

Dried Plasma (with or without TXA) Reduces 24-Hour Mortality in Traumatic Hemorrhage in a Resource-Limited Setting in South Africa

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- The views and conclusions contained herein are those of the author(s) and should not be interpreted as representing the official policies or endorsements, either expressed or implied, of the U.S. Government.



Background

- Data set is modelled off US NTDS & DODTR
- Collect >5-million data points per year
- Trained teams of data collectors and staff
- Electronic data capture at point-of-care
- Secure e-transmission to UCD REDCap database
- We are embedded within facilities/organization



 REDCap®

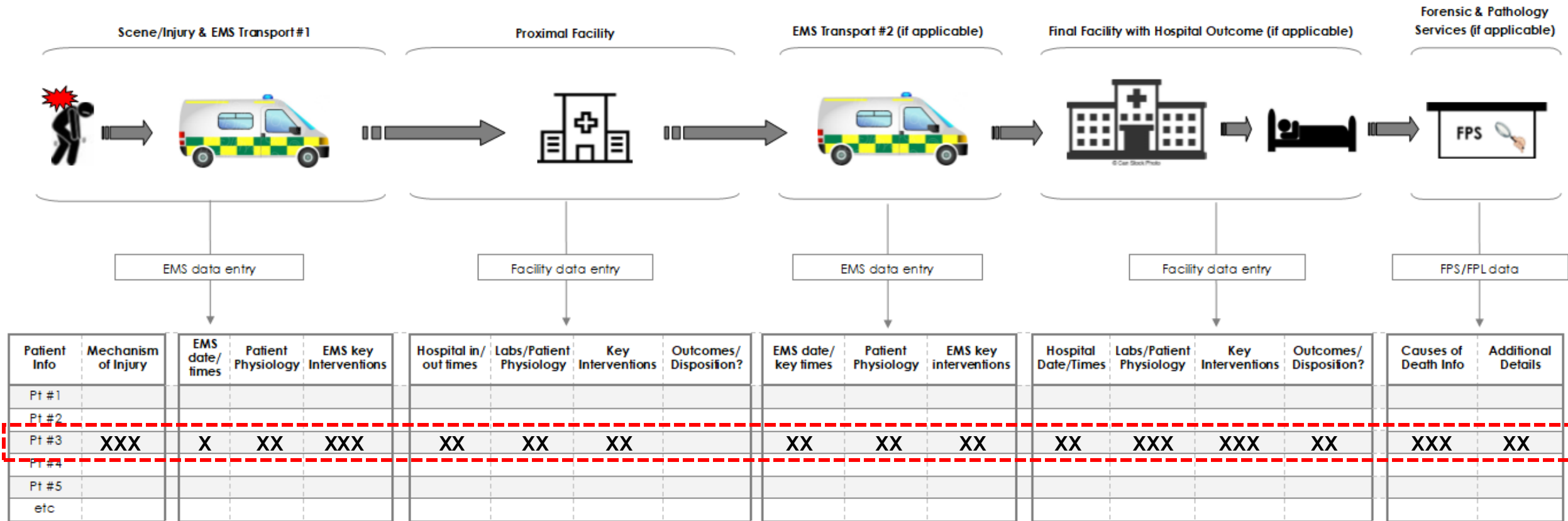
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Data Collection: POI to Final Outcome



Also collect Functional Status and Neurological Outcomes at discharge and up to 1-year post-discharge

Introduction



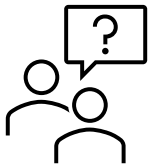
Hemorrhage is the leading cause of traumatic death



Outcomes are worse in austere settings



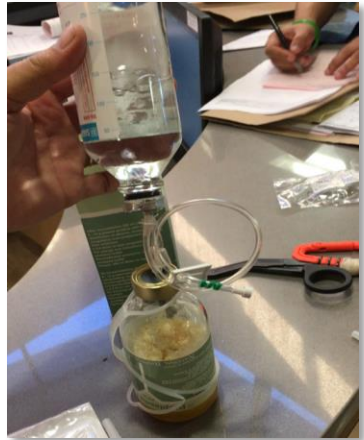
Separately, plasma and TXA have life-saving advantages



