Journal of Rawalpindi Medical College (JRMC); 2013;17(1):122-124

Original Article

A Clinical Audit of Fresh Frozen Plasma Usage

Hamid Iqbal, Farhat Abbass Bhatti, Nuzhat Salamat, Fahim Akhtar, Kashif Hafeez
Armed Forces Institute of Transfusion, Rawalpindi

Abstract

Background: To assess the appropriateness of transfusions of fresh frozen plasma (FFP).

Methods: In this cross sectional study use of FFP , by different departments, was analyzed. Management details and appropriateness, for the use of FFP, was recorded. British Committee for Standards in Haematology (BCSH) guidelines were used as standards.

Results: Four hundred and ninety eight units of FFP were used during the study period for 118 transfusion episodes. Only 44% episodes of FFP transfusions were deemed appropriate. The most common inappropriate uses included bleeding with no coagulation test abnormality following cardiopulmonary bypass, hypovolaemia and hypoproteinaemia. The proportion of inappropriate request was similar between surgical and non surgical units.

Conclusion: FFP is frequently used inappropriately.

Key Words: Fresh frozen plasma.

Introduction

Fresh frozen plasma (FFP) is a component separated from whole blood, stored at below –18^{0}C, and is good source of all coagulation factors It is life saving in multiple coagulation deficiencies but over the time it is being administered indiscriminately without scientific basis or clinical evidence, particulary in underdeveloped countries like Pakistan. Contrary to the general belief among clinicians, FFP transfusions are not risk free. Allergic reactions[1], infectious complications, hemolysis, fluid over load, transfusion related acute lung injury (TRALI)[3] and immune suppression can be caused by FFP administration.[1,2] Efforts have been made, mostly in developed countries to lay down the guidelines, rationalize its usage and educate the medical community employing different strategies and tools.[3-5]

Patients and Methods

Patients who received FFP from AFIT between 1st September and 31st Nov 2012 were enrolled in this study. Referreal units ,indications and other salient features were recorded . A transfusion episode in this study was defined as one when any number of FFP was transfused after each individual request. The guidelines published by British Committee for Standards in Haematology (BCSH) were used as standards(Table I).[3] Usage outside these indications was deemed inappropriate.

Table-I: Criteria for the use of fresh frozen plasma (BCSH,1992)

Definite indications for the use of FFP: 1-Replacement of single coagulation factor deficiency where specific factor concentrate is not available 2-Immediate reversal of warfarin effect 3-Acute DIC 4-Thrombotic thrombocytopenic purpura
Conditional uses of FFP: in the presence of bleeding and disturbed coagulation: 1-Massive transfusion 2-Liver disease 3-Cardiopulmonary bypass surgery
No justification for the use of FFP: 1-Hypovolemia 2-Plasma exchange 3-Nutritional support 4-Treatment of immunodeficiency states

Results

During the study period, 498 units of FFP were used for 118 transfusion episodes in 84 patients. Based on these guidelines, appropriate use of FFP was found in 52 transfusion episodes (44%) and inappropriate in 66 (56%) of 118 transfusion episodes evaluated. FFP was used by both medical and surgical specialties with general medicine, intensive care units and cardiac surgery being the main users(Table 2).

Chronic liver disease followed by DIC was the most appropriate indications for FFP infusion(Table 3) . Bleeding related to surgery such as cardiovascular and thoracic surgery with normal coagulation profile were the most common inappropriate indication for FFP use. The proportion of inappropriate request was similar (58 vs 56) between surgical and non surgical

specialties but higher in ICU patients than non ICU (64 vs 38)

Table2 :Episodes of FFP utilization by various departments

Departments	Number of episodes	Episodes with appropriate use (%age)	Episodes with inappropriate use (%age)
General Medicine	36	19 (53)	17 (47)
ICU / CCU	28	10 (36)	18 (64)
Cardiothoracic Surgery	24	8 (33)	16 (67)
Oncology/ Transplant Med.	10	7 (70)	3 (30)
General Surgery	8	3 (38)	5 (62)
Paediatrics	7	3 (43)	4 (57)
Obs. and Gynae.	5	2 (40)	3 (60)
Total	118	52 (44)	66 (56)

