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# Transfusion of Blood Components In Critical Patients Of Medical ICU Admitted In A Tertiary Care Centre Of Central India

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## Abstract

**Introduction**: Management of critically ill patients calls very important role of transfusion of blood and its components in supportive therapy. Every third patient in ICU (intensive care unit) requires blood transfusion during their stay in unit. The primary aim of study is to find out the transfusion indications, level of pretransfusion hemoglobin concentrations, pretransfusion INR and pretransfusion platelet counts in critically ill patients.

**Material & method**: The study was carried out for 06 consecutive months from June 2022 to December 2022.The study was conducted mainly for the medical and trauma cases who remain admitted for more than 24 hours, obstetrics and paediatric cases were excluded. For packed red cell (PRC) transfusion, we categorised patients into for groups based on the haemoglobin level before transfusion. Plasma transfusion requiring patients were categorized based on INR. Patients needing Platelet transfusion were divided into four groups based on platelet counts before transfusion. The blood requisition forms of the patients were analysed, and the different pretransfusion parameters and blood components issued were studied.

**Result**: Of 1270 total patients admitted, Packed Red Cells (PRC) were transfused to 582 (45.8%) patients, Fresh frozen plasma (FFP) transfusion was given to 212 (16.7%) patients. A total of 146 patients (11.4%) received platelet transfusion.

**Conclusion:** Mostly clinicians prefer conservative approach keeping with recent transfusion guidelines and try to avoid unnecessary transfusion. As blood and component transfusion is equivalent to drug transfusion so its indication must always be clinically justified.

**Keywords**: Transfusion, PRC, FFP, Platelets, INR.

## Introduction

Management of critically ill patients calls very important role of transfusion of blood and its components in supportive therapy. Every third patient in ICU (intensive care unit) requires blood transfusion during their stay in unit.[1] Components like Fresh frozen plasma, cryoprecipitate and platelets are exclusive products needed in the managing coagulopathic patients, and transfusion of blood and other blood products is a common intervention in the operating rooms and critical care unit.

Initially, protocol was to maintain haemoglobin concentration above 10 g/dl in terminally ill patients with the belief that high oxygen carrying capacity and oxygen delivery were important

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to prevent tissue hypoxia and organ failure.[2,3] This practice of maintaining higher oxygen level has been discarded by various trials across the globe which proved that maintaining supranormal oxygen delivery in patients has no significant effect on outcome[4] and also the clinically resuscitated critically ill patients do not often exhibit pathological oxygen supply dependency.[5-7]

We conducted this retrospective study to evaluate packed red cells, platelets and plasma transfusion requirements in the intensive care units in a tertiary care institute.

The primary aim of study is to find out the transfusion indications, level of pretransfusion hemoglobin concentrations, pretransfusion INR and pretransfusion platelet counts in critically ill patients.

**Material and methods**

The study took place in the ICUs (Medical ICU) of MY Hospital MGM Medical College, a government tertiary-referral centre and annually admits about 5000 patients in the emergency ICUs. The study was carried out for 06 consecutive months from June 2022 to December 2022. Bed occupancy in emergency ICUs was 100% and >80% of patients received mechanical ventilation. The study was conducted mainly for the medical and trauma cases who remain admitted for more than 24 hours, obstetrics and paediatric cases were excluded.

For packed red cell (PRC) transfusion, we categorised patients into for groups based on the hemoglobin level before transfusion, i.e., <7.0 gm%, 7.0.-10gm% and >10gm% and forms where hemoglobin (Hb) was not mentioned. The frequency, indications, and timing of red cell transfusion events in relation to ICU admission were described. There were mainly two types of indications: i) Haemorrhage: the patient required transfusion because of recent/ ongoing clinically evident blood loss. ii). Reduced physiological reserve. The patient was not bleeding or losing blood through other clinically apparent mechanism.

Plasma transfusion requiring patients were categorized on the basis of INR i.e., INR<1.5, INR> 1.5 and INR not mentioned. Patients needing Platelet transfusion were divided into four groups based on platelet counts before transfusion, i.e., Category I Platelet count: <20,000/cmm, Category II: 20,000-50,000/ cmm with signs of bleeding, Category III: >50,000/cmm, and Category IV: Platelet count not mentioned. The blood requisition forms of the patients were analysed, and the different pretransfusion parameters and blood components issued were studied.

**Result**

During study duration, total of 1270 patients were admitted in Medical ICUs. Of these, 896 (70.5%) were males and 374 (29.5%) were females. The total number of patients who received blood/blood components transfusion were 606 (47.7%), out of these, 421 (69.5%) were males and 185 (30.5%) were females [Table 1].

Of 1270 total patients admitted, Packed Red Cells (PRC) were transfused to 582 (45.8%) patients, among them 202 (out of 582) (34.7%) of them having a pretransfusion Hb levels below 7.0 g/dl, 224 (38.5%) of them had Hb levels between7.0 and 10 g/dl, 68 (11.5%) had above 10 g/dl, and in 88 (15.1%) patients, Hb was not mentioned [Figure 1].

