

# Characterizing Pediatric Supermassive Transfusion and the Contributing Injury Patterns in the Combat Environment

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**Patients receiving >80 mL/kg of blood product experienced increased mortality. Abdominal & extremity injuries were associated with need for SMT.**

## BACKGROUND

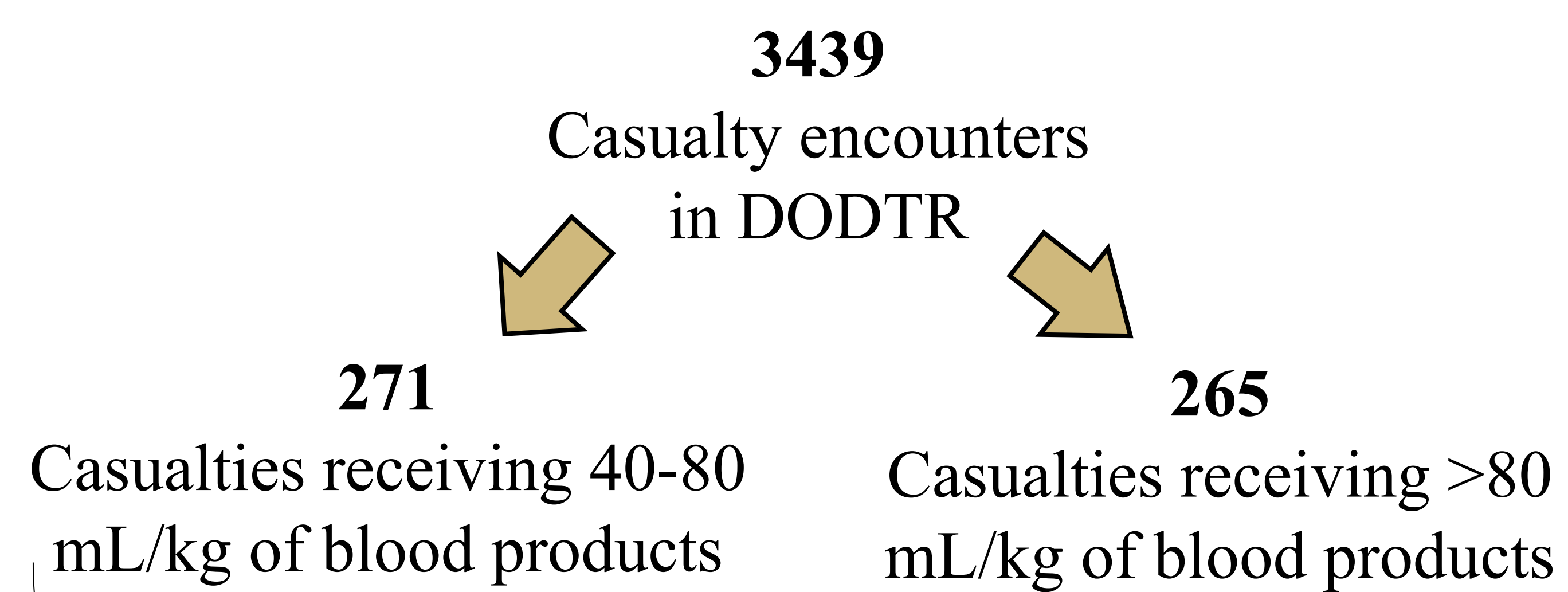
- Trauma is the leading cause of mortality in pediatric patients, with ~50% mortality rate among massive transfusion (MT) recipients.
- MT: >40 mL/kg of blood products within 24 hours.
- Literature describing supermassive transfusion (SMT) is lacking, specifically in transfusions of approximately one pediatric blood volume (75-80 mL/kg).

## OBJECTIVES

Describe the pediatric casualties, injury patterns, prehospital interventions, and clinical characteristics that make up a subset of massive transfusions referred to as a SMT.

## METHODS

Retrospective analysis of pediatric casualties from Department of Defense Trauma Registry (DODTR) January 2007 through January 2016.



Casualties analyzed for survival to discharge, type of blood products received, clinical characteristics, and multivariable regression model performed to compare serious injuries by body region and prehospital interventions.

## RESULTS

- Survival to discharge was significantly higher in the MT cohort (86%) versus the SMT cohort (78%; **p<0.011**).
- Multivariable analysis revealed serious injuries to the abdomen (OR 1.65, 95% CI 1.08-2.53) and extremities (OR 2.13, 1.45-3.12) were associated with SMT.
- Wound dressings (41% vs. 29%; **p=0.003**), tourniquets (23% vs. 12%; **p=0.001**), and IO access (17 vs. 10%; **p=0.013**) were more common in the SMT group.

### Multivariable Regression Model with Serious Injuries by Body Region

Head/Neck	0.94 (0.62-1.42)
Facial	<i>Low Incidence resulting in model dissociation</i>
Thorax	0.93 (0.61-1.42)
Abdomen	<b>1.65 (1.08-2.53)</b>
Extremities	<b>2.13 (1.45-3.12)</b>
Skin	0.33 (0.12-0.84)

### Prehospital Intervention Comparison

Intervention	MT	SMT	P value
Wound Dressing	29% (79)	41% (109)	<b>0.003</b>
Tourniquet	12% (33)	23% (61)	<b>0.001</b>
IO	10% (28)	17% (47)	<b>0.013</b>
IV Fluids	13% (35)	18% (48)	0.096
Intubation	12% (33)	14% (37)	0.539

### Age-Adjusted Vital Signs Comparison

Vital Signs	MT	SMT	P value
Hypotension	22% (59)	41% (100)	<b>&lt;0.001</b>
Tachycardia	87% (228)	86% (223)	0.932

## CONCLUSIONS

Pediatric SMT patients are at increased risk of mortality. Our study highlights the seriousness of extremity injuries, identifying associations between severe injuries to the extremities and abdomen with receipt of SMT. Prehospital wound dressings, tourniquets, and IO access were more frequent in the SMT cohort. Hypotension was associated with SMT, but tachycardia was not a reliable predictor of SMT over MT.

## LIMITATIONS

- Applying data from conflict zones to civilian trauma is difficult. Explosive injury was present in 63.9% of our cases but is a rare cause of pediatric trauma in the U.S.
- We did not account for prehospital transport time and/or method in conflict zones. Longer transport times and less formal transport methods may have resulted in en route death for some patients with severe injuries that would have required a transfusion.
- Our retrospective analysis is limited to variables collected and depends on accurate data recording and entry into the DODTR. Extensive training and quality assurance processes may mitigate this limitation.
- No long-term follow-up after discharge.

## DISCLAIMERS

The opinions expressed in this poster presentation are those of the authors and do not reflect the official policy or position of the U.S. Army Medical Department, Department of the Army, Department of Defense, or the U.S. Government.

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