure. With an NNT of 5 (95% CI 3 to 13) to obtain first attempt cannulation, the mitt could benefit many patients with little risk of adverse events. Although the device is electrically heated, insulation makes the likelihood of burns low if patients are conscious and peripheral sensation is intact. More careful monitoring may be required in patients with altered consciousness or sensation.

In conducting a second study on patients receiving chemotherapy and confirming the results of the first study, Lenhardt *et al* verify the usefulness of the device in a subset of patients in which venous access is likely to be more difficult. For practical purposes, patients with difficult access may be most likely to benefit from purchase of this device. The question of whether the mitt is superior to other means of topical warming, such as warmed, moistened towels, remains unanswered. The results of such a comparison should be considered before institutions invest in the device for use with all patients.

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