

TRANSFUSION TRIGGERS IN CRITICALLY ILL PATIENTS

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ABSTRACT

Objective: To determine the frequency of inappropriate transfusions in tertiary care hospital.

Study Design: Cross sectional study.

Place and Duration of Study: General Intensive Care Unit (ICU) Lady Reading Hospital Peshawar, from Dec 2017 to Feb 2018.

Material and Methods: We analyzed fifty blood transfusions in a cross sectional study, each patient was individually examined regarding the presence of indication of transfusion. Frequency of inappropriate transfusions was noted.

Results: Out of 50 transfusions 25 were done in medical patients and 25 in surgical patients. Red cell concentrate was the most frequently used blood product as 70% of all the transfusions were red cells. Out of the total transfusions 42% were not according to international guidelines, platelet was the most frequently misused blood product. Medical patients were significantly more likely to receive inappropriate transfusions.

Conclusion: Our study concludes that 42% of total transfusions were not according to international guidelines.

Keywords: Critically Ill, Inappropriate transfusions, Patient blood management.

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INTRODUCTION

In 2013 studies from United Kingdom showed that frequency of inappropriate transfusions was around 15 to 20% for red cells, and the number of inappropriate platelet/plasma transfusion was 30% to 40%. The aging population, and the need to replace old donors with new, creates burden for transfusion services. Also the excessive cost and side effects of inappropriate blood use are well recognized¹.

It was also noted that only 69% of the blood transfusing systems provided the record of indications for the transfusions. Also the data regarding the education and training of young doctors was insufficient i.e. around 19% to 23%¹.

In 2014 National Health Services (NHS) developed the concept of patient blood management which led to reduction in the number of inappropriate transfusions. The recommendations of the patient blood management are

multidisciplinary. Included among several of its recommendations are education of the clinicians, minimizing the blood sampling, assessment and treatment of anemia in pre-operative period, the empowerment of the blood lab staff to enquire about the indications and to ensure the appropriateness of blood product according to the local triggers¹⁻³.

It may not be possible to implement a full fledged program involving all the interventions and all the specialties at the same time in an institution where no such program exists, so taking start from small uni-focal issue is optimal approach. The first step to change is recognizing that the problem exists and this is the basis of our study. For a change to establish one must first need to know what the current blood utilization practice is, and then share this data with the physicians, plan and implement the intervention, and continue doing the audits³.

Anemia is common in critically ill patients, up to 97% of patients become anemic after spending one week in Intensive care unit (ICU)⁴. The only effective therapy is blood transfusion^{5,6}. Approximately 50% of critically ill patients

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Received: 09 Apr 2018; revised received: 10 Aug 2018; accepted: 20 Aug 2018

receive red blood cell transfusion all of which may not be appropriate, studies have shown that there is a relationship between bad outcomes, death, organ failure longer ICU stay, infection and blood transfusions^{4,5}.

Simple interventions like placing posters in the ICU and attaching these guidelines to the blood prescriptions can dramatically reduce the transfusion requirements. Local implementation strategies have proven to be the best policies in improving the transfusion triggers. Frequent assessment of the knowledge of the consultants is helpful in training⁴.

Whether it's septic shock or any other form of critical illness the transfusion benefits are not seen above a trigger of 7gm/dl^{3,8}. Application of transfusion bundles can help to reduce inappropriate transfusions in the Intensive care unit⁹.

Various studies show that fresh frozen plasmas (FFPs) may also be used inappropriately with 31% to 63% of frequency. Studies between 90s and 2000 in United Kingdom show that 34% of FFP use was not according to the guidelines¹⁰⁻¹².

Similarly platelet transfusion without indication is a problem, it is estimated by National Health Service that in 2010 28% of platelet transfusions could have been avoided. Platelet preparation and storage is a very difficult process^{13,17}.

The above mentioned background led us to investigate transfusion triggers in our own Intensive care unit to find out what our transfusion triggers were. The hope of this study is to improve the blood transfusion practices in critically ill patients in our setup.

MATERIAL AND METHODS

Data was collected at General intensive care unit, Lady Reading Hospital Peshawar from December 2017 till February 2018 for a descriptive study. It is a 10 bedded intensive care unit that has both medical and surgical patients. Patient population included the adult patient

admitted in the intensive care unit. Data of 50 patients was collected using the non-probability convenience sampling technique. Fifty transfusions were analyzed. After informed consent the individual patients 15 years of age and above were examined for hemodynamic instability, active bleeding, myocardial ischemia or severe hypoxemia, the indication and type blood product used was noted. Patients being transfused during plasmapheresis and massive transfusion were excluded from the study. At the end of the study the transfusions were classified, according to the international recommendations and clinical scenario, as appropriate or inappropriate. The results were analyzed in Statistical Package for Social Sciences (SPSS). Using SPSS version 23 frequencies and percentages of patients in various categories were calculated. Transfusion type was analyzed using frequencies. Cross tabulation was used to compare patient category with indications and chi square test was used. A p -value ≤ 0.05 considered as a significant p -value.

