

Evaluation of Tranexamic Acid in Trauma Patients: A Retrospective Quantitative Analysis



Michelle Ng, B.Sc.(Pharm).; Jerrold Perrott, B.Sc.(Pharm)., ACPR., PharmD.; Sarah Burgess, B.Sc.(Pharm)., ACPR., PharmD.; Flora Young, B.Sc.(Pharm)., ACPR., PharmD.; Kathleen Fyvie, B.Sc.N., M.N.-N.P.; Iain MacPhail, M.D., FRCP(C).

Background

- Exsanguination causes 1/3 of in-hospital mortality in trauma.
- Tranexamic acid (TXA) is an antifibrinolytic used to reduce bleeding.
 - Gold standard in trauma: 1g bolus (over 10 min), then 1g infusion (over 8 h).
 - Based on CRASH-2: reduced all-cause-mortality (16% to 14.5%). Benefit only when given ≤ 3 hours of injury.
 - Currently integrated into pre-hospital and hospital trauma care worldwide.
- Royal Columbian Hospital (RCH) is a level-1 trauma center, providing one of the highest levels of care in British Columbia. Receives over 1000 trauma patients annually. However, current use of this drug is unknown.

Objectives

- Characterize the utilization of TXA for actual or potential hemorrhage in trauma patients at a tertiary centre.
- Exploratory analysis of the following outcomes:
 - In-hospital mortality at 28 days
 - # of units of PRBCs transfused
 - Vascular occlusions (DVT, PE, MI, stroke)
 - Surgical interventions

Methods

- Design:**
 - retrospective chart review (Apr. 2012- Jun. 2015)
 - convenience sample of trauma patients at RCH ER with actual/suspected hemorrhage
- Inclusion (as per CRASH-2):**
 - >16 years of age
 - Indication for TXA (significant hemorrhage defined as SBP<90 mmHg +/-or HR >110 bpm, AND presentation ≤ 8 hours of injury)
- Data Sources:**
 - BC Trauma Registry
 - Health Records (Fraser Health)
- Analysis:**
 - descriptive statistics, % and proportions, mean, median, odds ratio for mortality, χ^2

Population

	TXA (n=67)	no TXA (n=50)	Overall (n=117)
Sex			
Male	54 (81%)	42(84%)	96 (82%)
Female	13 (19%)	8 (16%)	21 (18%)
Age (years)			
Mean (SD)	42.3 (17.9)	43.6 (20.4)	42.8 (18.9)
Time since injury to ER presentation (h)			
Mean (SD)	1.3 (1.2)	1.2 (1.1)	1.2 (1.1)
≤ 1	38 (57%)	31(62%)	69 (59%)
>1- ≤ 3	26 (39%)	14 (28%)	40 (34%)
>3	3 (4%)	5 (10%)	8 (7%)
Type of injury			
Blunt	45 (67%)	33 (66%)	78 (67%)
Penetrating	22 (33%)	17 (34%)	39 (33%)
Glasgow Coma Score			
Mean (SD)	11 (4.6)	12 (4.6)	11 (4.6)
Severe (3-8)	20 (30%)	12 (24%)	32 (27%)
Moderate (9-12)	10 (15%)	4 (8%)	14 (12%)
Mild (13-15)	33 (49%)	34 (68%)	67 (57%)
Not known	4 (6%)	0 (0%)	4 (3%)
Systolic blood pressure			
Mean (SD)	88 (42)	109 (38)	97 (41)
Heart rate			
Mean (SD)	108 (40)	117 (28)	112 (35)
ISS (Injury Severity Score)			
Mean (SD)	27 (16)	25 (16)	26 (16)
Mild (<9)	0 (0%)	2 (4%)	2 (2%)
Moderate (9-15)	11 (16%)	14 (28%)	25 (21%)
Severe (16-25)	23 (34%)	13 (26%)	36 (31%)
Profound (>25)	33 (49%)	21 (42%)	54 (46%)

Table 1: Baseline demographics

Limitations

- Retrospective chart review – difficult to assess significance of hemorrhage.
- Sample of convenience – not powered for secondary outcomes.
- Inclusion for screening based on BCTR database.
- Use of TXA for surgery – possible confounder.