Fresh frozen plasma (FFP) transfusion was given to 212 (16.7%) patients. Of them 36 patients (16.9%) had pretransfusion INR levels below 1.5. Fifty-five patients (25.9%) had pretransfusion INR levels more than 1.5. The INR levels of rest of the 121 patients (57%) were not available.

A total of 146 patients (11.4%) received platelet transfusion. 12.5% of them had platelet counts below 20,000/cmm. 35.5% of them had pretransfusion platelet counts between 20,000 and 50,000/cmm with signs of bleeding. 14% of the patients had platelet counts above 50,000/cmm and in 38% patients, the platelet values were not mentioned [Figure 3].

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During the study, there were 81 patients (6.3%) who received red cells and FFP. Twenty-six patients (2%) received red cells and platelets. Nine patients (0.7%) received platelets and FFP. There were 82 patients (6.4%) who had received all the three components, i.e., red cells, FFP and platelets.

**Figure 01: Distribution of recipients**

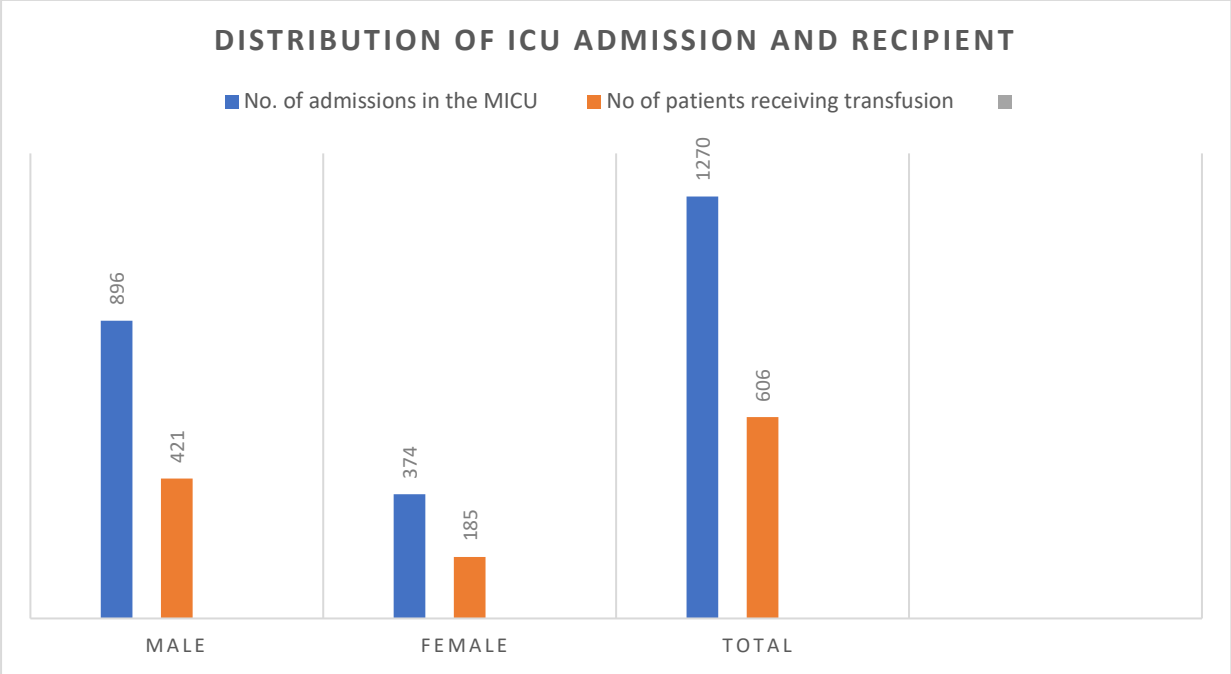


**Table 01: Distribution of PRC Recipients:**

| Recipient Category | | No. Of PRC recipient | Percentage % |
|---|---|---|---|
| Category I | Hb < 7 gm% | 202 | 34.7 |
| Category II | Hb 7-10 gm% | 224 | 38.6 |
| Category III | Hb > 10 gm% | 68 | 11.5 |
| Category IV | Hb not mentioned | 88 | 15.2 |
| Total | | 582 ( Out of 1270 admission) | 100% |

**Table 02: Distribution of FFP Recipients:**

| Recipient Category FFP | No. Of FFP recipient |
|---|---|
| INR < 1.5 | 36 |
| INR >1.5 | 55 |
| INR not mentioned | 121 |
| Total | 212(Out of 1270 admission) |

**Table 03: Distribution of Platelets Recipients:**

| Recipient Category Platelet | Recipients Percentage |
|---|---|
| <20000 cumm | 12.5% |
| 20000-50000 cumm | 35.5% |
| >50000 cumm | 14% |

