

Research letter

Prospective audit of the use of fresh-frozen plasma, based on Canadian Medical Association transfusion guidelines

Cynthia Luk, Kathleen M. Eckert, Robert M. Barr, Ian H. Chin-Yee

The use of fresh-frozen plasma (FFP) continues to rise,¹ despite the fact that the supply of plasma derived from allogeneic blood donation is finite. Unfortunately, this product is commonly overused or inappropriately used.¹

In 1997, in view of the limited supply of FFP and the shrinking donor pool, an expert working group convened by the Canadian Medical Association (CMA) published recommendations for the appropriate use of erythrocyte (red blood cells) and plasma transfusion.² The guidelines recommended transfusion of FFP in 3 specific situations: for patients with significant coagulopathy because of acquired deficiencies of multiple coagulation factors in whom serious bleeding has occurred or for whom emergency surgery or other procedures are planned, for treatment of thrombotic thrombocytopenic purpura and for treatment of acquired single-factor deficiencies where a product containing the specific factor is ineffective or unavailable. We conducted a prospective audit to determine whether current FFP transfusion practice in 2 tertiary care teaching hospitals in London, Ont., followed these recommendations.

From June to August 1999 the following information was collected by blood bank technologists at the time FFP was requested for any adult patient: diagnosis, clinical indication (e.g., active bleeding, emergency surgery or invasive procedure) and pretransfusion coagulation result. The clinical information was obtained from the health care practitioner placing the FFP order, and the coagulation results were obtained from a computerized laboratory reporting system. The patient's chart was reviewed later if any information was missing. A hematologist (CL) applied the CMA guidelines to each transfusion request and classified the transfusion as appropriate if the criteria were completely fulfilled, as probably appropriate if the criteria were not completely fulfilled but FFP use was likely necessary in the context of the clinical scenario, or as inappropriate. Questionable scenarios

(22% total cases) were judged by consensus after case reviews with two additional hematologists.

Over the 3-month study period, there were 671 FFP transfusion orders, accounting for 2372 units for 358 patients. The FFP transfusions for 2 patients were excluded because available information was insufficient to determine the appropriateness of transfusion. Furthermore, an additional 15 transfusion orders for plasmapheresis used in 2 patients with vasculitis were omitted from the analysis because there were no guidelines to judge the appropriateness of transfusion in this situation. The transfusions were judged appropriate for 167 patients (47%), probably appropriate for 31 (9%) and inappropriate for 160 (45%). The situations in which transfusion was judged inappropriate are listed in Table 1.

The rate of inappropriate use of FFP in this study (45%) was within the range reported in previous studies (10% to 73%).³⁻⁶ However, the results of our study are not directly comparable with the earlier results because of differences in the guidelines used. The high rate of inappropriate use reported here is due in part to our stringent application of the CMA guidelines. The strengths of this audit include the large sample size and its prospective nature. A limitation of

Table 1: Situations in which transfusion of fresh-frozen plasma was judged inappropriate*

| Situation | No. (and %) of patients | |
|--|-------------------------|------|
| Active bleeding or preparation for emergency surgery or invasive procedure in patient with INR or a PTT \leq 1.5x normal | 85 | (53) |
| Coagulopathy without clinical evidence of bleeding | 33 | (21) |
| Active bleeding with normal coagulation profile | 18 | (11) |
| Active bleeding without a coagulation profile | 14 | (9) |
| Preparation for minor procedure in patient with liver disease and INR \leq 2 | 7 | (4) |
| Reversal of oral anticoagulation† with no clinical evidence of bleeding | 3 | (2) |

Note: INR = international normalized ratio, PTT = activated partial thromboplastin time.

*The 160 patients for whom plasma transfusion was inappropriate represented 45% of the patients who received such transfusions over a 3-month period at 2 tertiary-care centres.

†Plasma transfusion used instead of administration of vitamin K.

the assessment is that the adjudication process was performed without full knowledge of each case.

