Original article

Long-term audit of platelet consumption in a university hospital

Audit à long terme de la consommation de plaquettes dans un hôpital universitaire

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Abstract

Objectives. – To determine the long-term trend in platelet consumption in a university hospital.
Materials and methods. – The annual consumption of platelets concentrate (PC) was analyzed over 23 years (1985–2007) in King Khalid University Hospital (KKUH), Riyadh, Saudi Arabia.
Results. – The total 23 years consumption was 100,466 units of PC. Consumption went through 3 phases: the first, 1985–1994: the annual consumption increased from 1706 to 5912 which coincided with the increase in the number of patient admissions; the second, 1994-2003:featured a remarkable drop (48.9%) in annual consumption while patient admission remained stable. There was a concurrent decline in platelet consumption and all-cause mortality/patient. Third phase: 2003–2007, the consumption increased to reach 5642 units/year in 2007. The Department of Medicine consumed (52%), followed by Pediatrics (21%), and General Surgery (16%).
Conclusion. – This audit uncovered evidence of inappropriate platelet consumption that reached 48.9% in the period 1994 to 2003, which coincided with widely publicized HIV scare that dominated blood transfusion during that period. We also found evidence suggesting that reducing platelet transfusion could improve patient outcome.
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Keywords: Platelet consumption; Platelet transfusion; Platelet audit; HIV

Résumé

Objectifs. – Déterminer la tendance à long terme de la consommation de plaquettes dans un hôpital universitaire.
Matériaux et méthodes utilisés. – La consommation annuelle de concentré de plaquettes (CP) a été analysée durant 23 ans (1985–2007) dans l'hôpital universitaire King Khalid (KKUH), Riyad, Arabie Saoudite.
Résultats. – La consommation totale en 23 ans était de 100 466 unités de PC. La consommation a comporté 3 phases : la première, 1985–1994, durant laquelle la consommation annuelle a augmenté de 1706 à 5912, ce qui a coïncidé avec l'augmentation du nombre d'admissions de patients ; la deuxième a vu une baisse remarquable (48,9 %) de la consommation annuelle alors que l'admission des patients est restée stable. Il y a eu un déclin simultané de la consommation de plaquettes et de la mortalité des patients toutes causes confondues. La troisième (2003–2007, au cours de laquelle la consommation de CP a augmenté pour atteindre 5642 unités par an en 2007. Le Département de médecine a été le premier prescripteur (52 %), suivi de la pédiatrie (21 %) et de la chirurgie générale (16 %).
Conclusion. – Cette vérification a révélé une consommation inappropriée de plaquettes qui a atteint 48.9% entre 1994 et 2003, ce qui a coïncidé avec la crise du VIH, largement médiatisée, qui a dominé la transfusion sanguine pendant cette période. Nous avons également trouvé des éléments de preuve suggérant que la réduction des transfusions de plaquettes n'était pas au détriment des patients.
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Mots clés : Consommation de plaquettes ; Transfusion de plaquettes ; Audit plaquettaire ; VIH

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1. Introduction

The transfusion of allogeneic platelet products has become an essential part of the supportive therapy given to patients with quantitative or qualitative platelet disorders, for both prophylactic as well as therapeutic purposes [1–3]. In recent years the consumption of platelets continued to rise as a result of the general improvement of medical care particularly the specialized care offered to hematology/oncology patients, who are now living longer and consuming more platelets than before [4].

Unavoidably, the more frequent platelets infusions, like other blood products, are expected to increase the exposure of the recipients to the risks of blood transfusion, both infectious and non-infectious [5,6]. Although many steps have been followed to reduce these risks including highly sensitive screening tests of donated blood, leukodepletion and others, attention was also turned to reducing the infusion of these blood products. Along with these steps, concern was also raised about the overuse and/or the inappropriate use of blood components including platelet transfusion [7].

A search of the literature uncovered many studies that highlighted the extent of the inappropriate utilization of platelet transfusion and the reported prevalence ranges from as low as 6.45% [8] and 17.5% [9] to 33.3% [10].

