Influence of Esophageal Temperature Probe Tip Placement on Core Temperature Measurement Accuracy in Cold Environments: A Randomised Crossover Trial with Implications for Cardiac Arrest Management

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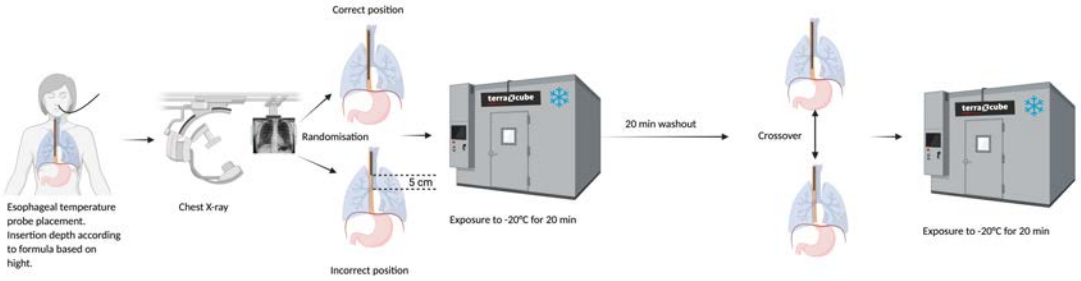
BACKGROUND

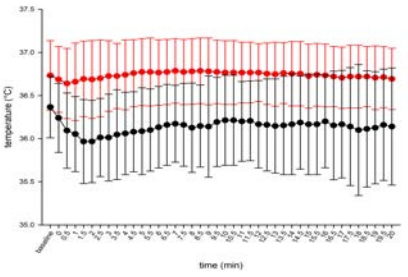
Accurate core body temperature measurement is critical for staging and management in accidental hypothermia, particularly in cardiac arrest where it guides extracorporeal rewarming decisions. Esophageal temperature monitoring is considered the reference method in the prehospital setting in patients with a secured airway. However, it is unknown how an incorrectly positioned probe tip affects measurement accuracy.

METHODS



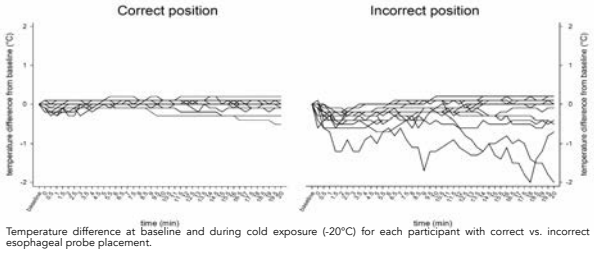
RESULTS

At baseline and at all timepoints during exposure to -20°C, mean CBT was significantly lower when the probe was incorrectly positioned. On average, measurements from the incorrect position were 0.6 °C lower than those obtained from the correctly positioned probe.



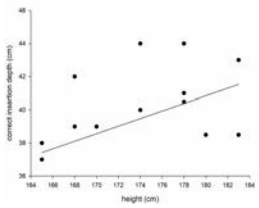
Mean of measured temperature at baseline (+20°C) and during cold exposure (-20°C). Error bars represent standard deviation, red colour indicates the correct position and black colour indicates the incorrect esophageal probe position.

Temperature fluctuations were also greater with the probe in the incorrect position.



Temperature difference at baseline and during cold exposure (-20°C) for each participant with correct vs. incorrect esophageal probe placement.

Radiographically confirmed correct positioning of the esophageal temperature probe was achieved in 60% of participants. Deviations from the optimal position ranged from –3.0 cm to +4.5 cm.



scatterplot of height and correct insertion depth. The straight line represents the insertion depth calculated using the formula by Mekjavić et al.18.

CONCLUSION

Incorrect proximal placement of esophageal probes during cold air exposure results in falsely low and more variable temperature readings. This may critically affect triage and treatment decisions, particularly in hypothermic cardiac arrest, where precise measurement is essential for guiding extracorporeal rewarming.

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