
Abstracts

□ **EXAMINING OUTCOMES IN CASES OF ELDERLY PATIENTS WHO FELL FROM GROUND LEVEL AT HOME WITH NORMAL VITAL SIGNS AT THE SCENE: AN ANALYSIS OF THE NATIONAL TRAUMA DATA BANK.**

Ahmed N, Greenberg P, *Journal of Trauma and Acute Care Surgery* 2019;87(3):672–677

Prior studies have shown an increased burden of serious injury in the elderly population due to a fall from ground level (FFGL) and have demonstrated a mortality benefit from transferring elderly patients with major traumatic injuries to a higher level of care. This study investigates whether a mortality benefit is maintained in the cohort of elderly patients who suffered a FFGL and were taken to either a level I or Level II trauma center yet had a favorable physiologic profile at the time of the fall.

This was an observational study utilizing the National Trauma Data Bank (NTDB) to identify all patients from 2012 to 2014 who were age 65 or older, were brought to any hospital due to a FFGL suffered at their residence, had a Glasgow Coma Scale (GCS) of 15, heart rate (HR) between 60-100 beats per minute and systolic blood pressure (SBP) between 90-160. This cohort was divided into two groups determined by whether they were taken to a higher-level facility (Level I or II trauma center) or a lower-level care institution (Level III or IV trauma center or unranked/nontrauma center). After initial analyses, patients were one-to-one propensity score matched by selecting a patient in the higher-level care group (Group 1) and matching them with a patient in the lower-level care group (Group 2) according to the following variables: age, sex, race and ethnicity, respiratory rate, Injury Severity Score (ISS) and comorbidities such as smoking, chronic kidney disease, prior stroke, diabetes and hypertension. Primary outcome was in-hospital mortality while secondary outcomes included time to death, total length of stay, and patient disposition at discharge.

Before matching, patients in Group 1 had significantly higher rates of comorbidities than Group 2. After matching there were 18,813 patients in each group and the statistically significant differences in comorbidities were eliminated. A statistically, but not clinically, significant difference in median ISS remained (9 [4-9] vs. 9 [4-9]). The overall in-hospital mortality rate was 2.5% (95% CI, 2.3%-2.7%) for the higher care group vs 2.3% (CI 95%, 2.1%-2.5%) in the lower care group (p=0.19). Differences in traumatic injuries were reported, with Group 1 showing higher rates of brain contusion, c-spine fractures, rib fractures, pneumothorax and liver injuries. Group 2 had higher rates of intertrochanteric and femoral neck fractures. There was no significant difference in the primary outcome of in-hospital



mortality between the two groups. Regarding secondary outcomes, more patients in Group 1 were able to be discharged home without any assistance compared to Group 2, although over half of patients in each group required transfer to a skilled nursing facility (SNF) at discharge.

The authors conclude that their study demonstrates there is no mortality benefit or significant reduction in hospital length of stay for elderly patients with a normal hemodynamic and physiologic profile who present to the highest-level trauma centers vs other hospitals after a ground-level fall. Despite the lack of mortality benefit, elderly patients may benefit from increased resources available at level I and Level II facilities as evidenced by the greater number of patients that were discharged home without further assistance.

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Commentary: This study suggests that elderly patients who suffer ground-level falls and present with normal vital signs and a GCS of 15 may not need assessment at a Level I or Level II trauma center. The current National Trauma Triage Protocol Field Triage Decision Scheme recommends considering transporting elderly trauma patients directly to a trauma center. Adhering to this protocol may involve bypassing the nearest facility in favor of a designated trauma center often located miles from a patient's home and support system. Allowing elderly trauma patients with a favorable hemodynamic profile and minimal risk factors who suffer FFGL to be initially assessed at their local facility could potentially result in tremendous healthcare savings without posing undue risk to these patients.

□ **SAFETY PROFILE AND IMPACT OF LOW-TITER GROUP O WHOLE BLOOD FOR EMERGENCY USE IN TRAUMA.**

Williams J, Merutka N, Meyer D, et al. *Journal of Trauma and Acute Care Surgery*. 2019. [Epub ahead of print]

Whole blood (WB) is often used in trauma patients in the combat setting but is seldom used in civilian trauma. The convenience of WB compared to transfusing separate red blood cells (RBCs), platelets, and plasma is only one of the advantages to using WB. There is also evidence to support that WB provides higher levels of hematocrit, coagulation factors and platelets.

