

**CLINICAL UTILIZATION OF RED CELL CONCENTRATES IN DIFFERENT
CLINICAL DEPARTMENTS OF BANGABANDHU SHEIKH MUJIB MEDICAL
UNIVERSITY, BANGLADESH**

**Dr. Shahanaj Parveen^{*1}, Dr. Farah Anjum Sonia², Dr. Mohammad Fatteh Ul Islam³, Dr. Zia Uddin Ahmed⁴,
Dr. Marzia Mursafa⁵, Dr. Iffat Ara Akbar⁶ and Dr. Atiar Rahman⁷**

¹Assistant Registrar, Department of Transfusion Medicine, BRB Hospitals Limited, Dhaka, Bangladesh.

²Assistant Professor, Department of Transfusion Medicine, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh.

³Junior Consultant, Department of Transfusion Medicine, Rajshahi Medical College Hospital, Rajshahi, Bangladesh.

⁴Junior Consultant, Department of Transfusion Medicine, BRB Hospitals Limited, Dhaka, Bangladesh.

⁵MD, Department of Transfusion Medicine, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh.

⁶Assistant Professor, Department of Transfusion Medicine, Shaheed Mansur Ali Medical College, Dhaka, Bangladesh.

⁷Associate Professor, Department of Transfusion Medicine, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh.

***Corresponding Author: Dr. Shahanaj Parveen**

Assistant Registrar, Department of Transfusion Medicine, BRB Hospitals Limited, Dhaka, Bangladesh.

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ABSTRACT

Background: Blood and blood components for transfusion, is obtained from voluntary, non-remunerated blood donors, thus it should be utilized as considering it a limited and precious resource, and must be effectively managed and stocked. To ensure appropriate and optimum use of blood and blood products, monitoring blood utilization pattern in a hospital setting is very important and may contribute in effective management of blood stock to meet the existing and imminent transfusion demands in a hospital. **Objective:** This study was designed to determine clinical utilization of red cell concentrates in different clinical departments of a tertiary care hospital in Dhaka city. **Methodology:** This was a cross sectional observational study which was conducted at department of Transfusion Medicine, Bangabandhu Sheikh Mujib Medical University, Dhaka. To determine the supply of Red Cell Concentrate among the different departments of this university from July 2018 to June 2019. The supply of RCC to the different department was considered by requisition form meeting the inclusion criteria of patient. The demographic clinical and other data were collected by using check list as state at on the requisition form. The appropriate supply from RCC was statistical analysis was carried out using the statistical package for social sciences version 25. **Result:** Among the 21 departments of the hospital, and 1200 recipients, total 2408 units of red cell concentrate had been transfused during the study period which was almost double of the recipients. With 62.17% male and 37.83% female recipients, the highest percentage of recipients (30.08%) were in age group of under 20 years. The highest proportion of patients belong to the blood group B positive (44.33%) and the blood group O positive (43.17%). A total of 261 (21.7%) pediatric patients from 4 of the pediatric departments, and 939 (78.3%) other patients from other 17 departments received 331 (13.75%) and 2077 (86.25%) units of red cell concentrate respectively. The department of Hematology showed to use the highest proportion of red cell concentrates (40.68%). The department of Hematology and Otolaryngology and Head Neck Surgery recorded to use 3 units of red cell concentrate per recipient on average. Appropriate blood transfusion as per the predetermined criteria was done in all cases except in 1.33% cases. **Conclusion:** This study evaluates that the supply of red Cell Concentrate from Transfusion Medicine department is optimum for the utilization of various department as their patient demand. Available donors including donor list would sustain the optimum supply of Red Cell Concentrate as per demand of hospital setting.

KEYWORDS: blood, blood components, blood products, red cell concentrate, appropriate use of red cell concentrate.

