



Original Research Article

Appropriate and Inappropriate Use of Fresh Frozen Plasma (FFP) and Packed Cell Volume (PCV)

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ABSTRACT

Aims: The aim of this study was to evaluate the usage of fresh frozen plasma (FFP) and packed cell volume (PCV) according to indications and to reduce inappropriate usage.

Method: A two years retrospective study was conducted in Dr. S.C.G.M.C. and hospital blood bank. Based on the guidelines published by college of American pathologist, national health and medical research council and Australian society for blood transfusion FFP and PCV usage were categorized into appropriate and inappropriate. Pre and post transfusion INR/PT were recorded and the effect of FFP were studied in patients who received FFP

Results: During two years study 1079 unit of FFP were used for 267 patients. Out of 267 patients only 125(46.81%) request were appropriate and 142(53.19%) were inappropriate requests. Pregnant female with active labour suffering from severe anaemia with shock was the commonest reason for inappropriate FFP use. Out of 125 appropriate request 100 patients were compared by evaluating Pre and post transfusion PT/INR by using fully automated coagulometer. Total 993 PCV units were transfused in 445 patients out of which 358 were appropriate and 87 were inappropriate as per the guidelines. Highest appropriate request were from pediatric department followed by gynaecology department.

Conclusion: Inappropriate use of FFP and PCV not only increase the treatment costs, but also causes loss of productive power and exposes the patient to the unnecessary side effects of transfusion. Inappropriate FFP and PCV transfusion should be prevented by means of education and awareness programme by establishing the hospital transfusion guidelines

Keywords: Appropriate, fresh frozen plasma (FFP), inappropriate, Packed cell volume (PCV)

INTRODUCTION

There is shortage of blood and blood component in most of the developing countries.

The reported percentages and inappropriate and appropriate orders vary from 10% ^[1] to 83%. ^[2]

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.

Packed cell volume and Fresh frozen plasma (FFP) is a widely used blood component. If plasma unit is isolated from

the unit of whole blood, then we will get packed cell settled down and plasma as supernatant and this supernatant is frozen within eight hours from donation the unit is termed as FFP.

FFP is used for coagulation disorders ,treatment of bleeding of prophylaxis of bleeding, DIC, dilutional coagulopathy due to massive blood transfusion, in infants with secondary immunodeficiency, antithrombin deficiency and open heart surgery.

MATERIALS AND METHODS

A two year retrospective study was conducted in Dr Shankarao Chavan Government Medical College and hospital blood bank, Nanded, Maharashtra during the period January 2012 to December 2013.

The patients in whom PCV and FFP was requested and transfused were included in this study in order to study the appropriateness of PCV and FFP transfusion.

Data of age, gender of the patient provisional clinical diagnosis, indication for PCV and FFP, department of the requesting clinician date of transfusion, number of unit transfused and coagulation profile of the patient collected.

FFP was melted at 37 degree Celsius in 15 to 20 minutes. Each unit of FFP was 175 ml to 250 ml in volume. PCV volume was around 180 ml and was supplied after doing grouping followed by major and minor cross matching.

The guidelines published by CAP, National health and medical research council and Australian society for blood transfusion (ASBT) were used as standards as shown in table 1 and table 2.

If FFP infusion was according to the table 1 and table 2 it was categorized as appropriate transfusion otherwise as inappropriate transfusion.

If PCV was issued according to the guidelines given by NHRMC/Australian

society of blood transfusion (ASBT) given in table no.3, it was considered as appropriate.

TABLE 1: FFP Transfusion guidelines, College of American pathologist, 1994 [3]

1. History or clinical course suggestive of a coagulopathy due to a congenital acquired deficiency of coagulation factors with active bleeding or other invasive procedures. This must be documented by at least one of the following:

a. Prothrombin time (PT) greater than 1.5 times midpoint of normal range.

b. Activated partial thromboplastin time (APTT) greater than 1.5 times the top of normal.

c. Coagulation assay of less than 25% activity.

2. Massive blood transfusion: replacement of more than one blood unit within several hour's with evidence of a coagulation deficiency as above with continued bleeding.

3. Reversal of warfarin effect: If immediate homeostasis is required to stop active bleeding or prior to emergency surgery or an invasive procedure(PT>18 seconds or INR >1.6)

4. Prophylactically for surgery of invasive procedures in cases of documented congenital or acquired coagulation factor deficiency.