RESULTS

Out of 50 patients 24 (48%) were females and 26 (52%) were males. Fifty percent (25) were medical while 50% (25) were surgical patients. RBC were the most frequently transfused blood product with 70% frequency, platelet transfusion and FFP transfusion is 14% to 16% respectively. Out of total blood transfusions 42% were found to be inappropriate (table-I). Platelet was the most misused product 4 out of 7 platelet transfusions were not indicated (57%). Red cell concentrate were inappropriately used 37% of times and FFP 50%. Mean HB for transfusion was 7.36gm/dl in medical group and 7.56gm/dl in surgical group. Applying chi square to medical and surgical subgroups show that medical patients are significantly more likely to receive inappropriate transfusions p -value (.01). OR 4.75 95% CI (1.4 to 16) (table-II).

DISCUSSION

Blood transfusion is one of the most over used therapies even in developed countries.

Use of blood products fell rapidly since the 80's mainly due to recognition of its potential to transmit HIV and Hepatitis viruses. Later on the studies revealed bad outcomes for the patients who were transfused without compelling indications. The demand of blood has fallen 3% every year since 2010¹⁴.

In critically ill patients it is estimated up to 27% of patients receive RBC transfusion¹⁷, 30% receive FFP while 23% receive platelet transfusion. All of these transfusions are not appropriate, the reason may be intuitive correction of physiology, such as anemia and coagulation derangements in severely ill patients. It may however not be possible to identify appropriateness of transfusion if based only upon HB levels, platelet numbers and coagulation testing.

Table-I: Transfusion indicated vs non-indicated.

	Frequency	Percentage
Not Indicated	21	42.0
Indicated	29	58.0
Total	50	100.0

Table-II: Comparison of patient category with indications.

Indication	Patient Category		Total
	Medical	Surgical	
Not Indicated	15 (71.4%)	6 (28.6%)	21 (42%)
Indicated	10 (34.4%)	19 (65.5%)	29 (58%)
Total	25 (50%)	25 (50%)	50
<i>p</i> -value	0.01		

The need of transfusion should be assessed individually¹⁷. This question was well addressed in our study as each patient was individually assessed and indications for transfusion were documented.

In 2001 19% to 26% of red cell transfusions in UK were inappropriate. Hip surgery data from 2007 shows that as much as 48% of the red cell transfusions were not according to the guidelines, our study shows the frequency to be 37% which is comparable to the mentioned statistics¹⁴.

In the similar audits from UK 43% of FFPs and 26% of platelet transfusions were inappropriate¹⁴. We report a slightly higher frequency of platelet and FFP misuse 57% and 50%

respectively. A study from USA reveals that in 2015 60% of blood transfusions were inappropriate¹⁵. According to the joint commission which is a non-profit organization that accredits health care organizations and programs in United States, blood transfusion is among the top five most commonly overused procedures. A cost of 2 million was saved by implementing strategies to help clinicians decide about the correct transfusions¹⁶.

Implementation of strategies like computerized ordering systems with best practice alerts based on the patients last measured HB led to an enormous reduction in transfusion at higher threshold from 66% to 30% in a study at Stanford university hospital. Similarly at Oxford university hospital the proportion of inappropriate RBC

transfusion declined from 62% to 33%, while platelet transfusion was reduced from 46% to 13% with use of computerized ordering¹⁷.

In an Iranian study conducted in 2015 the mean HB at transfusion was 9.1 which was much higher than ours. In the same study up to 21% of transfusions were done above the HB of 10gm/dl, 72% of inappropriate transfusions were done in the intensive care settings. A study from China shows 37% of irrational transfusions¹⁸.

Guidelines do not recommend the use of HB as a single measure, most favor clinical evaluation. Some guidelines recommend parameters of tissue oxygen delivery like mixed venous oxygen saturation, oxygen extraction ratio and serum

lactate levels as well to guide transfusion decision^{7,19,21,22}. Improvement of tissue oxygen delivery by transfusion in the absence of acute anemia has been used in previous studies, where it has shown mortality benefits²³ however this benefit was not shown in the newer research⁸.

The statement from surviving sepsis campaign recommends transfusion only when HB concentration decreases to 7 in adults in the absence of extenuating circumstances such as myocardial ischemia, severe hypoxemia, or acute hemorrhage²⁴.

Nevertheless set levels of HB have been established to guide physicians. According to these guidelines hemodynamically stable patients in ICU should not receive blood unless HB is less than 7gm/dl, for stable surgical patients the threshold has been set at 8 gm/dl in the peri-operative period. This excludes patients with acute coronary syndromes, heart failures, active bleeding and patients with neurosurgical problems, where the thresholds are different^{14,20,17,25}.

Patients with symptoms of anemia can be transfused above the recommended threshold, the symptomatic anemia includes orthostatic hypotension and tachycardia not responding to fluid resuscitation in the absence of other plausible explanation and symptoms of myocardial ischemia signifying the importance of clinical examination while making decision to transfuse¹⁶.

CONCLUSION

Based on our study it is found that blood products are being over used, upto 42% transfusions are without any indications. The probability of being inappropriately transfused was significantly high in Medical patients as shown by p -value=0.01.

RECOMMENDATIONS

Clinicians should clearly mention the transfusion indication in blood ordering form, the blood bank staff should be empowered to question if they consider transfusion to be inappropriate or if the indication has not been clearly mentioned. Hospital's local transfusion

committee should be capable of auditing various departments, arranging teaching sessions, and making necessary recommendations.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any authors.

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