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Is freeze dried plasma the solution to the plasma drought?

A retrieval / prehospital perspective

Aeromed 2025 Conference

Jon Newman | NSW Institute of Trauma and Injury Management

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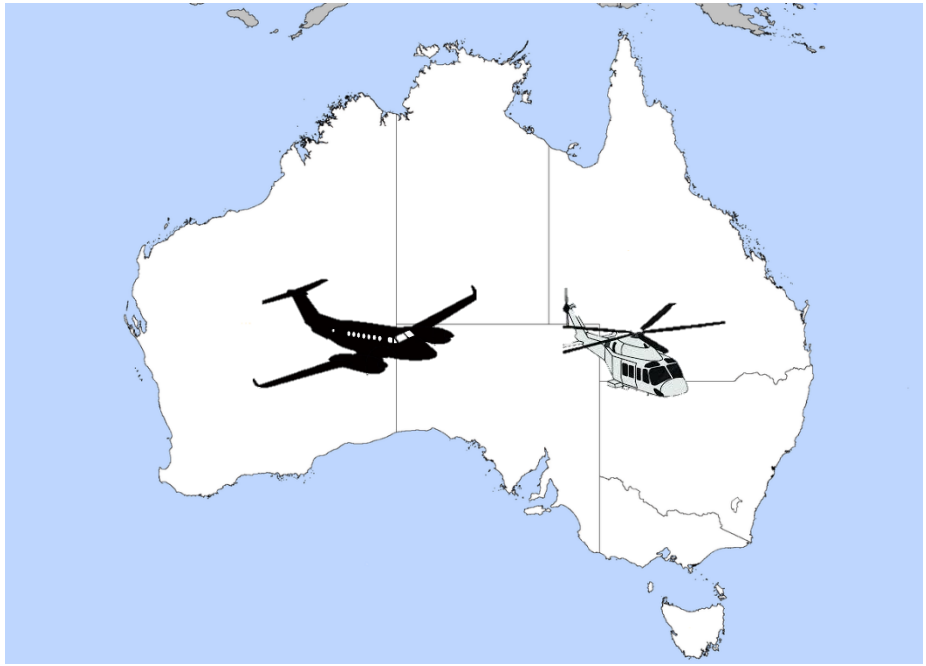
Disclosures

Graphic content warning



EVIDENCE SERIES

Freeze-dried plasma administration in trauma

Review of literature and key findings

APRIL 2023

Contents

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The NSW Institute of Trauma and Injury Management
Trauma Innovation Committee


HEAVY
RESCUE
100

Death from bleeding

ScienceDirect

Injury
Volume 48, Issue 1, January 2017, Pages 5-12

Trends in 1029 trauma deaths at a level 1 trauma center: Impact of a bleeding control bundle of care

Blessing T. Oyeniyi, Erin E. Fox, Michelle Scerbo, Jeffrey S. Tomasek, Charles E. Wade, John B. Holcomb

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https://doi.org/10.1016/j.injury.2016.10.037
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Abstract

