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Long-term audit of the use of fresh frozen plasma in a university hospital

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الملخص

أهداف البحث: هناك قلق عالمي بشأن الاستخدام غير الملائم للبلازما المجمدة الطازجة. أجريت هذه الدراسة للكشف عن مدى الاستخدام غير الملائم للبلازما المجمدة الطازجة في مستشفى الملك خالد الجامعي، بالرياض، وللتأكد من ما إذا كانت هناك أي خطوط توجيهية يتم اتباعها أثناء الاستخدام السريري لها.

طرق البحث: قامت هذه الدراسة بتحليل الاستهلاك السنوي من البلازما المجمدة الطازجة في مستشفى الملك خالد الجامعي خلال الفترة من ١٩٨٦ إلى ٢٠٠٧. بعد ذلك، تم استخراج نتائج اختبارات فحص التخثر من السجلات الطبية لـ ٥٣١ مريضا متتاليا من عدة تخصصات في المستشفى لمزيد من التحليل.

النتائج: تم صرف ما مجموعه ٦٨٤٨٠ وحدة من وحدات البلازما المجمدة الطازجة خلال الـ٢٢ عاما من الدراسة. وارتفع الاستهلاك إلى هضبة، إلا أنه انخفض بشكل كبير بنسبة ٣٠.٩٪، في عام ١٩٩٥ إلى أدنى مستوى له في عام ٢٠٠٠. وكان هناك أيضا انخفاض متزامن ومتداخل في استهلاك كل من البلازما المجمدة الطازجة ومجموع وفيات المستشفى لكل حالة دخول. وصُرف ما مجموعه ١٦٢٠ وحدة من البلازما المجمدة الطازجة لـ ٥٣١ مريضا، وأجري اختبار التخثر قبل وبعد إعطائه في جميع المرضى تقريبا لقسم التوليد وأمراض النساء و٩٠٪ من المرضى في قسم الجراحة.

الاستنتاجات: تم الكشف عن الدرجة الكبيرة من الاستخدام غير الملائم للبلازما المجمدة الطازجة في مؤسستنا عن طريق الانخفاض الملحوظ في الاستهلاك بعد "خوف فيروس نقص المناعة البشرية" العالمي في أوائل التسعينات من القرن الماضي. ويعكس الانخفاض الناتج في إجمالي الوفيات في المستشفى المصاحب للانخفاض المتزامن في استهلاك البلازما المجمدة الطازجة فوائد الاستفادة من بدائل علاج الدم. تم تطبيق اختبار التخثر إلى حد مُرضٍ. يمكن لعمليات التدقيق في سياسات نقل الدم وبرامج التعليم أن تؤدي إلى استخدام أفضل للبلازما المجمدة الطازجة.

الكلمات المفتاحية: البلازما المجمدة الطازجة؛ العلاج بالدم؛ نقل الدم؛ التدقيق

Abstract

Objectives: There is universal concern about the inappropriate use of fresh frozen plasma (FFP). This study aimed to determine the extent of the inappropriate use of FFP at a university hospital in KSA.

Methods: Medical records on the annual use of FFP were analysed from 1986 to 2007. Then, the results of the coagulation screening tests were extracted from the medical records of 531 consecutive patients in various departments of the hospital.

Results: As many as 68,480 FFP units were used during the 22 year study period. Consumption increased and then plateaued in 1995, but dropped dramatically by 30.9% and reached its lowest level in 2000. There was also a concomitant and overlapping drop in both FFP usage and the hospital mortality rate per patient admission. One-thousand-six-hundred-twenty FFP units were issued for 531 patients. Coagulation testing, before and after infusion, was adopted in almost all patients in the

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Department of Obstetrics and Gynaecology, in 90% of patients in the Department of Surgery and in approximately 70% of patients in other departments.

Conclusions: Significant inappropriate use of FFP at our institute has been made evident by examining the remarkable drop in use following the universal "HIV scare" of the early 1990s. The resulting drop in the hospital mortality rate, accompanying the simultaneous drop in FFP use, reflects the benefits of resorting to the use of less blood therapy. Coagulation testing was used to a satisfactory extent. Transfusion audits and educational programs could result a better use of FFP.