The purpose of auditing transfusion use is to raise awareness and to improve the rate of appropriate use of blood products. In this study we found a high rate of inappropriate FFP use and identified the situations in which FFP was used inappropriately. We recommend adoption of a program to promote more efficient use of the limited FFP supply in all institutions. Such a program should incorporate strategies that have proven effective, such as formal education and regular utilization audits⁷⁻⁹ targeting the inappropriate indications that we identified.

This article has been peer reviewed.

Dr. Luk is a Clinical Scholar with the Department of Medicine, Division of Hematology, London Health Sciences Centre, University of Western Ontario, London, Ont. Ms. Eckert is with the Blood Transfusion Laboratory, London Health Sciences Centre, University of Western Ontario, London, Ont. Drs. Barr and Chin-Yee are with the Department of Medicine, Division of Hematology, London Health Sciences Centre, University of Western Ontario, London, Ont., and Canadian Blood Services, London, Ont.

Competing interests: None declared.

Contributors: Dr. Luk was responsible for data analysis and preparation of the manuscript. Ms. Eckert was responsible for study design, data collection and manuscript revision. Drs. Barr and Chin-Yee contributed to study design, data interpretation and manuscript preparation.

References

1. Thomson A, Contreras M, Knowles S. Blood component treatment: a retrospective audit in five major London hospitals. *J Clin Pathol* 1991;44(9):734-7.
2. Expert Working Group. Guidelines for red blood cell and plasma transfusion for adults and children. *CMAJ* 1997;156(11 Suppl):S1-S24. Available: www.cma.ca/cmaj/vol-156/issue-11/blood/index.htm
3. Blumberg N, Laczin J, McMican A, Heal J, Arvan D. A critical survey of fresh-frozen plasma use. *Transfusion* 1986;26(6):511-3.
4. 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(1):37-41.
5. Brien WF, Butler RJ, Inwood MJ. An audit of blood component therapy in a Canadian general teaching hospital. *CMAJ* 1989;140(7):812-5.
6. Mozes B, Epstein M, Ben Bassat I, Modan B, Halkin H. Evaluation of the appropriateness of blood and blood product transfusion using preset criteria. *Transfusion* 1989;29(6):473-6.
7. Morrison JC, Sumrall DD, Chevalier SP, Robinson SV, Morrison FS, Wiser WL. The effect of provider education on blood utilization practices. *Am J Obstet Gynecol* 1993;169(5):1240-5.
8. Shanberge JN. Reduction of fresh-frozen plasma use through a daily survey and education program. *Transfusion* 1987;27(3):226-7.
9. Barnette RE, Fish DJ, Eisenstaedt RS. Modification of fresh-frozen plasma transfusion practices through educational intervention. *Transfusion* 1990;30(3):253-7.

Correspondence to: Dr. Ian H. Chin-Yee, Department of Hematology, Room 2760, London Health Sciences Centre, 800 Commissioners Rd. E, London ON N6A 4G5; fax 519 685-8477; ian.chinyee@lhsc.on.ca

CMAJ Essay Prize Deadline: Dec. 15, 2002

CMAJ is offering a single open-category prize of \$1000 for the best piece of writing submitted to the 2002 CMAJ Essay Prize contest. We welcome entries from physicians, students, residents and nonphysicians. We are looking for reflective essays of up to 2000 words on topics of interest to a general medical readership.

The winner will be selected by a committee appointed from CMAJ's Editorial Board. The judges will make their decision on the basis of originality of thought and quality of writing. The winning manuscript must be suitable for publication in CMAJ. All papers submitted will be considered for publication. The journal reserves the right not to award a prize. Prospective entrants are encouraged to read the description of the selection of winners for the 2000 Essay Prize in our June 26, 2001, issue (available at www.cmaj.ca/cgi/content/full/164/13/1859).

Authors should submit their papers with a cover letter stating that they would like their manuscript to be considered for the 2002 CMAJ Essay Prize. We welcome submissions by mail (CMAJ, 1867 Alta Vista Drive, Ottawa ON K1G 3Y6), fax (613 565-5471) or email (pubs@cma.ca) until the deadline of Dec. 15, 2002.