Background

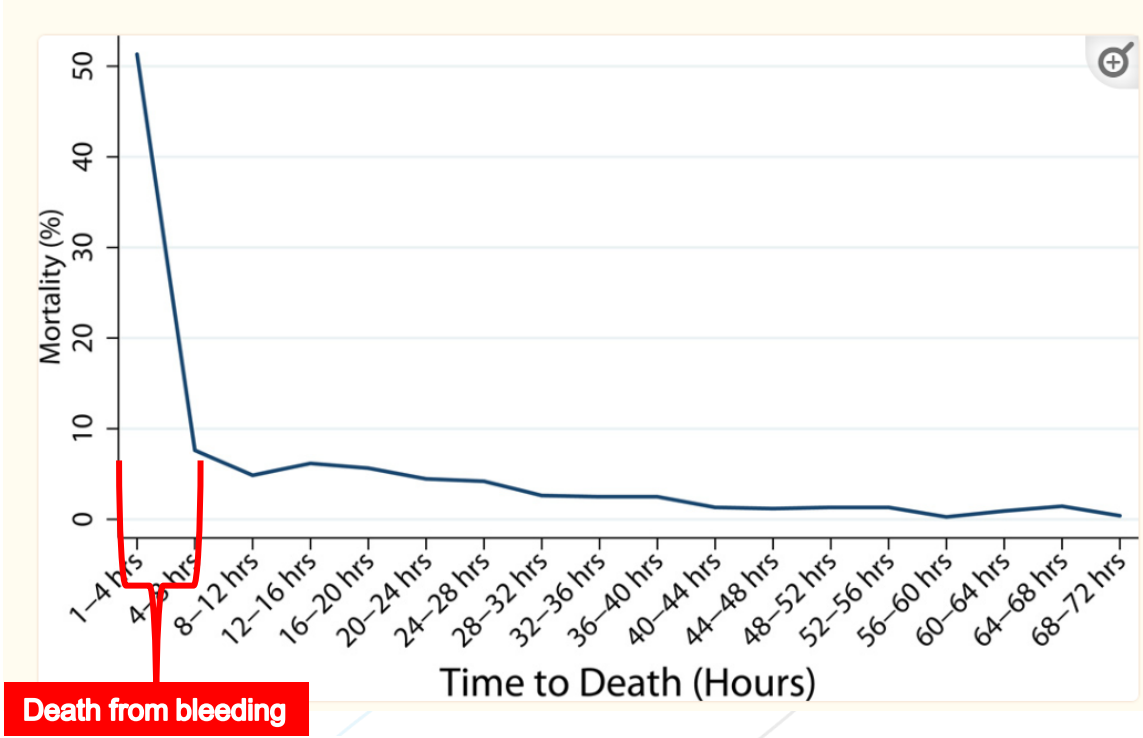
Over the last decade the age of trauma patients and injury mortality has increased. At the same time, many centers have implemented multiple interventions focused on improved hemorrhage control, effectively resulting in a bleeding control bundle of care. The objective of our study was to analyze the temporal distribution of trauma-related deaths, the factors that characterize that distribution and how those factors have changed over time at our urban level 1 trauma center.

Methods

Records at an urban Level 1 trauma center were reviewed. Two time periods (2005–2006 and 2012–2013) were included in the analysis. Mortality rates were directly adjusted for age, gender and mechanism of injury. The Mann-Whitney and chi square tests were used to compare variables between periods, with significance set at 0.05.

Results

7080 patients (498 deaths) were examined in 2005–2006, while 8767 patients (531 deaths) were reviewed in 2012–2013. The median age increased 6 years, with a similar increase in those who died. In patients that died, no differences by gender, race or ethnicity were observed. Fall-related deaths are now the leading cause of death. Traumatic brain injury (TBI) and hemorrhage accounted



ELSEVIER

Critical Care Clinics

Volume 33, Issue 1, January 2017, Pages 15-36

Optimal Fluid Therapy for Traumatic Hemorrhagic Shock

Ronald Chang MD [a], John B. Holcomb MD [b]

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The NEW ENGLAND JOURNAL of MEDICINE

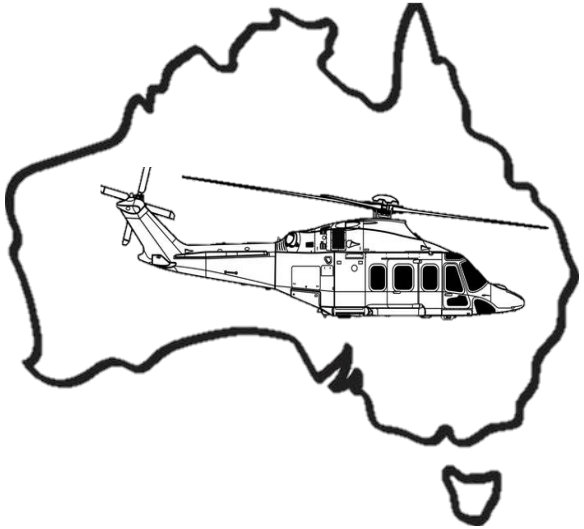
ORIGINAL ARTICLE

Prehospital Plasma during Air Medical Transport in Trauma Patients at Risk for Hemorrhagic Shock

Authors: Jason L. Sperry, M.D., M.P.H., Francis X. Guyette, M.D., M.P.H., Joshua B. Brown, M.D., Mark H. Yazer, M.D., Darrell J. Triulzi, M.D., Barbara J. Early-Young, B.S.N., Peter W. Adams, B.S., +18, for the PAMPer Study Group* Author Info & Affiliations