INTRODUCTION

Blood and blood products are one of the unique, life-saving therapeutic interventions, with very scarce resource and availability. Blood transfusions have

emerged as an important medical therapy, which are extensively being used in a wide spectrum of clinical settings as a supportive care for treatment of anemia, whether it be elective surgery or trauma cases, or patients

suffering from blood disorders.^[1] These bloods for transfusion, is obtained from voluntary, non-remunerated blood donors, thus it should be utilized as considering it a limited and precious resource, which must be effectively managed and stocked.^[2] In developing countries like Bangladesh, there are limited resources of blood and with the increasing demand, it is indispensable to make an efficient use of blood.^[3] Therefore, to ensure appropriate use of blood and blood products, monitoring blood utilization pattern in a hospital setting is very important and may contribute in effective management of blood stock to meet the existing and imminent transfusion demands in a hospital.

Transfusion of one or more of the components of whole blood rather than using the whole blood is beneficial for patients in most cases, only without in cases, where there is acute hemorrhage. This blood component therapy was introduced between 1950 and 1960s with the aim to capitalize on the benefits of all components present in the whole blood.^[4] Blood component therapy has gained much of the interest in recent years because of its merits over whole blood transfusion like, it reduces volume overload on patient and has greater shelf life and offers, better patient management. Appropriate and rational use of blood/blood components is required to ensure their availability to patients in needs, as well as to avoid the unnecessary risk of transfusion-transmitted diseases.^[5]

Red cell concentrate has introduced a new dimension in component therapy to minimize adverse effect of whole blood transfusion.^[4]

OBJECTIVES

General Objectives

To assess the clinical utilization and unit of red cell concentrates in different department of Bangabandhu Sheikh Mujib Medical University with in study period.

Specific objectives

- To assess the frequency unit of red cell concentrates on the basis of disease.
- To assess the departmental requirement of RCC.
- To assess the frequency distribution of red cell concentrate on the basis of ABO and Rh blood group.

METHODOLOGY

Study Design: The study used a descriptive type of prospective observational study design to observe the clinical utilization of red cell concentrates in different clinical departments of a tertiary level hospital in Dhaka city.

Place of study: Department of Transfusion Medicine, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka.

Study Period: The time period of the study was from July, 2018 to June, 2019.

Study population: All admitted patients of BSMMU were included in this study in between the period of July 2018-June 2019.

Inclusion Criteria

1. Patient admitted in BSMMU
2. Patient irrespective to age and sex.
3. Requested for or already have been transfused with red cell concentrate
4. Hemoglobin level less than 8 gm/dl
5. Elective surgery case Hemoglobin is less than 10 gm/dl
6. Hemoglobin is less than 10 gm/dl in oncology case.
7. Anemia with heart failure.

Exclusion criteria

1. Patient of OPD
2. Pancytopenia
3. Nutritional anaemia.
4. Minor blood group transfusion

Data collection tool: All the data was collected and recorded from blood requisition form and corresponding patient's medical records.

Sampling method: Purposive sampling.

Sampling procedure: After approval of this protocol, I contacted the in-charge who keeps the register khata. Then for this study, I searched for the requisition forms and registers where the information is recorded about the demand of red cell concentrate from different clinical department from July'18 to Jun'19. Then I elaborated each data according to the number of requisition form, place and department. Further selection was done according to diseases how many red cell concentrates were used according to ABO & Rh type.

Statistical Analysis: The statistical analysis was carried out using the Statistical Package for Social Sciences version 25. Data was expressed in number and frequency.

RESULT

Distribution of red cell concentrate recipients according to their age

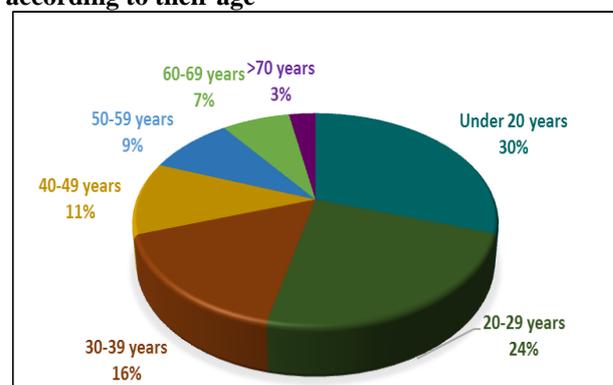


Figure 1: Distribution of red cell concentrate recipients according to their age.

