Improvement in Intraoperative Fresh Frozen Plasma Transfusion Practice -Impact of Medical Audits and Provider Education

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Abstract

Objective: To determine the practice of anaesthesiologists in our institution for intraoperative transfusion of Fresh Frozen Plasma (FFP) and to see whether provider education can reduce the incidence of inappropriate FFP transfusion.
Material and Methods: A retrospective audit was done for 6 months in all patients who received intraoperative FFP transfusion. The result were compared with recommendations by the British Committee for Standards in Haematology. These results were presented in the departmental meeting and guidelines were circulated. Another prospective audit was conducted for six months to see whether there was any effect of provider education on the intraoperative transfusion practice.
Results: The first audit showed that 14.6% of the transfusion were definitely indicated, 40.2% were conditionally indicated whereas there was no justification in 45.1%. The subsequent audit showed a significant reduction (23.3%) in the unjustified transfusions of FFP whereas conditional use was significantly increased (69.1 %), showing an overall improvement in the intraoperative transfusion practice.
Conclusion: Further education and a monitoring system to ensure adherence to the recommended guidelines is required to improve transfusion practice (JPMA 50:253, 2000).

Introduction

The introduction of blood component therapy has had a major impact on the practice of transfusion, in providing a larger number of therapeutic units from a single donation and also by increasing the available choices for the treatment of different patients. Various studies on the use of fresh frozen plasma (FFP) have shown that it is often misused. The main reason for this are limited knowledge for its use in specific situations, ignorance of risks and increased availability. Various guidelines have now been developed and have been extensively published for the use of blood components. to standardize the justification of blood component transfusion and to increase the quality of transfusion practice[1,2].
Anaesthetists transfuse approximately fifty percent of the blood and blood components used in surgical patients. The objective of this study was to determine the current practice of anaesthesiologists in our institution regarding intraoperative transfusion of FFP and how it conformed to the available guidelines[1]. An additional objective was to see whether provider education and subsequent audit of intraoperative FFP transfusion criteria can reduce the incidence of inappropriate FFP transfusion.

Material and Methods

The Aga Khan University Hospital is a 420 bedded tertiary care, university affiliated, private hospital. It has 11 operating rooms that cater to almost all the surgical subspecialties including cardiac surgery. A retrospective audit looking at the practice of anaesthesiologists regarding intraoperative transfusion of FFP was performed at the institution. All patients undergoing surgery were included except those undergoing cardiopulmonary bypass. The audit included data for 6 months from January 1997 to June 1997. Computerized in formation was gathered from the Information System Department (ISD), blood bank and the operating rooms. Patient's medical records were then reviewed for indications of intraoperative FFP transfusion. Information obtained was then tabulated and compared with the guidelines for FFP transfusion by the British Committee for Standards in Haematology (BCSH)[1].

Results of this audit were presented in the Audit Meeting of the Department of Anaesthesia and the guidelines of BCSH were also circulated.

A second follow-up audit was done between December 1997 and May 1998 in a prospective manner. Indications of FFP transfused in the intraoperative period were then tabulated in accordance with the same guidelines.

Statistical analysis

The results of the two audits were compared by using chi-squared test on Epi-info-6 statistical software package. A p value of <0.05 was considered significant.

Results

The results of the first audit showed that 82 patients received FFP in the intraoperative period as against a total of 1117 patients in the entire hospital (7.3%). Out of these 14.6% were definitely indicated, 40.2% were used in the presence of deranged coagulation profile as evidenced by prothrombin time (PT) and activated plasma thromboplastin time (APTT) while 45.1% of the intraoperative transfusions were not justified according to the BCSH guidelines (Table 1).

Table 1. Guidelines for the use of fresh frozen plasma given by the British Committee for Standards in Haematology (1992).

Definite Indications	1. Factor deficiency 2. Warfarin reversal 3. Acute DIC 4. TTP
Conditionl Use	1. Massive transfusion 2. Liver disease 3. Cardio-pulmonary bypass 4. Paediatric indications 5. Deranged coagulation
No Justification	1. Hypovolaemia 2. Plasma exchange 3. 'Formula' replacement 4. Nutritional support 5. Immunodeficiency states

Of the unjustified transfusions, 17.1% showed no obvious indication from the review of medical records. Details of this audit are shown in Table 2.

Table 2. Audits on intraoperative FFP transfusion practice at AKUH.