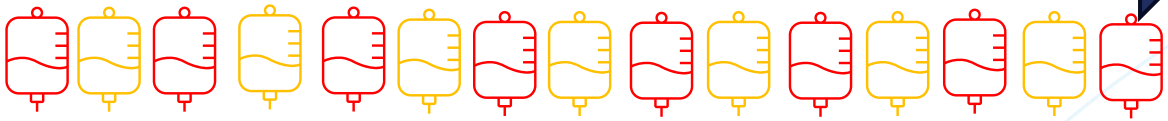
Published July 25, 2018 | N Engl J Med 2018;379:315-326 | DOI: 10.1056/NEJMoa1802345 | VOL. 379 NO. 4

Are we providing everything the patient needs?



Distance / time

Resources Required (Blood products)



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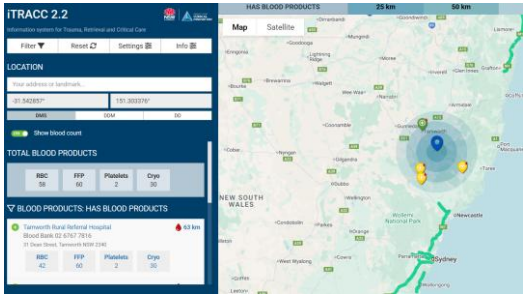
RTP



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Plasma Drought?

