Research article

A cross-sectional survey of platelet transfusion practices from a tertiary care center

Manjula S. D.[1], Poulami D.[1], Shamee Shastry[2], Vasanthalaxmi K.[1], Deepika Chenna[2]

[1]Department of Physiology, [2]Department of Immunohematology and Blood Transfusion,
Kasturba Medical College, Manipal, Manipal Academy of Higher Education, Manipal, Karnataka, India, 576 104

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Corresponding author: **Deepika Chenna.** Email: deepu.kkd@gmail.com; chenna.deepika@manipal.edu

ABSTRACT

Introduction and Aim: Platelets are precious blood components with a very short shelf life of only 5 days. Appropriate usage is essential for judicial utilization of these components. Blood utilization metrics help in assessing the demand and understanding the utilization pattern of blood components and in improving transfusion practices. This study aims to audit and evaluate the platelet transfusion metrics and to know the utilization pattern of platelet transfusion practices at our center.

Methods: This was a retrospective observational audit conducted over a period of 6 months to evaluate the transfusion requests received for platelet transfusion and to understand the utilization pattern across various specialties.

Results: Platelet transfusions were done only in about half the requests received 855/1543(55.4%) comprising 92% of Random Donor Platelet products and in the remaining Single donor platelet were transfused. The pre-transfusion platelet counts were documented in 1007(62.26%) of the request forms received. The utilization of platelet components was highest in General Medicine (29.6% SDP, 37.23% RDP) and Medical Oncology (40.8% SDP; 30.65% RDP).

Conclusion: Training and education at regular intervals about transfusion guidelines is essential for improvement of overall patient management. A standby order for platelet transfusion requests in par with type and screen of red cell components may help in better utilization of this valuable resource.

Keywords: Metrics; audit; reactions; standby order.

INTRODUCTION

Audits are indispensable tools to check a process and act as an important tool to identify areas of improvement (1). They can be performed at transfusion service and/or in the hospitals where transfusions are performed. Audits that can be conducted in transfusion service include an inventory of blood products, review of requisition forms of blood products to know indications and utilization patterns among various clinical specialties, of the different blood components issued.

Platelet transfusion offers rapid haemostatic control, and once bleeding has ceased, thrombopoiesis replenishes lost platelets. Platelet products are considered special among all blood products not only because of their short shelf life but also due to the fluctuating demand of the product which poses a challenge to the inventory management of the transfusion service (2). At the same time, platelet transfusions are responsible for the majority of transfusion reactions and patients may become refractory to platelet transfusions, especially when inappropriately used (3). Platelets are available for transfusion as random donor platelets (RDP) or Single Donor Platelets (SDP) derived from whole blood donation and apheresis respectively.

This study aims to audit and evaluate the platelet transfusion metrics and to know the utilization pattern of platelet transfusion practices at our center.

METHODS

A retrospective observational study on platelet transfusion practices was conducted in the Department of Immunohematology and Blood Transfusion which supports a 2032 bedded tertiary care hospital. Institutional ethical committee clearance (551/2019) was obtained and the data required for the study was retrieved from the transfusion requisition form, the departmental software (Easy Software) and the laboratory information system of the hospital. The study involved the collection of data on the number of transfusion requests received and issued for platelet components (SDP/RDP) in the blood bank by reviewing the requisition form of blood components between January to June 2019 while excluding the data of those patients who received components other than platelet transfusion and the requests received from other hospitals. The transfusion requests which were received before 1st January 2019 but issued after 1st January 2019 were also excluded in the study.

Data collection

The total number of requests received for platelet transfusion over 6 months were reviewed and the requests where platelets were issued were sorted out from them. Demographic data like age, gender, along

with platelet counts were collected for respective patients from the transfusion requisition form. The number of platelets (RDP/SDP) transfused was noted. Following components of platelet transfusion request forms of patients was assessed –

- Name, age, gender;
- Clinical Speciality;
- Identification number of the patient
- Provisional diagnosis;
- Pre-platelet count documented in the requisition form
- History of previous transfusion, pregnancy or transplant, transfusion reaction
- Indications for transfusion;
- Blood group;
- Number of units to be transfused (as requested by the doctor);
- Types of requests SDP/RDP.

Using the collected data for transfusion, a database was set up in a Microsoft Office Excel® for the study period. For each transfusion request, the necessary data mentioned above was retrieved. This dataset was further analysed according to the objectives of the study.

