Clinical Outcomes & Utilization Trends

Prehospital Whole Blood Program — Grady EMS

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Disclosures

I have no commercial relationships, financial disclosures or conflicts of interest

What We'll Cover

- Utilization trends
- Clinical & hemodynamic outcomes
- Spatial & socioeconomic patterns
- Data-driven, equitable deployment

THE CLINICAL CASE

Why Prehospital Whole Blood

41,000

people died of motor-vehicle crash injuries in 2023

43%

of those patients were still alive when first responders arrived

37%

of trauma patients with severe bleeding could potentially be saved by prehospital blood

WHY BUILD A PROGRAM

Improved patient outcomes

4× more likely to survive; 60% less overall blood required

Enhanced EMS capability

Clinicians meet the needs of complex trauma patients faster

Faster progress on roadway fatalities

Traffic deaths rose 30% from 2013–2022 prehospital blood can bend that curve

Source: NHTSA, EMS.gov prehospital blood transfusion program materials

GRADY EMS

Program at a Glance

Only Level I trauma center
in the city of Atlanta

360 sq mi / 690,000
Region 3, Fulton County

~162,000
annual 911 calls

March 21, 2024
Program implementation date

Low-titer O+ whole blood
(LTOWB) carried in the field

24 ZIP codes
reached by the program to date

MAR 2024 – JUN 2026

Utilization Snapshot

782
total patients transfused

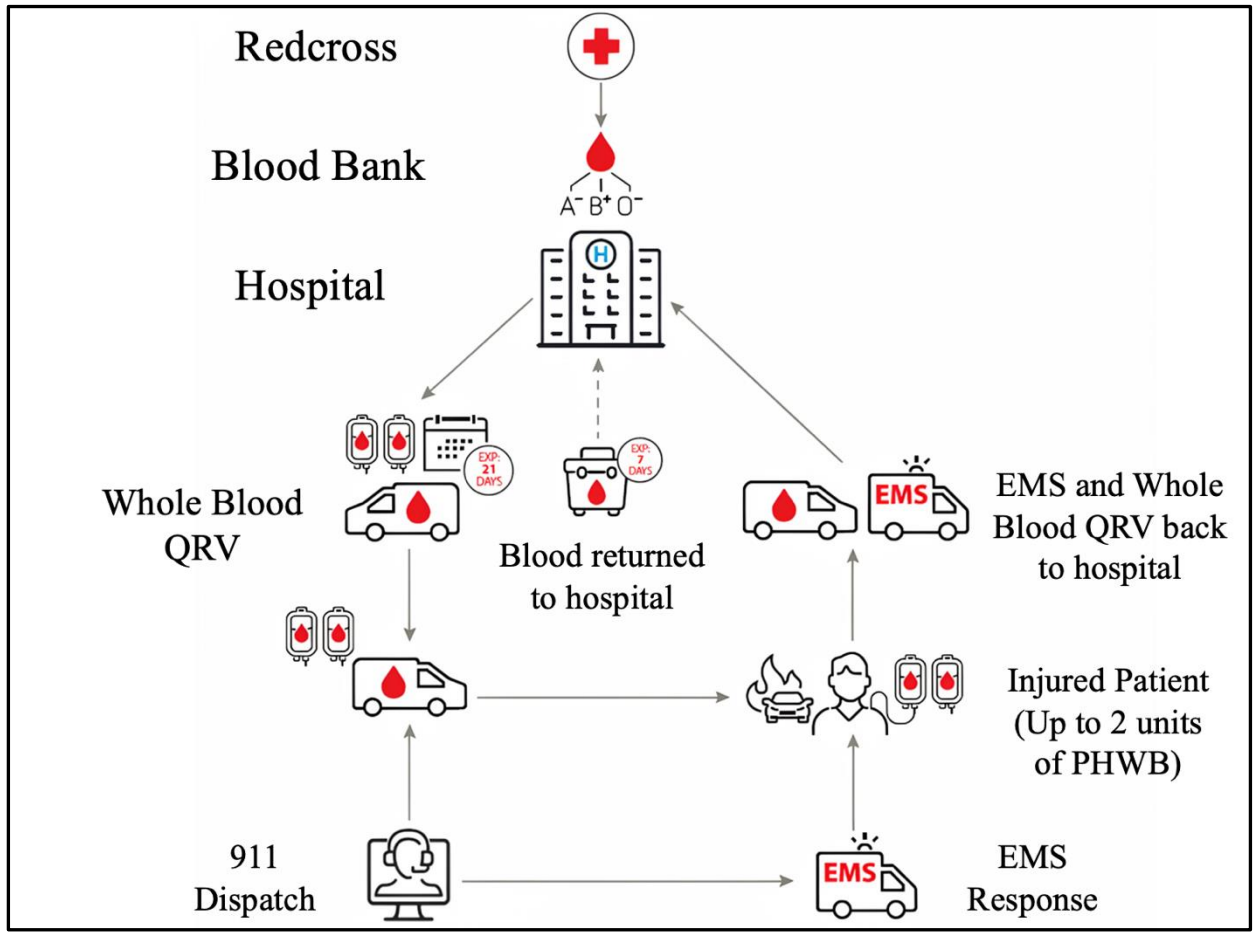
1213
trauma units administered

24
ZIP codes reached

64%
Penetrating trauma

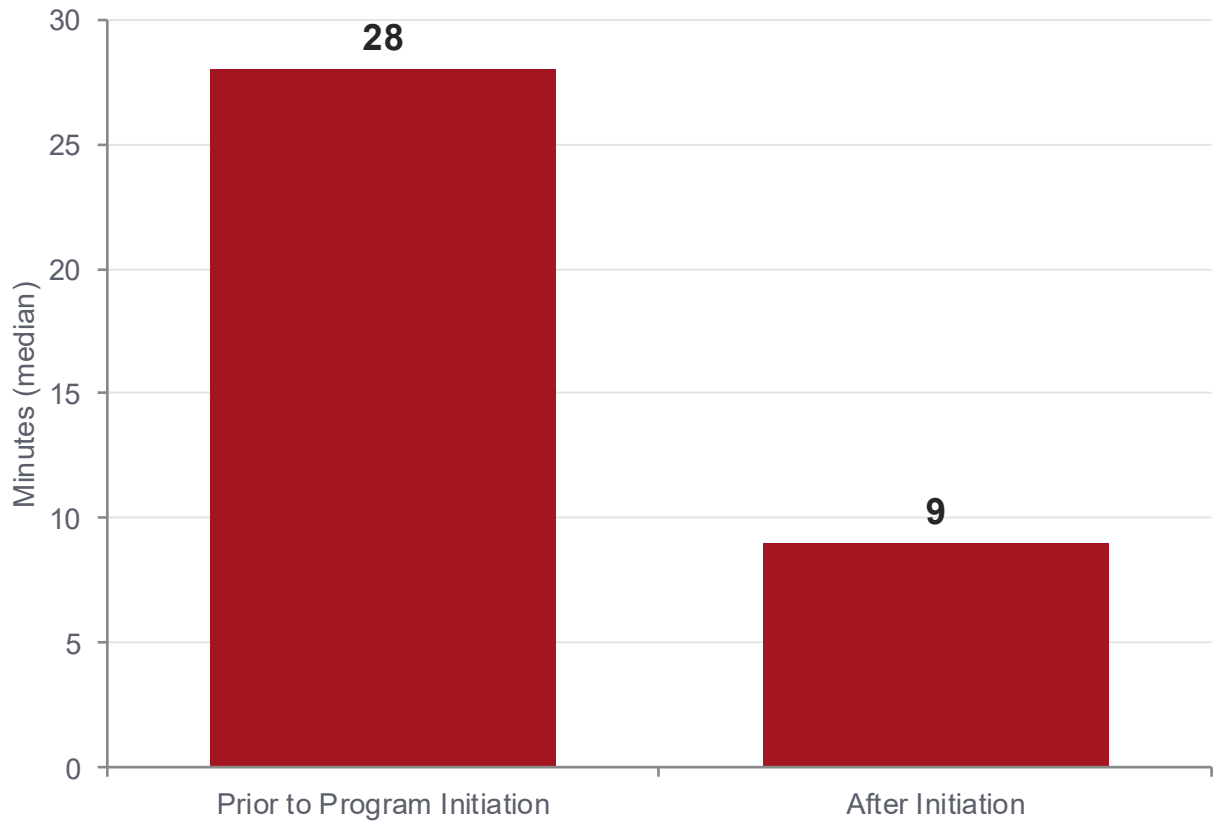
34
median patient age

53%
trauma patients given >1 unit



SYSTEM IMPACT

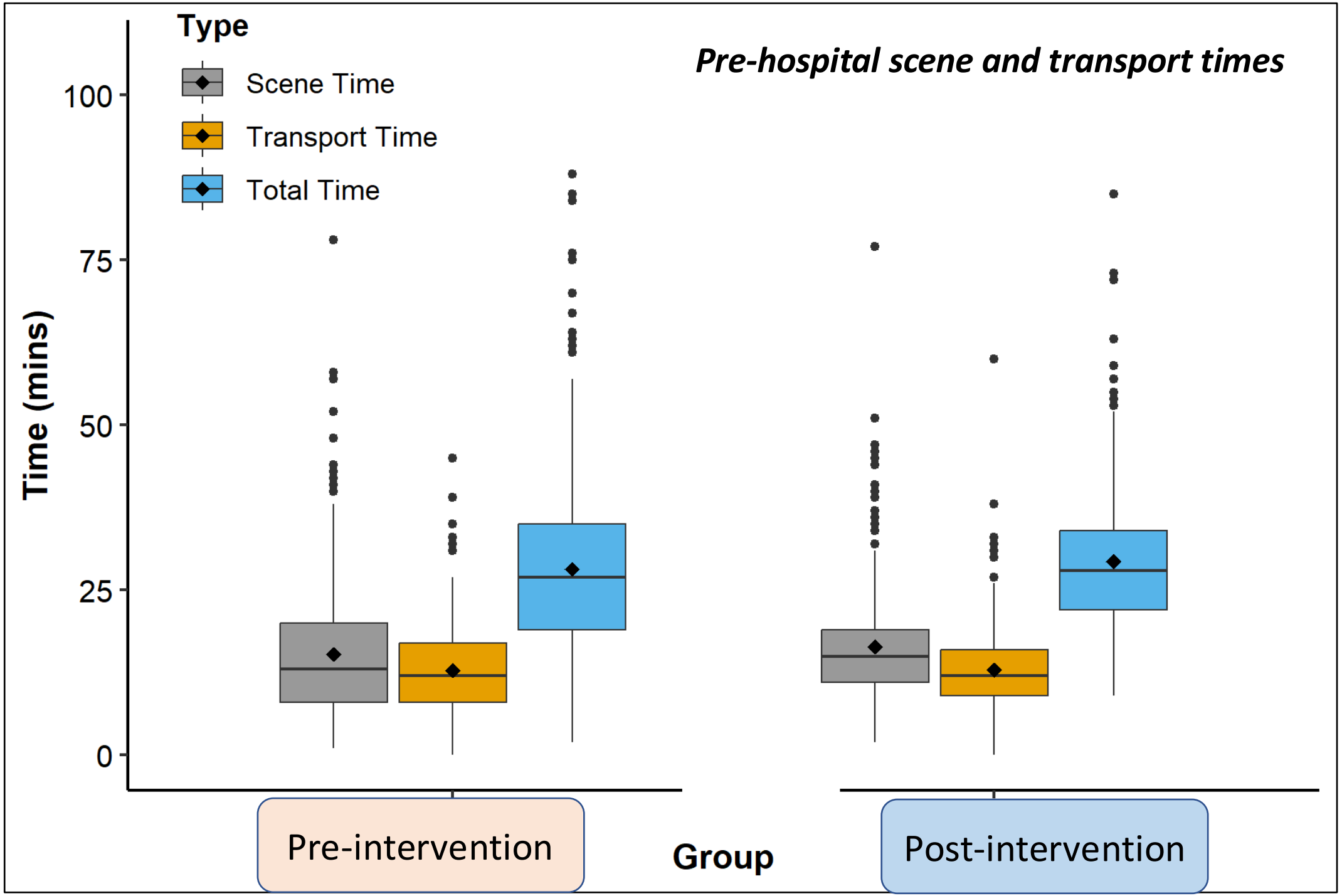
Time from Patient Contact to Transfusion