Conclusions

- Less than 10% of presenting trauma patients that met indication for TXA received it according to CRASH-2 protocol.
- 76% of those that received TXA did so within 3h.
- Possible areas for quality improvement in trauma care.

Future implications: identify reasons trauma patients do not receive TXA, as well as use of alternate regimens (ie. bolus only, 1g/30min, 2g/60min, shorter infusions etc.).

Results

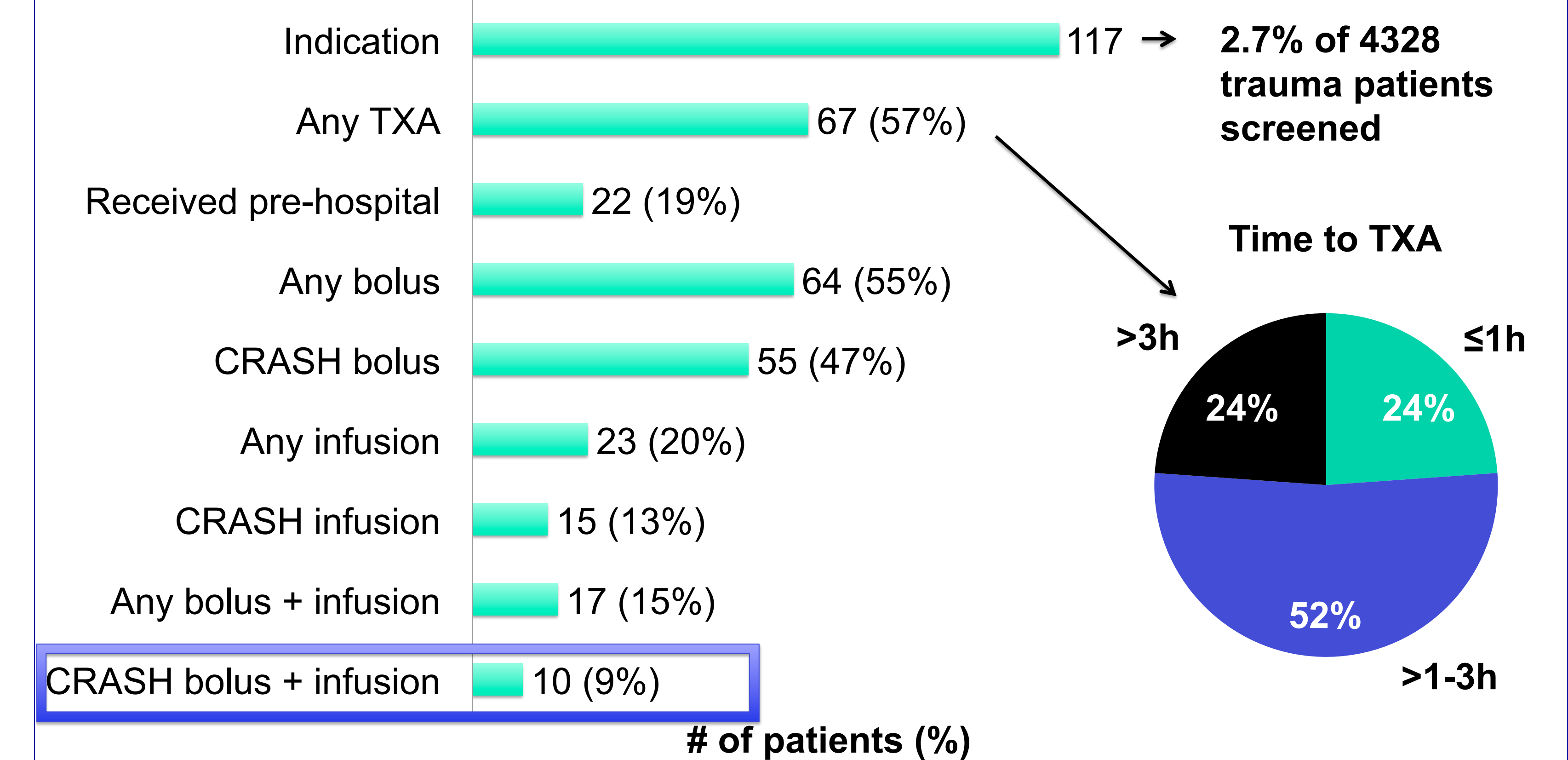


Figure 1: Primary outcomes - use of TXA at RCH (Apr. 9/2012 – Jun. 30/2015)