As it has been observed, with the increase of the age, there is a decrease in red cell concentrate transfusion. According to this study, among the 1200 red cell concentrate recipients, the highest percentage of recipients (30.08%) were in age group of under 20 years, followed by, 20-29 years (23.5%), 30-39 years (16.17%) 40-49 years (11.08%), 50-59 years (9.08%), 60-69 years (7.25%) and above 70 years of age (2.83%).

Table 1: Distribution of the red cell concentrate recipients according to their gender.

Gender	Number of recipients	Percentage
Male	746	62.17
Female	454	37.83

Based on the gender distribution, among the recipients of red cell concentrates, 62.17% recipients were male and 37.83% recipients were female.

Table 2: Distribution of red cell concentrate recipients and units of transfusion according to the pediatric departments and other departments.

	Number of departments	Number of recipients	Number of units
Pediatric departments	4	261 (21.7%)	331 (13.75%)
Other departments	17	939 (78.3%)	2077 (86.25%)
Total	21	1200	2408

As described in Table 2, among the 21 departments of the hospital, and 1200 recipients, total 2408 units of red cell concentrate had been transfused during the study period which was almost double of the recipients. A total of 261 (21.7%) pediatric patients from 4 of the pediatric

departments, received 331 (13.75%) units of red cell concentrate. And the other 17 departments, the red cell recipient patients were 939 (78.3%) in number and 2077 (86.25%) units of red cell concentrate had been transfused in them.

Table 3: Distribution of red cell concentrate recipients according to the department (Adult).

Departments	Frequency	Percentage
Internal Medicine	92	9.80
Gastroenterology	7	0.75
Hematology	382	40.68
Hepatology	8	0.85
Nephrology	169	18.00
Neurology	3	0.32
Oncology	104	11.08
Palliative Medicine	6	0.64
Neonatology	6	0.64
General Surgery	56	5.96
Cardiac Surgery	4	0.43
Gynae and Obs	89	9.48
Oto-Laryngology and Head Neck Surgery	6	0.64
Neurosurgery	3	0.32
Urology	1	0.11
Maxilo-facial Surgery	2	0.21
Ophthalmology	1	0.11

Among the adult patients the department of Hematology (40.68%), Nephrology (18.00%), Oncology (11.08%), Internal Medicine (9.80%), Gynae and Obs. (9.48%) showed to have greater amount of red cell concentrate transfusion requirements than the other departments. The department of hematology showed to use the highest proportion of red cell concentrate (40.68%).

(n=261)

Among the 4 pediatric departments, the highest proportion of red cell concentrate (55.56%) usage was in the general pediatric department. Pediatric hematology and oncology department was the second highest user of the red cell concentrate, that is, 40.61% of patients and 38.37% units. Pediatric nephrology and surgery used 2.3% and 1.53% respectively.

Table 4: Distribution of pediatric red cell concentrate recipients according to the department.

Departments	Frequency	Percentage
Pediatrics	145	55.56
Pediatric Hematology and Oncology	106	40.61
Pediatric Nephrology	6	2.3
Pediatric Surgery	4	1.53

Table 5: Distribution of units of red cell concentrate according to the department among the pediatric patients.

Departments	Frequency	Percentage
Pediatrics	188	56.8
Pediatric Hematology and Oncology	127	38.37
Pediatric Nephrology	10	3.02
Pediatric Surgery	6	1.81

Among the four pediatric departments, the department of pediatrics used the highest number of units (56.8%) of red cell concentrate, followed by Pediatric Hematology and Oncology department (38.37%), Pediatric Nephrology department (3.02%) and Pediatric Surgery department (1.81%).

Table 6: Distribution of units of red cell concentrate transfusion per pediatric patients among the pediatric departments.

