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Utilization of Platelet Concentrates in Different Departments of Bangabandhu Sheikh Mujib Medical University, Bangladesh

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ABSTRACT

Background: Transfusion of blood and blood components is an integral part of health care practice. Platelet transfusion are administered to patients across all age groups to prevent or treat bleeding in patients with quantitative or qualitative defects of platelets. The platelet products are one of the most expensive blood components and also, among the most misused blood products. In our country there is limited availability of platelet products as only few blood centers have component separation facility and thus a limited data is available on this topic. **Objective:** To evaluate the pattern of utilization of Platelet concentration in different clinical department in a tertiary care hospital.**Method:** This is a retrospective observational study which was carried out after approval of the protocol from Institutional Review Board (IRB), over a period of 06 months from March'2019 to August'2019 at the Dept. of Transfusion Medicine, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka.**Results:** Adult Hematology and Pediatric Hematology and Oncology are the main principal user specialties utilizing 28.60% and 25.80% of prepared Platelet unit respectively. The most of the patients were male 2091 (62.17%) and female were 1272 (37.83%). Of the patients receiving platelets, 100% were transfused ABO and Rh (D) group specific platelets.**Conclusion:** Platelet utilization varied by departments. Hematology followed by Paediatric Hematology and Oncology, Internal Medicine and Dengue Cell were the main three principal users of platelet in our tertiary care center. Necessary remedial measures can be taken to maximize appropriate and judicious utilization of each components.

KEY WORDS: Platelet concentration, hematology, transfusion therapy, component therapy

I. INTRODUCTION

Blood is a specialized bodily fluid that supplies essential substances and nutrients and removes metabolic waste products from the cells. It is composed of cell and plasma. The cellular component includes red blood cell, white blood cell and platelets. Plasma contains coagulation factors. Blood is essential for human survival. Until now there is no efficient substitute for blood. Evidence based medicine approach dictates the necessity of the use of specific blood components to correct specific deficiencies; for example, in patients with low platelet counts and showing features of mucosal bleeding, platelet concentrate should be administered and not whole blood. The decision to transfuse has to be based on clinical features and laboratory parameters. The world is, therefore, moving from whole blood therapy to specific component therapy for various ailments, with the decision based on evident clinical assessment and laboratory values.At the same time, Platelet also has the distinction of being very commonly transfused for inappropriate indications.Inappropriate and indiscriminate use of Platelet has implications in respect to economics, workload burden as well as safety of the recipients. The Platelet products are one of the most expensive blood components and also, among the most misused blood products. There is limited availability of Platelet products as only few blood centers have component separation facility and thus limited data is available on this topic. To promote the rational use of blood components, particularly Platelet, the present study was conducted. The study will help to define quality gaps in practices and procedures of in hospital transfusion services. Specifically, the study will assess the appropriate practice of rational use of Platelet by various clinical departments. The study will also determine the pattern of Platelet usage and will evaluate the haemovigilance system.

Blood segment treatment has picked up a lot of interest as of late as a result of its benefits over entire blood bonding like, it decreases volume over-burden on patient, more noteworthy time span of usability and better patient administration. Component therapy was introduced between 1950 and 1960s to maximize the benefits of all components present in the whole blood.[2] WHO (2009) Guidelines and Principles for safe blood transfusion states that inappropriate transfusion practices can lead to serious consequences for recipients including transmission of infectious agents. In developing countries there are limited resources of blood and increasing demand, hence it is necessary to make an efficient use of blood.[4] As blood is a precious resource, clinician should weigh the risks of transfusion against risks of not transfusing.[3]Data on the use of blood products are limited; studies have revealed high proportion of inappropriate use of blood transfusion often in both developed and developing countries.[1]Platelets are mainly used in leukemia, aplastic anemia, ITP, Dengue Hemorrhagic Fever (DHF) etc. However, to my best knowledge there is no such report of utilization of blood products in our country. So it is prudent to have our own data regarding the utilization of platelet concentration in our country. Therefore, this study had been designed to assess the practice of utilization of platelet concentrates in different clinical department of BSMMU as a part of health care.Klein et al. (1956) and Freireich et al. (et al., 1959) developed a technique for platelet separation by differential centrifugation to obtain platelets for clinical use and a first study comparing fresh versus banked blood in the management of bleeding was performed.[6] In one of the first reviews platelet transfusions were already considered as a part of the "total care" for patients with malignancies, however the difficulty of an objective evaluation of the "self-apparent" effects of platelet transfusions and the need for controlled studies was also emphasized.[7] The first prospective landmark study in 92 patients with acute leukaemia by Gaydos et al showed a relationship between the platelet count as well as a decrease in platelet count and the risk of bleeding, although no threshold level could be observed. However, it was after this publication that the concept of prophylactic rather than therapeutic platelet transfusions emerged.[8]

OBJECTIVE

General objective:

- To evaluate the pattern of utilization of platelet concentration in different clinical department of Bangabandhu Sheikh Mujib Medical University.

