Processes of Hemorrhage Care in Massive Transfusions: An Institution-Wide Analysis Across Hemorrhage Phenotypes

Byars VH, McNally J, Noory M, Mukhopadhyay S, Doben AR, Montgomery SC, Posillico SE

Saint Francis Hospital, Hartford, CT

Introduction

- Massive transfusion protocols (MTP), large volume blood product transfusions, rapidly and effectively resuscitate patients with massive exsanguinating hemorrhage. MTP is commonly used in non-trauma patients, with various hemorrhage etiologies. Evidence supporting utility and benefit outside trauma is mixed.

- MTPs are triggered for any severe bleeding event in the hospital. Hemorrhage in medical patients often results from a combination of underlying pathologies such as aneurysms, peptic ulcers, liver cirrhosis, and malignancies. It can also occur in labor and delivery, procedural complications following surgery and external factors like the use of anticoagulant medication or NSAIDS.

- The emergent nature of these patients' presentation along with the complexity of their immediate care represents a difficult clinical scenario for even the most experienced staff.

- There is substantial literature pertaining to the implementation of MTPs in trauma patients, however, the literature on MTPs in medical patients is limited



Aim and Hypothesis

The goal of this project was to characterize institution-wide variation in processes of care regarding recognition and treatment of hemorrhage, use of adjunctive therapies, and MTP protocol operations, and how these differ with different hemorrhage etiologies.

We hypothesized that hemorrhage response would vary by specialty, leading to differences in MTP timing, blood product utilization, resuscitation patterns, and outcomes.

What is a Massive Transfusion?

Massive transfusion is defined as >10 units of packed red blood cells (PRBC) in 24 hours.

The American College of Surgeons (ACS) Trauma Quality Improvement Program (TQIP) recommends that all centers adopt a massive transfusion protocol (MTP), to ensure a rapid, balanced hemostatic resuscitation for severe hemorrhage by delivering blood products such as PRBCs, plasma and platelets in a 1:1:1 ratio. Trauma centers are required to have a process for immediate availability of PRBC, plasma and platelets as well as a standardized assessment and treatment of coagulopathy, acidosis, hypothermia and hypocalcemia.

This involves a multidisciplinary approach including trauma, emergency department (ED), anesthesia and the blood bank. Massive transfusion protocols also include training and regular drills to maintain competency. (1)

Method and Study Design

This is a retrospective cohort study of all MTP activations at Saint Francis Hospital from 2022 to 2025. Patients were classified by hemorrhage phenotype: traumatic, non-trauma surgical, obstetric, and medical.

This is a descriptive study, focusing on describing the frequency with which certain hemorrhage phenotypes occur, transfusion characteristics, use of adjunctive therapies, and operational metrics. Physiologic parameters will be described as well. Outcomes include mortality, use of renal replacement therapy, and blood product wastage.

Conclusions

Hemorrhage response and processes of care, such as adjunct use and protocol adherence, were variable across distinct hemorrhage phenotypes and primary service. These findings highlight opportunities for targeted education and quality improvement across specialties, as well as custom pathways to reduce blood waste.



Results

A total of 292 patients underwent MTP activation during the study period, with 52 (17.8) OB, 107 (36.6%) traumatic, 62 (21.2%) medical, and 71 (24.3%) non-trauma surgical. OB and trauma cohorts were significantly younger and healthier. Mortality ranged from 0% (0) deaths in OB to 51.6% for medical ($p<0.001$). Time to MTP activation from first physiology disturbance was shorter for trauma compared to non-trauma surgical and medical patients (10 min vs 79 and 120.5 min, respectively, $p<0.001$). The 1:1 transfusion compliance was 85.2% for trauma, 71% for medical, 60.5% for obstetric, and 60.3% for non-trauma surgical patients ($p=0.002$). There were significant differences in TXA ($p<0.001$) and calcium ($p=0.036$) usage across all cohorts. TEG utilization was universally low ($p=0.908$).



Dr. Sarah Posillico – Sarah.Posillico@trinityhealthofne.org