Evaluation of Fresh Frozen Plasma Usage At A Tertiary Care Hospital In Vadodara

Trupti Barot*, Farzana Kothari, Milind Dighe*****

*3rd Year Resident in IHBT, **Associate Professor in IHBT, ***Head of the Department of Immunohematology and Blood Transfusion in Govt. Medical College, Vadodara-390001.

Abstract: Background: Concerns regarding transfusion-transmitted infections and non-availability of blood components in developing nations make it crucial to optimize fresh frozen plasma (FFP) transfusions and reduce wastage. Method: A prospective study was done between January 2016 to September 2016 in terms of appropriateness and inappropriateness. The total number of patients during our study period was 207 receiving 785 units of plasma. Each file record was checked for the diagnosis of the patient, coagulation profile and doctor's indications for blood transfusion. The indications of FFP were checked according to guidelines for plasma transfusion as given in American Association of Blood Banking and WHO manuals in terms of indication and adequate volumes for transfusion. Result: In this study 785 units of FFP were used during study in 207 patients in 218 episodes in which in 53(24.4%) episodes transfusion was appropriate and in 165(75.6%) episodes transfusion was inappropriate. Department of general Surgery and Medicine were the departments with maximum number of inappropriate requests. Conclusion: The study highlighted the inappropriate use of FFPs in a tertiary care hospital and threw light on poor transfusion practices and the lack of implementation of the principles of hemovigilance in the utilization of FFPs. Specific recommendations include, administrative intervention with regular screening of requests by blood bank doctors and senior doctors of the departments using FFP and establishment of guidelines in departments regarding the use of blood components including FFP. [Trupti B NJIRM 2017; 8(2):99-102]

Key words: Appropriate, audit, fresh frozen plasma.

Author for correspondence: Trupti Barot, 44 / 2, Jivraj Colony, Opp D-Mart Mall, Inside Anupam colony, India colony, Bapunagar.Ahmedabad-380024. M: 7567427705 E-Mail:drtruptikbarot11@gmail.com

Introduction: There is shortage of blood and blood components in most of the developing countries. The resources are inadequate in terms of meeting the ever growing demand of blood components especially platelets. Appropriate use of blood components is required to ensure their availability for needy patients as well as to avoid the unnecessary risk of transfusion transmitted diseases[1]. Each donation of whole blood can be used to create as many as four different products (packed red cell concentrate, platelet concentrate, fresh frozen plasma and cryoprecipitate) that can be transfused to patients. If plasma unit is isolated from the unit of whole blood and frozen within eight hours from donation, the unit is termed fresh frozen plasma (FFP). FFP from a standard donation of whole blood (450 ml) usually measures 175–250 ml and it contains 70–80 units of factor VIII, IX, VWF and other clotting factors. The use of FFP has significantly increased in the past 10years. There are certain situations where FFP is clearly indicated such as coagulation deficiency secondary to liver disease, DIC, dilutional coagulopathy due to massive blood transfusion, in infants with secondary immunodeficiency, antithrombin deficiency and open heart surgery[2]. FFP contains antibodies against ABO antigens and is capable of causing complications like hemolytic transfusion reactions and transfusion related acute lung injury. It is also capable of transmitting transfusion transmissible infections. Other complications like allergic reaction and fluid overload associated with blood transfusion can also occur with plasma infusion. Hence, the use of FFP is not without potential damage.

In certain situations like specific factor or fibrinogen deficiency FFP is not indicated[3].

In spite of improvement in quality control, standardization and available guidelines about use of FFP, there are many studies around the world which report a high frequency of inappropriate use of this blood component. The appropriate use of FFP requires an understanding of the properties of FFP and its inadequacies as well as an appreciation of the complications.

The aim of this is study was to evaluate the usage of FFP according to indications and to reduce inappropriate usage.

Methods: Medical records of 207 patients who received FFP transfusion in our hospital from January 2016 to September 2016 were retrospectively studied. Data collected were provisional clinical diagnosis, indication for FFP transfusion, demographic data including age & gender of the patient, body weight &number of FFP units transfused. The usage of FFP was divided into two categories Appropriate &

Inappropriate based on guidelines published by "American Association of Blood Banking (AABB)". Transfusion of minimum 10ml/kg body weight of patient was considered adequate dose[4]. FFP usage was called Appropriate if it was according to AABB guidelines & in appropriate dosage.