The indications for transfusion that were retrieved from the transfusion requisition form were categorized as per the hospital guidelines for platelet transfusion as derived from British Standards for platelet transfusion and the Directorate General of Health Services was adopted in the hospital (4,5). They are stated as a threshold for platelet transfusion i.e., ≤10,000/µl, to a febrile patient with platelet count ≤20,000 µl, ≤50,000 µl in case of surgery, active haemorrhage and a column for others which do not fit into the above criteria. According to the guidelines for platelet transfusion, four to six units of RDP or a single SDP is considered an appropriate dose for adult patients. The neonate or paediatric dose of platelet transfusion is 5-10 mL/kg or 1 RDP unit/10 kg (patient's ≥10 kg). In this study, keeping those limits of the appropriateness of given dosage as standard, the dose appropriateness for individual transfusions was assessed.

RESULTS

A total of 1543 requests for platelet transfusions were received through the period of study, where data is analysed and interpreted. The percentage of requests received for SDP is 5.65% (88 patients for 94 units) and for RDP is 94.29% (1455 patients for 5761 units). Among these patients, the number of females was 586 (37.39%) and males were 957(61.95%) with a male to female ratio of 1.6:1. Majority of the patients were above 12 years 1335(86.52%) followed by those between 1-12 years(79; 5.12%) and those below 1 year of age (129;8.36%).

The age, gender, unique identification number, the department and ward under which the patient was admitted were documented in 100% of the request forms. In most of the request forms, the indication for transfusion 1399(90.77%), history of previous transfusion 1371(88.9%) and the history of previous transfusion reaction 1379 (89.38%) were documented. In 570(36.9%) of the requests, there was a previous history of transfusion of which only 0.45% of the patients had a previous history of transfusion reaction. The pre-transfusion platelet counts were documented in 1007(62.26%) of the request forms received. In the majority of the request forms (90.67%), the indication for transfusion was documented in the given format of the requisition form. Accordingly, majority of the requests 40.44% were for prophylactic transfusions, in 3.11% for patients with haemorrhage and in 46.94% of the requisitions had an indication as "others" some of which were documented as for use in ICU, surgery, RTA, etc., (Table 1).

Table 1: Indications for platelet transfusion

Indication for transfusion	**Number of patients n (%)**
Prophylactic platelet count <10,000	262(16.79)
2. Prophylactic platelet count <20,000 with additional risk factors (fever, sepsis, splenomegaly, on chemotherapy)	244(15.81)
3. Platelet count <50,000 (with the minor invasive procedure (liver biopsy, epidural anaesthesia, insertion of the central line, gastroscopy etc)	121(7.84)
4. Haemorrhage	48(3.11)
5. Others	724(46.94)
6. Not specified	144(9.33)
TOTAL	1543(100)

The ratio of total number of units requested to that of the transfused is approximately 2:1(1543/855;55.4%) comprising 92% of RDP products and in the remaining SDPs were transfused. The order of utilization of RDP was highest in General Medicine (37.23%), followed by medical oncology (30.65%), paediatrics and neonatology (11.25% RDP) followed by other clinical specialties. The order of utilization of SDP was highest in Medical Oncology(40.8%) followed by General Medicine (29.6%), and Obstetrics and Gynaecology (7.04%). Table 2 summarizes the utilization of platelet components across various specialities. Most

of the patients (91.23%)who received platelet transfusions were discharged in stable condition, while 2.23% of patients were discharged against medical advice. The mortality rate was 4.67% in patients who received a transfusion, though not attributed to platelet transfusion alone. Among the transfused patients, in few recipients (12.3%;105/855) the dose for platelet transfusion was inappropriately raised, of which around 10% were less than adequate dose and remaining more than the recommended dose was ordered.

Table 2: Utilization pattern of platelet components among different specialties

Clinical specialty	**Number of units utilized**	
	SDPN (%)	**RDPN (%)**
General Medicine	28(39.43)	877(37.23)
General Surgery	3(4.24)	117(4.97)
Orthopaedics	0	21(0.89)
Paediatrics and Neonatology	0	265(11.25)
Obstetrics/Gynaecology	4(5.63)	77(3.27)
Medical Oncology	28(39.43)	722(30.65)
Nephrology	4(5.63)	31(1.31)
Gastroenterology	1(1.40)	54(2.30)
Cardiothoracic surgery	0	9(0.38)
Neurosurgery	0	35(1.50)
Casualty	0	11(0.47)
Others	3(4.24)	136(5.78)
Total	71(100)	2355(100)

DISCUSSION

Continuous process improvement is a part of a good quality management system. It can be attained by conducting audits/surveys at different levels and adapting the changes as necessary. Documentation is the key to review the process flow of a procedure. Transfusion requests need to be filled appropriately for the transfusionist to reviewing and assess the need of blood products for the recipient and decide on the issue of blood components based on the inventory of the transfusion center. In this study, the survey was conducted retrospectively to review the completeness and accuracy of the transfusion requisitions received at our tertiary care hospital.