ICU = Intensive Care Unit, CCU = Coronary Care Unit

Table 3:Evaluation of FFP usage according to the clinical indications

	No. of transfusion episodes	No. of FFP infused
Appropriate uses		
Liver disease	16	62
DIC	14	48
Post op bleeding with deranged coagulation profile	10	42
Massive transfusion	08	36
Reversal of warfarin effects	02	08
Factor deficiency	02	06
Inappropriate uses		
Surgery related with normal coagulation profile	21	98
Bleeding caused with normal coagulation profile	16	80
Hypoproteinemia	15	64
Hypovolemia	08	30
Reversal of heparin	06	24
Total	118	498

Discussion

Concerns regarding transfusion-transmitted infections and non-availability of blood components in developing nations, makes it crucial to optimize FFP transfusions and reduce wastage. In Pakistan the situation is more urgent due to the fact that there is no volunteer donor base, robust viral screening strategies are lacking, blood banks are unregulated and hospital audit mechanisms are almost non existent. Data on residual risk of viral transmission by blood products is lacking and there is perpetual scarcity of components for transfusion as there are very few blood centers having facilities for component preparation. Sufficient guidelines and recommendations for the transfusion of FFP are available in medical literature, although mostly from other countries, but FFP usage remains often misused.

In present study, FFP was used appropriately in 42% of cases as per published BCSH guidelines. [3] A substantial proportion of transfusions were inappropriate which is consistent with other studies in other parts of the world. In different studies the percentage of appropriate use ranges from 27 to 74%. (Table 4). [6-10] The spectrum of misuse of FFP reported by different countries varies. Indian studies revealed that FFP were most frequently being used as nutritional supplement for burns, sepsis, hypoproteinaemia and as plasma expander and in bleeding without coagulopathy. [11] Previous study in Pakistan showed inappropriate use in 45% cases that was mostly used intraoperatively.[12] Similar results were published from Malaysia.[13] Cardiothoracic surgeries revealed a substantial inappropriate usage of FFP .[14,15] The cause of bleeding during cardiovascular surgery is more frequently attributed to platelets and requires more rational therapy. [18] This clinical situation has also been studied in detail by Gleb et al who observed that the multiple coagulation factors do fall during cardiovascular surgery but this is transient and never critical (i.e. < 30% of normal). [16] Thus, routine perioperative use of FFP is unnecessary and exposes patients to unnecessary risks, including additional source of antithrombin III, that can produce heparin rebound.[17] The rational approach, advocated by BCHC guidelines is to advise FFP only if there is proven coagulation abnormality.

There is no justification for the administration of FFP as volume expander or as nutritional supplement. Safer alternatives, such as crystalloid, synthetic colloids or human albumin solutions are available for this purpose. High cost of human albumin discourages its use in hypoprotienemia in developing countries. Efforts are therefore, needed to establish infrastructure for large scale production of albumin in the country.

The main indications where FFP have been mostly transfused appropriately were the patients with chronic liver disease, DIC and prolonged bleeding with abnormal coagulation test results. Inappropriate

Table 4:Audit of FFP usage: various studies

Country	Appropriate use %	Guidelines used	Reference
Australian	37	NHMRC/ASBT	Schofield et al Med J Aust 2003;178 – 21
Singapore	27	CAP	Chng WJ et al Singapore Med J 2003;44: 574–8
Indian	33	BCSH	Chaudhary R et al ANZ J Surg
Malaysian	40	CAP	Parthiba et al Malays J Pathol 2001;2:41–6
Indian	40	BCSH	Kakkar N et al Transfus Med 2004;14:231–35
UK	66	BCSH	Jones HP et al Transfus Med 1998;8:37-41
Pakistani	55	BCSH	Hameedullah et al J Pak Med Assoc 2000;50:253–6
UK	47	CMA	Luk C et al CMAJ 2002;166:1539-40
Venezuelan	51	BCSH	Marti-Carvajal et al Int J Qual Health Care 1999;11:391–5
Australian	74	NHMRC/ASBT	Hui C-H et al Internal Med J 2005;35:283-8
UK	62	NIH con confs	Thomas A et al J Clin Path 1991; 44 : 734 –7
UK	66	BCSH	Eagleton et al Transfus Med 2000; 10:1- 6

NHMRC/ASBT = National Health and Medical Research Council / Australasian Society for Blood Transfusion Guidelines, CAP = College of American Pathologists;CMA = Canadian Medical Association, NIH con confs = National Institute of Health consensus conferences

use of blood components leads to the risk of transfusion-transmitted infections and wastage of precious human resource in developing countries.[18,19] Modification of FFP request forms with inclusion of laboratory evidence of coagulation defects, education of the staff at entry level and periodic audit of transfusion practices examined by the Hospital Transfusion Committee have been instrumental in curtailing the misuse of FFP. [20,21]

Conclusion

Evidence based guidelines are required for the rational utilization of FFP.

