Original Article

Usage of Red Cell Concentrates at Kimberley Hospital Complex: A Retrospective Study

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ABSTRACT

AIM The universal acceptability of anaemia as an indication for transfusion of red cell concentrates (RCC) is incontrovertible. While the non-concordant use of RCC is well documented in different parts of the world, no such study has ever been conducted in the Northern Cape Province of South Africa. This study aimed to audit the haemoglobin levels at which patients at Kimberley Hospital Complex (KHC) are being transfused as well as the indications for RCC transfusions.

METHODS Fifty transfusion episodes from four clinical disciplines were randomly selected and studied using national guidelines for South Africa as criteria for the audit.

RESULTS The mean pre-transfusion Hb and post-transfusion Hb were 6.5 g/dL (SD 2.07) and 8.7 g/dL (SD 1.84) respectively. The most common reasons for transfusion were symptomatic anaemia and upper gastrointestinal (GI) bleeding. Two units of RCC were on average transfused per episode. Eight percent of transfusion episodes were found to be entirely non-concordant with guidelines. In the majority of transfusions studied, there was no documented evidence of efforts to establish diagnosis in anaemic patients as well as no documentation of the outcome of the transfusions.

CONCLUSION It is encouraging that there were a relatively low percentage of entirely non-concordant transfusions at KHC. A prospective study with a larger sample size is recommended to explore the significance of non-concordance in RCC transfusions as well as the nature of physicians' inability to document their approach to anaemia and the inability to document post transfusion clinical and laboratory indicators.

Keywords: Red blood cell transfusion; South Africa; Medical audit; Anemia; Hemoglobin level**.**

INTRODUCTION

The use of blood and blood products has remained to date an essential component of clinical practice [1] since 1818 when Dr James Blundell performed the first human to human blood transfusion. [2] Red cell concentrates (RCC) remain one of the most transfused blood products as they are needed to increase the oxygen carrying capacity of blood through an increase in the concentration of haemoglobin of anaemic patients. [1,3]

The universal acceptability of anaemia as an indication for transfusion of RCC is incontrovertible. But there is still no general consensus on an acceptable transfusion triggers for the transfusion of RCC. [4-5] It is generally recommended that the decision to transfuse RCC should be based on both the patient's clinical status

and haemoglobin level. [6] A pertinent question one should ask is whether attending physicians transfuse RCC appropriately. Numerous studies conducted in different parts of the world including Australia, [7] Canada, [8-10] England, [11-15] the Netherlands [16] and United States [17] have demonstrated inappropriate use of RCC.

Since no previous study has been conducted in the Northern Cape Province, it is the aim of this clinical audit to assess (i) the haemoglobin levels at which patients in selected units of Kimberley Hospital Complex (KHC) are being transfused and (ii) the concordance of RCC transfusion with national guidelines.[6] Kimberley Hospital, located in Kimberley, is the main referral facility for the Northern Cape province of South Africa offering both secondary and tertiary health care services.

METHODS

This was a retrospective clinical audit of a convenient sample of 50 patients selected randomly from 1,187 patients who received red cell concentrates between 1st January and 31st June 2009 in four clinical units namely: Obstetrics and Gynecology; Internal Medicine; Surgery and Intensive Care Unit of KHC where 17, 14, 13 and 6 patients were selected respectively.

The audit standard and criteria used in this study was based on national guidelines.[6] The following information was collected from each patient's file and the laboratory computer during the audit: (1) patient age and sex, (2) pre-transfusion Hb (PreTranHb), (3) post-transfusion Hb (PostTranHb), (4) date of PreTranHB and PostTranHb, (5) number of units cross-matched and transfused, (6) date of and indications for transfusion, (7) co-morbidities, and (8) Hb level on discharge from the hospital.

Audit data collection sheets were used to compile data and descriptive statistical analysis was done using Microsoft excel 2007. Concordance of transfusion was analysed for the entire sample and also for each of the following PreTranHbs: (i) less than 7 g/dL; (ii) between 7 and 10 g/dL; and (iii) above 10 g/dL.

The audit was approved by the Ethics Committee of the Faculty of Health Sciences of the University of Free State. Permission to carry out the audit at KHC was obtained from the Clinical Manager of the hospital.

