

RED CELL TRANSFUSION; TRIGGERS USED IN OPERATING ROOM

DR. MOHAMMAD ABDUL NAEEM

Classified Pathologist
CMH, Abbottabad

DR. AZHAR NIWAZ

Classified Anesthetist
CMH, Abbottabad

ABSTRACT... Objective: The purpose of this study was to determine and quantify those factors that anesthetist's use when deciding to transfuse blood in operating room. **Setting:** CMH Abbottabad **Period:** Nov to Dec 2008 **Design:** Survey report. **Patients and Methods:** Prospective cross-sectional descriptive from operation theatre of Combined Military Hospital Abbottabad a tertiary care hospital. With consent from the local ethics committee, an audit was carried out using a questionnaire designed to examine some of the factors that could be important in the decision-making process surrounding blood transfusion during intermediate and major surgery. Anesthetists were asked to fill in the audit forms and to indicate whether they were going to give blood or not. Fifty two audit forms, completed during intermediate or major surgery, were analyzed to determine the strengths of certain factors in the decision-making process related to transfusion. **Result:** Fifty one forms had a satisfactorily complete data set with hemoglobin concentrations Hb between 6.6 and 15.0 g/dL. This study demonstrates that, of the physiological factors, the hemoglobin concentration was the most important factor used for red cell transfusion, and the presence of ongoing bleeding an important contextual factor. Peer pressure to transfuse became apparent at a [Hb] of about 8.5 g/dL. **Conclusion:** The patients were transfused at the average Hb value of 10.8 g/dL. This average Hb of transfused patients is much higher than current Hb trigger thresholds of 7.0–8.0 g/dL.

Key words: Transfusion practice, Operating room, Hemoglobin Levels

INTRODUCTION

Intraoperative and postoperative interventions include (A) red blood cell transfusion, (B) management of coagulopathy, and (C) monitoring and treatment of adverse effects of transfusion. Intraoperative and postoperative management of potential or actual blood loss includes¹ monitoring the amount of blood loss², monitoring hemoglobin or hematocrit³, monitoring for the presence of inadequate perfusion and oxygenation of vital organs (e.g., blood pressure, heart rate, temperature, blood oxygen saturation), and⁴ transfusion of allogeneic red blood cells or autologous blood (i.e., normovolemic hemodilution and intraoperative red blood cell recovery)¹.

At present the literature available is insufficient to evaluate the efficacy of specific intraoperative or postoperative monitoring techniques for detecting the presence of inadequate perfusion or oxygenation of vital organs, or as indicators for the transfusion of red blood cells. The available literature supports the efficacy of acute normovolemic hemodilution as well as intraoperative red blood cell recovery in reducing the number of allogeneic units transfused per patient in

certain appropriate surgical procedures (e.g., cardiac surgery, liver surgery, large orthopedic surgery).

However, the literature is equivocal regarding the ability of either technique to reduce the number of patients transfused. Available literature suggests that postoperative red blood cell recovery will reduce the number of patient's transfused².

Despite a large volume of work that has been published since the last practice guidelines; the information needed to define precisely when a blood transfusion should be given is not available in the literature. Although multiple trials have evaluated transfusion thresholds on patient outcome, the literature is insufficient to define a transfusion trigger in surgical patients with substantial blood loss. The consultants strongly agree that periodic visual assessment of the surgical field and communication with the surgical team should be done to assess the presence of excessive intravascular bleeding (i.e., coagulopathy). The consultants also strongly agree that monitoring for the presence of inadequate perfusion and oxygenation of vital organs should be continuous.

They strongly agree that red blood cells should usually

be administered when the hemoglobin level is less than 6 g/dl and strongly agree that red blood cells are usually unnecessary when the level is more than 10 g/dl. In addition, the consultants and ASA members agree that, when autologous blood is required or preferred, acute normovolemic hemodilution intraoperative or postoperative red blood cell recoveries are viable options. The consultants are equivocal and the ASA members agree that postoperative red blood cell recovery is a viable option in avoiding or minimizing allogeneic transfusion. Finally, they agree that frequent postoperative point-of-care sampling and other laboratory testing may be a source of significant ongoing blood loss³.