Unknown if there is an additive or synergistic survival benefit of plasma with TXA

Freeze-dried Plasma

- Provides vital coagulation factors; restores blood volume
 - Combats trauma-induced coagulopathy and shock
- Shelf stable at room-temp
 - Ideal for resource-limited trauma care
- Ease of use
 - Reconstitute with sterile water



Methods

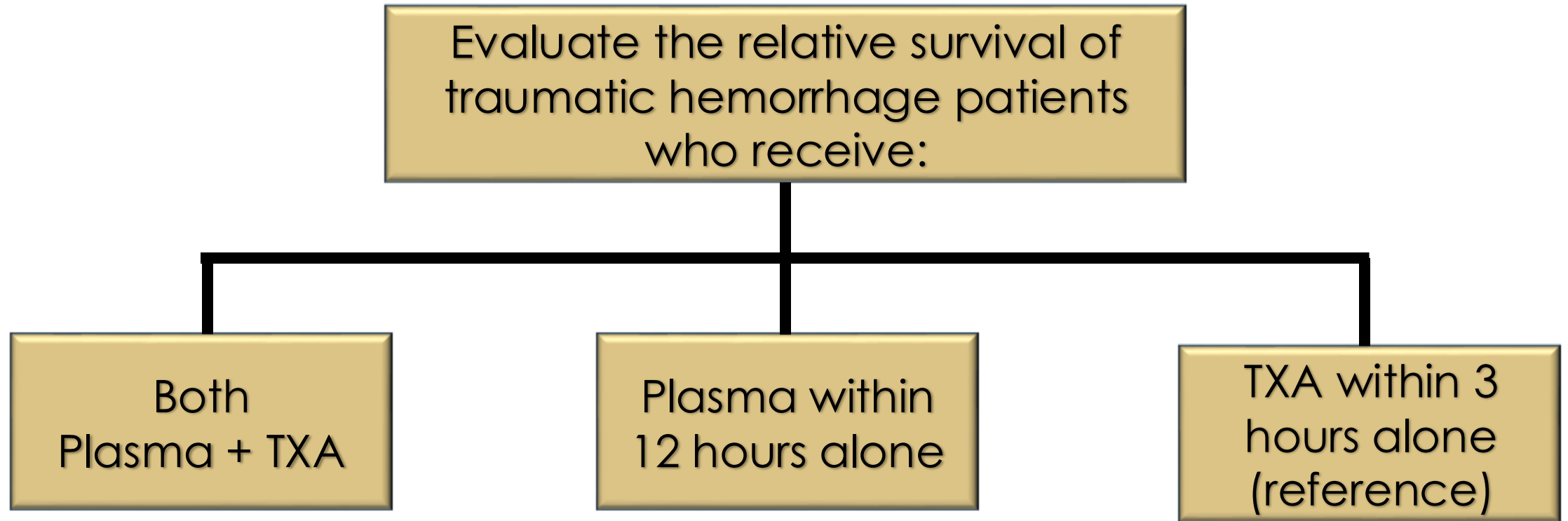
Design:

- Secondary analysis of EpiC Study
- Multi-center cohort study
- 2021-2024

Cohort:

- Trauma patients (≥ 18 years)
- Blunt or penetrating injuries
- At risk for hemorrhage
 - Any non-head injury
 - AND ≤ 100 mmHg SBP **or** ≥ 1.0 Shock Index **or** blood products within ≤ 12 hrs of injury **or** circulatory diagnosis at any time during hospital encounter **or** cause of death = hemorrhage or CTD
- Survived to ambulance or hospital

Objective



Outcomes:

- 24-hour mortality (*primary*)
- 48-h, 7-d, 30-d mortality (*secondary*)

Analysis

Propensity score-weighting:



- IPTW (multinomial model) to balance treatment groups
- Sex, age, injury mechanism, shock index, NISS, GCS, pre-intervention blood product administration, & time from injury to intervention

Outcome analysis:



- Covariate-adjusted cox modeling
 - Using same covariates as PS weighting
- Facility-clustered

Subgroup analyses:



- FDP only (excluding FFP)
- Moderate-severe hemorrhage
- Blunt vs penetrating trauma

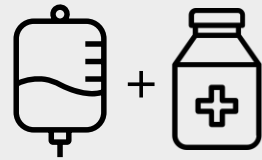
Results

843 Patients at Risk of Hemorrhagic Shock and received treatment



89% male
Median age: 31
86% penetrating injuries
59% severe injuries

Treatment Received



Plasma+TXA
n = 303 (36%)



Plasma
n = 361 (43%)



TXA [Reference Group]
n = 179 (21%)

Adjusted Hazard of 24hr Mortality vs Reference Group

28% reduced hazard of death
aHR 0.72 (95%CI 0.39–1.32)

46% reduced hazard of death
aHR: 0.54 (95%CI 0.35-0.83)

Results – FDP only subgroup

Among the 664 patients that received plasma, 87% received FDP

FDP alone vs TXA alone

Mortality	aHR (95%CI)
24-hour	0.62 (0.43 - 0.90)
48-hour	0.65 (0.44 - 0.96)
7-day	0.69 (0.51 - 0.93)
30-day	0.58 (0.43 - 0.77)

FDP + TXA vs TXA alone

Mortality	aHR (95%CI)
24-hour	0.82 (0.51 – 1.43)
48-hour	0.88 (0.53 – 1.46)
7-day	0.75 (0.52 – 1.09)
30-day	0.58 (0.49- 0.68)

Results – Moderate + severe hemorrhage

Plasma alone vs TXA alone

Mortality	aHR (95%CI)
24-hour	0.43 (0.28 - 0.65)
48-hour	0.48 (0.31 - 0.73)
7-day	0.61 (0.44 - 0.83)
30-day	0.49 (0.39 - 0.61)

Plasma + TXA vs TXA alone

Mortality	aHR (95%CI)
24-hour	0.55 (0.26 – 1.16)
48-hour	0.59 (0.29 – 1.21)
7-day	0.67 (0.41 – 1.09)
30-day	0.49 (0.35 - 0.67)

Results – Blunt vs Penetrating Injury

BLUNT

Plasma alone vs TXA alone	
Mortality	aHR (95%CI)
24-hour	0.28 (0.21, 0.38)
48-hour	0.34 (0.29, 0.41)
7-day	0.30 (0.11, 0.80)
30-day	0.33 (0.12, 0.95)

Plasma + TXA vs TXA alone	
Mortality	aHR (95%CI)
24-hour	0.88 (0.30, 2.60)
48-hour	0.99 (0.35, 2.83)
7-day	0.93 (0.32, 2.70)
30-day	0.86 (0.27, 2.76)

PENETRATING

Plasma alone vs TXA alone	
Mortality	aHR (95%CI)
24-hour	0.54 (0.32, 0.92)
48-hour	0.60 (0.36, 1.01)
7-day	0.66 (0.54, 0.79)
30-day	0.52 (0.36, 0.75)

Plasma + TXA vs TXA alone	
Mortality	aHR (95%CI)
24-hour	0.56 (0.36, 0.88)
48-hour	0.59 (0.39, 0.89)
7-day	0.52 (0.43, 0.64)
30-day	0.39 (0.36, 0.43)

Results - subgroups



Both plasma alone and Plasma+TXA associated with reduced mortality compared to TXA alone