RESULTS

Thirty five (70%) of the 50 patients studied were female. The mean age of the audited patients was 36 years (SD 15.7). The most frequently transfused age group was 21-30 years followed by 31-40 years (Figure 1).

Among the 50 audited transfusion episodes, 107 (96.4%) of 111 crossmatched RCC units were transfused. The most common indications for transfusion were symptomatic anaemia (26%), upper gastrointestinal bleeding (12%), ante/postpartum haemorrhage (10%) and haemothorax (10%) (Figure 2). The mean number of units transfused was 2.1. In all cases under investigation, the PreTranHb was done before transfusion. An overwhelming majority of patients (92%) were transfused by day 1 after PreTranHb testing (Figure 3). PostTranHb testing was on average done within 2 days of transfusion but was not done in 16% of episodes. While 70% of patients had Hb testing performed by day 2 post transfusion (Figure 3), almost 50% of patients did not have Hb testing done on discharge.

The mean PreTranHb and PostTranHb were 6.5 g/dL (SD 2.07) and 8.7 g/dL (SD 1.84). The mean Hb on discharge was 9.2 g/dL (SD 0.79). Most of the patients transfused (60%) had PreTranHb of less than 7 g/dL compared to 4% for those with PreTranHb of more than 10g/dL (Table 1). Thirty two percent of transfusions were considered entirely concordant based on national guidelines, 48% were non-concordant either due to over or under transfusion. Eight percent were found to be entirely non-concordant while the rest of the cases (10%) could not be assessed due to lack of information.

The indication for transfusion was not documented for any of the transfusion episodes that were considered non-concordant. With the exception of three cases that could not be assessed due to insufficient information, all transfusions in the group of patients with PreTranHb of less than 7 g/dL were found to be concordant . All the non-concordant episodes were observed in the group of patients between 7 and 9 g/dL.