68%

faster time to transfusion after program launch

Faster hemostatic resuscitation at the point of injury translates directly into the hemodynamic gain


Type
Scene Time
Transport Time
Total Time
Pre-hospital scene and transport times
Time (mins)
100
75
50
25
0
Pre-intervention
Group
Post-intervention

FIELD TO TRAUMA CENTER

Hemodynamic Improvement

Systolic BP	78 mmHg	→	**110 mmHg**	**+32**
Heart Rate	108 bpm	→	**88 bpm**	**–20**
Shock Index	1.4	→	**0.8**	**–0.6**

Pre-administration → Post-administration, Grady EMS PHWB Administration Data (Mar 2024 – Feb 2026)

PROSPECTIVE PRE/POST STUDY

Study Design

INCLUSION CRITERIA

- Age ≥ 15 years
- Traumatic mechanism of injury
- Systolic BP < 90 mmHg

PRE-INTERVENTION

Mar 2022 – Mar 2024

Control group
N = 485

POST-INTERVENTION

Mar 2024 – Sept 2025

PHWB group
N = 390

Compared: demographics • field vitals • transfusion data • hospital course • hemodynamics on arrival

TABLE 1 — BASELINE COMPARISON

Cohort Characteristics

Characteristic	Pre-Intervention (N=485)	Post-Intervention (N=390)
Age, median [IQR]	36 [26–52]	**34 [25–43]**
Male	78.8%	**82.6%**
Black	82.7%	**84.4%**
Penetrating injury	56.7%	**70.5%**
Gunshot wound	49.3%	**57.7%**
Motor vehicle collision	17.1%	**8.7%**
Injury Severity Score, median [IQR]	18 [10–33]	**17 [19–28]**

PRE/POST STUDY RESULTS

Key Clinical Outcomes

Overall Mortality

39.6% ↓ **19.0%**

pre post

aOR 0.36 [0.25–0.53], p<.001

Massive Transfusion (MTP)

21.4% ↓ **16.9%**

pre post

fewer activations post-intervention

Total Units Transfused (4hr)