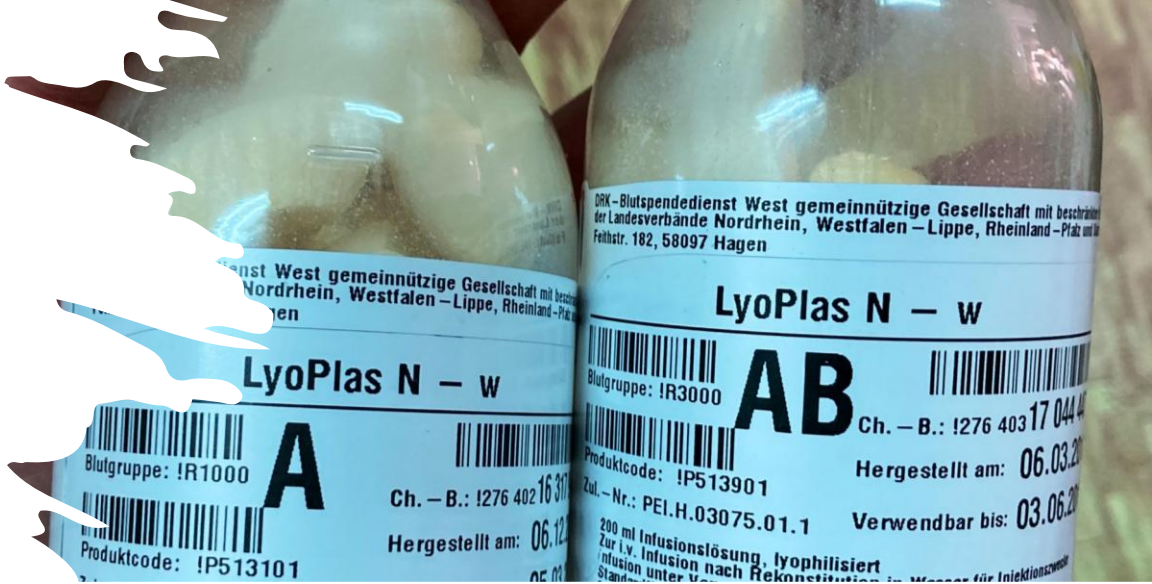
Freeze Dried Plasma

Agency for Clinical Innovation

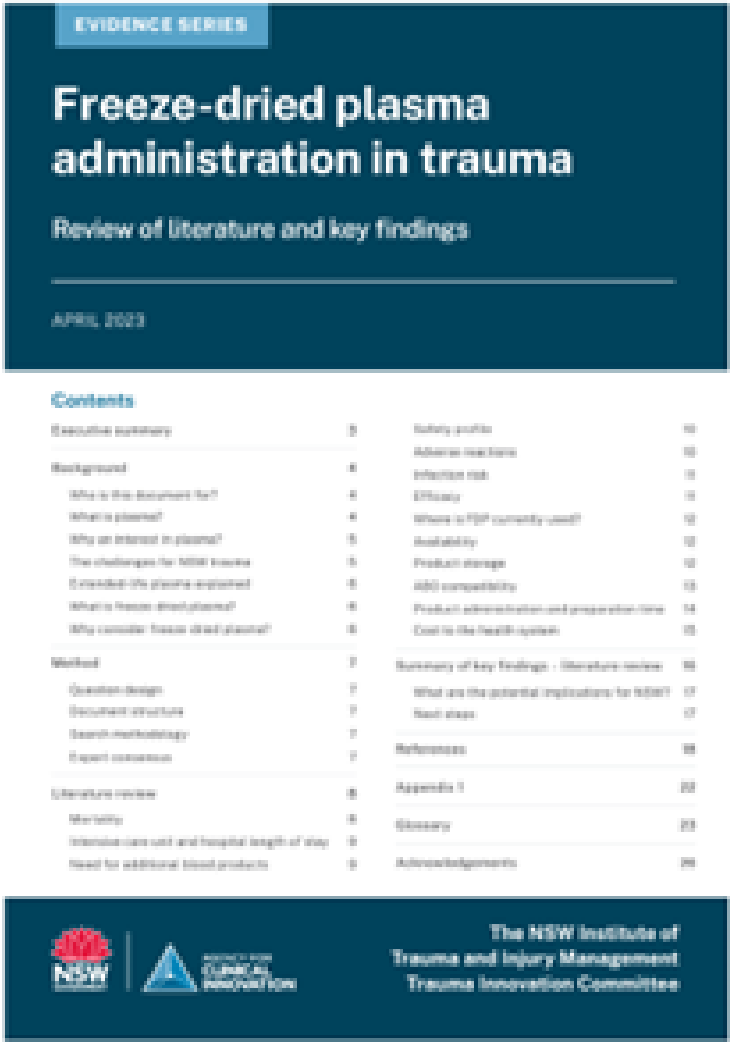
Why Freeze-Dried Plasma?

It’s Plasma!!

Logistic advantage over FFP



Is FDP a reasonable alternative to FFP?



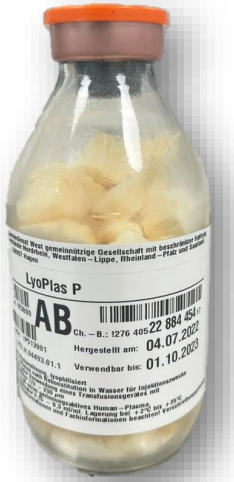
Mortality

Additional blood products

Safety

Efficacy

~~ICU / hosp LOS~~



VS

Mortality

Table 2: Studies comparing FDP to FFP on mortality

Author group	Mortality control (FFP)	Mortality intervention (FDP)	p-value
Nguyen et al.[39]	**N = 29**	**N = 43**	
24 hour	9 (31%)	9 (21%)	0.591
Haemorrhage-related	5 (17%)	3 (7%)	0.293
28 day	10 (34%)	11 (26%)	0.703
Garrigue et al.[34]	**N = 24**	**N= 23**	
All cause in-hospital within 30 days	7 (29%)	5 (22%)	0.56

Need for additional blood products

French lyophilized plasma versus fresh frozen plasma for the initial management of trauma-induced coagulopathy: a randomized open-label trial

D Garrigue [1 2], A Godier [3 4], A Glacet [1 2], J Labreuche [5], E Kipnis [1 6], C Paris [7], A Duhamel [5], E Resch [8], A Bauters [7], F Machuron [5], P Renom [7], P Goldstein [1 2], B Tavernier [1], A Sailliol [9], S Susen [7 10]

Affiliations + expand

PMID: 29274254 DOI: 10.1111/jth.13929

~~FDP required less Fibrinogen (median 2gms vs 3gm)~~
RCC & Crystalloids demands were equal.

Use of French lyophilized plasma transfusion in severe trauma patients is associated with an early plasma transfusion and early transfusion ratio improvement.