This is a single center, prospective observational study comparing outcomes in patients who undergo emergency traumatic resuscitation using low-titer group O-negative whole



blood (LTO-WB) with those resuscitated with separate component transfusions. Trauma patients 16 years or older who received pre-hospital or emergency department (ED) transfusions of uncrossed blood products, including LTO-WB, RBCs and plasma, between 11/1/17 and 7/1/18 were included. Low-titer is defined as having anti-A and anti-B titers less than 1:256, which previous research has shown to be safe for emergency release blood products. While the indications for WB and component transfusions were the same, the decision to use one or the other was at the flight team or trauma attending's discretion. For analysis, the patients were divided into groups of those who only received component transfusions with RBCs and plasma (COMP group) and those who received any WB (LTO-WB group). The primary outcome was clinical or laboratory evidence of hemolytic transfusion reactions, specifically any change in serial hemolysis panel labs (creatinine, potassium, LDH, total bilirubin, and haptoglobin) or change in P/F ratios at 3, 24, and 48 hours. Patients were also monitored for clinical development of other transfusion related complications, including transfusion-related acute lung injury (TRALI) within 6 hours of last transfusion (defined as hypoxemia with P/F ratio less than 300 mmHg and new bilateral infiltrates on chest x-ray in the absence of left atrial hypertension), and transfusion associated circulatory overload (TACO) within 12 hours after transfusion (defined as acute worsening respiratory distress with evidence of acute or worsening pulmonary edema and volume overload). Other complications included transfusion reactions severe enough to be documented in the chart or necessitating pause or discontinuation of the transfusion, such as urticarial rashes, anaphylaxis, tachycardia, or chills and fever within 1 hour of transfusion. The secondary outcomes were post-ED blood product transfusions and 30-day survival, analyzed using a multivariate logistic regression model.

Of the 5029 trauma patients admitted over this 8 month period, a total of 350 patients received uncrossed, emergency release blood products in either the pre-hospital or ED setting. The LTO-WB group consisted of 198 of these patients, while the remaining 152 were in the COMP group. The groups did not differ in age, sex, race, BMI, mechanism of injury, or Injury Severity Score (ISS), however the LTO-WB group had higher chest-specific Abbreviated Injury Scale (AIS) (median 3 vs. 2; $p=0.027$). The LTO-WB group also had lower arrival systolic (median 94 vs. 105; $p=0.005$) and diastolic blood pressures (median 59 vs. 65; $p=0.023$), lower arrival pH (median 7.22 vs. 7.26; $p=0.011$), higher lactate levels (median 5.1 vs. 3.5; $p<0.001$), and worse base excess (median -7 vs. -5; $p=0.014$). The groups received a similar number of transfusions in the ED (WB equal to 1 unit plasma and 1 unit PRBC), however the LTO-WB group required less overall products after leaving the ED (median 0 vs. 3; $p=0.001$). There was no significant difference in hemolysis panels between the groups over time, with the exception of slightly lower total bilirubin at 24 hours in the LTO-WB group (median 0.7 vs. 1.1; $p=0.014$). This study only had two recorded transfusion reactions, with both cases of suspected TRALI being in the COMP group ($p=0.061$). Using a multivariate logistic regression model controlling for age, pre-hospital blood pressure, arrival pH, mechanism of injury, and chest AIS, the LTO-WB group was an independent predictor of increased

30-day survival (OR 2.19; 1.01-4.76; $p=0.047$) compared to the COMP group. When controlled for age, pre-hospital blood pressure, arrival pH, mechanism of injury, and ISS, the LTO-WB group was associated with reduced post-ED blood transfusions (OR 0.47; 0.23-0.94; $p=0.033$) compared to the COMP group.

The authors concluded that emergent transfusion of cold-stored LTO-WB is safe in civilian trauma patients. They go on to include that LTO-WB was not associated with increased transfusion reactions, increased laboratory evidence of hemolysis, or mortality. The authors highlight that their data is even more significant when you consider the LTO-WB group had more severe chest injuries with worse arrival vitals and higher evidence of shock by laboratory values. The logistics of WB transfusions are also important to consider. Not only is it more convenient to transfuse all the components in one bag, but it also reduces the number of donors a patient is exposed to while minimizing overall transfusion volume. The authors note this study was the first to identify a statistically significant association between WB transfusions and 30-day survival, however state that a randomized control trial is still needed to fully evaluate the effect of WB on mortality. The limitations of this study include possible selection bias in the decision between LTO-WB and COMP, with whole blood possibly being saved for the more severely injured patients, as well as difficulty generalizing this single center prospective observational study to other institutions considering the definition of "low-titer" for whole blood can vary between hospitals.

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Comment: Although there is obvious bias affecting this study, it still provides interesting information about a topic that has become more popular in recent years. If further research continues to support the use of LTO-WB, integrating it into practice will still largely depend on individual hospitals adopting it as standard of care.

□ **EFFECT OF LOW-DOSE SUPPLEMENTATION OF ARGININE VASOPRESSIN ON NEED FOR BLOOD PRODUCT TRANSFUSIONS IN PATIENTS WITH TRAUMA AND HEMORRHAGIC SHOCK: A RANDOMIZED CLINICAL TRIAL.**



Sims CA, Holena D, Kim P, et al. *JAMA Surgery* 2019. doi:10.1001/jamasurg.2019.2884

Trauma is the leading cause of death in adults under the age of 45, with 72% of mortality attributable to hemorrhage. Shock in the setting of trauma has long been managed by volume resuscitation, both with crystalloid and blood products. However, resuscitation with large fluid volumes is not without adverse effects and can lead to coagulopathy, acute lung injury, and abdominal compartment syndrome. It is possible that vasopressors, such as the hormone arginine vasopressin (AVP), could limit blood transfusion volumes required during trauma resuscitation and decrease the risk of associated complications. AVP is widely used in critically ill medical patients, but evidence