However, there is paucity of information on platelets usage and/or the extent of inappropriate use of platelet transfusion in our region and in developing countries in general [11]. Thus, this current 23 years audit was conducted (i) to reveal the trend in the use of platelet transfusion in a major teaching hospital and whether there is any evidence of the inappropriate use of platelet transfusion; (ii) To find out whether platelet transfusion therapy was affected by the 1990s HIV "scare".

2. Materials and methods

This is a retrospective study that covers a 23 years period from 1985–2007 conducted at the Blood Bank of the teaching hospital of the College of Medicine, Riyadh, Saudi Arabia. The hospital is a 850-bed hospital and has 33 clinical departments and divisions. The Blood Bank at KKUH operates like a transfusion service as it is responsible for the recruitment of blood donors, the collection and screening of donated blood, and the preparation and issue of blood products, specifically packed red blood cells (PRBCs), platelet concentrate, fresh frozen plasma, cryoprecipitate and filtered and irradiated components. The Blood Bank data is currently stored in a computerized management system that is readily obtainable for analysis. A guideline to the transfusion of blood and its derivatives booklet is issued by a Hospital Blood Transfusion Committee and is readily available to physicians and nurses.

The collected data include: the total number of platelet units consumed annually over a 23 years period, (1985 to 2007), as well as the annual total number of platelet units consumed by the following clinical departments and divisions: Medicine (including Hematology/Oncology), General Surgery, Cardiac Surgery, Pediatrics, Obstetrics and Gynecology, Accident and Emergency (A and E) and Renal Dialysis Unit.

The platelets product in routine use at KKUH is predominantly pooled single unit platelet concentrate, prepared by double centrifugation of whole blood and the separation of about 30 ml. of platelet rich plasma. In the last few years platelet apheresis collected units have become available in a very limited extent.

The number of patients admitted annually to KKUH during the study period was obtained from the hospital records. The early part of the data in the current study was presented at the 27th Congress of the International Society of Blood Transfusion (ISBT), held in Vancouver in 2002 and published in abstract form [12].

This study has received ethical approval from the Institutional Review Board (IRB) of the College of Medicine, King Saud University, Riyadh.

Statistical analysis: the analysis aims to identify changes in the trend in the platelet consumption (increasing, decreasing or remain unchanged) over long time interval (23 years), quantify these findings and test for their significance, at the 5% level. As the change in consumption is not expected to be linear from year to year, (with no correlation between data collected at different times), we employed the Mann-Kendall Test for Monotonic Trend (MK test) [13], rather than parametric linear regression analysis that requires normal distribution of the residuals from the fitted regression; an assumption not needed by the MK test. Linear trend (median drop per year in platelet consumption) was assessed using the robust linear regression Theil-Sen estimator [14]. The choice of this technique was based on the fact that it is more accurate than simple linear regression for skewed and heteroskedastic data and compares well against non-robust least squares even for normally distributed data in terms of statistical power. Strength of the trend was assessed using the MK test statistic. Years at which significant change occurred was identified. Categorical data were compared using the χ^2 test or Fisher exact test; as appropriate. Cuzick test for ordered data trend was used to compare mortality and platelet consumption.

3. Results

The total number of transfused PC units over the 23 years period of this survey was 100,466 units. The total consumption of platelets over this period can be split into three phases (Fig. 1): the first phase (1985 to 1994): there was a gradual increase in PC from 1706 units in the year 1985 to 5912 units in 1994. This increase coincided with the gradual increase in patients admissions to KKUH (Fig. 2) in its early opening years. The second phase (1994 to 2003): In these 10 years there was a remarkable decline in platelets consumption starting in year 1995 (down from 5912 units in 1994 to 3022 units/year, in 2001, representing a 48.9% drop in platelet utilization). During this period, the number of patients admitted to KKUH remained stable at around 34,000/year (Fig. 2). Third phase: the period from 2003 till 2007 where the consumption increased gradually to reach 5642 units/year in 2007 (Fig. 1). During this period although the total hospital patient admissions did not change significantly, there was a disproportionate increase of services in