Nguyen C [1], Bordes J , Cungi PJ , Esnault P , Cardinale M , Mathais Q , Cotte J , Beaume S , Sailliol A , Prunet B , Meaudre E

Author information

The Journal of Trauma and Acute Care Surgery, 01 May 2018, 84(5):780-785
https://doi.org/10.1097/ta.0000000000001801 PMID: 29334571

Significantly fewer cases of massive transfusion in the FLYP group – 7% vs 45% P < 0.0001

Safety profile

Reported adverse reactions 2007-2011 in Germany

Adverse reactions	LyoPlas (n=237,850 units)	FFP (n= 343,821 units)
Urticaria	54	63
Fever	24	14
Severe hypotonia including anaphylactic shock	3	5
Bronchospasm	1	3
Transfusion-related acute lung injury (TRALI)	None reported*	None reported*

*Safety procedures using plasma only from male donors and female donors without children or female donors with children having additional antibodies screening have been in place from 2006. This likely accounts for the absence of TRALI cases in both groups.

Efficacy

1. **Freeze-dried plasma for major trauma - Systematic review and meta-analysis**

Garrick Mok [1], Richard Hoang, Montaha Wajid Khan, Dylan Pannell, Henry Peng, Homer Tien, Avery Nathens, Jeannie Callum, Keyvan Karkouti, Andrew Beckett, Luis Teodoro da Luz

Affiliations + expand

PMID: 33507025 PMCID: PMC7899224 DOI: 10.1097/TA.0000000000003012

→ Effects on coagulation parameters
INR, Prothrombin time, TEG
No difference.

2. **French lyophilized plasma versus fresh frozen plasma for the initial management of trauma-induced coagulopathy: a randomized open-label trial**

D Garrigue [1 2], A Godier [3 4], A Glacet [1 2], J Labreuche [5], E Kipnis [1 6], C Paris [7], A Duhamel [5], E Resch [8], A Bauters [7], F Machuron [5], P Renom [7], P Goldstein [1 2], B Tavernier [1], A Sailliol [9], S Susen [7 10]

Affiliations + expand

PMID: 29274254 DOI: 10.1111/jth.13929

→ n=48
FLyP more rapid & longer lasting effect on fibrinogen levels.

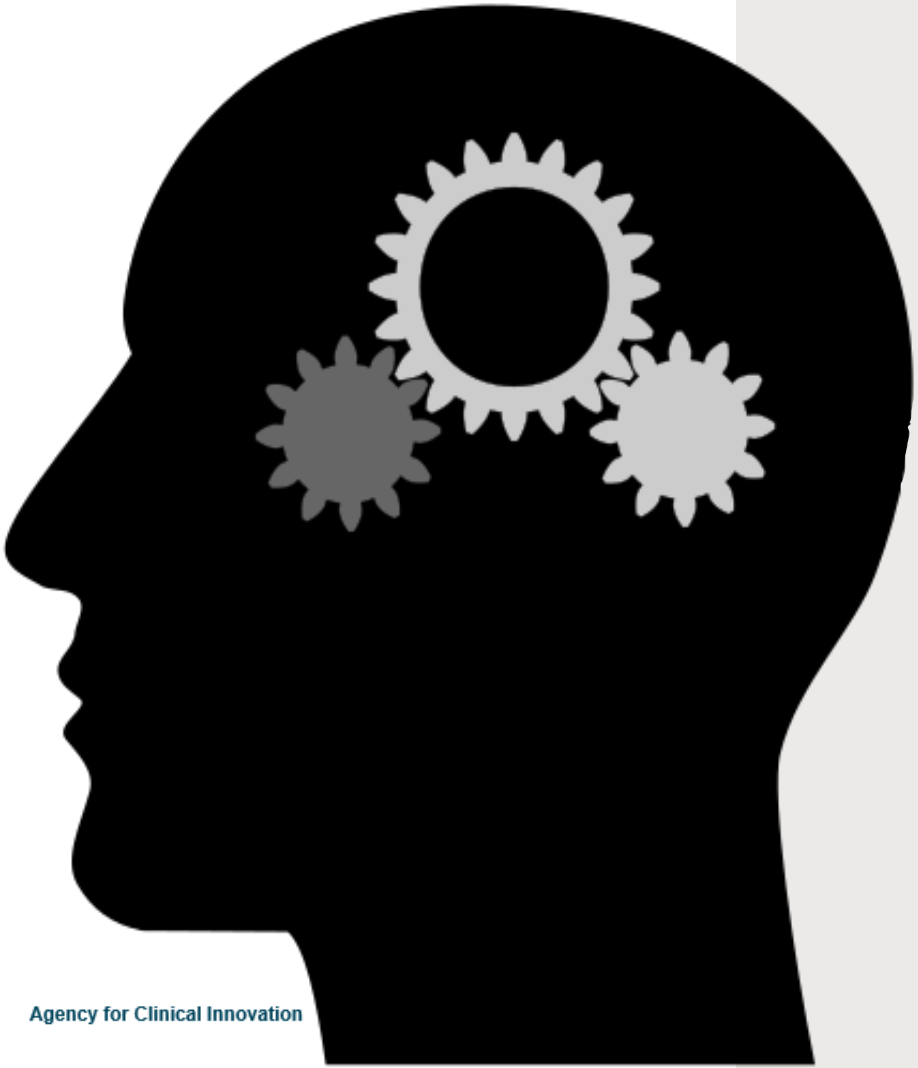
3. **Use of French lyophilized plasma transfusion in severe trauma patients is associated with an early plasma transfusion and early transfusion ratio improvement.**