The completeness of requisitions can be divided into multiple sections as details of demographic data, identification of recipient, clinical diagnosis, details related to past transfusions, the indication for platelet transfusion along with the documentation of pre-transfusion platelet counts. Documenting age, gender and the unique identification number of an individual is the primary means of completeness of transfusion form. It is necessary for appropriate identification of patients as well. It was 100% in this study as it is achieved by the barcode label on the transfusion form where the unique identification number, name, age and gender are fetched. Barcoding positively establishes identification and links specimens and tests to a patient in the entire testing process from ordering, sample collection, analysis to test results (6). It is one of the essential tools to help minimize identification and specimen labelling errors.

The history of transfusion and transfusion reaction helps in identifying patients who are chronically transfusion dependent and allows them to take necessary action and alerts the transfusionist to make any additional modifications to the blood products to minimize the occurrence of transfusion reactions before issue of blood components. Platelets are known to cause allergic reactions, Febrile Non-hemolytic transfusion reactions(FNHTR) which can be minimized in cases of recurrent reactions by adopting techniques of component modifications like washing, leukofiltration (7). The above details were documented in > 85% of the forms which indicates the responsibility of the treating physicians towards minimising the untoward transfusion reactions and increasing patient safety. However, only 0.45% of the patients transfused had previous history of transfusion reaction and none of them were recurrent requiring component modification.

Pre-transfusion platelet counts are considered decision making for prophylactic platelet transfusions. Relevant documentation of the pre counts is necessary to justify the need for transfusion. From literature we see that most of the audits on transfusion practices are done retrospectively, to avoid unnecessary delay in patient blood management (8-11). Hence appropriate documentation of pre-counts and diagnosis is key in evidence generation of audits.

Common platelet transfusion triggers include less than 10,000/µL for stable, nonbleeding patients and less than 20,000/µL for febrile patients. A trigger of 100,000/µL is often used for neurosurgical patients or those patients experiencing ophthalmological bleeding (4). Despite these recommendations, the debate continues about the rationale, efficacy, and the threshold of prophylactic platelet transfusions in patients. The prerequisite of each transfusion varies among different specialities of the departments. Thus,

the assessment of the need for transfusion requires different criteria for different clinical specialities. The indications for prophylactic transfusions ranged from 35%- 97% across different institutes (8, 12-14). This study reported only 40% of the requests being for prophylactic transfusions which may be less compared to the actual number as around 40% were marked as 'Others' in indication. The exact reason for documentation of 'Others' could not be ascertained due to the retrospective nature of the audit.

Typical dosing for an adult is a pool of 6 whole blood-derived (sometimes referred to as random donor) platelets (RDP) or one apheresis platelet (SDP). This is expected to raise the platelet count by 30,000-60,000/µl in a 70 kg patient. During this audit, considering 4 to 6 RDP and 1 SDP as an appropriate dose, the below and above the appropriate dose is considered as underdose and overdose respectively. A less than necessary dose was supplied to around 16.7% of the individuals and this could be because of unnecessary standby requests that we received or due to shortage of blood components.

Only a few studies reported the actual utilization compared to the requests raised and have observed approximately 80% utilization (15,16). In this study we observed that only 55.4%(855) of the total 1543 requests received were transfused. These units were received as a standby order for use in emergency cases or in case of unanticipated bleeding during surgeries. These additional requests create an extra burden on the transfusion centre to manage an inventory that is double the need. The ratio of total number of requests received to utilized may be considered as an important PBM metric for better inventory management. The centre witnessed an 8% percent discard rate with a 6.7% of platelets being discarded due to expiry during the study period.

Recommendations from the survey

Propose a standby order of platelets to manage inventory in a judicial way. When "Others" is chosen for indication, appropriate indication to be mentioned on the form.

CONCLUSION

In order to further improve on the inventory, we propose a stand by order for platelet transfusions in par with the type and screen policy of the red cells. This might help in improving the inventory and to utilize these platelet products in a judicial way.

CONFLICT OF INTEREST

Authors declare no conflicts of interest.

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