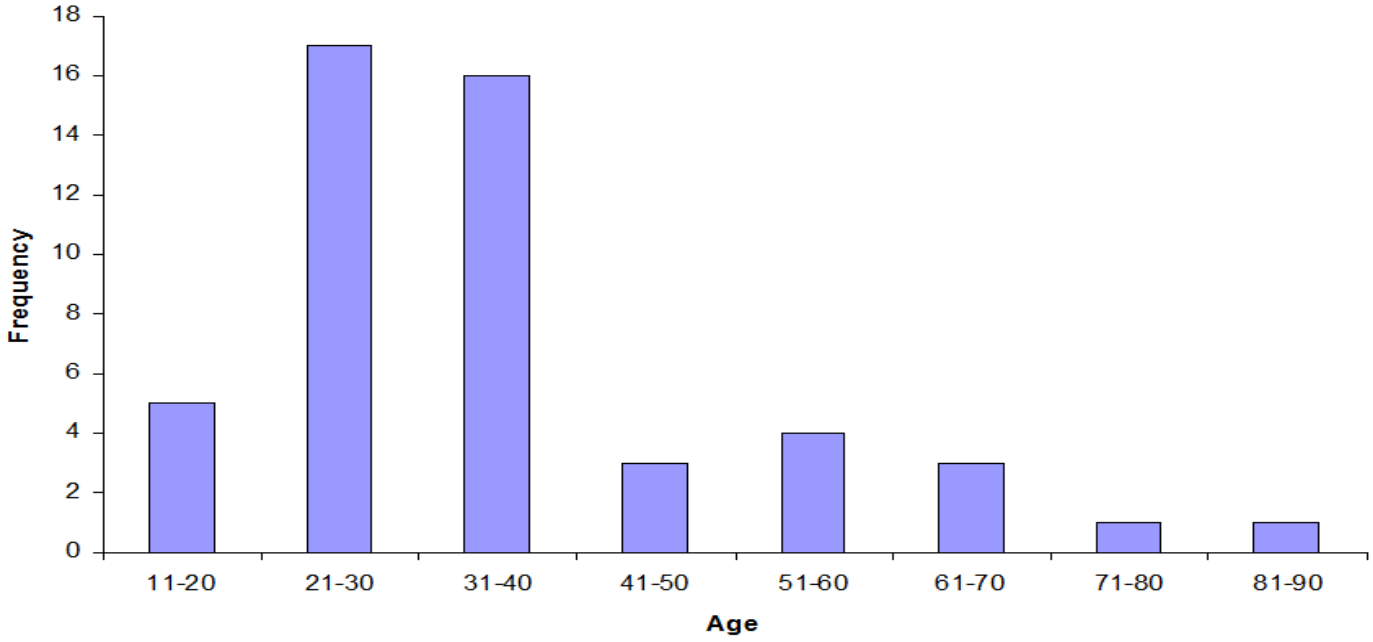

Figure 1: Age profile of audit sample

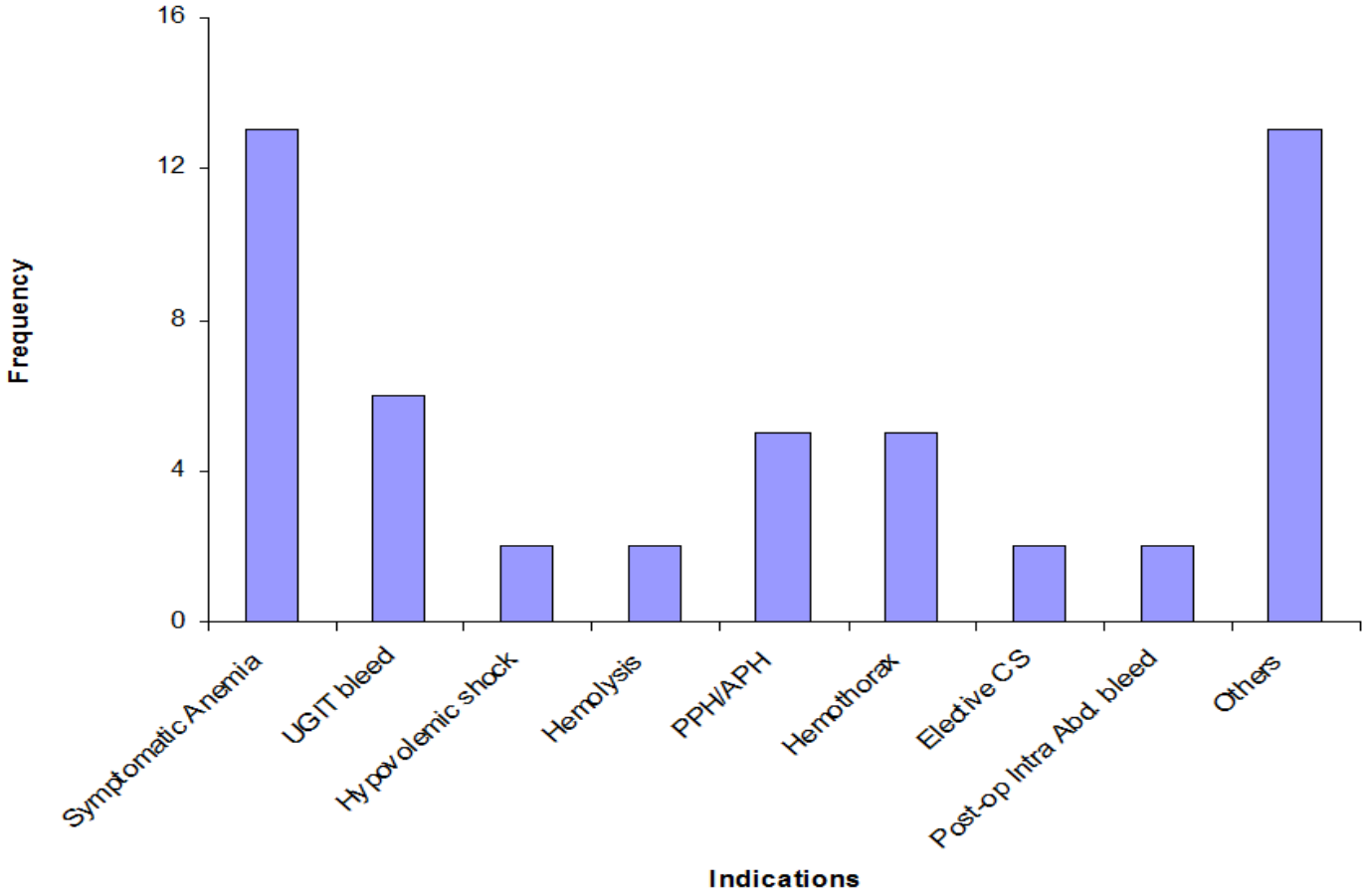

Figure 2: Indications for transfusion

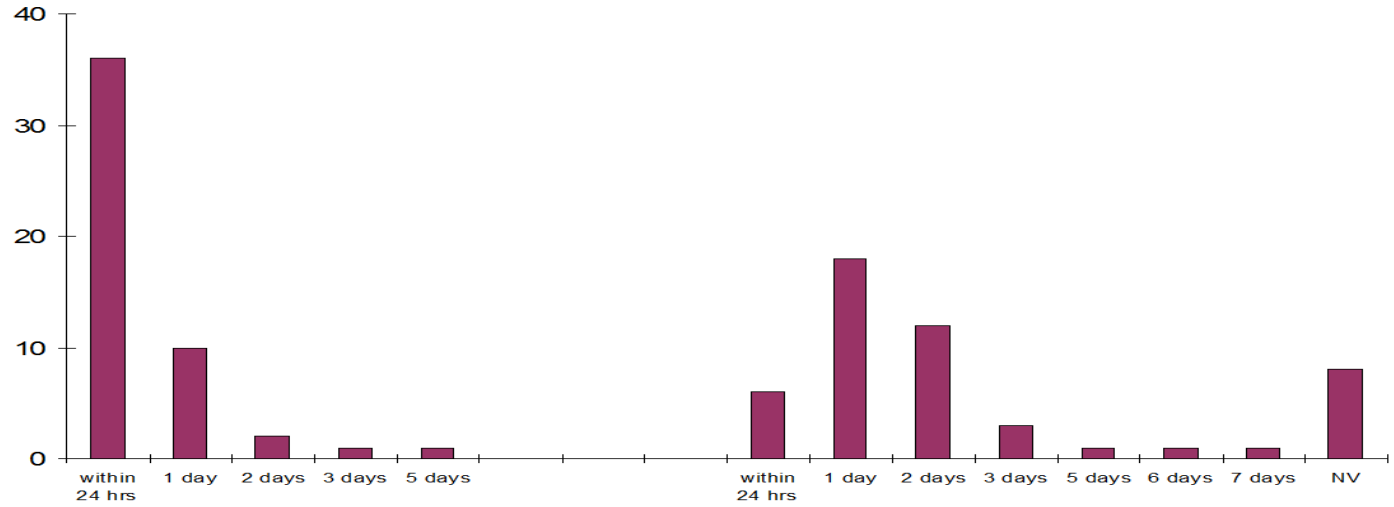

Figure 3: Number of days (i) before transfusion that PreTranHb was done (graph on the left) and (ii) after transfusion that PostTranHb was done (right)

Table 1 Concordance of transfusion of red cell concentrates

Range of PreTranHb	No of patients	% of cases	No of units transfused			PreTranHb		PostTranHb		Concordance (%)		
			Total number	Mean	Range	Mean	Range	Mean	Range	EC	IC & NUTNC	ENC
Less than 7g/dL	30/50	60	70	2.3	1 - 4	5.2	2.0 - 6.9	8.2	4.8 - 11.9	10	17	0
Between 7.0 and 10.0 g/dL	18/50	36	32	1.8	1 - 3	8.2	7.1 - 9.6	9.6	7.1 - 12.9	5	8	4
10.1 g/dL and above	2/50	4	5	2.5	2 - 3	11.4	11.3 - 11.5	8.3	NV - 8.3	1	0	0

EC: Entirely concordant, ENC: Entirely non-concordant
IC & NUTNC: Indication concordant, number of units transfused non-concordant
PreTranHb: Pre-transfusion haemoglobin
PostTranHb: Post-transfusion haemoglobin

DISCUSSION

While the elderly (61 – 90 years) are most likely to be transfused in England, [10-12] they received less transfusion in the present study. This is due to the fact that most of the episodes studied were carried out in the departments of surgery and obstetrics and gynaecology in which transfusion took place for trauma and pregnancy related reasons respectively. Unfortunately, the age and sex distribution of KHC admissions were not available during this study to serve as denominator data regarding the population studied.

