

Original Article

The Demand of Whole Blood in Casualty Management at a Tertiary Level Hospital in Bangladesh

MJ Alam¹, MM Hossain², MN Hossain³, AM Hossain⁴, L Sanjowal⁵

Abstract:

Efficient blood transfusion facility in the casualty wards is essential to minimize the morbidity and mortality of the injured patients. Proper knowledge of blood transfusion demand in a facility can help forecast future demands and facilitate the planning of existing resources allocation for best injury care. This cross-sectional study was conducted at the casualty wards of Dhaka Medical College Hospital from July 2018 to December 2018. During this period, patients who attended the casualty wards and needed whole blood transfusion were selected as the study population. Relevant information regarding the required blood units, blood group, and blood collection source were recorded and analyzed. During our study period, 1619 units of whole blood were required by 896 patients. Most of the study population were from the age group of 31-40 years. Male group was the predominant at a 3.9:1 male-female ratio. Majority of the patients (55.13%) required only one unit of blood, and 28.57% of the patients required two units. O+ve blood group was the most demanded (34.65%) followed by B+ve, A+ve, AB+ve, O-ve, B-ve and A-ve (31.87%, 23.72%, 7.6%, 1.42%, 0.49% and 0.25%, respectively). The patients' relatives donated around 85% of blood, and the rest were from voluntary donors. The average daily and weekly requirement of whole blood for the casualty departments of Dhaka Medical College Hospital was around 9 and 62 units respectively. Evidence-based expert guideline for the use of whole blood in the casualty management and social awareness for blood donation may save thousands of valuable lives.

Key words: Whole Blood, Casualty Management, Injury care.

Introduction:

Injury is a significant cause of death and disability worldwide. A significant increase in the incidence of casualty has taken place in recent years, and it has become a major international public health concern. Road traffic accidents (RTA) are considered the most common cause of severe injury worldwide¹.

1. Dr. Md. Jahangir Alam, MBBS, MTM (Transfusion Medicine), Associate Professor, Department of Transfusion Medicine, Faridpur Medical College, Faridpur.

2. Dr. Md. Monir Hossain, MBBS, MD (Pediatrics), Assistant Professor (Pediatrics), Faridpur Medical College, Faridpur.

3. Dr. Mohammad Neamat Hossain, MBBS, MD (Neonatology), Assistant Professor (Neonatology), Faridpur Medical College, Faridpur.

4. Dr. Ahmmed Manadir Hossain, MBBS, D. Card, FCPS (Medicine), Associate Professor, Department of Medicine, Faridpur Medical College, Faridpur.

5. Dr. Lipika Sanjowal, MBBS, DA, MCPS (Anaesthesiology), Associate Professor and Head, Department of Anaesthesiology, Diabetic Association Medical College, Faridpur.

Address of correspondence :

Dr. Md. Jahangir Alam, MBBS, MTM (Transfusion Medicine), Associate Professor, Department of Transfusion Medicine, Faridpur Medical College, Faridpur. Mobile: +88-0 01732683091, E-mail: alamjahangir886686@gmail.com

Injury is a significant cause of death and disability worldwide. A significant increase in the incidence of casualty has taken place in recent years, and it has become a major international public health concern¹. The World Health Organization (WHO) estimates that nearly 1.35 million people are killed and 50 million people are injured worldwide every year due to different modalities of RTA². In the year 2000, injury accounted for 9% of the world's deaths and 12% of the world's burden of disease³. Also, the global burden of disease due to road traffic injuries is expected to move from the 9th position in 1990 to the 3rd position in 2020⁴. Due to RTA, an estimated 316000 people are killed each year in South East Asia, which is approximately 25% of the estimated global deaths⁵.

The problem is intense in Bangladesh because of rapid population increase, urbanization, and insufficient investment in road safety. According to the statistics of "Nirapad Sarak Chai", a road safety campaign of Bangladesh, more than five thousand deaths and approximately seven thousand injuries were reported in the year 2019⁶. Violence is also a major cause of injury, which accounts for more than three hundred thousand deaths every year in South East Asia⁷.

In addition to adapting and implementing injury prevention measures, effective injury care is essential for a nation to save many years of productive life. Hemorrhage is the second most common cause of death among the injured patients⁸. By the nineteenth century, it was recognized that in the treatment of acute blood loss blood transfusion has the most dramatic effect⁹. Successful management of the casualty is not possible without effective blood transfusion facilities. To build an efficient casualty management system, policies are needed to manage massive transfusion events, limit blood use to minimize transfusion risks, integrate new hemorrhage control modalities, and deal with blood shortages¹⁰. Proper blood utilization management includes blood usage review which enables forecasting i.e., predicting future blood use from data of past usage¹¹. There are three less complicated estimation methods: average weekly use estimate, average daily use estimate, and moving average method. In the above methods, the total use of blood over a certain period is determined. Then the total number of blood units is divided by the time period to find out the weekly or daily requirements¹¹.