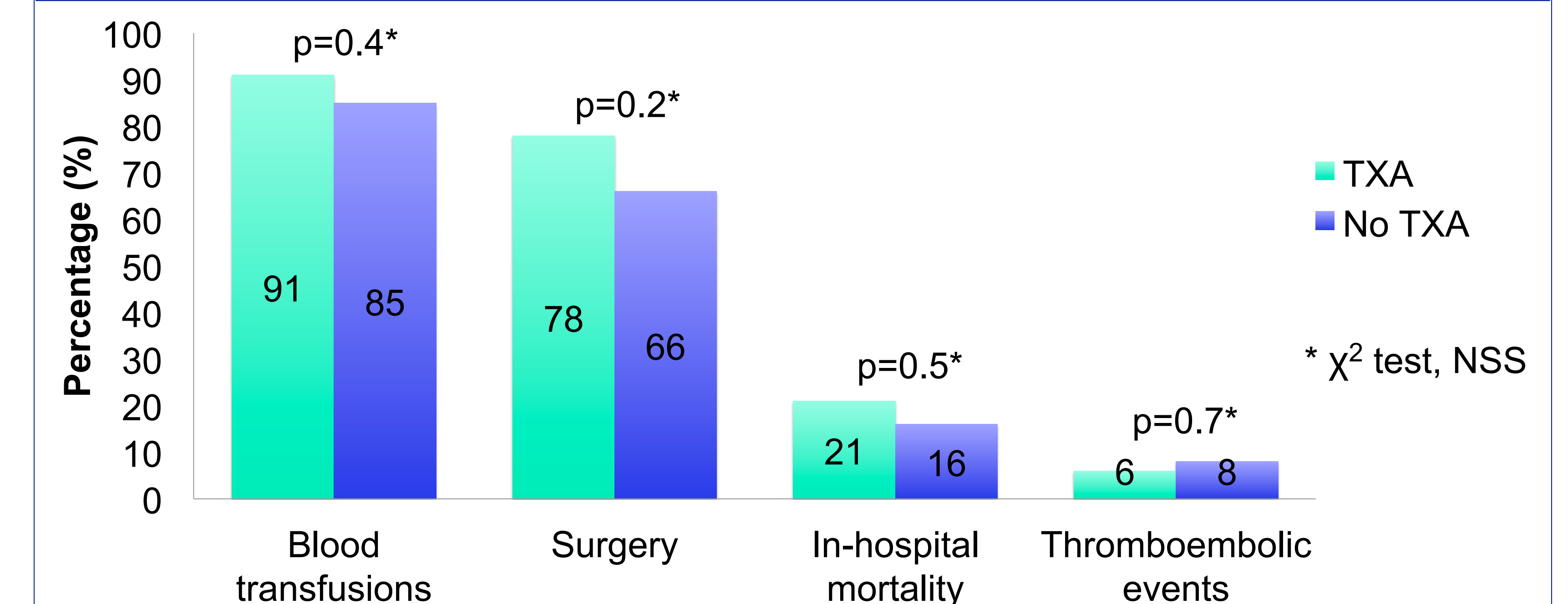


Figure 2: Secondary outcomes up to 28 days in hospital.

- Odds of mortality
 - OR (given TXA exposure) = 1.39 (0.53-3.62)
 - OR (given TXA \leq or >3 h) = 5.13 (0.62-42.75)
- Median units of PRBC transfused = 6 (8 in TXA group, 4 in no TXA)
- Most common surgical intervention was orthopedic, followed by laparotomy.
- 8 thromboembolic events occurred (4 in TXA group, 4 in no TXA group).