Departments	Unit per recipient
Pediatrics	1.3
Pediatric Hematology and Oncology	1.2
Pediatric Nephrology	1.7
Pediatric Surgery	1.5

The average unit of red cell concentrate per pediatric patients was highest in the department of pediatric nephrology (1.7). The department of pediatrics used 1.3 units of red cell concentrate on average, the department of pediatric hematology and oncology and the department of pediatric surgery used 1.2 and 1.5 units of red cell concentrate per patient respectively.

DISCUSSION

As opposed to earlier practice of using whole blood for patients, the modern transfusion therapy aims to provide appropriate blood components for specific hematologic deficiencies.^[6] To increase the efficacy, safety and utilization of blood and blood components, clinicians and hematologists should follow the set guidelines in order to avoid the potential risk associated with blood component therapy and supposed to weigh the risk benefit ratio.^[7]

As it has been observed from this study, with the increase of the age, there is a decrease in red cell concentrate transfusion. According to this study, among the 1200 red cell concentrate recipients, the highest percentage of recipients (30.08%) were in age group of under 20 years, followed by, 20-29 years (23.5%), 30-39 years (16.17%) 40-49 years (11.08%), 50-59 years (9.08%), 60-69 years (7.25%) and above 70 years of age (2.83%). Transfusions were evaluated in 148 patients, mean age 40.53 ± 19.36 years. These patients received 422 transfusions (2.17 ± 1.78 transfusions per patient).^[8]

Based on the gender distribution, among the recipients of red cell concentrates, 62.17% recipients were male and 37.83% recipients were female. Tiwari *et al.*, found that,

in their study, among 764 patients used red cell concentrate, 65.3% were male recipients were male.^[6] And Ambroise *et al.*, found that 55.7% red cell concentrate were male.^[9] Another study recorded that out of 1113 patients 526(47.25%) patients were male and 587(52.74%) patients were female who had been transfused.^[10]

Among the 21 departments of the hospital, and 1200 recipients, total 2408 units of red cell concentrate had been transfused during the study period which was almost double of the recipients. Therefore, the mean usage was 2.01 units per patient. Alcantara *et al* observed in their study that, a total of 1,075 transfusion events were evaluated among the tertiary hospitals, with a mean number of 2.43 transfusions per patient. Forty one percent (41%) received two transfusions, 22% received one, and 37% received three or more transfusions.^[15]

In this study a total of 261 (21.7%) pediatric patients from 4 of the pediatric departments, received 331 (13.75%) units of red cell concentrate. And the other 17 departments, the red cell recipient patients were 939 (78.3%) in number and 2077 (86.25%) units of red cell concentrate had been transfused in them. Among the adult patients the department of Hematology (40.68%), Nephrology (18.00%), Oncology (11.08%), Internal Medicine (9.80%), Gynae and Obs. (9.48%) showed to have greater amount of red cell concentrate transfusion requirements than the other departments. The department of hematology showed to use the highest proportion of red cell concentrate (40.68%).The department of hematology recorded to have utilized the highest number (55.18%) of units of red cell concentrates during the study period, followed by the department of Nephrology (13.87%), Oncology (9%), Internal Medicine (6.93%), Gynae and Obs. (5.97%) and General Surgery (5.3%). The department of Hematology and Oto-Laringology and Head Neck Surgery recorded to use 3 units of red cell concentrate per recipient on average. The average unit of red cell concentrate per pediatric patients was highest in the department of pediatric nephrology (1.7). The department of pediatrics used 1.3 units of red cell concentrate on average, the department of pediatric hematology and oncology and the department of pediatric surgery used 1.2 and 1.5 units of red cell concentrate per patient respectively.

CONCLUSIONS

This study evaluate that distribution of RCC from transfusion medicine department is sufficient for the utilization of various department as there patient demand. The inappropriate use of red cell was nil though very few measured were eliminate for the discrepancy of cross match 0.5% and blood group discrepancy 0.75%. In order to implement guidelines for standard transfusion practices, a coordinated team effort by clinicians, blood transfusion experts, other laboratory personnel and health care providers involved in the transfusion chain, is needed. Orientation of standard practices is vital in

addressing these issues to improve the quality of blood transfusion services.

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