

The prehospital use of younger age whole blood is associated with an improved arrival coagulation profile

Thomas Clements, Cameron McCoy, Scott Assen, Jessica Cardenas, Charles Wade, David Meyer, Bryan A Cotton

J Trauma Acute Care Surg. 2021 Apr 1;90(4):607-614

Abstract

Introduction: Recent in vitro data have shown that the hemostatic profile of whole blood (WB) degrades significantly after 14 days, yet the optimal storage remains debated. We hypothesized that arrival coagulation studies would be improved in patients receiving younger WB in the prehospital setting.

Methods: This study was approved by our institutional review board. We evaluated all trauma patients who received prehospital blood products by our helicopter service between July 2017 and July 2019. "Young" WB was defined as 14 days or less. Patients who received at least 1 U of young WB were classified as YOUNG, while the remainder was classified as OLD. Continuous data are presented as medians (25th-75th interquartile range) with comparisons performed using Wilcoxon rank sum. Assessments of clinical hemostatic potential included arrival platelet cell count and rapid thrombelastography. Multivariate regression analysis was also performed (Stata 12.1; College Station, TX).

Results: A total of 220 patients received prehospital WB during the study period. Of these, 153 patients received YOUNG WB, while 67 were transfused only OLD WB units. There were no differences in demographics, prehospital or arrival physiology, or Injury Severity Score among the two groups. The measures of clot initiation (activated clotting time) and kinetics (k time) were improved, as were the measures of clot acceleration/fibrinogen function (angle) and platelet function (maximum amplitude). As well, arrival platelet count was higher in the YOUNG cohort. No significant differences in postarrival transfusion were noted ($p = 0.220$). Multivariate analysis showed the greatest differences in maximum amplitude and α angle but failed to reach significance.

Conclusion: Previous in vitro data have suggested deterioration of platelet function in cold-stored WB after 14 days. The current study demonstrated decreased global hemostasis by clinically available laboratory tests, especially related to fibrinogen and platelet interactions on univariate, but not multivariate analysis. This did not translate into increased transfusion requirements. Further studies are needed to determine the optimal storage duration for cold-stored WB for transfusion in the bleeding trauma patient, as well as rule out the presence of confounding variables.