5.14 ↓ **3.54**

pre post

aOR 0.56 [0.43–0.73], p<0.001

TABLE 2 — ADJUSTED PRE/POST COMPARISONS

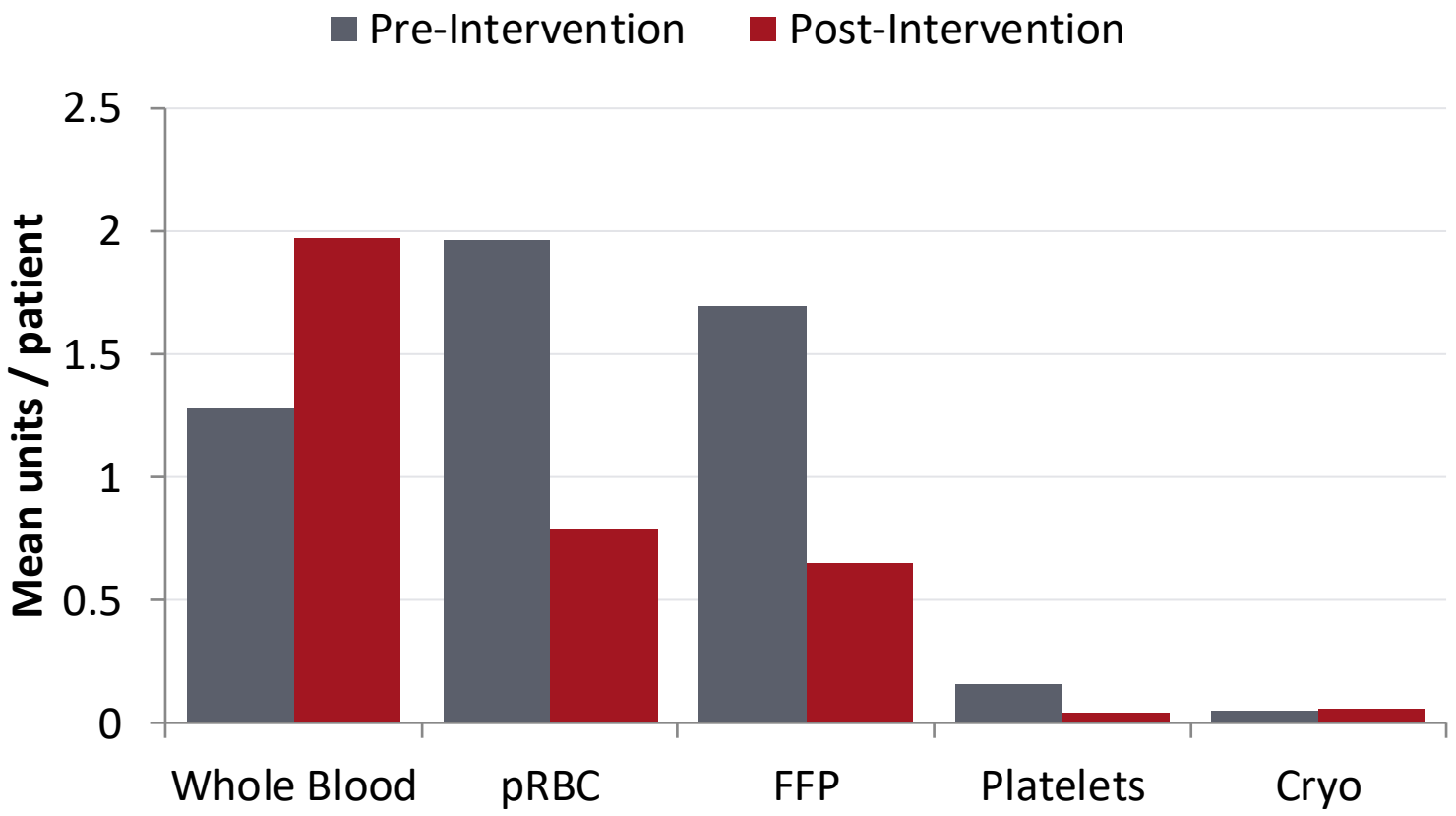
Adjusted Outcomes Across Endpoints

Outcome	Adjusted OR/RR [95% CI]	P value
ED thoracotomy	0.89 [0.51–1.53]	0.66
Whole blood (hospital)	1.30 [1.01–1.68]	**0.04**
pRBC	0.28 [0.20–0.39]	**<.001**
FFP	0.16 [0.11–0.23]	**<.001**
Platelets	0.38 [0.22–0.65]	**<.001**
Cryoprecipitate	1.52 [0.63–3.66]	0.35
Total units transfused (4h)	0.56 [0.43–0.73]	**<.001**
Mortality, 24 hours	0.35 [0.23–0.52]	**<.001**
Mortality, overall	0.36 [0.25–0.53]	**<.001**

Highlighted rows reached statistical significance (p<0.05). Adjusted for age, sex, injury severity, and mechanism.

TABLE 3 — AVERAGE UNITS TRANSFUSED (4HR)

Blood Product Mix Shifted Toward Whole Blood



5.14 → 3.54
total units transfused per patient, first 4 hours

1714 mL → 1419 mL
total transfusion volume per patient

Whole blood is the only product that increased replacing, not adding to, component use.