Indications	Audit I (JAN - JUNE '97) n (%)	Audit II (DEC '97 - MAY '98) n (%)
Definite Indications		
Factor deficiency	2 (2.4)	4 (3.7)
Warfarin reversal	nil	nil
Acute DIC	10 (12.1)	4 (3.7)
TTP	nil	nil
Total	12 (14.6)	8 (7.4)
Conditional Use		
Massive transfusion	4 (4.8)	4 (3.7)
Liver disease	nil	nil
Paediatric indications	nil	4 (3..7)
Deranged coagulation	29 (35.6)	66 (61.6)
Total	33 (40.2)	74 (69.1)
No Justification		
Hypovolaemia	nil	nil
Plasma exchange	nil	nil
'Formula' replacement	20 (24.3)	12 (11.2)
Nutritional support	3 (3.6)	1 (0.9)
Immunodeficiency states	nil	nil
Unknown / Peer pressure	14 (17.0)	12 (11.2)
Total	37 (45.1)	25 (23.3)

The second follow-up audit showed that intraoperative FFP transfusions as compared to total in-hospital transfusions were reduced to 5.8% (107 patients transfused out of 1845 patients). Out of these 7.4% were transfused for definite indications, 69.1% were conditionally transfused (deranged coagulation profile) and in 23.3% intraoperative FFP transfusions were unjustified.

Break-up is shown in table 2.
Comparison of the two audits revealed a reduction in the overall FFP transfusion (20%). There was a decrease in FFP transfused on definite indications (50.6%) and also those which were unjustified (51.6%). There was a significant increase in the conditional transfusion of FFP (71.8%) i.e., FFP transfused in the presence of deranged coagulation.

Discussion

Several reasons exist for avoiding the inappropriate use of FFP. Risks associated with its transfusion, particularly those of infection (Hepatitis, HIV) should not be underestimated[3,4]. Other adverse effects include allergic reactions; intravascular haemolysis of recipient red cells after infusion of ABO incompatible plasma; fluid overload; formation of antibodies to donor granulocytes leading to' leucocyte aggregation in pulmonary vessels and acute lung injury; and immune suppression[5,6]. These concerns have forced the healthcare organizations to standardize and optimize the transfusion practice. This has lead to the development of various guidelines[1,2], in an attempt to ensure the appropriateness of transfusion practice.
Anaesthesiologists are involved in the management of patients in the operating rooms (OR), intensive care units (ICU), labour wards, emergency room (ER) and pain clinics. They are closely involved with the patients in the perioperative period where they take decisions and are solely responsible for transfusion of blood and blood components. Audits on general use of FFP in specialties like paediatrics[7], gynaecology and Obstetrics medicine and surgery[8-10] have already been published but there is lack of data regarding the intraoperative use of FFP. An audit on the above subject was planned as part of the ongoing quality assurance activity of the Department of Anaesthesia.
The first audit was retrospective where data regarding indication of transfusion, was primarily collected from patient's medical records. The results were discouraging but did not significantly differ from those in other studies done to assess the transfusion practice for FFP in various disciplines, although none of them was for intraoperative period[11-14] Our definitely indicated transfusions were only. 14.6%. As it was a retrospective audit, it was extremely difficult to find out whether all patients with definite indications did receive intraoperative FFP. In this audit 40.2% of the transfusions were in patients who had a deranged coagulation profile (evidenced by altered PT, APTT), 4.8% of which were related to massive transfusion while the remaining had no stated underlying reason for their deranged coagulation. Patients undergoing cardiopulmonary bypass were excluded from the study. Of the 45.1% unjustified transfusions, 24.3% were as so-called 'formula replacements' i.e., 2 units of FFP for every 4-6 units of packed cells used. The use of FFP according to predetermined replacement regimens cannot be presently justified[15] as no correlation between number of units transfused and extent of coagulopathy has been shown, 'Formula replacement' with FFP is unlikely to avoid the problem[16] rather it exposes the patient to additional risks. For correction of low serum albumin levels 3.6% of FFP were transfused which again is an example of inappropriate use of FFP. In 17.1% of the unjustified transfusions we could not find any justification of use on reviewing the medical record of the patients. Retrospective audits have certain limitations, but in this case, it effectively pointed out the unfamiliarity of our staff with the current practice and guidelines for FFP transfusion. We presented the results in the departmental audit meeting and reviewed the hazards and complications of FFP transfusion. At the same time the guidelines for FFP transfusion used by the BCSH were circulated among all the members of the department. Provider education has