PATIENTS AND METHODS

The study was carried out at Pathology Department in collaboration with Anesthesia Department at the Combined Military Hospital Abbottabad. The duration of study was conducted from November to December 2008. Study design was Descriptive, cross-sectional, prospective survey. Sampling technique was Non-probability convenience sampling.

An inclusion criterion was all patients who are having intermediate or major surgery. Exclusion criteria had patients having minor surgery. With consent from the local ethics committee, a survey was carried out using a questionnaire designed to examine some of the factors that could be important in the decision-making process surrounding blood transfusion during intermediate and major surgery. Anesthetists were asked to fill in the audit forms and to indicate whether they were going to give blood or not. Data collected included the patient's age, the measured [Hb] (or an estimated value taking into account the preoperative [Hb], blood loss and fluid administration), relevant clinical disorders, and questions about peer pressure. Forms were freely available in the preoperative area with the anesthetist. On completion the forms were collected personally by the anesthetists. This personal contact with the anesthetists allowed explanation of the audit's objectives.

It was repeatedly made clear that the forms should be completed whether blood was given or not. Because of staff changes during the study, the potential number of

decision makers were five. Two trainees, with sufficient experience to make independent decisions, rotated into the Department at the same time.

RESULTS

Of the initial 52 forms, one did not have either a measured or estimated [Hb], so the remainder were used for analysis. There were fourteen forms with Hb values between 7.0 and 10.0 g/dL. There were thirty four forms with Hb >10.0 g/dL and three forms with Hb <7g/dL. The ages, frequency of transfusion, ongoing bleeding was analyzed. The median age of transfused patients was 46.2 years (interquartile range, 15-80 years). The result for set of forms are presented in three parts, [Hb] <7.0 g/dL, [Hb] > 10.0 g/dL, and [Hb] 7.0–10.0 g/dL. Median age of transfused patients [Hb] <7.0 g/dL was 58 years, [Hb] > 10.0 g/dL thirty seven years, and [Hb] 7.0–10.0 g/dL thirty years. Ongoing hemorrhage (OGH) was more commonly anticipated in the third group of patients 10/14 (71.4 %). All patients were assessed for their ability to increase their cardiac output. The median value of cardiac output assessment for transfused patients was 55 mm (interquartile range, 25–75 mm) and when not transfused, 76 mm (65–85 mm).

Should no transfusion be administered – was 65 mm (41–79 mm) in transfused patients compared with 19 mm (12–25 mm) in non-transfused patients. Tissue hypoxia was anticipated in 21/51(41%) patients. Peer pressure to transfuse (PPT) was recorded in 39% of the transfused patients but in 12% the view was against transfusion (PPNT). The anesthetists thought that the surgeon would have strong views on the decision making on 53% (27/51) of the forms. The majority of patients 29/51 (56 %) who were transfused had accompanying co morbid conditions. Most patients 23/29 (72 %) were on drug therapy i.e. beta blockers. The majority of patients who were transfused were operated for obstetrical / gynaecological reason 20/51 (39 %) conditions. Seven (7/20) patients received single unit transfusions for LSCS.

DISCUSSION

Blood transfusions like all other medical treatments should be prescribed only after consideration of the risks vs. the benefits of the therapy⁴. While the potential risks

associated with blood transfusions are well described, much less is known about the benefits of blood transfusion. The practice of giving a patient a transfusion for a hemoglobin level less than 100 g/L (10 g/dL) or a hematocrit less than 0.30 is no longer uniformly accepted⁵. Hemoglobin concentration was either measured or estimated for 99% of the patients but, in the authors' opinion, it is immaterial whether it was measured or estimated because the decision to transfuse was made on the 'mind map' of the situation⁶. The patients were usually transfused when their [Hb] fell below the average value of 10.8 g/dL and the patient had excessive intra operative bleeding as clinically assessed by the surgeons. This average [Hb] of transfused patients is slightly higher than current [Hb] trigger thresholds of 7.0–8.0 g/dL⁷. Transfusing thirty four patients with Hb level more than 10g/dL was probably due to strong peer pressure to which the anesthetists did succumb to. Otherwise strong peer pressure in making decisions for transfusions resulted in intra operative transfusions against all standard guidelines.