Nguyen C [1], Bordes J, Cungi PJ, Esnault P, Cardinale M, Mathais Q, Cotte J, Beaume S, Sailliol A, Prunet B, Meaudre E

Author information

The Journal of Trauma and Acute Care Surgery. 01 May 2018, 84(5):780-785
https://doi.org/10.1097/ta.0000000000001801 PMID: 29334571

→ n=43
No difference in Fibrinogen levels

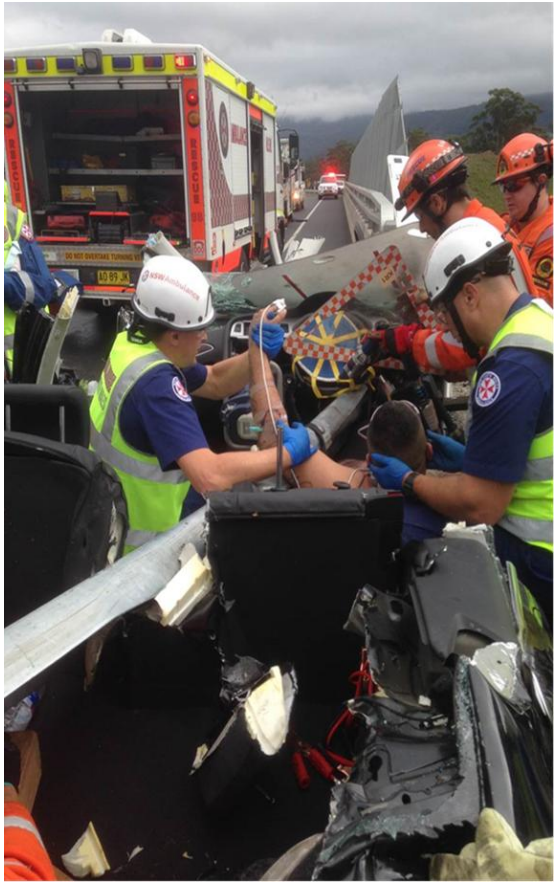


Agency for Clinical Innovation

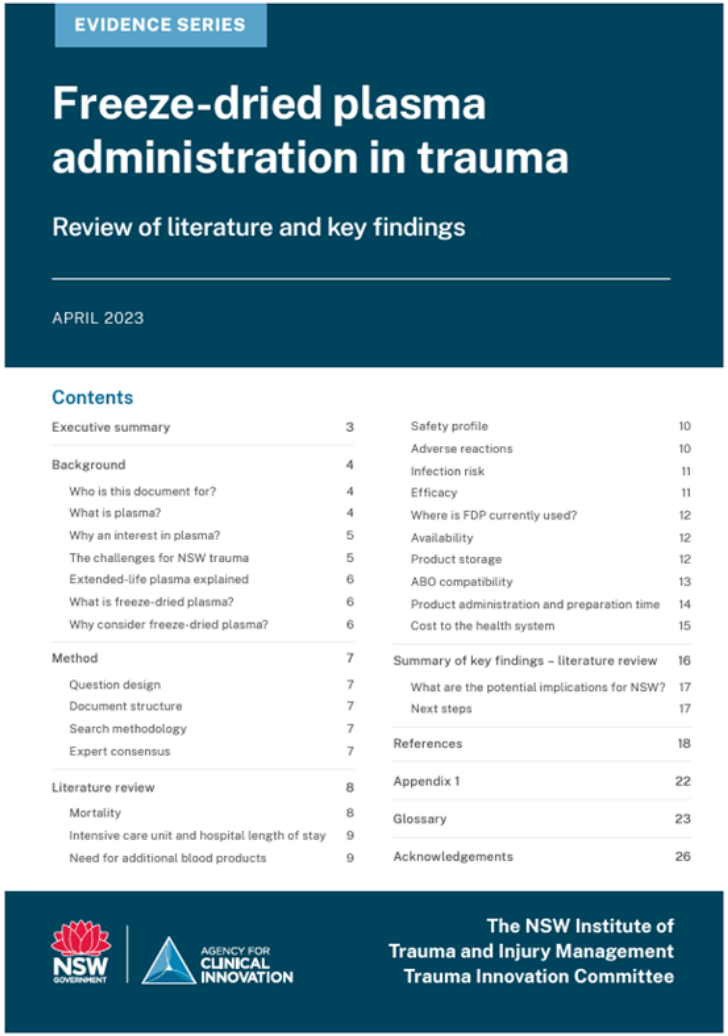
Is FDP a reasonable alternative to FFP?

Yes, it is!

SO WHAT?



Next steps



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Pre-hospital freeze-dried plasma for critical bleeding after trauma: A pilot randomized controlled trial

Biswadev Mitra [1 2], Ben Meadley [3 4], Stephen Bernard [2 4 5], Marc Maegele [6 7], Russell L Gruen [8], Olivia Bradley [4], Erica M Wood [2 9], Zoe K McQuilten [2 9], Mark Fitzgerald [10 11 12], Toby St Clair [3 4], Andrew Webb [13], David Anderson [3 4 5], Michael C Reade [2 14 15 16]

Affiliations + expand

PMID: 37103482 PMCID: PMC10946458 DOI: 10.1111/acem.14745

Abstract

Objectives: Transfusion of a high ratio of plasma to packed red blood cells (PRBCs), to treat or prevent acute traumatic coagulopathy, has been associated with survival after major trauma. However, the effect of prehospital plasma on patient outcomes has been inconsistent. The aim of this pilot trial was to assess the feasibility of transfusing freeze-dried plasma with red blood cells (RBCs) using a randomized controlled design in an Australian aeromedical prehospital setting.

