

Price comparison of fresh frozen plasma (FFP) vs lyophilized plasma (FDP)

Date: 13 September 2019

Background: This is an update of the cost comparison that was done on 21 January 2016. At the Adult Hospital Committee meeting of 21 January 2016¹, it was recommended that FDP be provided as an alternative to FFP. This recommendation was made following a motivation received from the Western Cape Pharmaceutical and Therapeutics Committee.

Evidence: There is limited evidence of efficacy suggesting that FDP is comparable to FFP in terms of clotting factors², and for the management of clotting deficiencies^{3 4}.

LoE: II RCT

Additional factors:

The following factors have pragmatic implications:

1. *Storage requirements:* FFP requires to be stored at temperatures below -30 °C, whilst FDP can be stored at room temperature^{5 6}.
2. *Shelf life:* FDP has a 2 year shelf life; whilst FFP is stored as a frozen product, and once thawed (for therapeutic use) needs to be stored at 0 to 4°C, but must be used within 24 hours.
3. *Availability:* FDP is immediately available; whilst FFP needs to be thawed prior to use.
4. *Solvent detergent treated process:* FDP is pathogen inactivated as it has undergone a solvent detergent inactivation procedure⁷.
5. *Crossmatch:* FDP does not require a crossmatch, as it is not a pooled product.

Price comparison:

Although, a health economic study done in the United States has shown that FDP is more cost-effective than FFP for plasma transfusions⁸, a cost minimisation analysis for the South African context was performed. This analysis only used direct costs of medicines, crossmatch laboratory test and storage and retrieval costs for FFP. This is an update of the price comparison done on 21 January 2016.

¹ Minutes of the Adult meeting of 21 January 2016.

² Lerner RG, Nelson J, Sorcia E, Grima K, Kancherla RR, Zarou-Naimo CM, Pehta JC. Evaluation of solvent/detergent-treated plasma in patients with a prolonged prothrombin time. *Vox Sang.* 2000;79(3):161-7. <http://www.ncbi.nlm.nih.gov/pubmed/11111235>

³ Bindi ML, Miccoli M, Marietta M, Meacci L, Esposito M, Bisà M, Mozzo R, Mazzoni A, Baggiani A, Scatena F, Filipponi F, Biancofiore G. Solvent detergent vs. fresh frozen plasma in cirrhotic patients undergoing liver transplant surgery: a prospective randomized control study. *Vox Sang.* 2013 Aug;105(2):137-43. <http://www.ncbi.nlm.nih.gov/pubmed/23448618>

⁴ Williamson LM, Llewelyn CA, Fisher NC, Allain JP, Bellamy MC, Baglin TP, Freeman J, Klinck JR, Ala FA, Smith N, Neuberger J, Wreghitt TG. A randomized trial of solvent/detergent-treated and standard fresh-frozen plasma in the coagulopathy of liver disease and liver transplantation. *Transfusion.* 1999 Nov-Dec;39(11-12):1227-34. <http://www.ncbi.nlm.nih.gov/pubmed/10604250>

⁵ National Bioproducts Institute. Bioplasma FDP® (lyophilized powder for IV infusion) South African MCC registered package insert, 13 March 2015

⁶ South African National Blood Service: Clinical Guidelines for the use of blood products in South Africa, 6th edition (2016).

⁷ Liembruno GM, Franchini M. Solvent/detergent plasma: pharmaceutical characteristics and clinical experience. *J Thromb Thrombolysis.* 2015 Jan;39(1):118-28. <https://www.ncbi.nlm.nih.gov/pubmed/24844804>

⁸ Huisman EL, de Silva SU, de Peuter MA. Economic evaluation of pooled solvent/detergent treated plasma versus single donor fresh-frozen plasma in patients receiving plasma transfusions in the United States. *Transfus Apher Sci.* 2014 Aug;51(1):17-24. <https://www.ncbi.nlm.nih.gov/pubmed/25151097>

Assumptions:

- Dosages calculated for a 70 kg adult.
- Full crossmatch test required for FFP infusion, sourced from the 2018/9 NHLS price list⁹.
- FFP requires storing below -30°C; and once thawed stored at -4°C and used within 24 hours. Therefore, storage and retrieval costs were included. These were extrapolated from a US cross-sectional survey¹⁰.
- Prices extrapolated from 2011 US cross-sectional study was inflated to an estimated equivalent 2019 price; and converted to South African Rands using the average Oanda exchange rate for 2019 (performed on the 13 September 2019)¹¹.