5. Deficiency of antithrombin, heparin cofactor, protein c or protein s.

6. Plasma exchange for thrombotic thrombocytopenic purpura of haemolyticuraemic syndrome.

TABLE 2: National health and medical research council and the Australian society for blood transfusion guidelines for transfusing fresh frozen plasma 2002 [4]

Appropriate if any of the following applicable .likely to be inappropriate if none applicable

1. INR or APTT high and liver disease before major surgery or invasive procedure
2. INR or APTT high and liver failure
3. INR or APTT high and acute disseminated intravascular coagulation
4. INR or APTT high and excessive bleeding
5. INR or APTT high before an invasive procedure
6. INR or APTT high before, during or major surgery
7. INR high and warfarin effect present and massive blood loss or emergency surgery
8. Correction of single factor deficiency when a specific factor was not available
9. Treatment of thrombotic thrombocytopenic purpura

TABLE 3: Summary of NHMRC/ASBT and CIDSCO guideline for packed cell volume (PCV) ^[4]

1. No need of blood transfusion of Haemoglobin > 8 gm/dl
2. Single unit of PCV transfusion equivalent number of unit of blood transfusion.
3. Symptomatic profile of patient's pulse, BP, Urine output to be taken in consideration.

RESULTS

A total of 993 units of PCV were issued for 445 patients. There were 240 male and 205 female with mean age 9 years (range 6 months to 60 year)

A total of 1079 units of FFP were issued for 267 patients. The number of FFP infused per transfusion ranged from 1 to 8 with a median of 6 and average of 4.04.

There were 115 male and 152 female with mean age of 25 year (range 1 day to 70 yr)

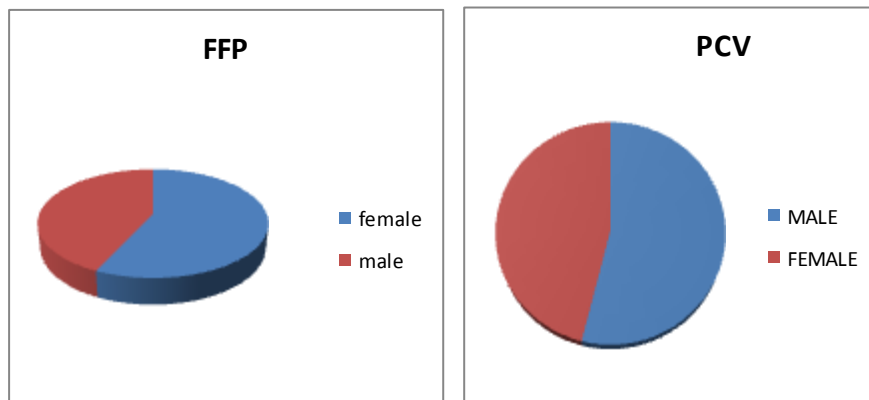


Fig.1: Pie diagram showing male to female ratio for FFP and PCV

PCV and FFP were most commonly transfused in the patient age group of 4 to 14 year and 20 to 27 years respectively.

Most number of PCV units requested was from pediatrics department followed by gynaecology department followed by medicine department. The most common indication was severe anaemia in children suffering from haemoglobinopathies, severe

anaemia in gynaecology department, severe anaemia with cardiac failure in medicine department. PCV was transfused in 445 patients as shown in table.4, out of which 358 were appropriate and 87 were inappropriate as per the guideline. Highest appropriate request were from pediatric department followed by gynaecology department.

TABLE 4: Indication of PCV

Sr no	disease	No. of bags	Percentage
1	Severe anaemia in cardiac disease	80	8.05
2	Haemoglobinopathies	650	65.45
3	Pregnancy induced hypertention with blood loss	143	14.40
4	Myeloproliferative disorders	120	12.08

TABLE 5: Distribution of FFP request according to different departments

Sr no	Department	No. of request	Unit of FFP supplied	Appropriate request	Inappropriate request
1	Medicine	86	409	42	44
2	Surgery	11	42	5	6
3	Obstetrics & Gynaecology (OBS& GYN)	115	472	59	56
4	Paediatrics	25	46	12	13
5	ENT	2	4	0	2
6	ICCU	23	96	07	16
7	Orthopaedics	1	2	0	1
8	Burn ward	4	8	0	4
	Total	267	1079	125	142

Most number of FFP units requested were from obstetrics and gynaecology department followed by medicine department as shown in Table 5. The most common indication was ANC with DIC with HELLP with shock followed by liver disease as shown in table.6. FFP was transfused to 267 patients out of which 125 were

appropriate and 142 was inappropriate transfusion as per published guidelines. Highest appropriate request were from obstetrics and gynaecology department followed by medicine department highest inappropriate request were from gynaecology department too.

