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Evaluating Blood Requests and Transfusion Practice in Major Surgical Procedures

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ABSTRACT

Background: Red blood cell and other blood products play a crucial role in management of different disease processes, but in spite of implementation of crucial steps to improve the process of request for blood and blood consumption, there is still not enough information available regarding the proper practice in many medical centres. We aimed to evaluate the status of blood product requests and transfusion practice in surgical patients in Al-Zahra and 17th Shahrivar hospitals, Rasht, Iran.

Materials: This retrospective, descriptive cross-sectional study was performed using medical records of patients undergoing major surgical procedures in Al-Zahra and 17th Shahrivar hospitals, Rasht, Iran, from April to December 2013. The cross-match to transfusion ratio (C/T ratio), transfusion probability (T%) and transfusion index (TI) were analyzed. We used SPSS analytical software to analyze the data.

Results: Transfusion index was 0.27, transfusion probability 12.8% and C/T ratio was 7.38 which were higher than standards, indicating that only 54 units out of 399 red blood cells units requested were used. Laparoscopic surgery had the worst indicator in terms of wastage of packed cell products. These findings in 17th Shahrivar hospital were 0.09, 8.82% and 12.5, respectively. In this hospital only 10 units out of 125 requested units were used. Appendectomy showed the worst indicators.

Conclusion: Blood transfusion indexes particularly for laparoscopic and appendectomy procedures were high in two hospitals studied. In order to overcome this problems, providing teaching courses for proper transfusion practice in surgery departments to improve their knowledge of haemovigilance and preparation of defined guidelines for red blood cells' cross matching and transfusion is recommended.

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Introduction

In the first half of the twentieth century and with discovery of blood groups (ABO and Rh) and also with improvement of conservative materials for preservation of blood products, the ability to use human blood as a vital component in medicine for treatment of patients with severe disease was achieved. Blood transfusion is an important life-saving component in daily clinical practice, specifically in major surgeries. However, due to resource constraints, it is not always possible for the blood product to reach the patient at the right time,[1] as a result the proper use of these vital products is one of the main challenges in blood transfusion practice. In our country, despite having the volunteer-based nature of

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blood donation, preparation of blood and its byproducts needs a high amount of financial resources including the cost of instruments, well organized laboratories and specialized personnel in this process. Because of this high cost process the appropriate use of blood products holds an important and undeniable priority.[1]

Increased blood request by physicians and inappropriate use of blood products cause a serious loss of financial and human resources, which indicates the need for performing research on means to improve the ordering and consumption of blood products.[2]

The high rate of ordering of blood might be related to the fear of health care personnel about the consequences of unavailability of blood products during the surgery, lack of knowledge regarding the amount of accessible blood in blood banks, or absence of appropriate guidelines for blood transfusion.[3-5] The goal of the present study was to evaluate the process of packed red cell ordering and its consumption based on the kind of surgery performed in two medical surgery centres in order to reach a consensus recommendation.

Patients and Methods

This retrospective study was performed in Al-Zahra and 17th Shahrivar hospitals in Rasht, North of Iran. Medical records of 377 patients hospitalized from April to December 2013 were evaluated. Hospitals' blood bank records, cross-match requests for hospitalized patients in obstetrics and gynecology departments of Al-Zahra Hospital and pediatric surgery department of 17th Shahrivar Hospital were studied and the results were filled in a predesigned questionnaire. Then blood units which were actually consumed based upon the respective department and kind of surgery wrere extracted. Three main indicators of blood transfusion consumption were calculated as follows:[6]

1-Cross match to transfusion ratio (C/T ratio): This index is the most important parameter for estimating the need for blood during surgery. A C/T ratio lower than 2.5 is a significant indicator of the need for blood transfusion during surgery.

2-Transfusion probability (T%): It indicates the probability of requirement of the blood during a surgery and a value greater than 30% indicates considerable requirement of blood.

3-Transfusion index (TI): It shows the average number of units used per patient and for operations that usually require less than 0.5 units of blood, blood compatibility testing before surgery is not necessary.

SPSS analytical software version 16 (Chicago, Illinois, USA) was used to perform the statistical analysis. P values less than 0.05 were considered statistically significant.

Results

Medical records of 377 patients (269 and 108 patients from Alzahra and 17th Shahrivar Hospital, respectively) were analyzed. Mean age of adult patients was 31.83±9.7 years and mean age of pediatric patients was 4.48±4.23 years (table 1).

The main surgical procedure performed in Al-Zahra Hospital was caesarean section followed by laparotomy, laparoscopy, hysterectomy and myomectomy. Surgical procedures in 17th Shahrivar hospital were appendectomy, herniorrhaphy, laparotomy, orchiopexy, and intussusception.