Specific objective:

- To estimate the frequency of requirement or demand of platelet concentration from the number different clinical departmental requisition form.
- To estimate the requirement by ABO and Rh blood group.

Materials and Methods

Study design: Retrospective observational qualitative study.
Place of study: Department of Transfusion Medicine, BSMMU, Dhaka.
Study population: Not Applicable
Period of study: 06 months after approval of protocol (March'19 to August'19).

Sample Size (n):

Since this study identified data from the departmental records, all the eligible records from March'2019 to August'2019 are incorporated in this study. Prepared platelet transfused to 3363 patients in 9327 transfusion episodes.

Inclusion Criteria:

- Data regarding Platelet concentration given to various patient from Transfusion Medicine Department during the period of March'19 to August'19 were included.

Exclusion criteria:

- Platelet concentration supplied, but which was not used by the patient were excluded from this study.

Sampling method: Purposive sampling.

Study Procedure: After approval of this protocol, I contacted with the in-charge who kept the register book.Then for this study, requisition form was searchedand register where the information was recorded about

the demand of platelet concentrate from different clinical department from March'19 to August'19. Data was elaborated according to the number of requisition form, place and department. Further selection was done according to diseases how many platelet units were used and ABO & Rh type.

Data collection method: Total number of supplied unit of Platelet concentration given to different patient and patient of different diseases from the Dept. of Transfusion Medicine during the period of March'19 to August'19, were calculated & then it is calculated into frequency percentage for this purpose.

Statistical Analysis:
The statistical analysis was carried out using the Statistical Package for Social Sciences (SPSS) version 20.0 for Windows (SPSS Inc., Chicago, Illinois, USA). Data is expressed in number, frequency and percentage.

II. RESULT

During 6-month study period, 9327 platelet units were transfused to 3363 patients, out of them 2091 (62.17%) were male and 1272 (37.83%) were female. The majority units of platelet were utilized by the Dept. of Hematology (2667/9327, 28.59%), are shown in (Table 3). Then Pediatric Hematology and Oncology (2406/9327, 25.80%) were in the second most user and Internal Medicine and Dengue cell (2394/9327, 25.67%) were in the third position. Neonatology (02/9327, 0.02%) and Ophthalmology (04/9327, 0.04%) were the lowest users of platelet unit, are shown in (Table-3). Mean age 44 years (yrs.) (range 0–80). Most of the patients were under 20 years (1449/3363, 43.08%) followed by 40-49 years (504/3363, 14.98%) and 50-59 years (444/3363, 13.20%) of age group, are shown in (Table-1). 100% platelet transfusions were of group specific platelets, ABO and Rh (D). Considering the blood group of the patients, maximum was blood group B positive (1491/3363, 44.34%) followed by O positive (1452/3363, 43.18%), then A positive was (239/3363, 07.10%), AB positive was (65/3363, 1.94%), B negative was (50/3363, 01.48%), A negative was (44/3363, 01.30%), and O negative was (22/3363, 0.65%), are shown in (Table-5)

Table-1: Requirements of Platelet according to the age (n=3363)

Age group (years)	Frequency	Percentage (%)
< 20	1449	43.09
20-29	313	9.31
30-39	364	10.82
40-49	504	14.99
50-59	444	13.20
60-69	227	6.75
>70	62	1.84
Total	3363	100.00