Knowledge of patterns and requirements of blood use in injury care is essential for resource allocation and planning of the blood transfusion department for casualty management¹². Unfortunately, similar studies and data in Bangladesh are scarce. Dhaka Medical College is the oldest and the largest tertiary level hospital in Bangladesh where the first blood transfusion service in this country was established in 1950.

This study aimed to evaluate the demand for whole blood in casualty management at Dhaka Medical College Hospital, Dhaka, Bangladesh which will contribute to better planning of the existing transfusion service and casualty management in the future.

Materials and Methods:

This cross-sectional study was carried out at the casualty wards of the Dhaka Medical College Hospital (DMCH), Dhaka. A total of 896 patients admitted in the hospital's casualty wards and needed whole blood transfusion from July 2018 to December 2018 were included in this study. The required amount of blood units, blood groups, and blood collection sources for each patient were collected from their medical records.

Collected data were checked for consistency and to remove any minute error. All the relevant data were compiled on a master sheet first and then analyzed using Microsoft Excel (2007). Percentages were calculated to determine the proportion of the findings and the results were presented in tables, graphs, and diagrams.

Ethical permission for this study was taken from the Ethical Review Committee (ERC) of Dhaka Medical College. Informed written consent from the patient was not taken as only information from the existing medical record was used and anonymity was maintained.

Results:

We have observed that 896 patients in casualty management required 1619 units of whole blood in the DMCH from July 2018 to December 2018. The average weekly and daily requirements of whole blood for casualty management were 62 units and 9 units, respectively (Table I).

Table I: Whole blood utilization pattern in casualty management at DMCH between July to December 2018

Total number of whole blood units required	1619
Total number of patients received whole blood	896
Average weekly requirement of whole blood units (rounded)	62
Average daily requirement of whole blood units (rounded)	9

The age distribution of our study population ranged from 4 to 91 years. Highest number of patients (n=209, 23.33%) were from the age group of 31-40 years (Table II).

Table II: Age distribution of the blood recipients (n=896)

Age group (years)	Number of patients	Percentage (%)
1-10	39	4.35
11-20	75	8.37
21-30	176	19.64
31-40	209	23.33
41-50	178	19.87
51-60	94	10.49
61-70	64	7.14
71-80	43	4.80
81-91	18	2.01
Total	896	100

According to sex distribution, the number of male patients were approximately four times higher than those of female patients (79.69% and 20.31% respectively). The distribution of sex of the study population is shown the figure 1.

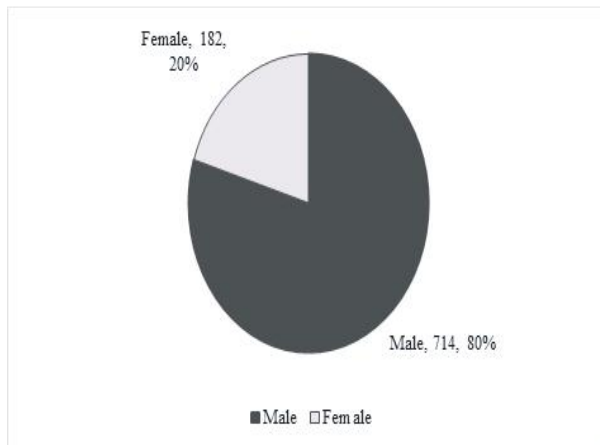


Figure 1: Distribution of study population according to the sex (n=896)

According to the number of whole blood unit usage, the distribution of the study population is shown in table III. We found that the maximum number of patients (n=494, 55.13%) needed only one unit of whole blood, followed by (n=256) 28.57% patients requiring two whole blood units.

Table III: Distribution of patients according to the number of whole blood unit usage (n=896)

Number of whole blood unit	Number of patients	Percentage (%)
1	494	55.13
2	256	28.57
3	72	8.04
4	32	3.57
5	20	2.23
6	09	1.01
7	06	0.67
8	03	0.34
9	0	0.00
10	02	0.22
More than 10	02	0.22
Total	896	100

Out of 1619 units of whole blood that were required in the casualty management during the study period, blood group of 561 units (34.65%) was O+ve followed by B+ve (31.87%), A+ve (23.72%), AB+ve (7.6%), O-ve (1.42%), B-ve (0.49%) and A-ve (0.25%). No AB-ve whole blood was required during this period (Figure 2).

