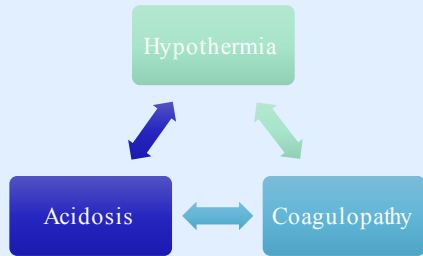


Objectives & Background

Hypothermia in major trauma has been associated with an increase in mortality independent of injury severity score, associated shock or fluid resuscitation¹. There are multiple mechanisms thought to contribute to this but its effects on the clotting cascade and worsening of trauma induced coagulopathy are thought to be the most significant².



It was noted that some trauma patients who required blood transfusion became colder during their time in the ED. The extent of this problem was unknown. We posed the question “How well are we managing the temperature of trauma patients requiring blood transfusion in QEUEH Emergency Department?”

Methods

Patients were identified from the Scottish Trauma Audit Group (STAG) database³

All patients with an Injury Severity Score > 15 had their case notes reviewed and all those who received a blood transfusion were included in the audit.

There were no exclusion criteria above those already imposed by STAG.

We reviewed all medical and nursing notes and recorded:

- Arrival temperature
- Departure temperature
- Attempts made at re-warming

Two cycles have been performed, the first running from 01/06/2015 – 01/06/16 and the second from 01/06/2016 – 01/11/2016.

Between the 1st and 2nd cycles several steps were taken to improve standards.

Interventions

- Findings from the 1st cycle were presented at the ED clinical governance meeting in May 2016.
- In-situ training was carried out with nursing and medical staff to demonstrate options for warming. This included teaching from industry representatives for mistral-air@plus which had been newly acquired for the hospital.
- An updated checklist was created for patients requiring blood transfusion highlighting the importance of anticipating hypothermia, ensuring all fluids are heated, all wet clothes are removed and patient is heated with under and over heating-blankets.
- A “How-To” guide for heating blankets was attached to each of the mistral-air@ plus machines to ensure correct use.
- The temperature of the department has been set at 23 +/- 0.5 degrees. Previously there was no established guide to the ambient temperature and there was no thermostat or thermometer in the resuscitation room.
- The availability of oesophageal/rectal probes was highlighted.
- There are now pre-warmed fluids which are stored in a fluid-warmer cabinet.

Results

	Pre- Interventions	Post-Interventions
Number of months	12	5
ED attendances	81, 625	37, 288
Mean Age	50 (range 22- 96)	45 (21- 68)
Mean ISS	33 (range 16- 54)	33 (range 17-59)
Number of major trauma cases	140	74
Number of major trauma requiring transfusion	25	13
Temperature recorded at any point in the ED	13 (52%)	10 (77%)
More than one temperature recorded	7 (28%)	6 (46%)
Number of patients who had documented evidence of attempts at rewarming	4 (16%)	5 (38%)
Mean temperature on arrival	34.4	35.4
Mean temperature on departure	34.7	35.9
Number of patients who left colder	2	2

Limitations:

It is important to mention that scanning of electronic notes when the QEUEH first opened was not at the standard it is now. In some cases nursing documentation from the ED was missing. Medical notes were available in all but one patient.

Conclusions:

After the first audit cycle it was clear that despite hypothermia being a recognised factor in mortality in major trauma, our department was not routinely monitoring or attempting to control it. A number of factors were thought to contribute to this:

- There is no thermostat for the resuscitation room and “one temperature fits all” has been applied to the whole department. The resuscitation room has a short corridor to the outdoors and is often cooler than other areas of the department.
- On opening of the new hospital, the teams were initially unfamiliar with one another and were accustomed to a variety of equipment and documentation.
- Poor general awareness of the importance of temperature control.
- Task fixation – more urgent issues may have taken priority over keeping the patient warm.

Following the interventions, there has been an improvement in recording of temperatures with 77% of patients getting a temperature recorded at least once within the department. There was also proportionately more documented attempts at re-warming patients. The average departure temperature has increased by an average of 1.2 °C - it is important to mention though that in the second cycle of the audit, the arrival temperature of patients was also higher by 1°C.

There is still much work to be done. In the last month there has been “Skills & Drills” session on the transfer of trauma patients and this covered the importance of keeping these patients warm. New trauma documentation is in the pipeline and ultimately we aspire to have a Trauma App with compulsory checklists which will prompt clinicians to monitor and manage patients’ temperature.

Over time it is hoped that these interventions will be central to a robust system to ensure this uncommon but challenging patient group is managed appropriately.

References & Abbreviations

- Is hypothermia in the victim of major trauma protective or harmful? A randomized prospective study. L M Gentilello, G J Jurkovich, M S Stark, SA Hassantash, G E O’Keefe Ann Surg. 1997 October; 226(4): 439–449.
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We would like to thank STAG for allowing us access to their data.