

Trauma/Disaster Med

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London's Air Ambulance: 3 year experience with pre-hospital transfusion

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Purpose of the study: In 2012 London's Air Ambulance (LAA) became the first UK civilian pre-hospital service to routinely carry packed Red Blood Cells (pRBC) to the scene. Pre-hospital transfusion is considered for patients fulfilling three simple "Code Red" criteria (suspicion or evidence of active haemorrhage, systolic BP <90 mmHg, failure to respond to fluid bolus). We describe pre-hospital transfusion in our service to audit practice and guide implementation.

Material and methods: LAA is an urban physician-led pre-hospital trauma service serving a daytime population of around 10 million. We conducted a retrospective trauma database cohort study to identify all Code Red patients 3 years after implementation of the transfusion practice.

Results: The LAA treated 5528 patients in the 3-year study period of which 321 (5.8%) were Code Red patients that received pre-hospital transfusion. The median age of transfused patients was 31 years (IQR 23–45) and 254 (79%) were men. The patients received a median of 2 units (IQR 1–3). Thoracotomy was performed in 100 (31%) cases. Penetrating and blunt mechanism of injury was seen in 121 (38%) and 197 (61%) of the cases, respectively. Unknown mechanism was denoted in 3 (1%) cases. One unit of pRBC was wasted.

Conclusions: Implementation of pre-hospital transfusion practice is feasible. The service complied with local and national legislation and avoided unnecessary wastage of this precious resource. The practice echoes current "Damage Control Resuscitation" strategies that target more aggressive use of blood products.

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Emergency preservation and resuscitation – Science fiction or the answer for the exsanguinating patient?

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Introduction: Up to 40% of deaths from trauma are due to major haemorrhage and even though injuries are deemed to be surgically repairable there is often not enough time to do so. Emergency preservation and resuscitation (EPR) is a novel future technique to rapidly induce a state of 'suspended animation' via profound hypothermia in patients suffering from an exsanguinating cardiac arrest. EPR may allow the time for surgical repair and delayed resuscitation with no neurological deficit.

Objective: To review the preclinical literature on EPR and discuss its relation to the possibility of its future application in clinical medicine.

Method and results: A standardised search strategy was used across multiple databases in order to identify relevant research in five overarching categories.

1. Feasibility of EPR and its induction
2. Ideal rate, temperature and duration of EPR
3. EPR associated with trauma
4. Substrates used in cooling
5. Future application of EPR

The initial search strategy returned 805 results with 50 paper deemed to be eligible.

Discussion: It has now been shown that 60 min of EPR at 10 °C in exsanguinated pulseless dogs and swine can yield extremely good functional outcomes. The technique is now replicable in a controlled research environment. Literature has specifically explored solutions to the potential difficulties of practically delivering the procedure to the exsanguinating trauma patient and a human trial is currently underway in the U.S.

Conclusion: Despite the huge difficulties in human application, including transport and rapid delivery of the large quantities of fluid required for the procedure, there are promising steps towards making this groundbreaking advancement in resuscitation a reality.

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Selected indicators in the assessment of immunological risk of severe complications after major trauma



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The aim of this study is to determine the immunological indicators which depending on the extent of the injury will have practical significance for the early diagnosis of severe complications after trauma.

Material and methods: The study reported in 52 patients admitted to the ER after trauma. Patients were divided into two groups, the group A ISS ≥ 20 (*n* = 23) and the group B ISS <20 (*n* = 29). Laboratory tests and immunoassays were performed at the time of admission to the ER, and then repeated at 3, 6, 12, and 24 h. The observation included clinical status of each patient, the incidence of complications, the type of treatments and mortality.

Results: In group A, 15 patients had complications, and 5 died, while in group B only 2 patients had complications. The most common complications include respiratory failure and infections. The study of comparable groups of patients showed significant differences only in the concentration of cytokines. The concentration of IL-6 in the group A in the 3rd hour of hospitalization was significantly higher compared with the concentration of IL-6 in the group B tested at the same time. In patients with traumatic complications the concentration of IL-6 was significantly higher compared to those without complications. Similar statistically significant changes in the study groups were found in levels of IL-1Ra. However, they occurred a bit later in the 6th hour of hospitalization.