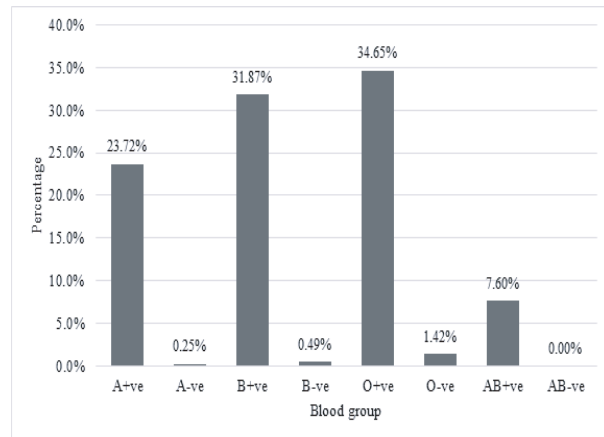


Figure 2: Bar diagram of required whole blood units according to ABO and Rh group (n=1619)

According to the source of the required blood units, maximum (84.99%) were donated by the patients' relatives and 15.01% were from voluntary donors. There was no paid donor (Table IV).

Table IV: Source of required whole blood units (n=1619)

Source	Number of units of blood	Percentage (%)
Relatives	1376	84.99
Voluntary donors	243	15.01

Discussion:

Care at the casualty wards can save many lives and years of productive life. Proper and prompt management with adequate resources, especially effective blood transfusion facilities, is a prerequisite for providing the best injury care. Knowledge of blood usage and transfusion pattern can help properly allocate and maximize survival when blood supplies are limited; or tackle mass casualty situations.

In this study, 1619 units of whole blood were required in casualty management in Dhaka Medical College Hospital from July to December 2018. The average weekly requirement of whole blood for casualty management was 62 units. Average daily requirement was 09 units. These 1919 units of whole blood were required by 896 patients. The age of the patients that required whole blood ranged between 4 to 91 years. Most of them were in the age group of 31-40 years. This finding agrees with the past study findings that people at the prime of their life are most commonly exposed to trauma and blood transfusion¹³. It highlights

the importance of blood transfusion in casualty management as it can save the lives of people of their most productive age when they are vital for the family and the nation. In this study, no age group is exempt from whole blood transfusion.

According to the sex distribution, there were 714 (79.69%) males and 182 (20.31%) females with a ratio of 3.9:1. It probably reflects the socio-cultural situation of Bangladesh, where most males are employed in the out-door jobs in their quest for livelihood for their family, whereas females mainly do household works. This finding is similar to that of other studies¹³⁻¹⁵ who also found that males are more exposed to trauma than females.

It was found in this study that maximum patients 494 (55.13%) needed only one unit of whole blood transfusion, followed by 256 (28.57%) patients requiring two units of whole blood. Gould SA et al also reported that 50% of trauma center patients in Illinois, the US received only 1 to 2 units of blood¹⁶. So, our study finding supports the previous study finding.

Out of the 1619 units of whole blood that were required in casualty management, blood group of 561 units (34.65%) was O+ve, 516 units (31.87%) was B+ve, 384 units (23.72%) was A+ve and 123 (7.6%) was AB+ve. Twenty three units of whole blood (1.42%) were O-ve, 8 units (0.49%) were B-ve and 4 units (0.25%) were A-ve. No AB-ve whole blood unit was required. It reflects the blood groups in the general population of Bangladesh as described by Rahman¹⁷.

According to the source of the required whole blood units, maximum (84.99%) were donated by relatives. The source of 243 units (15.01%) was voluntary donors. There were no paid donors. It reveals that the gradual awareness among common people regarding voluntary blood donation and the hazards of blood from paid donors-it is a success of the Government's safe blood transfusion program.

Limitation:

This study involved a limited number of patients due to a limited time period. Further multicenter study of a more extended period with a larger study population may give more precise results regarding whole blood requirements in different casualty management settings.

Conclusion:

Good casualty management with the best access to blood transfusion services is a health care priority in a developing country like Bangladesh, which can save thousands of valuable productive lives. As most of the

patients required only one unit of whole blood in this study, it recommends an expert guideline for the use of whole blood in casualty settings so that requirements can be minimized with transfusion alternatives. Simultaneously, more awareness regarding voluntary blood donation should be created by mass-media and by counseling prospective donors.

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