Table 1: The age distribution of patients in two medical centers

17th Shahrivar Hospital	Al-Zahra Hospital
Age category number (%)	**Age category number (%)**
Less than 1: 40 (37)	Less than 20: 19 (7.1)
1-3: 15 (13.9)	21-30:117 (43.5)
3-7: 23 (21.3)	31-40: 98(36.4)
More than 7: 30 (27.8)	41-50: 23 (8.6)
	More than 50: 12(4.5)
Total: 108	Total: 269

In Al-Zahra Hospital, 399 packed cell units were cross-matched with only 54 units being transfused. The C/T ratio in this centre was 7.38. The highest and lowest C/T ratios were 41 and 2.46 which belonged to laparoscopy and hysterectomy, respectively. For 108 pediatric patients from 17th Shahrivar Hospital, 125 packed cell units were cross-matched with only 10 units being transfused. The total C/T ratio in this population was 12.5 with the highest C/T ratio of 56 for the appendectomy and lowest ratio of 3 for the laparotomy. The total transfusion probability (T%) for Al-Zahra Hospital was 12.8 % with the lowest T% of 3.1% for laparoscopy and the highest T% of 33.3% for hysterectomy. The total T% for the 17th Shahrivar Hospital was 8.82% with the lowest T% of 2.6% for appendectomy and highest T% of 33.3% for intussusception. The transfusion index (TI) for 269 patients in Al-Zahra hospital was 0.27 with the lowest TI of 0.03 for laparoscopy and highest of 1.08 for hysterectomy. TI index for patients in 17th Shahrivar Hospital was 0.09 with the highest TI of 0.44 for intussusception and the lowest TI of 0.026 for appendectomy. The details are presented in table 2.

Discussion

Most previous studies showed higher need for cross-match versus world standards.[5-7] Also, similar Iranian studies showed a much higher rate of cross-matching compared to world standards. It seems that this may be the result of unfamiliarity of health care professionals with the standards of transfusion practice and blood ordering or lack of a proper national guideline or the concern of medical staff regarding access to blood products in emergency conditions.[1,3,4,8]

Three main indices used in ordering blood products including C/T ratio, transfusion probability and TI were evaluated in the present study. We found that the C/T ratio for the Al-Zahra hospital was 7.38 indicating that only 12.8 percent of cross-matched packed cell units were actually transfused. Also among different surgical procedures performed in this centre, the C/T ratio for hysterectomy and laparotomy were near standards but it was much higher than standards for other procedures.

In 17th Shahrivar Hospital, the total C/T ratio was 12.5 and TI was 0.09 indicating that only 8.82 percent of cross-matched packed cell units were actually

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Table 2: Transfusion indexes based on related surgeries and the medical center.

	TI	T%	C/T ratio	Number
Al-Zahra Hospital				
Cesarean section	0.11	6.6	18.9	179
Laparotomy	0.67	30	3.22	41
Laparoscopy	0.03	3.1	41	32
Hysterectomy	1.08	33.3	2.46	12
Myomectomy	0.2	20	12	5
Total	0.27	12.8	7.38	269
17thSharivarHospital				
Appendectomy	0.026	2.6	56	41
Herniorrhaphy	0.027	2.7	38	38
Laparotomy	0.4	30	3	11
Orchiopexy	0.12	12.5	9	9
intussusception	0.44	33.3	2.5	9
Total	0.09	8.82	12.5	108

transfused. In this center, except for intussusception and laparotomy which showed C/T ratios near the standard, the C/T ratio for other procedures was much higher than world standards.

In a study by Abbasyvash et al.,[1] the C/T ratio was reported to be 7.8 and the total blood transfusion index was reported to be 0.25 which was much higher than standard blood ordering except for few surgical procedures similar to our findings.

In a study by Khoshrang et al. C/T ratio, T% index and TI index were reported to be 14.18, 8.85% and 0.11, respectively.[6] Our figures were closer to standards in comparison to their study which could be attributed to higher risk surgical procedures in their study or more logical practice of our practitioners.

The problem of higher than standard cross-match ordering has also been reported in other countries. In a study by Benset et al.,[5] a C/T ratio of 7.3 has been reported which is very near to the ratio that we found in Al-Zahra hospital. In studies done by Iwasaki et al.[9] and Mahar et al.,[10] the results were closer to standards rather our findings. The C/T ratio in these two studies were 1.71 and 1, respectively which could be attributed to their proper use of MSBOS guidelines.

Sajwani et al. have reported a C/T ratio of 1.6 in their study which is again much better than our finding and can be credited to the educational classes for improving the knowledge of their practitioners regarding appropriate blood ordering practices.[11]

All these findings showed that considering the standard cross-match indexes of C/T ratio of 2.5, TI>0.5 and T%>30% in blood transfusion practice, cross match ordering has been much higher than standards in many centres.

We also found that our cross-match orderings in Al-Zahra and 17th Shahrivar Hospitals were much higher than world standards indicating that doing cross-match in many surgical procedures were performed unnecessarily in our centres.

Conclusion

Blood transfusion indexes particularly for laparoscopy and appendectomy were high in our studies. In order to resolve this problem, providing teaching courses for medical surgical staff to improve their knowledge of hemovigilance procedures and preparation of consent guidelines for red blood cell cross-matching is recommended.

Conflict of Interest: None declared.

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