DEM Journal Club

Article Appraisal

Article: Plasma-first resuscitation to treat haemorrhagic shock during emergency ground transportation in an urban area: a randomised trial

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Background and Study Objective(s):

In the last decades, the focus for trauma resuscitation has evolved towards Trauma Induced Coagulopathy and earlier use of blood products through massive transfusion protocols, including FFP. In the prehospital setting, minimizing crystalloids with early initiation of blood products could be of benefit by initiating its use before or at the development of coagulopathy, hypotension, and acidosis. Trials done on prehospital use of plasma, to date, showed no benefit but were limited in size and with significant survivor bias. This led to the simultaneous creation of two major RCT's studying prehospital use of plasma for trauma resuscitation. This trial, Control of Major Bleeding After Trauma trial COMBAT, looks at ground prehospital plasma use.

Study Design:

This trial is a single center RCT, conducted from 2014 to 2017 at the Denver Medical Health Center, a level 1 trauma center. Patients included were adults presenting after trauma with sBP <70, or sBP 71-90 but with HR >108, thought due to acute blood loss, and were excluded if pregnant, prisoners, asystolic or required CPR before randomization, an isolated head gunshot wound, family objection or known objection to blood products. In this previously published protocol, once eligibility established by attending paramedics, patients were 1:1 block randomized in groups of 20 based on the hidden contents of a sealed cooler delivered by study staff not involved in enrolment. If randomized to the intervention group, the cooler would contain two units of fresh frozen plasma, which was thawed and given. If randomized to the control, the cooler instead contained a similar volume of frozen water, which prompted paramedics to give NS only per usual standard of care.

Study Question:

Does the use of plasma for prehospital resuscitation of trauma patients lead to improved mortality?

Results:

Primary outcome was mortality within 28 days, which was established either by chart review, or by phone contact if discharged before that time. Secondary outcomes included laboratory and clinical indicators of multiorgan failure, trauma induced coagulopathy and shock, as well as "exploratory outcomes" which included time from injury to need for first RBC transfusion, number of ventilator or ICU free days, and safety outcomes like transfusion related acute lung injury.
Of this group of 144 young, hypotensive trauma patients, most with blunt trauma and ISS >25, there was no significant difference in 28 day mortality, time to hospital arrival, coagulation studies, transfusion requirements, acute lung injury, multiorgan failure, ventilator or ICU free days; however given low numbers, the confidence intervals were wide. Analyses were completed per protocol and by intention to treat with no change in overall results. The trial was terminated early for futility based on an interim analysis.

Strengths:

This is a clinically important question, asked in a pragmatic way from a systems perspective, and with a thorough and appropriate study design and analysis. Funders (US military) had no role in design, and study was blinded to the point of randomization. Outcomes were concrete and relevant to patients and providers.

Limitations:

Broad, simple inclusion criteria may limit our understanding of which subsets of patients could benefit from this treatment. Given the small numbers and very optimistic power calculations (for a predicted 19% mortality difference), this trial was not powered to understand a smaller mortality benefit or any of the secondary outcomes.

Generalizability of Results:

This group of 144 trauma patients were mostly young, with blunt trauma and average ISS >25, and had on average a very short transport time (<30min) to a single Level 1 center. This patient population is similar to ours, but given the geographical size of our catchment areas and relatively longer transport times, as well as our provincial rather than hospital-based EHS system, this may not be entirely generalizable to our practice.

The Bottom Line:

In this RCT of ground prehospital use of plasma for resuscitation of young patients with significant trauma, shock and transport times less than 1 hour, there was no survival or other benefits when compared against standard of care (crystalloid only). There were no adverse events or safety concerns, however given the significant cost and effort required, there is no justification for its use in this context.