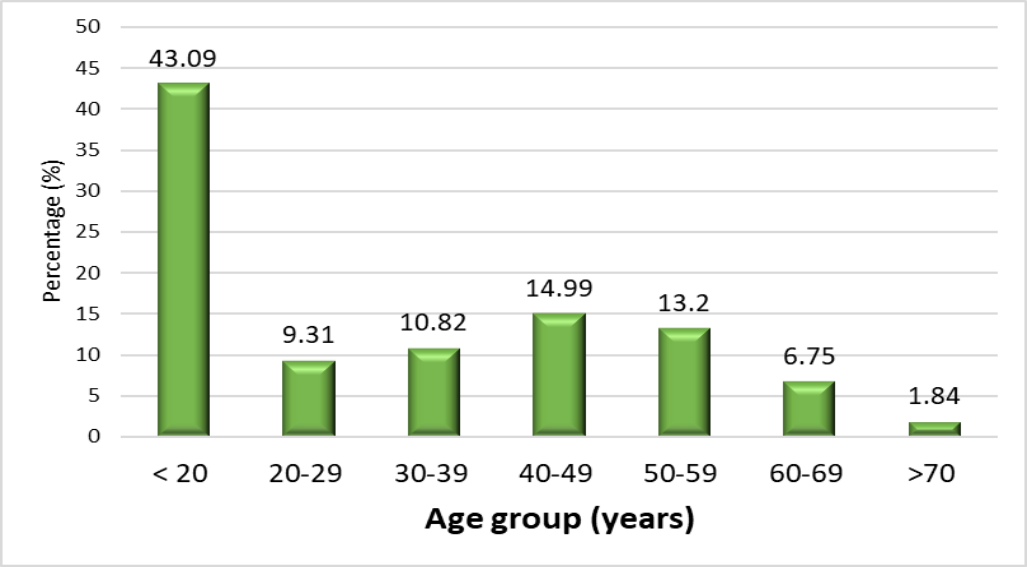

Figure-1: Age distribution

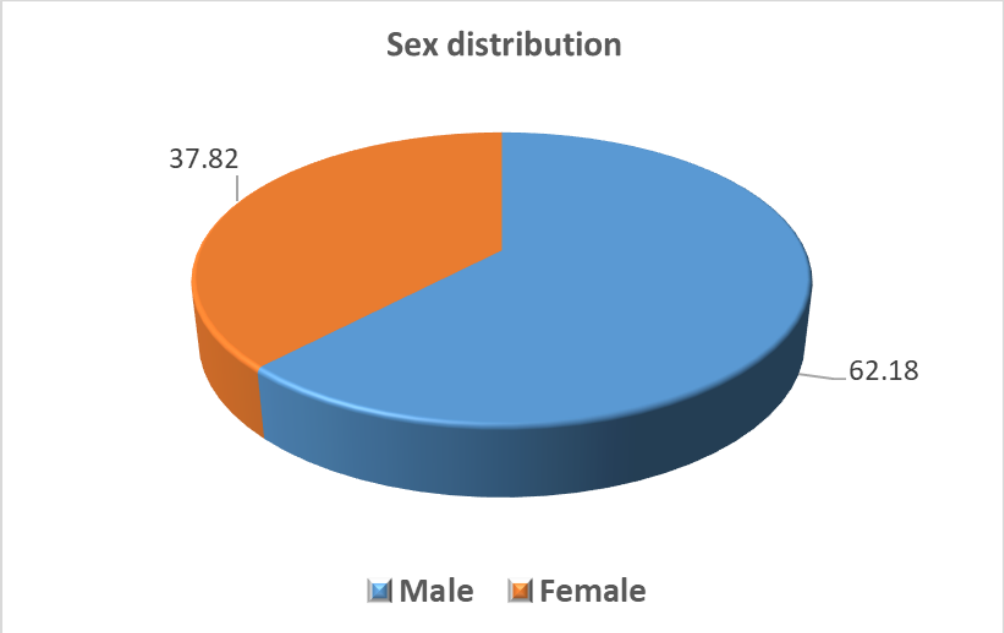

Figure-2: Sex distribution

Table-2: Distribution of the study subjects by department (n=3363)

Department	Frequency	Percentage (%)
Internal Medicine	318	9.46
Dengue Cell	368	10.94
Gastroenterology	7	0.21
Hematology	889	26.43

Hepatology	6	0.18
Nephrology	7	0.21
Neurology	2	0.06
Oncology	338	10.05
Palliative Medicine	3	0.09
Neonatology	2	0.06
Paediatrics	138	4.10
Paediatric Hematology and Oncology	1206	35.86
Paediatric Nephrology	10	0.30
General Surgery	11	0.33
Cardiac Surgery	4	0.12
Gynae and Obstetrics	2	0.06
Otolaryngology and Head Neck Surgery	9	0.27
Neurosurgery	2	0.06
Pediatric Surgery	31	0.92
Urology	6	0.18
Maxillofacial Surgery	2	0.06
Ophthalmology	2	0.06
Total	3363	100.0

Table-3: Requirements of Platelet Concentration by ABO and Rh Blood Group (n=3363)

Blood Group	Frequency	Percentage (%)
A (+) ve	239	7.10
B (+) ve	1491	44.34
O (+) ve	1452	43.18
AB (+) ve	65	1.94
A (-) ve	44	1.30
B (-) ve	50	1.48