TABLE 6: Indication of FFP use

Sr no	Disease	No. of bags used	Percentage(%)
1	DIC	389	36.05
2	Chronic liver disease	185	17.14
3	Coagulation factor deficiency	25	2.31
4	Hypovolemic replacement	380	35.21
5	Excessive bleeding	42	3.89
6	Surgical bleeding	32	2.96
7	Rodenticide poisoning	12	1.11
8	Snake bite	14	1.29

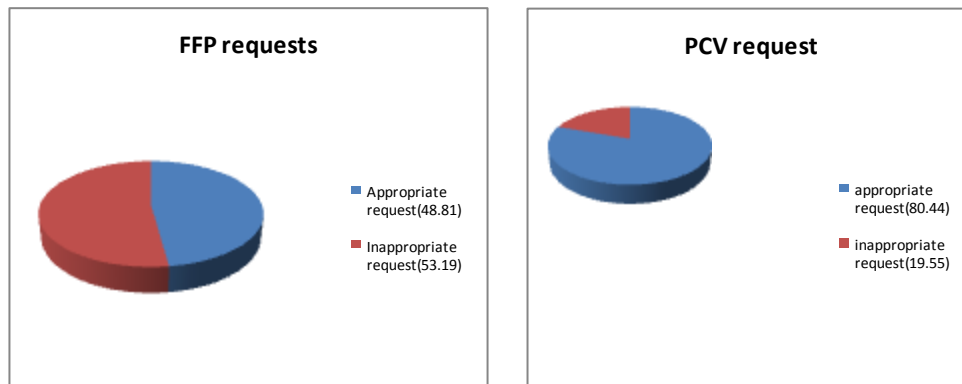


Fig.2: Pie diagram showing appropriate and inappropriate FFP and PCV requests.

Out of the 267 number of patients 201 patients received only FFP along and 66 patients received FFP with other supplements such as whole blood, packed red cell volume, platelets etc. In order to study the effect of FFP transfusion on INR, Patient who received other supplements was excluded.

Pre and post transfusion PT/INR were compared. The post transfusion PT/INR was done within six hour of transfusion. Pre and post transfusion INR were compared in 100 patients receiving 380 transfusion of FFP. The median pretransfusion INR of these patients was 2.1(range 1.5-10.0), and the post transfusion median was 1.8(range1.3-5.2).The number of random FFP units (median volume 325 ml) infused per transfusion ranged from 1 to 6 with median of 2 and an average of 3.8

The effect of FFP was measured by the difference between the pre transfusion results and the first recorded post transfusion INR. The improvement of INR was (0.75) noted after transfusion.

None of the patients experienced any complication during the transfusions.

DISCUSSION

Blood transfusion has been in use since many years.PCV and FFP is a frequently used blood product and evaluation of blood component usage is very important. In spite of clear guideline regarding the use of blood component, many studies have shown a high incidence of inappropriate use of FFP. Inappropriate use of FFP has a significant impact upon the patient's as well as the hospital staff in the form of healthcare cost, wastage of resources, depriving more needy patient and transmission of infection with unnecessary allergic reaction leading to mortality and morbidity in patients. The blood bank has to evaluate the existing trend of utility of FFP to prevent misuse which may lead to

shortage and thus deny this blood product to someone in life threatening situation. In the present study, after evaluation of all the requisition form 53.19% did not fulfill that constitute appropriate FFP usage.

FFP transfusion is appropriate in bleeding patients; patients undergoing invasive procedures with coagulopathy resulting from DIC, massive blood transfusion or liver failure and plasma exchange for thrombotic thrombocytopenic purpura. [3,4] In the present study the appropriate usage of FFP was 46.81% which matches to study done by Kulkarni et al [5] which shows 48% appropriate usage of FFP.

CONCLUSION

After evaluating the usage of PCV and FFP, it was found PCV usage was appropriate in 80.44 % cases, which need more improvement, regarding FFP there is a generalized and widespread irrational use of FFP among specialists. To reduce the inappropriate usage of blood component 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 PCV and FFP transfusion should be mentioned regularly.

REFERENCES

1. Brian W F, Butler R J, Inwood M J. an audit of blood component therapy in Canadian general teaching hospital. CMAJ, 1989; 140; 812-815.
2. Mozzes B, Epstein M, Ben-Bassat I et al. Evaluation of the appropriateness of blood and blood products transfusion using present criteria. Transfusion, 1989;29;473-476.

3. Practice parameter for the use of FFP, cryoprecipitate and platelets administration practice guidelines, development task force of the college of American pathologist, JAMA 1994; 271(10); 777-81
4. Cariberra: National health and medical research council (NHRMC/ Australian society of blood transfusion (ASBT).Clinical practice guideline, appropriate use of PCV, fresh frozen plasma & cryoprecipitate C:2001 P :09
5. Nagarekakulkarni, Evaluation of fresh frozen plasma usage at a medical college hospital-A two year study, International journal of blood transfusion and immunohematology, vol 2,2012,16-20.

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