been shown to improve the transfusion practice before in different studies[17,18].
The audit was again repeated after an interval of five months to see any change in the transfusion practice for FFP in the intraoperative period by the anaesthesiologists of our institution. Results of this audit are shown in Table 2. There was a definite reduction in the intraoperative use of FFP (5.8% vs 7.3%) despite a 63.2% increase in the use of FFP in the entire hospital during the audit period (1824 units vs 111 7 units). Definitely indicated transfusions have decreased from 14.6% to 7.4% in the second audit. The reason for this is that the number of patients with definite indications for FFP transfusion may vary froni time to time, but it was encouraging to find that all patients with definite indications were transfused FFP intraoperatively.
Londitionally usea F F P were significantly increased (69.1%) as compared to the previous audit (40.2%). Of these 3.7% were related to massive transfusion, 3.7% for neonates and 61.6% for deranged coagulation profile (PT, APTT) intraoperatively. FFP's are transfused to the neonates for the theoretical advantage of providing the complement and clotting factors although there are no studies providing evidence that outcome from infection is improved19 and it is included as conditional indication in guidelines by BCSH. Regarding the unjustified transfusions, there was a significant reduction in this group (23.3%) from the previous audit (45.2%). There was a 60% reduction in the transfusion of FFP for 'formula replacement' and only 1 patient was transfused for correction of low serum albumin levels. A large proportion of unjustified transfusions (48%) was due to 'peer pressure' from the surgeons. This could be due to the unfamiliarity of the surgeons with the current indications of FFP transfusion. In patients who are at risk of clinically significant bleeding intraoperatively, it is usually the local causes that are responsible, but a generalized haematological defect may be uncovered particularly in emergency or urgent situations. In such situation, transfusion of FFP and platelets is empirical initially but is subsequently guided by the clinical and laboratory coagulation profile of the patient[20]. This could have been the reason of transfusions requested by the surgical colleagues (peer pressure). The results of this audit showed a significant improvement in FFP transfusion practice of the anaesthesiologists at our institution.
The use of blood products including FFP has come under close scrutiny over the past decade particularly because of the transmission of diseases. Various guidelines, algorithms and recommendations have been issued in an attempt to ensure appropriateness of transfusion practice, but the results are less than satisfactory. Education as to the appropriate blood and blood products utilization and concurrent quality assurance audit techniques can safely reduce blood and blood product usage in the operating rooni as well as in the entire hospital thus providing maximum benefit to the patient with minimal risk.

References

1.Contreras M, Ala FA, Greaves M, et al. British Guidelines for the use of fresh frozen plasma. Committee for Standards in Haematology, Working Party on the Blood Trandfusion Task Force. Transfusion Med., 1992;2:57-63.
2.Stehling CL, Doherty DC, Faust RJ, et al. Practice Guidelines for Blood Component Therapy. A report by the American Society of Anesthesiologists Task Force on Blood Component Therapy. Anesthesiology. l996;84:732-47.
3.Lee KK, Vargo LR, i.e CT, et al. Transfusion acquired hepatitis A outbreak from fresh frozen plasma in a neonatal intensive care unit. Paediatr. Infect. Dis. J., 1992;11:122-23.
4.Crosby ET. Perioperative haemotherapy: 1. Indications for blood component transfusion. Can.

J. Anaesth., 1 992;39:695-707.
5.Cohen H. Avoiding the misuse of fresh frozen plasma. Br. Med. J. 1993;307:395-96.
6.Lindgren L. YIi-Hankala A, Hamle L, et al. Transfusion related acute lung injury after fresh frozen plasma in a patient with coagulopathy. Acta. Anaesthesiol. Scand., 1996:40:64 1-44.
7.Strauss RG, Levy GJ, Sotelo-Avila C, et al. National survey of neonatal transfusion practices: II. Blood component therapy. Pediatrics, 1993;91,530: 36.
8.Barradas R, Scitwalbach T, Novoa A. Blood and blood product usage in Maputo. Cent. Afr. J. Med., 1994:40:56-60.
9.Nicholls MD, Au-Yeung D, lannella M. Fresh frozen plasma use in a tertiary referral hospital. J. Quality Clin. Pract., 1994:14:77-84.
10.Devine P, Postoway N, Hoffstadter L, et al, Analysis of fresh frozen plasma administration with suggestions for wavs to reduce usage, Transfusion Med.,1992;2:189-94.
11.Thomson A, Contreras M, Knowles S. Blood component treatment: a retrospective audit in five major London hospitals. J. Clin. Pathol., 1991;44:734-37
12.Silver H, Tahhan HR, Anderson J, et al. A non-computer-dependent prospective review of blood and blood component utilization. Transfusion, 1992;32:260-65,
13.Metz J, McGrath KM. Copperchini ML, et al. Appropriateness of transfusion of red cells, platelets and fresh frozen plasma. An audit in a tertiary care teaching hospital. Med. J. Aust., 1995;162:572-73,
14.Schots J, Steenssens L. Blood usage review in a Belgian university hospital. Int J. Quality Health Care, 199;6:41-45.
15.Mannucci I'M, Fedirici AB, Sirchia G. Haetnostasis testing during massive blood replacement. Vox Sanguinis, 1982:42:113-23.
16.Harvey MP, Greenfield TP, Sugrue ME. et al. Massive blood transfusion in a tertiary referral hospital. Clinical outcomes and hacmostatic complications. Med. J. Aust. 1995:163:356-59.
17.Barnette RE, Fish DJ, Eisensteadt RS. Modification of fresh frozen plasma transfusion practices through edticational intervention. Transfusion, 1990;30:253-57.
18.Morrison JC, Suinrall DD. Chevalier SP, et at, The effect of provider education out blood utilizatioti practices. Am J. Obstet. Gynaecol 993;169:1240-45.
19.Russell ARB. New modalities for treating neonatal infection. Eur. J. Pediatr. 1996:1 55(suppl):S2 1-24.
20.Gold MS. Dietz PA. Heneghatt SI. et al. Emergency surgery in haematologic patients World J.Surg., 1996;20:1133-40.