Keywords: Blood transfusion; Coagulation screening tests; Fresh frozen plasma; HIV

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Introduction

Fresh frozen plasma (FFP) is one of the most commonly used haemostatic blood products and its use is on the rise.[1] However, there are currently few firm indications or guidelines surrounding its use and, as a result, there are growing concerns that FFP is used inappropriately and without scientific rationale, at a time of general disquiet about the safety of blood transfusion products. The risk of transfusion-transmitted infections has decreased markedly, but there is still a prevailing worry about the non-infectious risks, specifically transfusion-associated circulatory overload, transfusion-associated graft-versus-host disease, transfusion-related acute lung injury and the transfusion of ABO-incompatible blood.[2,3] Overall, this situation is more pressing in developing countries due to the shortage of donated blood and the wide prevalence of infections transmitted by blood transfusion, particularly HIV and hepatitis viruses.[4]

A survey of the literature uncovered numerous studies from developing countries on the trend of the use of FFP, showing a continuous reduction in its use. This reduction was generally attributed to the application of guidelines on the transfusion of blood products, the physicians that were educated on the proper use of FFP, and also the emphasis on the fact that no transfusion is completely free from the infectious and non-infectious risks of blood transfusion.[1,5–8] Nonetheless, the inappropriate use of FFP is still widespread.[8–12] Information in this area is lacking in our geographical region and is very scanty in developing countries. The present study is a retrospective review of the use of FFP by various clinical departments in a teaching hospital in KSA, with the aim of figuring out the long-term (22 years) trend in the use of FFP and to what extent coagulation screening tests are used as both a guide to its infusion and a measure of its efficacy.

Materials and Methods

This is a retrospective audit performed at King Khalid University Hospital (KKUH), which is an 850-bed, major teaching hospital of the College of Medicine, King Saud University, Riyadh. It has 33 clinical divisions including Accident and Emergency, Cardiac Surgery, Haematology/Oncology, Medical, Surgical and Neonatal Intensive Care Units. There is a Hospital Blood Bank that serves as a blood transfusion centre and is fully responsible for the recruitment of blood donors, collection and testing of donated blood, preparation, storage and issuing of blood products, including packed red blood cells, platelet concentrate, fresh frozen plasma, cryoprecipitate, and filtered and irradiated components. There are *Guidelines to the Transfusion of Blood and its Derivatives* that were issued by the Hospital Blood Transfusion Committee. The blood bank records have undergone gradual modernization to reach the current fully computerized portion of the general hospital management system. This study has received ethical approval from the Institutional Review Board (IRB) of the College of Medicine. The analysis and presentation of the data are divided into two parts:

Part I: The annual overall use of FFP by the blood-consuming hospital departments (General Surgery, Medicine, including Haematology/Oncology, Renal Dialysis Unit, Paediatrics, Obstetrics and Gynaecology and Cardiac Surgery), was extracted from the hospital blood bank records retrospectively, over a 22 year period from January 1986 to December 2007, and entered into a data spread sheet on a computer (Microsoft Excel) to facilitate the analysis. The FFP is conventionally prepared in the blood bank in the following manner: fresh plasma is separated from donated whole blood, collected in citrate-phosphate-dextrose (CPD) solution, after centrifugation and subsequent removal of plasma (approximately 250 ml) within 4–6 h after blood collection, and then is frozen immediately at −40 °C or lower.

Part II: A review was conducted of the hospital blood bank records of 531 consecutive patients who received FFP during the period from December 2003 to June 2004, in the following clinical departments: Medicine (n = 306), Surgery (n = 102), Paediatrics (n = 87), Accident and Emergency (n = 21), Obstetrics and Gynaecology (n = 15). The available results were recorded on pre- and post-FFP transfusion coagulation tests: prothrombin time (PT), international normalized ratio (INR), activated partial thromboplastin time (APTT) and plasma fibrinogen (FIB) (Table 2).

Statistical analysis

This is an exploratory analysis that aims to identify station(s) at which significant changes occurred in the trend of the use of fresh frozen plasma (increasing, decreasing or unchanged) over a long time interval (22 years) and to quantify these findings and test for their significance at the 5% level. As the change in use is not expected to be linear from year to year (with no correlation between measurements collected at different times), we employed the Mann–Kendall Test for Monotonic Trend (MK test),[13] rather than the parametric linear regression analysis that requires normal distribution of the residuals from the fitted regression; an assumption that is not required by the MK test.

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