Conclusion: The concentrations of cytokines correlate with the ISS scale. The pro-inflammatory response syndrome to injury is ahead of the appearance of the inflammatory response. The innate immune response, assessed on the basis of concentrations of cytokines in plasma precedes severe post-traumatic complications,

which may indicate the practical suitability of the parameters as early indicators of the risk of complications and death in patients after major trauma.

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Exploring the issue of occult hypoperfusion in the pre-hospital trauma setting



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Background: Extensive evidence has shown biochemical markers measuring tissue perfusion, namely lactate and base deficit (BD), to be considerably more accurate and reliable than conventional pre-hospital methods. Furthermore, studies have suggested 16–25% of normotensive trauma patients with no clinical signs of shock have abnormal lactate and BD readings evidencing shock; a phenomenon known as occult hypoperfusion (OH).

In light of the scarce quantity of evidence currently documenting OH, this study also aimed to identify the prevalence of OH in the pre-hospital setting and explore ways to improve its identification and management. In addition to this, the study investigated the current factors pre-hospital physicians use to determine the management of trauma patients.

Methods: A quantitative retrospective data analysis was carried out on 75 sets of patient records for trauma patients treated by KSSAAT between November 2013 and October 2014. The KSS HEMS notes and subsequent ED notes were collected. Trends between patients' SBP on scene, whether or not they received PRBCs on scene as well as lactate and BD readings in the ED were assessed. Patients' KSS HEMS notes written by the HEMS crew were also reviewed and recorded.

Results:

- Suspected OH was identified in 7% of the patients who did not receive PRBCs in the pre-hospital phase.
- SBP appears to heavily influence the physicians' decision of whether or not to transfuse PRBCs in the pre-hospital phase.

Preliminary conclusions: We recommend a prospective trial to evaluate whether detecting trauma patients' tissue perfusion status in the pre-hospital phase using portable devices capable of measuring serum BD and/or lactate could aid more accurate detection and management of all haemorrhaging trauma patients, including patients with OH.

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Trauma and analgesics – A retrospective pre-hospital evaluation



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Purpose: In order to elucidate pain treatment of traumas with analgesics in a pre-hospital setting, we wanted to evaluate the use of Visual Analogue Scale (VAS) or any other visualization of treatment effect by an anaesthesiologist manned Mobile Emergency Care Unit (MECU). Secondly we wanted to characterize the patients with most pain according to specific parameters.

Materials and methods: Data from the Mobile Emergency Care Unit (MECU) in Odense, Denmark was extracted and subjected to analysis. Patients in the period of 1st of January 2013 to 31st of December 2014 with the diagnoses multiple injuries, examination and observation following transport accident, examination and observation following other accident and concussion were included in the analysis.

Results: 1027 cases met our inclusion criteria. 40 cases were excluded, primarily due to incomplete data. This left 987 cases to be analysed. VAS was documented in 1 case. In all, 789 patients experienced no pain or mild pain (no pain, $n=244$, mild pain, $n=545$) and 168 patients experienced severe pain or worse (severe pain, $n=155$, intolerable pain, $n=13$).

In the severe pain group, 138 were treated with opioid analgesics or S-Ketamin (approximately 14% of all the included patients) while no pharmacological intervention was documented in 30 cases. 8 of the 138 cases needed endotracheal intubation. 11 cases in the patients with mild or no pain needed endotracheal intubation, Odds ratio (OR) = 4.2 ($p=0.0026$).

In all, 58 patients were diagnosed with multiple traumas; 42 in the group of patients with severe or intolerable pain versus 16 in the group of mild or no pain, OR = 15 ($p<0.0001$).

Conclusions: Effect was not documented by the anaesthesiologist after administering analgesics in a trauma patient population, where approximately 14% of patients needed treatment of pain and 6% were diagnosed with multiple traumas.

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