International Journal of Biomedical and Advance Research
ISSN: 2229-3809 (Online); 2455-0558 (Print)
Journal DOI: 10.7439/ijbar
CODEN: IJBABN **Original Research Article**

An Audit of plasma usage in Tertiary care hospital

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Abstract

Aims & Objectives: 1)To evaluate the usage of plasma in a tertiary care hospital. 2)To evaluate reasons for inappropriate transfusion of plasma.
Introduction: FFP contains plasma proteins and all the coagulation factors, including the labile factors V and VIII. There exist only a few firm indications for fresh frozen plasma transfusions and there is a growing consensus that most of the time this blood product is used inappropriately and without any scientific rationale. FFP transfusion is always associated with risks like TRALI, HLA alloimmunisation, Allergic reaction, anaphylactic shock, TTI etc, so FFP should only be transfused when indicated and in adequate volume to achieve haemostasis so that its benefits of transfusion overweighs the hazards of transfusion.
Materials & Method: The present study was a prospective study done between Jan 2014 to July 2014 in patients having requested for Fresh Frozen Plasma with or without other components in terms of appropriateness & inappropriateness. The guidelines for plasma transfusion were benchmarked on the basis of American Association of Blood Bank in terms of indication and adequate volumes for transfusion.
Result: In this study 1594 units of FFP were used during study in 420 patients in 478 episodes in which in 185 episodes transfusion was appropriate and in 293 episodes transfusion was inappropriate. So appropriate requests were 38% while inappropriate requests were 62%, department of general Surgery and obstetrics & gynaecology were the departments with maximum number of inappropriate requests.
Conclusion: A continual system of staff education and administrative intervention by conducting regular departmental CME's will be helpful to reduce inappropriate use in future by making other departments aware of appropriate usage of plasma so that unnecessary transfusions & hazards of plasma transfusions could be minimised & plasma usage would really benefit the patient.
Keywords: Hepatitis, Hepatitis C virus, HCV

1.Introduction

Fresh frozen plasma (FFP) is a blood product extracted from plasma and frozen to -30˚C or below within 6hours after collection. It contains plasma proteins and all the coagulation factors, including the labile factors V and VIII.[1] There exist only a few firm indications for fresh frozen plasma transfusions and there is a growing consensus that most of the time this blood product is used inappropriately and without any scientific rationale.[2][3] There are certain situations where FFP transfusions are clearly indicated like Liver disease with active bleeding, coagulopathy &bleeding resulting from DIC,TTP.[4] Although guidelines for FFP usage are available, Inappropriate employment can be significant problem. However there are many instances such as volume expansion, hypoproteinemia where risk of FFP transfusion overweighs its potential benefits so should not be used[5]. So FFP should only be transfused when indicated and in adequate volume to achieve minimum level of clotting factors to achieve haemostasis.[6]

2. Materials & Methodology

Medical records of 420 patients who received FFP transfusion in our hospital from January 2014 to July 2014 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[5]. 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] [5][6]:

i. 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.
ii. 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).
iii. DIC or consumptive coagulopathy with active bleeding.
iv. TTP.
v. 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.
vi. Massive blood transfusion.
vii. Plasma should be transfused adequately i.e. 10-20 ml/kg
viii. Therapeutic Plasma Exchange
ix. Congenital deficiency of "C1 esterase inhibitor"

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

a) Volume replacement
b) Correction of hypoalbuminemia
c) Nutritional support
d) Immunoglobulin replacement
e) Plasma transfused in inadequate volume (<10ml/kg) at least 10ml/kg body weight of plasma shouldbe 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.[5]
- 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.[6]
- FFP is not effective in correcting INRs that are only minimally elevated.[5]
- 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."[5] Other definitions are replacement of >50% of blood transfusion in 3 hours or 4-5 units of RBC units in 1 hour.[9]
- Use of FFP in Massive transfusion differs among various institutions, for trauma purpose FFP: RBC ratio is 1:1.[5]
- FP can also be used in C1 inhibitor deficiency.[6]

3. Results

A total of 1594 units of FFP were issued for 420 patients in our study group in 478 episodes which included 176(42%) males &244(58%) 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. Department of Medicine had maximum number of 165 requests, most common clinical condition for FFP usage was "Chronic Liver Failure". The usage of FFP was categorised as appropriate if it was transfused in a minimum of 10ml/kg body weight. We concluded that FFP was transfused appropriately in 138 patients amounting to 185 requests (38%), 282 patients received inappropriate transfusion of FFP, amounting to 293 requests (62%). "Raised PT/INR with bleeding" was the most common indication for appropriate transfusion of FFP while the use of FFP for "Raised PT/INR without bleeding" was the most common indication for inappropriate transfusion of FFP.

Table1: Department wise FFP transfusion as Appropriate and Inappropriate

Department	Total	Appropriate	Inappropriate
General surgery	96	26(27%)	70(73%)
Medicine	165	58(35%)	107(65%)
Obstetrics & Gynaecology	71	21(30%)	40(70%)
Paediatrics	60	49(82%)	11(18%)
Orthopedics	33	10(30%)	23(70%)
Neurosurgery	31	9(29%)	22(71%)
Urology	14	5(36%)	9(64%)
Paediatric surgery	18	7(39%)	11(61%)
Total requests	488	185(38%)	293(62%)

Table2: Percentage of various appropriate FFP requests in our hospital

Reason's	Percentage
1) DIC with bleeding	29(15%)
2) Raised PT/INR with bleeding	95(52%)
3) Raised PT/INR before surgery	23(12%)
4) Therapeutic Plasma Exchange	27(15%)
5) In massive transfusion	11(6%)
Total appropriate requests	185

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

Reason's	Percentage
1) Raised INR without bleeding	83(29%)
2) Volume transfused was lesser than the therapeutic range to control bleeding with raised INR	22(7%)
3) FFP transfused without any raise in INR (during surgery)	58(20%)
4) During haemorrhage with normal INR	56(19%)
5) Volume replacement	33(12%)
6) Hypoproteinemia	27(9%)
7) Prophylactically without bleeding	10(3%)
8) In massive transfusion ratio of RCC to FFP not correct	4(1%)
Total Inappropriate requests	**293**

4. 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 byauthors 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 34 requests for volume expansion. In these cases, other alternatives like plasma expanders should have been used instead of FFP.

In our study, most common indication is DIC with bleeding followed by excessive bleeding with raised INR and inappropriate FFP transfusion in 62% patients, amounting to 293 units (62%). Many studies have been done worldwide with only few studies in India like studies done by Shinagare *et al*[8]from KIMS, Maharashtra, Choudhary *et al*[10] from SGPGI, Lucknow", "Kulkarni *et al*[7] from VIMS, Karnataka" with their inappropriate FFP transfusions like 39.4 %, 70.5 % and 52 % respectively.

While the exact figures differ, these various published audits also show a high proportion of inappropriate FFP usage. 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*[8] and Kulkarni *et al*[7], also more common indication was DIC with bleeding followed by excessive bleeding. While In the study by Choudhary *et al*[10], 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)".

5. Conclusion

The hospital transfusion guidelines should be established based on existing international guidelines.

Awareness program for the clinician should be conducted regularly.

In the requisition forms the appropriate indication for FFP transfusion should mentioned to serve as reminder.

Regular evaluation may help to reduce inappropriate use & plays a vital role in overseeing transfusion practices to ensure optimal use of blood & component therapy.

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