References

1. Moor ACE,Dubbleman TM,Van Steveninck J.Transfusion-transmitted disease, risk, prevention and perspectives. Eur J Haematol 1999;62:1-18.
2. Blumberg N and Heal JM. Evidence for plasma mediated immunomodulation transfusion of plasma- rich blood components. Transplant Proc 1988;206:1138-42.
3. British Committee for Standards in Haematology. Guidelines for the use of fresh frozen plasma. Tranfus Med 1992 ; 2 : 57 – 63.
4. Fresh Frozen Plasma, Cryoprecipitate, and Platelets administration-practice guidelines. JAMA 1994;271:777-81.
5. NIH Consensus Conference. Fresh Frozen Plasma. Indications and risk. JAMA 1985;253:551-53.
6. Thomas A, Contreras M, Knowles S. Blood component treatment: a retrospective audit in five major London hospitals. J Clin Path 1991; 44 : 734 –37.
7. Jones HP, Jones J, Napier JA, Al-Ismail S. Clinical use of FFP: results of a retrospective process and outcome audit. Transfus Med 1998;8:37–41.
8. Luk C, Eckert KM, Barr RM, Chin – Yee IH. Prospective audit of the use of fresh frozen plasma, based on Canadian Medical Association transfusion guidelines. CMAJ 2002 ; 166 : 1539 – 40.
9. Chng WJ, Tan MK, Kuperan P. An audit of fresh frozen plasma usage in an acute general hospital in Singapore. Singapore Med J 2003 ; 44 : 574 –78.
10. Marti-Carvajal AJ, Munoz-Navarro SR, Pena-Marti GE. An audit of appropriate use of blood products in adult patients . Int J Qual Health care 1999; 11 : 391 – 95.
11. Kakkar N, Kaur R, Dhanoa J, Improvement in fresh frozen plasma transfusion practice: results of an outcome audit. Transfus Med 2004;14:231–35.
12. Hameedullah K, Khan FA, Kamal RS, Improvement in intraoperative fresh frozen plasma transfusion practice – impact of medical audits and provider education. J Pak Med Assoc 2000;50:253–56.
13. Prathiba R, Jayaranee S, Ramesh JC, Lopez CG. An audit of fresh frozen plasma usage in a tertiary referral centre in a developing country. Malays J Pathol 2001;2:41–46.
14. Chaudhry R, Singh H, Verma A, Ray V. Evaluation of FFP usage at a tertiary care hospital in North India. ANZ J Surg 2005;75:573–77.
15. McCarthy PM, Popovsky MA, Schaff HV, Orszulak TA. Effects of blood conservation efforts in cardiac operations at the Mayo Clinic. Mayo Clin Proc 1988;63:225-29.
16. Gleb AB, Roth RI, Levin J, London MJ, Noall RA Changes in blood coagulation during and following cardiopulmonary bypass. Am J Clin Pathol 1996;23:351-56.
17. Roy R, Stafford MA, Hulspeth AS, Meredith JW. Failure of prophylaxis with fresh frozen plasma after cardiopulmonary bypass surgery. Anesthesiology 1998;69:254-57.
18. Bamette RE and Fish DJ. Modification of fresh frozen plasma transfusion practices through educational intervention. Transfusion 1990;30:253-57.
19. Wilson K, MacDougall L, Fergusson D. The effectiveness of interventions to reduce a physician's levels of inappropriate transfusion: what can be learned from a systemic review of the literature. Transfusion 2002;42:1224–29.
20. HUI CH, Williams I, Davis K. Clinical audit of the use of fresh frozen plasma and platelets in a tertiary teaching hospital Intern Med J 2005;35:283-88.
21. Chang G, Wong HF, Chan A, Chan A, Chui CH. The effects of a self educating blood component request form and enforcement of transfusion guidelines on FFP and platelet usage. Clin Lab Haematol 1996;18:83–87.