On going hemorrhage (OGH) during surgery and its impact on intraoperative operations is an issue with no standard global guidelines to follow. The decisions are essentially made on "eye contact" between the surgeon and the anesthetists on the operating table. With analysis of the trend of transfusions in the surgery was transfusion is frequently required a mathematical predictive model for can be generated. Creating a model combining physiological and environmental factors that fits this decision-making process may enable more consistent decision making based on the department's consensus viewpoint⁸. Tissue hypoxia was not a major issue intraoperatively which forced the anesthetists to transfuse⁹.

Again the mind map of the anesthetists had the thought at the back of their minds that surgeon's pressure would be upon them to transfuse even if they did not agree to their opinion and in 53% of the patients this anticipation proved to be correct. It was surprising that 23/29 of the patients who were transfused were on drug therapy of some kind preoperatively but this did not have a major impact on decision making for intra operative

transfusion¹⁰. Gynecologists resorted to a maximum percentage of transfusions which according to the standard guidelines were unjustified¹¹. The patients presented in the last trimester and majority of the cases were unbooked¹². Seven (7/20) patients received single unit transfusions for LSCS which did not have any impact on the outcome of the patient when compared to the patients who were not transfused for similar levels of haemoglobin¹³.

Autoantibodies against red blood cell antigens are considered the diagnostic hallmark of AIHA: Direct antiglobulin test (DAT) completed by cytofluorometry and specific diagnostic monoclonal antibodies (mAbs) allow for a better understanding of autoimmune hemolytic anemia (AIHA) triggers. Once B-cell tolerance checkpoints are bypassed, the patient losses self-tolerance, if the AIHA is not also caused by an possible variety of secondary pathogenic events such as viral, neoplastic and underlying autoimmune entities, such as SLE or post-transplantation drawbacks; treatment of underlying diseases in secondary AIHA guides ways to curative AIHA treatment. The acute phase of AIHA, often lethal in former times, if readily diagnosed, must be treated using plasma exchange, extracorporeal immunoadsorption and/or RBC transfusion with donor RBCs devoid of the autoantibody target antigen.

Genotyping blood groups and narrowing down the blood type subspecificities with diagnostic mAbs help to define the triggering autoantigen and to select well compatible donor RBC concentrates, which thus escape recognition by the autoantibodies¹⁴. A significant proportion of postpartum RBC transfusions are possibly inappropriate, partly due to over transfusion. If current guidelines would be more specific, in particular, with respect to the target Hb levels, the total amount of RBC transfusions may be considerably decreased¹⁵. Platelets undoubtedly play a pivotal role in haemostasis and trauma induced coagulopathy. However, their specific dysfunction in trauma remains to be elucidated. Further research to characterize the dysfunctional pathways of the platelet response is required, together with clinical trails of the optimal timing and dose of platelet transfusions¹⁶. In institutions with patterns of blood use

similar to ours, control of transfusions to medical patients is the most effective response to acute blood shortages¹⁷.

**Blood Transfusion Survey Performa
CHM Abbottabad Path Dept**

Reg No.	Date		
1. Age	Yes	No	
2. Blood given/(units)	Yes	No	
3. Patients ability to increase cardiac output	Yes	No	
4. Risk of tissue hypoxia if not transfused	Yes	No	
5. Hb(g/dl) measured			
6. Anticipation of ongoing hemorrhage	Yes	No	
7. Peer pressure to transfuse at this Hb	Yes	No	
8. Peer pressure not to transfuse at this Hb	Yes	No	
9. Surgeons views to transfuse this patient	For	Against	
10. Any other comment			
Note: Please tick appropriate box		Signature of Anesthetist	

CONCLUSION

The patients were transfused at the average [Hb] value of 10.8 g/dL. This average [Hb] of transfused patients is much higher than current [Hb] trigger thresholds of 7.0–8.0 g/dL.