VIOLENCE-RELATED TRAUMA, 1-YEAR ANALYSIS

Spatial Distribution of Utilization

220

patients transfused

22

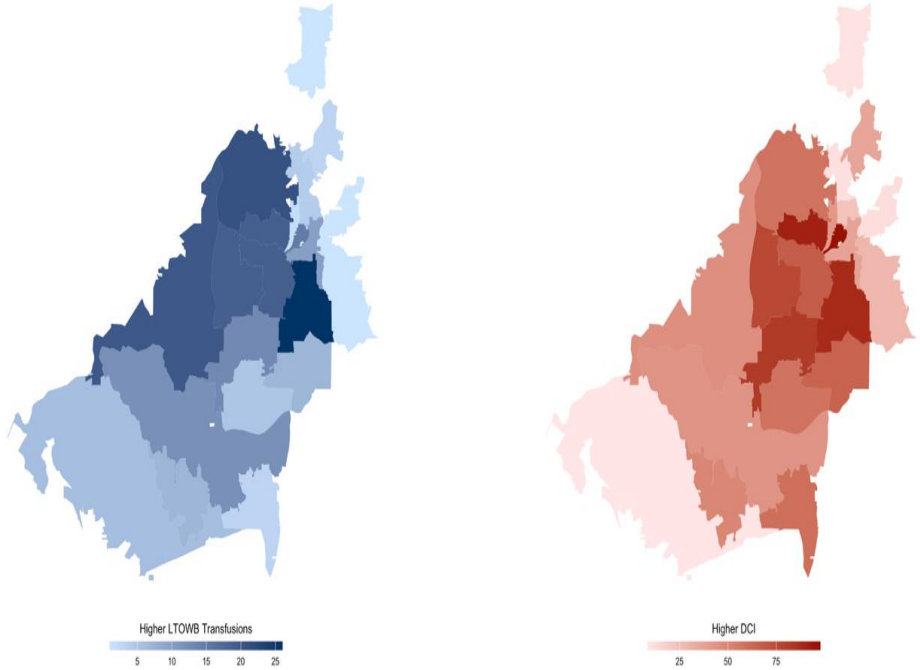
ZIP codes

31.2

transfusions / 100,000 residents, catchment-wide

2.9–231.7

per-100k range across ZIP codes (p<0.001)



Higher LTOWB Transfusions (left) vs. Higher DCI Distress (right), by ZIP code

NEGATIVE BINOMIAL REGRESSION

Utilization Tracks Community Distress

RR = 1.03

(95% CI: 1.02–1.03) per 1-point increase in DCI score — a ~3% rise in per-capita transfusion rate for every additional point of community distress

Associated with higher utilization ($p < 0.05$)

- Lower educational attainment
- Higher poverty rate
- Higher unemployment
- Lower income ratio
- Greater housing vacancy

Not significantly associated

- Employment growth
- Business establishment growth
- Race / ethnic composition

READING OUR FINDINGS AGAINST THE FIELD

Contextualizing the Evidence

TOWAR

Sperry et al., NEJM 2026 — 44 U.S. HEMS

- 1,020 patients, cluster-randomized
- Whole blood vs. component therapy
- No significant difference in mortality

SWIFT

Smith et al., NEJM 2026 — UK air ambulance

- 616 patients, randomized
- Death/massive transfusion at 24h
- RR 1.02 [0.80–1.31], p = 0.84

Both trials capped transfusion at 2 units and enrolled predominantly blunt/mixed-mechanism, air-transported patients, a different population than Grady's urban, penetrating-trauma-heavy, ground-EMS cohort. Standardized, multi-site data collection is needed to reconcile registry and RCT findings.

CLOSING THE LOOP

Our Data Standardization Framework

Analyze

Track utilization, appropriateness, and outcomes at the patient and system level

Refine

Incorporate individual case review, feedback, and trauma registry alignment

Improve

Use standardized data to update training, protocols, and deployment

Why it matters: standardized, registry-grade data is what lets a single-system finding like ours be tested and reconciled against multicenter evidence.

WHERE THIS LEAVES US

Key Takeaways

Improved field-to-ED hemodynamics

with no increase in EMS scene or transport time

Reduced downstream blood product utilization

fewer units required in the first 4 hours of hospital care

A mortality signal that warrants prospective confirmation

Utilization tracks socioeconomic distress

supporting DCI-informed, equity-driven deployment

TURNING INSIGHT INTO ACTION

Next Steps

Refine patient selection criteria
using field and hospital-outcome data as the program matures

Expand implementation strategies

across additional units and operational contexts

Use DCI / geographic data to guide equitable deployment

so resources reach the communities with greatest need

Standardize multi-site data collection

to reconcile Grady's registry findings with TOWAR / SWIFT

Questions?

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