Thermal variations in the patient compartment of an ambulance in an Irish context: A feasibility study

Damien Gaumont¹-², Claire Armstrong¹, Gordon Armstrong³
1: Paramedic Studies, Graduate Entry Medical School, University of Limerick
2: National Ambulance Service, Limerick
3: Bernal Institute, University of Limerick

Background
- The unpredictability of the nature of the next call is a basic feature of Emergency Services.
- It could be a trauma victim, a hypothermic ill patient or a prehospital birth.
- All patients (other than those who are pyrexic) have in common the need for a warm environment to prevent deterioration in their condition.
- Multiple observation studies found that patients suffering from various levels of trauma, arrived in the Emergency Department with degrees of hypothermia.
- Hypothermia, a core temperature <35° C, affects multiple organ systems, and is associated with poor outcomes including death.
- Cold has been reported as negatively impacting the comfort of patients.

Current situation
- It is currently assumed that the ambulance patient compartment's heater (Air Top Evo 40, Webasto™, Gilching, Germany), produces enough heat to offer thermal comfort and to help prevent further decrease of body temperature in the hypothermic patient.
- However, what is not clear is for how long and to what ambient temperature the ambulance's patient compartment needs to be heated, to provide the ambulance furniture with sufficient stored energy to maintain the patient at an appropriate temperature for the duration of their transport to hospital.
- We consider how current practices and behaviours may need to be adapted to improve patient comfort and outcomes.

Objectives
- This study is to determine the feasibility of measuring and monitoring temperatures in a new generation Emergency Ambulance.
- The overarching objective, is to optimise patient comfort, outcome and prevention of hypothermia.

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Method
- Using thermocouples, a data logger and a thermal camera to record temperatures at locations in the patient compartment, we recorded the variation of temperature in a typical new generation Emergency Ambulance compliant with the CEN - EN 1789:2007 standard.
- Thermal imaging and temperature logging studies were conducted on in May/July 2018. Temperature was logged for 24 hours.
- The locations examined were the stretcher mattress surface, low and high storage lockers and the outdoor ambient air.

Results
- The thermal camera images show a significant variation of surface temperature through out the patient compartment.
- Preliminary temperature logging experiments show a measurable difference in temperatures at the areas of interest relative to the outside temperature over 24 hours.
- Some variations in rates of cooling and warming in each area have been observed during the cool – heat period; the stretcher mattress is the slowest to rewarm.

Conclusion
The proposed method of measuring temperature variation in targeted locations of a new generation ambulance proves efficient and could be used in further studies.

References on request.
Correspondence: damien.gaumont@hse.ie
@DamienGaumont  Damien Gaumont

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