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| | |
|---|---|
| Platelets Not mentioned | 38% |

**Discussion**

A handsome proportion of blood units are dispatched to ICUs critically ill patients. Corwin et al, in their study, found that after two days of a patients stay in ICU, more than 85% of patients were foundanaemic.[8] As many as 80% of patients with an ICU stay 7 days or more received at least one unit of blood, and on an average, these patients receive>9 units during stay in ICU.[9] Also aggressive transfusion for maintaining Hb is a common finding in ICU unit. In a Canadian Clinical Trials Group study, it was advised for judicious transfusion as there is no clinical benefit in maintaining a hemoglobin level greater than 10 gm% in critically ill patients. In the absence of cardiac dysfunction or critical coronary artery disease, a hemoglobin concentration of more than 8 g/dl is sufficient to meet the oxygen demandin most patients.[10] Most tissueswill not become ischemic even with a hemoglobin concentration as low as 7 g/dl.[11] The study conducted by us in the ICU of the hospital also confirmed the following facts. Clinicians in our centre were conservative in keeping with recent transfusion guidelines. For past many years Hb level of 10 gm% has been used as a transfusion start pointin surgical and leukemic patients, which has now been lowered to 7.5 g/ dl.[12] By lowering this cut off trigger for transfusion to 7.5g%, several unnecessary transfusions have been avoided. However, 21.4% of the patients who received PRC had a Hb level above 10gm% before transfusion, this could be because the transfusion cut-off trigger is not the only criteria for blood transfusion, and the overall clinical condition of patient has to assessed before deciding requirement of blood transfusion. To improve the blood transfusion services (BTS) in a hospital, a regular communication between the treating physician and blood bank unit has been given utmost importance. This keeps transfusion officer ready and informed about the patient's condition and issuing the correct blood components in time of mass emergency. There were significant number of patients (14.5%) whose pretransfusion INR was below 1.5 but received FFP transfusion. This could be mainly due to the total plasma exchanges (TPE) done on few of them who were diagnosed with thrombotic thrombocytopenic purpura, myasthenia gravis, Goodpasture's Syndrome, etc. The usage of FFP show that a significant number of patients received FFP for indications that fit the recommendations in the British Committee for Standards in Haematology (BCSH) guidelines.[13] Although 14.5% of patients appeared to have been given FFP for reasons not clearly specified within the guidelines, this does not necessarily imply that the use was inappropriate. Clinical details obtained during the audit were sometimes incomplete. In other cases, the result of coagulation tests not available before the administration of FFP was considered necessary by the clinicians managing the patient. However, the results of the audits do suggest that FFP is still sometimes over-prescribed and strict clinical criteria for the demand of FFP from hospital blood banks needs to be enforced.

Reports of Partial Thromboplastin Time (PT)/ Activated Partial Thromboplastin Time (APTT) and International Normalized Ratio (INR) values are of utmost importance for rational use of FFP. These practices help reducing the wastage and the over-prescription of FFP.

Around 52% of platelet transfusions were issued where pretransfusion levels are more than 50000/cmm or platelet level is not mentioned in requisition form. Various indications for platelet transfusion, e.g., leukaemia, cases of sepsis or patients undergoing minor surgical procedures have different trigger level for transfusion. In our studies, significant percentage of blood request forms were incomplete or has not mentioned the indication for platelet transfusion.

Most of these requisitions are marked as 'Urgent' or 'Emergency', the blood bank personnel issues even in the absence of baseline investigations. However, weekly a clinical audit is done to assess the cause of the incomplete request; also the concerned doctor/staff is also informed

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and educated about the need for proper filling of requisition form. Time to time interaction between the
Clinical-blood bank staff & regular follow up has made a significant impact on decreasing in the number of incomplete forms.
About 22.3% PRC and 23.1% of FFP transfusion orders were inappropriate in a study done by Kakkar et al. in 2003.[14] The newer trend in critical care medicine is the recent surge in randomized, controlled trials designed to test the validity of commonly used diagnostic and therapeutic practices. Many critical care health organizations are working categorically to standardise the transfusioncriteria'shelping clinicians to manage critically ill patients. 'Do No Harm' is first dictum for clinician to adhere before transfusing a patient. With this practice blood banks will have adequate blood and its components for emergency management.

**Conclusion**

Mostly clinicians prefer conservative approach keeping with recent transfusion guidelines and try to avoid unnecessary transfusion. We found 21.4% of PRC transfusions unnecessary as they were given to patients with Hb above10gm%. Same with 14.46% of Fresh Frozen Plasma and 19% platelet transfusions which were transfused without proper indication. Requisition forms provide vital information and must always be filled for assessing the required component and dosage to be transfused. However, timely interdepartmental meets and teachings have reduced the rate of unnecessary transfusion by providing completely/properly filled requisition forms. As blood and component transfusion is equivalent to drug transfusion so its indication must always be clinically justified.

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