Indications

The indications for FFP in the Adult Hospital level STGs and EML are:

- 2.10.1 Haemophilia A and B, Von Willebrands Disease
- 2.12 Thrombotic thrombocytopenic purpura-haemolytic uraemic syndrome (TTP-HUS)
- 2.13.1 Disseminated intravascular coagulation (DIC)
- 19.19 Anticoagulant (warfarin and rodenticide superwarfarin) poisoning
- 20.6 Angioedema

Prices:

Product	One Unit Volume (mL)	Current price	Price per mL
FFP	280	R 1494.49 ⁶	R 5.34
FDP	200	R 1141.49 ¹²	R 5.71

Other prices:

Item	Price	
	US \$	ZAR
Full crossmatch	n/a	R 64.29
Storage/retrieval	\$68.00	R 1509.76

R 1 574.05

FFP price with additional costs (crossmatch, storage, retrieval)			
FFP	280	R 3068.54	R 10.96

⁹ NHLS State price list, 2018/9.

¹⁰ Toner RW, Pizzi L, Leas B, Ballas SK, Quigley A, Goldfarb NI. Costs to hospitals of acquiring and processing blood in the US: a survey of hospital-based blood banks and transfusion services. Appl Health Econ Health Policy. 2011;9(1):29-37. <https://www.ncbi.nlm.nih.gov/pubmed/21174480>

¹¹ Oanda average exchange rate for 2016. <http://www.oanda.com/currency/average>

¹² Contract circular RT285-2019

Price comparison:

2.10.1 Haemophilia A and B, Von Willebrands Disease; 2.13.1 Disseminated intravascular coagulation; 19.19 Anticoagulant (warfarin and rodenticide superwarfarin poisoning)		
Medicine	FFP	FDP
Dose (ml)	15 mL/kg (1050 mL)	15 mL/kg (1050 mL)
Price	R 11 507,01	R 5 992,82
Price Difference (FFP vs FDP):		R 5 514,18
2.12 Thrombotic thrombocytopenic purpura-haemolytic uraemic syndrome (TTP-HUS)		
Medicine	FFP	FDP
Dose (ml)	30 mL/kg (2100 mL)	30 mL/kg (2100 mL)
Price	R 23 014,01	R 11 985,65
Price difference (FFP vs FDP):		R 11 028,37
20.6 Angioedema		
Medicine	FFP	FDP
Dose (ml)	560	400
Price	R 6 137,07	R 2 282,98
Price difference (FFP vs FDP):		R 3 854,09

Sensitivity analysis:

Requesting a full crossmatch test, prior to administering FFP is not standard practice in the public healthcare setting. Therefore, a sensitivity analysis was performed with the omission of this test. Updated price comparison analysis follows below:

2.10.1 Haemophilia A and B, Von Willebrands Disease; 2.13.1 Disseminated intravascular coagulation; 19.19 Anticoagulant (warfarin and rodenticide superwarfarin poisoning)		
Medicine	FFP	FDP
Dose (ml)	15 mL/kg (1050 mL)	15 mL/kg (1050 mL)
Price	R 11 265,92	R 5 992,82
Price Difference (FFP vs FDP):		R 5 273,10
2.12 Thrombotic thrombocytopenic purpura-haemolytic uraemic syndrome (TTP-HUS)		
Medicine	FFP	FDP
Dose (ml)	30 mL/kg (2100 mL)	30 mL/kg (2100 mL)
Price	R 22 531,84	R 11 985,65
Price difference (FFP vs FDP):		R 10 546,19
20.6 Angioedema		
Medicine	FFP	FDP
Dose (ml)	560	400
Price	R 6 008,49	R 2 282,98
Price difference (FFP vs FDP):		R 3 725,51

Conclusion:

FDP is cheaper than FFP, noting that the additional pragmatic aspects (as listed above) of using the different plasma products needs to be factored into the decision making process. Limitations of this cost comparison analysis was that the robustness of the assumptions and uncertainties were not verified.

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