

# [NM-245] Use of a Novel Visual Analytics Interface to Characterize Pediatric Trauma Patients Who Receive Massive Transfusions at a Children's Hospital

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## INTRODUCTION

The leading cause of preventable death in pediatric trauma is hemorrhage.[1] Studies in adults have shown that massive transfusion practice guidelines with 1:1:1 ratio of red blood cells (RBC):fresh-frozen plasma (FFP):platelets (PLT) have improved survival.[2] Adult data may not be easily applied to pediatric populations. There is little data on massive transfusion protocols in pediatric trauma patients, especially looking at survival outcomes. Creating protocols that are applicable to children of all ages and weights is difficult.[3]

The purpose of our study is to describe the perioperative blood product requirements pediatric trauma patients at by combining data from the Anesthesia Information Management System (AIMS), the blood bank (BB) database and the Pennsylvania Trauma Systems (PTS) database collection system.

## METHODS

We queried all records in the AIMS (Compurecord) between October 2001 to December 2010. The AIMS, BB and PTS database exports were combined in a dimensional database with a visual analytics interface (Qlikview). We then looked for patients who received massive transfusions (n=654), defined as using greater than 40 mL/kg of blood products during the surgical procedure.[3] We then excluded transplant, craniofacial, cardiac and scoliosis surgeries (n=458). The remaining 196 patients were cross-referenced with the PTS database to identify trauma patients who received massive blood transfusion (n=10). We also queried the PTS database for any patients who received blood products in the ER and were transferred to the OR immediately (n=30).

The total number of procedures on these patients was 31. We calculated the number of units transfused during surgery by obtaining volume values from AIMS and used conversion factors of: 1 unit RBC=300mL, 1 unit FFP=250mL and 1 unit platelets=250mL. These were determined from BB average volumes per unit of blood product. We verified AIMS data with BB data on number of units of blood product transfused. We then calculated the transfusion ratio of RBC:FFP:PLT for the intraoperative period.

## RESULTS

We present a case series of 31 pediatric trauma patients over the 9-year period. We included patients from 0-20 years old. We grouped the patients in 2-year intervals. There were no patients in the 4-6, 6-8 or 12-14 years. Only one 8 year old patient died during the first hospital day. All other patients survived to discharge.[Table 1]

## DISCUSSION

The use of the visual analytics interface allows for real time interaction with variables across multiple databases. Filters can be adjusted in real time to identify patient populations and to explore relationships between procedures, transfusion and outcome variables. Our goal is to develop a collaborative effort to enable comparison of blood product ratios administered during massive transfusions for children.

## REFERENCES

1. Emerg Med Clin North Am 2007; 25:803-36
2. Ann Surg 2008; 248:447-583
3. Am J Surg 2013; 206:655-60

Table 1

Age	Weight (kg)	pRBC	FFP (units)	Platelets	Ratio (RBC:FFP:PLT)	PTS reported complications	Survival to discharge
<b>0 to 2 years</b>							
2 months	4.0	2	1	0	2:1:0	None	Yes
2 months	3.5	1	0	0	1:0:0	None	Yes
8 months	7	2	0	0	2:0:0	None	Yes
9 months	7	3	0	0	3:0:0	postoperative hemorrhage, acute respiratory failure, cardiopulmonary arrest, decubitus	Yes
10 months	10	2	2	0	2:2:0	None	Yes
11 months	10	3	1	0	3:1:0	None	Yes
11 months	10	3	1	1	3:1:1	None	Yes
11 months	10	2	0	0	2:0:0	None	Yes
<b>2 to 4 years</b>							
3 years	17	3	0	0	3:0:0	None	Yes
<b>8 to 10 years</b>							
8 years	30.0	9	1	3	9:1:3	aspiration pneumonia, sinusitis	Yes
8 years	26	9	2	1	9:2:1	none	No
8 years	25	5	4	1	5:4:1	none	Yes
9 years	30	7	6	1	7:6:1	none	Yes
<b>10 to 12 years</b>							
10 years	28	0	2	1	0:2:1	Coagulopathy	Yes
10 years	30	6	2	3	4:1:1.5	Coagulopathy	Yes
10 years	60	4	0	0	4:0:0	None	Yes
11 years	40	2	1	0	2:1:0	None	Yes
11 years	40	1	0	0	1:0:0	None	Yes
11 years	50	2	0	0	2:0:0	None	Yes
<b>14 to 16 years</b>							
14 years	67.0	4	4	0	2:2:0	None	Yes
14 years	60	6	0	0	6:0:0	None	Yes
15 years	80	15	5	1	15:5:1	Iatrogenic pneumothorax	Yes
15 years	50	6	3	0	6:3:0	Wound Infection (traumatic or incisional)	Yes
15 years	70	6	0	0	6:0:0	Coagulopathy	Yes
<b>16 to 18 years</b>							
16 years	64	19	4	1	19:4:1	None	Yes
16 years	70	9	4	2	4.5:2:1	Septicemia	Yes
16 years	70	6	1	0	6:1:0	None	Yes
16 years	60	3	0	0	3:0:0	None	Yes
16 years	81	5	0	0	5:0:0	None	Yes
<b>18 + years</b>							
20 years	120	3	0	0	3:0:0	None	Yes