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Direct Hospital Costs Associated with Prehospital Whole Blood Transfusion in Adult Trauma Patients: A Matched Cohort Study

Background:
Prehospital whole blood (WB) transfusion is increasingly used to improve early resuscitation of severely injured trauma patients; however, its association with hospital costs and resource utilization remains poorly understood. We evaluated differences in direct hospital costs and resource utilization between trauma patients receiving prehospital WB and matched historical controls.

Methods:
Adult trauma patients receiving prehospital WB after implementation of the Omaha Fire Department prehospital WB program in July 2025 were retrospectively identified through the Nebraska Medicine Trauma Registry. Historical controls were matched 1:1 on sex, injury mechanism, trauma activation level, age, Glasgow Coma Scale, and prehospital shock index. Total direct hospital cost was the primary outcome. Secondary outcomes included hospital and ICU length of stay, massive transfusion protocol (MTP) activation, massive transfusion ≥10 units, and in-hospital mortality. Matched outcomes were analyzed using Wilcoxon signed-rank and McNemar exact tests. An exploratory sensitivity analysis evaluated surviving matched pairs.

Results:
Eleven WB patients were matched with 11 historical controls, with good baseline covariate balance. Median total direct hospital cost was higher in the WB cohort than controls ($24,668 vs. $8,963), although the difference was not statistically significant (p=0.075). Hospital length of stay was also longer (10.3 vs. 1.9 days; p=0.091). In the sensitivity analysis excluding two pairs involving control-group deaths, total direct hospital cost remained significantly higher among WB survivors ($22,547 vs. $3,997; p=0.038). Hospital length of stay remained longer (9.5 vs. 1.7 days; p=0.051), while direct cost per hospital day did not differ ($2,597 vs. $3,585; p=0.314). MTP activation was more frequent in WB patients (100% vs. 36.4%; p=0.016), although massive transfusion ≥10 units did not differ (9.1% vs. 9.1%; p=1.000). Mortality was 0% versus 18.2% (p=0.500).

Conclusions:
Prehospital WB patients had higher observed cumulative hospital costs, although the primary paired analysis was not statistically significant. Higher cumulative costs persisted among survivors despite similar daily spending intensity. These findings are consistent with the

possibility that differences in cumulative cost were related in part to longer hospitalization and greater opportunity for downstream resource utilization. Findings should be interpreted cautiously given the small sample size and potential residual differences in injury severity.