Copyright© 25 May, 2010.

REFERENCES

- Carson JL, Duff A, Poses RM. **Effect of anaemia and cardiovascular disease on surgical mortality and morbidity.** Lancet 1996;348:1055–60.
- Schönhofer B, Wenzel M, Geibel M, Kohler D. **Blood transfusion and lung function in chronically anemic patients with severe chronic obstructive pulmonary disease.** Crit Care Med 1998;26:1824-8.
- Clinical practice guidelines. **Appropriate use of red blood cells.** Australian Society of Blood Transfusion and National Health and Medical Research Centre. Canberra: National Health and Medical Research Centre, 2001.
- Hébert PC, Wells G, Blajchman MA. **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.
- Herregods L, Moerman A, Foubert L. **Limited intentional normovolemic hemodilution: ST-segment changes and use of homologous blood products in patients with left main coronary artery stenosis.** J Cardiothorac VascAnesth 1997;11:18–23.
- Spahn DR, Seifert B, Pasch T, Schmid ER. **Haemodilution tolerance in patients with mitral regurgitation.** Anaes 1998;53:20–4.
- Spahn DR, Schmid ER, Seifert B, Pasch T. **Hemodilution tolerance in patients with coronary artery disease who are receiving chronic beta-adrenergic blocker therapy.** Anesth Analg 1996;82:687–94.
- Wallace EL, Churchill WH, Surgenor DM. **Collection and transfusion of blood and blood components in the United States.** 1992 Trans 1995;35:802–12.
- French CJ, Bellomo R, Finfer SR, Lipman J, Chapman M, Boyce NW. **Appropriateness of red cell transfusion in Australasian intensive care practice.** Med J Aust 2002;177:548–51.
- Carson JL. **Morbidity risk assessment in the surgically anemic patient.** Am J Surg 1995;170(6A Suppl.): 32S–6S.
- Klein HG. **Immunomodulatory aspects of transfusion: a once and future risk?** Anesth 1999;91:861–5.
- Karkouti K, Beattie WS, Wijeyesundera DN et al. **Recombinant factor VIIa for Intractable blood loss after cardiac surgery: a propensity score-matched case-control analysis.** Transfusion 2005;45:26–34.
- Charo IF, B TM. **Chemokines in the pathogenesis of vascular disease.** Circ Res 2004;95:856–8 Diprose et al. 602.
- Lambert JF. **Geoeidemiology of autoimmune hemolytic anaemia.** Autoimmun rev 2010; 9:350-4.
- Osman C, Clicia J. **Triggers and appropriateness of red cell transfusions in postpartum patient.** Vox sang 2010; 98:65-9.
- Davenport RA, Brohi K. **Coagulopathy in trauma patients.** Curr opin Anesth 2009;22:261-6.
- Joseph BG. **Red blood cells used outside operating theatre.** Trans 2009;49:2060-9.

Article received on: 24/02/2010

Accepted for Publication: 25/05/2010

Received after proof reading: 04/11/2010

Article received on: 24/02/2010
Accepted for Publication: 25/05/2010
Received after proof reading: 04/11/2010
Correspondence Address:
Dr. Mohammad Abdul Naeem
Classified Pathologist,
CMH Abbottabad
bugsgallian@yahoo.com

Article Citation:

Naeem MA, Niwaz A. Red cell transfusion; triggers used in operating room. Professional Med J Dec 2010;17(4):741-745.

*Nine-tenths of wisdom is
being wise in time.*

Theodore Roosevelt