2.1 Criteria's for appropriate transfusion of FFP as per American Association of Blood Banking [AABB][4, 5]

1. Active bleeding or before surgery or an invasive procedure in patients (adults & neonates) With acquired deficiencies of one or more coagulation factor's as demonstrated by an increase PT, APTT, INR when no alternative therapies are available or appropriate.
2. Immediate correction of vitamin K deficiency or removal of warfarin effect in a patient with Active bleeding or before surgery or any invasive procedure (In conjunction with use of Prothrombin Complex concentrate).
3. DIC or consumptive coagulopathy with active bleeding.
4. TTP.
5. Active bleeding or before surgery or any invasive procedure in patients with congenital factor deficiencies of one or more Coagulation factors when no alternative therapies are available or appropriate.
6. Massive blood transfusion.
7. Plasma should be transfused adequately i.e. 10-20 ml/kg
8. Therapeutic Plasma Exchange
9. Congenital deficiency of "C1 esterase inhibitor"

2.2 **Common reasons for inappropriate transfusion of FFP:**

1. Volume replacement
2. Correction of hypoalbuminemia
3. Nutritional support
4. Immunoglobulin replacement
5. Plasma transfused in inadequate volume (<10ml/kg) at least 10ml/kg body weight of plasma should be transfused

In actively bleeding patients 10-20ml/kg body weight of transfused FFP helps maintain the required percentage of coagulation factors needed to achieve haemostasis, in this study we took minimum of 10ml/kg body weight transfused according to the guidelines as discussed above as appropriate[4].

FFP should be transfused immediately before it will be needed because some factors especially factor VII has very short in vivo half life of 2-5 hours[5].

FFP is not effective in correcting INRs that are only minimally elevated[4].

There are numerous definitions of Massive transfusion but as per AABB "**Massive transfusion** is defined as the replacement of one blood volume within 24-hour period, for adults of average size this is roughly equivalent to 10 units of RBCs with any accompanying crystalloid, colloid, platelet or plasma transfusions."[4]. Other definitions are replacement of >50% of blood transfusion in 3 hours or 4-5 units of RBC units in 1 hour[6].

Use of FFP in Massive transfusion differs among various institutions, for trauma purpose FFP: RBC ratio is 1:1[4].

FP can also be used in C1 inhibitor deficiency[5].

Result: A total of 785 units of FFP were issued for 207 patients in our study group in 218 episodes which included 109(53%) males and 98(47%) females. Patients age range from Newborn baby to 82 years old with a mean age of 31 years. FFP was most commonly transfused in the age group of 18-34 years.

Table 1: Department wise FFP transfusion as Appropriate and Inappropriate

Department	Total	Appropriate	Inappropriate
General Medicine	112	24(21%)	88(79%)
General Surgery	29	9(31%)	20(69%)
Obstetrics& Gynecology	47	12(26%)	35(74%)
Paediatrics	18	5(28%)	13(72%)
Orthopedics	12	3(25%)	9(75%)
Total requests	218	53	165

Table 2: Percentage of various appropriate FFP requests in our hospital

Reason's	Percentage
DIC with bleeding	11(21%)
Raised PT/INR with bleeding	18(34%)
Therapeutic Plasma Exchange	15(28%)
In massive transfusion	9(17%)
Total appropriate requests	53

Table 3: Percentage of various Inappropriate FFP requests in our hospital

Reason's	Percentage
Raised INR without bleeding	73(44%)
During hemorrhage with normal INR	28(17%)
Volume replacement	23(14%)
Hypoproteinemia	19(12%)
Prophylactically without bleeding	22(13%)
Total Inappropriate requests	165

Discussion: FFP usage is increasing globally so it must be kept in mind that it is associated with potential risks to the recipient. Many studies have shown a high incidence of inappropriate use of FFP. Inappropriate use not only leads to a wastage of limited resources depriving more needy patients, but also leads to an increased healthcare cost and increased risk of transfusion related complications. Therefore, there is a need for more prudent use of this expensive blood product. Various guidelines for appropriate FFP use have been proposed by authors but we followed American guidelines which are guidelines from "American Association of Blood Banking (AABB)" as reference standard. In our study, FFP was most often used in patients of age range 18-34 years. For instance, in our study FFP was transfused in 23 requests for volume expansion. In these cases, other alternatives like plasma expanders should have been used instead of FFP.

We believe that the widespread uncertainty about the appropriate indications of FFP among the clinicians is the cause of this high rate of unindicated FFP transfusions. In our experience, we found two common reasons behind the inappropriate FFP requests. Some clinicians were not aware of the guidelines, while some clinicians tend to use FFP as a "precaution" against litigations and disputes. This warrants efforts to raise awareness among clinicians, that appropriate FFP transfusion requires presence of active bleeding or an invasive procedure in a setting of coagulopathy and prolongation of PT or aPTT.

In the studies by Shinagare et al[7] and Kulkarni et al[8], also more common indication was DIC with bleeding followed by excessive bleeding. While In the study by Choudhary et al[9], most common indication is chronic liver disease followed by DIC and excessive bleeding. All these authors support our study in having excessive use of FFP when not indicated & unnecessary exposure of the patient to the hazards of FFP transfusion. Various international guidelines are followed by various authors but we followed American guidelines which are guidelines from "American Association of Blood Banking (AABB)".

Conclusion: After evaluating the usages of FFP, it was found that there is a generalized and widespread irrational use of FFP. To reduce the inappropriate usage of FFP the following strategies may be used:

1. The hospital transfusion guidelines should be established based on existing international guidelines.
2. Awareness program for the clinician should be conducted regularly.
3. In the requisition forms the appropriate indication for FFP transfusion should be mentioned to serve as a reminder.
4. Regular evaluation may help to reduce inappropriate use and plays a vital role in overseeing transfusion practices to ensure optimal use of blood and component therapy.

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