Larger benefit for patients with moderate-severe hemorrhage subgroup



Greater mortality reduction in plasma alone group for blunt injuries than penetrating injuries

Conclusion



Early plasma administration reduces mortality



FDP works, practical, life-saving option where blood product access is limited



Plasma+TXA potential long-term benefit



Limitations:

Observational design; residual confounding possible



Co-Investigators & Collaborators

Military Collaborators:

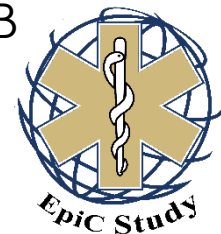
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- COL Vikhyat Bebartta, MD
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- Denise Lourens, MBChB
- Karlien Doubell, MBChB
- Willem Stassen, PhD



Questions?



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Supplemental – subgroups

FDP only (excluding FFP)		Moderate-severe hemorrhage	
Plasma alone vs TXA alone	aHR (95%CI) [p-value]	Plasma alone vs TXA alone	aHR (95%CI) [p-value]
24-hour mortality	0.62 (0.43, 0.90) [0.013]	24-hour mortality	0.43 (0.28, 0.65) [<0.001]
48-hours mortality	0.65 (0.44, 0.96) [0.030]	48-hours mortality	0.48(0.31, 0.73) [<0.001]
7-day mortality	0.69 (0.51, 0.93) [0.014]	7-day mortality	0.61 (0.44, 0.83) [0.001]
30-day mortality	0.58 (0.43, 0.77) [<0.001]	30-day mortality	0.49 (0.39, 0.61) [<0.001]
Penetrating injury		<500mL pre-intervention non-plasma transfusion	
Plasma alone vs TXA alone	aHR (95%CI) [p-value]	Plasma alone vs TXA alone	aHR (95%CI) [p-value]
24-hour mortality	0.54 (0.32, 0.92) [0.024]	24-hour mortality	0.70 (0.41, 1.21) [0.203]
48-hours mortality	0.60 (0.36, 1.01) [0.055]	48-hours mortality	0.80 (0.50, 1.28) [0.363]
7-day mortality	0.66 (0.54, 0.79) [<0.001]	7-day mortality	0.81 (0.59, 1.10) [0.174]
30-day mortality	0.52 (0.36, 0.75) [<0.001]	30-day mortality	0.71 (0.54, 0.93) [0.012]

Supplemental – subgroups

FDP only (excluding FFP)		Moderate-severe hemorrhage	
Plasma alone vs TXA alone	aHR (95%CI) [p-value]	Plasma alone vs TXA alone	aHR (95%CI) [p-value]
24-hour mortality	0.62 (0.43, 0.90) [0.013]	24-hour mortality	0.43 (0.28, 0.65) [<0.001]
48-hours mortality	0.65 (0.44, 0.96) [0.030]	48-hours mortality	0.48(0.31, 0.73) [<0.001]
7-day mortality	0.69 (0.51, 0.93) [0.014]	7-day mortality	0.61 (0.44, 0.83) [0.001]
30-day mortality	0.58 (0.43, 0.77) [<0.001]	30-day mortality	0.49 (0.39, 0.61) [<0.001]
Blunt injury		<500mL pre-intervention non-plasma transfusion	
Plasma alone vs TXA alone	aHR (95%CI) [p-value]	Plasma alone vs TXA alone	aHR (95%CI) [p-value]
24-hour mortality	0.28 (0.21, 0.38) [<0.001]	24-hour mortality	0.70 (0.41, 1.21) [0.203]
48-hours mortality	0.34 (0.29, 0.41) [<0.001]	48-hours mortality	0.80 (0.50, 1.28) [0.363]
7-day mortality	0.30 (0.11, 0.80) [0.017]	7-day mortality	0.81 (0.59, 1.10) [0.174]
30-day mortality	0.33 (0.12, 0.95) [0.040]	30-day mortality	0.71 (0.54, 0.93) [0.012]