

A Burning Issue

The risk of iatrogenic burns in the paediatric emergency care setting

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Introduction

This case illustrates the risks of thermal injury associated with the use of clinical examination gloves containing warm water to improve the success of peripheral venous access, through local vasodilation¹.

Case Summary

A tracheostomy ventilated 3-year-old, with myotubular myopathy, was admitted to a local emergency department with respiratory failure and hypotension. To aid cannulation, "warm" water filled gloves were applied to his right forearm. After an unspecified time period, the mother noticed areas of redness to the right wrist and hip area. On review following transfer to PICU, an area of erythema on the right wrist and a 0.5% superficial partial thickness burn to the right lateral thigh were documented [Figure 1]. The wounds were dressed and managed conservatively. Following multiple failed peripheral access attempts, Intraosseous access was subsequently obtained.

Figure 1 - Patients Injuries

(Consent for publication obtained from parent)



Area of erythema
on the right ulnar volar wrist



Superficial partial thickness burn to
right lateral thigh

Discussion

The risks posed through inappropriate use of hot/warm water filled gloves as a warming aid need to be recognised by professionals. Thermal injuries secondary to this practice have not been discussed in the literature, however this type of injury is synonymous with the thermal burns that occur in children following accidental exposure to a hot liquid or surface and is potentially comparable to the risks of serious burn injuries associated with the use of hot water bottles [Figure 2]². Of note, to reduce the risk of legionella in water systems, hot water is delivered to the clinical area at a temperature of 55 degrees³

Figure 2 – Mechanism of injury associated with hot water bottle use

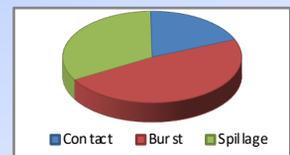


Table 1 – Time to injury⁴

Water Temperature	Time to full thickness burn
56°C	15 Seconds
54.5°C	30 seconds
52.7°C	60 seconds
48.9°C	10 minutes

The severity of an injury is dependant on the temperature of the liquid or surface and the duration of contact with the skin [Table 1]⁴. Wrapping of the glove and/or minimising the duration of contact with the skin may reduce conductive heat transfer, but does not eliminate the risk of burns, should the glove burst. This may result in a significant scald injury. Our patient had reduced mobility and sensory impairments, which may have increased the risk of thermal burns of this nature in this case. In addition, young children also have thinner skin, resulting in deeper burns, for the same temperature and exposure time to a scalding substance, compared to adults³. Iatrogenic thermal injuries such as this can result in considerable pain, prolonged treatment and possible lifelong scarring.

Conclusion

We advise against the use of hot/warm water filled gloves to aid peripheral vasodilation. The use of vein finder devices and ultrasound should be considered when peripheral vein location is more challenging. Intraosseous access should also be considered where there is a delay in gaining IV access. Where alternative peripheral warming therapies are available, their viability should be explored further, however, these may also need to be used with caution.

References

1. Naik VM, Mantha SS, Rayani BK. Vascular access in children. Indian journal of anaesthesia [Internet]. 2019 [cited 2022 Aug 29]; 63(9):737. Available from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6761776/>
2. Jabir S, Frew Q, El-Muttardi N, Dziewulski P. Burn injuries resulting from hot water bottle use: a retrospective review of cases presenting to a regional burns unit in the United Kingdom. Plastic surgery international [internet]. 2013. [Cited 2022 Aug 29]. Available from <http://dx.doi.org/10.1155/2013/736368> Research Article
3. Health and Safety Executive. Legionnaires' disease. The control of Legionella bacteria in hot and cold water systems. London. Health & Safety Executive. HSG274 Part 2. 2014 [cited 2022 August 29] Available from: <https://www.hse.gov.uk/pubns/priced/hsg274part2.pdf>
4. Youngchul J. New Aspects of Burn management. Diagnosis & classification of burns. Magazine for Dermatologists & Plastic Surgeons. 2013 [cited 2022 August 29] Available from: <http://idnps.com/clinical/new-aspects-of-burn-management/1-diagnosis-classification-of-burns/>