Methods: Patients attended by helicopter emergency medical service (HEMS) paramedics with suspected critical bleeding after trauma managed with prehospital RBCs were randomized to receive 2 units of freeze-dried plasma (Lyoplas N-w) or standard care (no plasma). The primary outcome was the proportion of eligible patients enrolled and provided the intervention. Secondary outcomes included preliminary data on effectiveness, including mortality censored at 24 h and at hospital discharge, and adverse events.

Results: During the study period of June 1 to October 31, 2022, there were 25 eligible patients, of whom 20 (80%) were enrolled in the trial and 19 (76%) received the allocated intervention. Median time from randomization to hospital arrival was 92.5 min (IQR 68-101.5 min). Mortality may have been lower in the freeze-dried plasma group at 24 h (RR 0.24, 95% CI 0.03-1.73) and at hospital discharge (RR 0.73, 95% CI 0.24-2.27). No serious adverse events related to the trial interventions were reported.

Conclusions: This first reported experience of freeze-dried plasma use in Australia suggests prehospital administration is feasible. Given longer prehospital times typically associated with HEMS attendance, there is potential clinical benefit from this intervention and rationale for a definitive trial.

Agency for Clinical Innovation

CSL

Conclusion on Freeze Dried Plasma

Evidence driven not barriers

FDP comparable to FFP logistic advantage

FDP…… Greatest benefit = Rural prehosp & retrieval

We all have a part to play!

FDP can be a solution to the plasma drought

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Thank you

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