One of the most significant positive findings from this study is that all transfusions were preceded by pre-transfusion Hb testing. On average, RCC transfusion took place within the first 24 hours which is consistent with the findings of other studies. [10-12] However, no additional testing was done to identify the reason for anaemia in the majority of cases. Similar paucity of anaemia diagnostic workup was identified in the findings of the Regional Transfusion Committees of South Wales and West Midlands regions in the UK [12] where ferritin level was the only test performed as part of anaemia work up. Even then, the ferritin level was documented for only 8% of all the patients that received transfusion in the UK study. In a resource limited context like ours, it is often necessary and still good practice to act on a clinical working diagnosis rather than extensively investigate every patient where there is a clear clinical diagnosis. Regardless, it is

very important that clinicians are seen to make an attempt to consider what the underlying diagnosis is and to make an appropriate management plan. This was not discernible in the transfusion episodes audited. In the era of HIV, knowing the HIV status of anaemic patients is useful. But this was not available for the majority of our study patients. The ethical and legal issues surrounding HIV testing in South Africa during the period of the study meant that HIV testing was not routinely done. However, it is increasingly becoming easier to convince patients to undergo voluntary counselling and testing (VCT) for HIV. This is due to recent vigorous awareness campaigns by the Department of Health encouraging members of the public to test for HIV. It is envisaged that in the future, data could become available that will assist in differentiating between the proportion of patients with anaemia who are either positive or negative for HIV.

The mean PreTranHb for this study (6.5 g/dL) and PostTranHb (8.7 g/dL) compare well with those presented in other studies. [10] The lack of significant difference between PostTranHb and the mean Hb on discharge (9.2 g/dL) justifies the reason why the latter test was not performed in almost half the number of cases. This might partly be due to cost containing measures that are enforced by the KHC administration. Although discharging the patient may suggest that the patient had improved, documentation of the clinical status of the patient following a transfusion could still have been a useful indicator of the effect of the transfusion even in the absence of the PostTranHb level. While the percentage of transfusions that were entirely concordant based on the national guidelines can be considered low (38%), an additional 48% of cases were considered concordant based on the indication for transfusion and not based on the number of units transfused. The level of entirely non-concordant transfusions (8%) was low compared to that obtained from most other studies. [10-14] It was not possible to analyse whether non-concordance with transfusion guidelines had an effect on morbidity or mortality as outcome data was not available.

Amongst the four cases that were considered to be entirely non-concordant, two were gynaecological patients. One of them was diagnosed with intrauterine death of the foetus, the other was in preterm labour. None of them had any co-morbidities and each received 2 units of RCC for PreTranHb of 9.4 and 8.7 g/dL respectively. The third case was a young man with fracture of C5 vertebra and PreTranHb of 7.9 g/dL who received 2 units of RCC without active bleeding or symptoms of anaemia. Just like the three cases described above, the reason for transfusing an HIV-positive young lady with PreTranHb of 7.2 g/dL was not stated. Observations from this study regarding non-concordant use of RCC are in agreement with the study by Parker *et al* [16] wherein they indicated that the most common reason for transfusion was low haemoglobin in the absence of symptoms.

CONCLUSION

The study showed that the level of entirely non-concordant transfusions at KHC was relatively low which is encouraging. The only area of concern was the absence of documented effort by treating physicians regarding establishing a diagnosis and a management plan for anaemia as well as the clinical effect of the transfusion. It would appear that anaemia was treated as a diagnosis per se rather than a manifestation of other diagnostic entities. Because this was a retrospective study where data was prone to be incomplete, it is not clear as to whether the foregoing omissions were real or just a consequence of poor documentation. A prospective study with a larger sample size than that of this study might provide better answers to the questions raised here.

ACKNOWLEDGEMENT

The authors would like to thank the following individuals for their assistance in getting this project to fruition: Mr G Moncho (CEO, KHC) and Dr. L. Koning (Clinical Manager, KHC) for allowing MAB access to patients' files; Mr. DuPlooy (Records department, KHC) for retrieval of files; Prof Vernon Louw and co-ordinators of the postgraduate diploma in transfusion medicine (University of Free State) for suggesting this topic as part of the course.

FOOTNOTES

Conflicts of interest: The authors declare no competing conflict of interest

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