

## Evidence based transfusion practice in surgical intensive care unit at a tertiary care hospital

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### Objective

To evaluate the practices of surgical intensive care in comparison to new evidence based transfusion practice guidelines.

### Methods

The study was carried out at surgical intensive care unit (SICU) of Shifa International Hospital, for a period of two months from 1st February, 2008 to 31st March 2008. The auditor was independent of the individuals making decisions about transfusion. All the patients were assessed each day during the audit period and data extracted from the charts and flow sheets of the patients.

### Results

During the study period, 149 patients were admitted in SICU. Blood was transfused in 69 (46%) of patients of patient. Model transfusion trigger was 8g/dl in 58 (39%) of subjects. 74 (45%) patients received only one unit. Post transfusion hemoglobin (Hb) was 9g/dl in 30 (20%) of patients.

### Conclusion

Hb of 8g/dl was used as a trigger for transfusion by most of the clinicians. (Rawal Med J 2009;34:223-225).

### Key words:

Surgical intensive care unit, blood transfusion, transfusion trigger.

## INTRODUCTION

The use of hemoglobin (Hb) as a transfusion trigger began in 1942 with recommendation that a hemoglobin of 10g/dl be used as an indication for erythrocytes transfusions.<sup>1</sup> This is most common transfusion trigger today. Two clinical trials have shown that a lower Hb of 7g/dl is safe in most patients and also reduces the number of RBC transfusions.<sup>2,3</sup> These reports suggested that restrictive use of blood transfusions is at least as safe as more liberal use, and is safer for less sick patients. Accumulated evidence points to possible harmful effects from blood transfusions in some patients so that transfusions should only be given when clinically indicated. The lower Hb level of 7g/dl is gaining popularity as a transfusion trigger for all patients who do not have active coronary artery disease. A recent survey showed that only 25% of RBC transfusion were based on lower Hb level of 7g/dl.<sup>4</sup> The purpose of our study was to determine whether the surgical intensive care (SICU) was adopting the new practice, i.e. restricting blood transfusions of between 7 and 9g/dl suggested by the Canadian study or whether a more traditional transfusion policy remained in effect.

## PATIENTS AND METHODS

The study was carried out in SICU of Shifa International Hospital Islamabad, for a period of two months from 1st February 2008 to 31st march 2008. The auditor was independent of the individuals making decisions about transfusion. All the patients were assessed each day during the study period and data was extracted from the charts and flow sheets of the patients. The method used to collect data was in the form of a data sheet stating: clinician deciding to transfuse, does this patient have chronic Ischemic heart disease (IHD)?, does this patient have acute coronary syndrome?,<sup>5</sup> at the time of transfusion was this patient undergoing resuscitation as a part of early goal directed therapy,<sup>6</sup> was there evidence of clinically significant bleeding at the time of transfusion?, transfusion triggers Hb (m/dl), number of red cell units transfused and post transfusions Hb (g/dl).

## RESULTS

Out of 149 patients admitted during the study period, 69 (46.30%) had transfusion. ICU team prescribed the most transfusions (Table 1).

**Table 1. Clinician deciding to transfuse.**

ICU Team	84.05%
Primary surgical team	15.94%

Only 2.01% (3) of patient had acute coronary syndrome and 7.38% (11) had IHD who received transfusion. 1.34% (2) of patients at the time of transfusion were undergoing resuscitation as a part of early goal directed therapy. 2.68% (4) had clinically significant bleeding at the time of transfusion.

Hb(g/dl)	# (%) of patients
6	13.04%
7	7.24%
8	39.13%
9	17.39%
10	7.24%
11	1.44%

**Table 2. Transfusion trigger Hb.**

An Hb level of 8g/dl was commonest trigger seen (Table 2). One or two units were most commonly transfused (Table 3). An Hb level of 9-11 was most commonly achieved (Table 4).

**Table 3. Number of red cell units prescribed for**

Number of red cell units	Prescription percentage
1 unit	44.92%
2 units	31.88%
3 units	8.69%

transfusion.

## DISCUSSION

The use of blood in ICU is common practice with report of up to 50% of all patients admitted to ICU receiving it.<sup>4,7</sup> In USA, 85% of patients with an ICU stay of greater than one week receive blood transfusion.<sup>4,7</sup> Of these transfusions, 20-40% are associated with bleeding and 60-80% occurs in non-bleeding patients.<sup>8,9</sup> Use of red blood cells on this scale may occur for treatment of acute hemorrhage.