O (-) ve	22	0.65
AB (-) ve	0	0.0
Total	**3363**	**100**

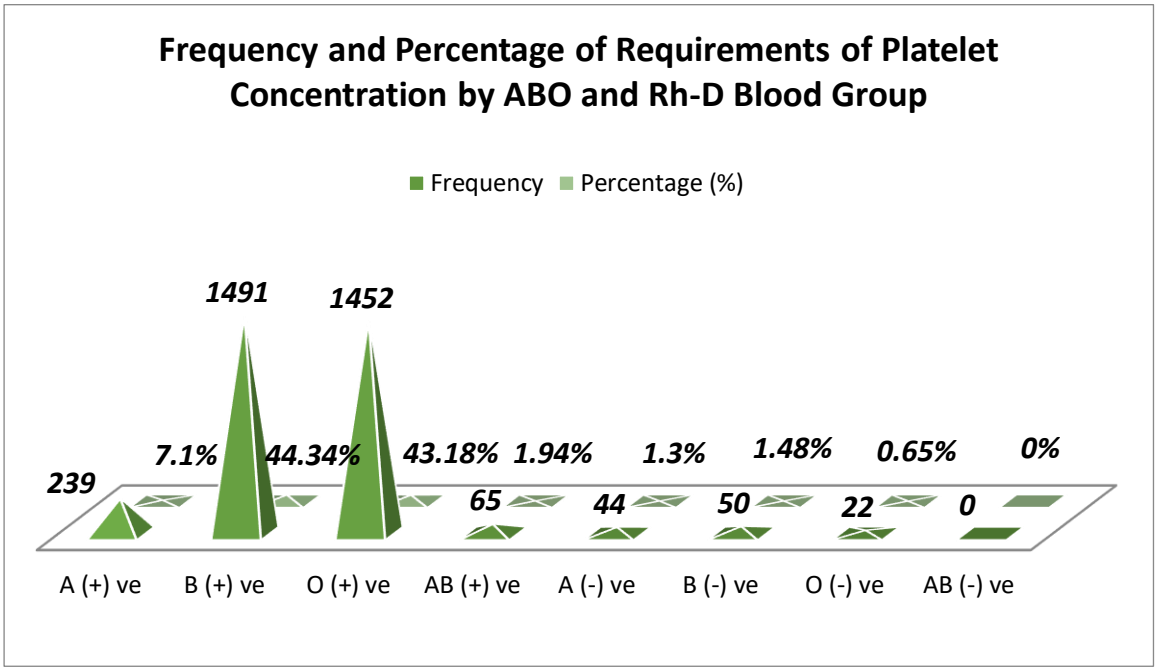

Figure-3: ABO and Rh-D blood group distribution.

III. DISCUSSION:

Platelet transfusions are administered to patients across all age groups to prevent or treat bleeding in patients with quantitative or qualitative defects of platelets. The platelet products are one of the most expensive blood components and also, among the most misused blood products even in developed world. In developing world there is limited availability of platelet products as only few blood centers have component separation facility and thus a limited data is available on this topic. This paper attempts to assess the platelet usage patterns and platelet transfusion policies in resource limited nations and provide suggestions for its optimum use and future development. The platelet utilization for that matter usage pattern of any other blood component is determined by several interlinked factors, viz., local circumstances in terms of patient populations served, level and standard of healthcare services available, availability of adequate blood components, level of education and training in transfusion medicine etc. The study was conducted over a 6 month of duration. Total 9327 unit of Platelet concentrate was transfused among 3363 patients. Among clinical department Hematology utilized highest (28.59%) amount of Platelet concentrate. But neonatology department required only 0.02% Platelet concentrate. B (+)ve was maximum required blood group. Most of the patients were below 20 years (43.08%).

Gottschall et al. (2017) conducted a study to assess platelet transfusion practice and efficacy to areas of high clinical need.[5]A total of 122,298 platelet doses were issued for transfusion: 74,721 (61%) were apheretic platelets; 47,577 (39%) were pooled whole blood derived platelets; 103,759 (85%) were for inpatients, 18,539 (15%) were for outpatients. For inpatient transfusions 54% were issued to the General Ward, 29% to ICU, 12% to OR(Operating room), 3% to ER(Emergency room). But in our study we had found that highest amount of Random donor platelet was used in hematology department but lowest amount in neonatology.Verma A. et al on 2005 conducted a study which showed maximum number of Platelet concentrate was utilized by Hematology department which was 36% and least number was used in radiotherapy department which was 1.5%. This study was almost similar to our study in the aspect of highest utilization.Salvadori et al. (2014) conducted an observational study had a within-subject design and involved 135 donors who underwent plateletapheresis.[9]

IV. CONCLUSION:

Platelet utilization varied by departments. Hematology followed by Pediatric Hematology and Oncology, Internal Medicine and Dengue Cell were the main three principal users of platelet in our tertiary care center. Normal review of blood constantly parts is an unquestionable requirement with the goal that vital therapeutic measures can be taken to expand suitable and wise use of every segments.Although bacterial screening has enhanced the safety of platelet transfusions, pathogen reduction technology may offer further benefits.

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