Post transfusion Hb	# (%) of patients
8 g/dl	17.39%
9g/dl	20.28%
10g/dl	15.94%
11g/dl	17.39%
12g/dl	7.24%
13g/dl	2.89%
14g/dl	1.44%

**Table 4. Post transfusion Hb (g/dl).**

It has been shown that outcome could be improved in high risk surgical patients if oxygen delivery was augmented to above 600ml/min/m<sup>2</sup> body surface area.<sup>10</sup> Keeping Hb level above 10mg/dl has been considered crucial to ensure good oxygen delivery. Recent studies suggested that the policy of augmenting oxygen delivery in patients under going high risk elective surgical procedures may still be advantageous.<sup>11</sup> More work in high risk surgical patients may clarify these points. Augmentation of oxygen delivery depending upon increasing Hb is still debatable. What has not been taken into account is the possible deleterious effects of transfused homologous blood. This may out weight, or at least influence, any potential advantages of increasing Hb levels above 7g/dl.<sup>3</sup> This large multi-center, randomized, controlled clinical trial compared two transfusion strategies in 838 critically ill patients in 25 Canadian ICU's. Patients were randomized to restrictive strategy (Hb concentration maintained between 7-9g/dl) and, in certain cases, a lower 30 day mortality than those treated with liberal transfusion strategy (Hb maintained between 10-12 g/dl). Out come was less clear in case of acute myocardial infarction, the elderly and those with the highest APACHE scores.<sup>3</sup> The recommendation of this study was to have a more conservative approach to transfusion in the ICU and in other clinical areas. Complications are reported in 2 to 4% of erythrocytes transfusions. The most notable of these are listed in table 5, along with frequency of each expressed in relation to the number of units

transfused.<sup>12</sup>

<b>Immune Reactions</b>	<b>Other risks</b>
Acute hemolytic reaction(1 per 35,000)	<b>Infection</b>
Fatal hemolytic reaction(1 per million)	Bacterial (1 per 500,000)
Acute lung injury(1 per 5,000)	Hepatitis B virus (1 per 220,000)
<b>Allergic reactions</b>	Hepatitis C virus (1 per 1.6 million)
Urticaria (1 per 100)	HIV (1 per 1.9 million)
Anaphylaxis (1 per 1,000)	<b>Transfusion Errors</b>
Anaphylactic shock (1 per 50,000)	Wrong person transfused(1 per 15,000)
Non-hemolytic fever(1 per 200)	Incompatible transfusion(1 per 33,000)

**Table 5. Adverse Events associated with RBC transfusions (per units transfused).<sup>12</sup>**

This study suggests that practice in Shifa's SICU was not consistent as regards a trigger Hb level to initiate transfusion. A modal trigger of 8g/dl suggests that over all transfusion triggers have been reduced since 1980's. None of the patient should receive blood transfusion if there Hb was 10g/dl or above and also no patient should be allowed to have Hb below 7g/dl. This study showed that more than 60% of the patient receive transfusion when there Hb was 8g/dl or above. About 55% of the patient were transfused two or more units of blood which cannot be justified. This shows that the clinicians do adhere to their own trigger for the use of red cells.

## CONCLUSION

This study showed that most clinicians use a Hb

level of 8g/dl as a trigger for transfusion. Clinicians seem to be aware of lower Hb tolerability and more education and debate may modify this situation and hopefully lead to optimal use of blood.

## REFERENCES

1. Adam RC, Lundy JS. Anesthesia in poor risk:some suggestions for decreasing the risk. Surg Gynecol Obstet 1942;74:1011-01.
2. Hebert PC, Yestisir E, Martin C, Blajchman MA, Wells G, Marshall J, et al. Is low transfusion threshold safe in critically ill patients with cardiovascular disease? Crit Care Med 2001;29:227-34.
3. Hebert PC, Wells G, Blajchman MA, Marshall J, Martin C, Pagliarello G, et al. A multi center; randomized, controlled clinical trial of transfusion requirements in critical care. Transfusion requirements in Critical Care investigators, Canadian Critical Care Trials Group. N Engl J Med 1999;340:409-17.
4. Crowin HL, Gettinger A, Pearl, RG, Fink MP, Levy MM, Abraham E, et al .The CRIT study:anemia and blood transfusion in the critically ill:current clinical practice in United States. Crit Care Med 2004;32:39-52.
5. Hebert PC, Fergusson DA. Do transfusions get to the heart of the matter? J Am Med Assoc 2004;292:1610-12.
6. Rivers E, Nquven B, Havstad S, Rassler J, Muzzin A, Knoblich B, et al. Early goal-directed therapy in the treatment of severe sepsis and septic shock. N Engl JMed 2001;345:1368-77.
7. Littenberg B, Cowin HC, Gettinger A, Leichter J, AuBuchon J. A practice guidelines and decision aide for blood transfusion .Immunoematology 1995;11:88-94.
8. Chohan SS, Mcardle F, McClelland DBL, Mackenzie SJ, Walsh TS, et al. Red cell transfusion practice following the transfusion requirements in critical care (TRICC) study: prospective observational cohort study in a large UK intensive care unit. Vox Sang 2003;84:211-18.
9. Walsh TS, Garrioch M, Maciver C, Lee RJ, MacKirdy F, McClelland DB, et al. Red cell requirement for intensive care units adhering to evidence-based transfusion guidelines. Transfusion 2004;44:1405-11.
10. Shoemaker WC, Appel PL, Kram HB, Waxman K, Lee TS. Prospective trial of supra normal values of survivors as therapeutic goals in high risk surgical patients. Chest 1988;94:1176-86.
11. Boyd O. The high risk surgical patient where are we now? Clinical intensive care special issue. Bios Scientific Publishers Ltd. Oxford 2000:PP3-10.

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