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An Audit of Surgical Blood Ordering Practices at a Tertiary Care Centre in Western India

KEYWORDS

Blood demand, CT ratio, Blood ordering schedule, Hospital Transfusion Committee

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ABSTRACT

Background: Appropriate and rational use of blood is required to ensure its availability to needy patients as well as to avoid unwanted risk of transfusion transmitted diseases.

Aim and Objectives: zTo analyze the demand and utilization of packed red blood cells (PRBCs) in a tertiary care hospital, to advocate a rational blood ordering practice in different surgical services, with the objective to avoid man-hour and material wastage, to reduce artificial paucity of blood units, and thus preventing unnecessary exposure of the patients to various undesired hazards of transfusions.

Materials and Method: In this five year retrospective study (2011-2015), data pertaining to the demand and utilization of PRBCs in various surgical sub-specialties were analyzed from bank records and were then correlated with crossmatch to transfusion ratio (CT), transfusion probability (TP) and transfusion index (TI).

Results: A total of 45766 patients were studied over a period of 05 years, who underwent various elective procedures in various surgical sub-specialties. Of the total 55700 PRBC units cross-matched pre-operatively, only 31809 units (57%) were transfused to 35679 patients. This resulted in 43% of the total crossmatched units not being transfused. Maximum requirement as per the PRBC demands pre-operatively was for cardiothoracic surgeries (45%), followed by oncological (15.5%) & obstetrical/gynecological (O&G) (7.2%) indications. Blood transfused was maximum for cardiothoracic surgeries (52.6%), followed by oncological (18%) and general surgeries (10%). A high CT ratio was observed in O&G (3.6) and orthopedic (2.4) specialties. Low values of TI were observed in O&G (0.23) and gastroenterological surgery (0.57). Minimum values of TP were observed for O&G (43.9%) and orthopedic (46.8%) specialties.

Conclusion: There was a considerable difference in demand and utilization of PRBCs. Hospital transfusion committee, periodic audits and implementation of maximum surgical blood order schedule can play an important role to monitor the correctness and efficient use of this product in any hospital.

INTRODUCTION

The gift of blood is the gift of life and there is no substitute for human blood. WHO has estimated that if a country has to be self-sufficient to cater for blood demands of its patients, then at least 10 % of its total population should donate.[1] Every year our nation requires about 4 crore units of blood, out of which only a meager 40 lakh units of blood are available with majority of blood donors still being replacement donors.[2-5] Appropriate and rational use of blood is required to ensure their availability to needy patients, as well as to avoid the unwanted risk of transfusion-transmitted diseases. It can help in bridging the gap between demand and utilization of precious blood in many countries, especially the developing ones.[1]

Ordering of blood is a common practice in elective surgical procedures. The request for blood units preoperatively is often based on worst case assumptions, with the possibility of exhausting the blood bank resources. As shown by various blood bank registers, the preoperative assessment of blood requirements is often an over assumption. The time and effort consumed in cross-matching for each patient undergoing a surgical procedure becomes substantial and most of which is not actually utilized for transfusion.[6-8] Any blood bag, which is taken out from the blood bank inventory for cross-matching, becomes unavailable for other patient's. Hence, an artificial paucity of blood is created. Many a time the newer blood bags get issued earlier than the older bags, which are kept matched and reserved for elective surgeries. With this in view, it is of utmost importance to rationalize the blood usage by incorporating a blood ordering schedule for surgical procedures.

A blood ordering schedule serves as a guideline to anticipate the amount of blood that will be required for transfusion for any elective surgical procedure. A maximum surgical blood ordering schedule (MSBOS) consists of a list of common elective surgical procedures performed, along with the maximum number of blood units which should be cross-matched preoperatively for each procedure.[9] It is designed to order adequate blood units, for more than 90% of the patients undergoing an elective surgical procedure. Although MSBOS has succeeded in propelling the efficiency of blood ordering system, it has the limitation of not able to account for the differences in transfusion requirements between various patients undergoing the same surgical procedure.[10]

We conducted this study to analyze the demand and utilization of packed red blood cells (PRBCs) in a tertiary care hospital, and based on the outcome of the study, to formulate and recommend a rational blood ordering practice in different surgical services, with the objectives to avoid unnecessary man-hour and material wastage, to reduce artificial paucity of blood units, and thus preventing unnecessary exposure of the patients to various undesired hazards of transfusions.

MATERIALS AND METHODS

The present study was conducted in the blood bank of a tertiary care hospital situated in Western Maharashtra. The blood bank maintains the record of demand and utilization of blood as per the existing guidelines of the blood bank regulatory authority of India. These records were retrospectively analyzed for 05 years from Jan 2011 to Dec 2015. Data was tabulated as per different elective surgeries done under major surgical specialties namely cardiothoracic & vascular, gastro-intestinal, oncological, orthopedic & trauma, obstetric & gynecological, and finally general surgery. The study was approved by the institutional ethical committee and the statistical analysis was done on Microsoft Excel [10].

Patients who underwent emergency surgery, autologous transfusion and massive transfusion were excluded from the study to eliminate bias. Massive transfusion has been defined in several ways. However in our study, massive transfusion was defined as, transfusion given to those patients who received 10 units or more of packed RBCs in 24 hours. Any unused PRBC units which were returned from operation theatres were not taken back into inventory, as per our blood bank's policy. This is done to avoid any access of deteriorated blood

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products (due to temperature variations) back into our inventory.

To analyze the demands and utilization of packed red blood cell units, routine transfusion parameters were used, such as the Crossmatch to transfusion ratio (C/T ratio) (Units cross-matched/Units transfused); Transfusion index (TI) (Units Transfused/Patients crossmatched); and Transfusion probability (TP) (Patients transfused×100/Patients crossmatched). A C/T ratio >2.5, TP (T%) > 0.5 (50%), TI > 0.5 was considered indicative of significant blood utilization.[9,10]

RESULTS

A total of 45766 patients were studied at our center, over a period of five years, who underwent various elective procedures in various major surgical subspecialties. There were 34324 males (75%) and 11442 females (25%). Of the total 55700 PRBC units crossmatched pre-operatively, only 31809 units (57%) were transfused to 35679 patients. That results in forty-three percent (43%) of the total crossmatched units not able to be transfused. The number of patients and units, cross-matched and transfused is tabulated in Table 1.

Maximum requirement as per the PRBC demands preoperatively was for cardiothoracic surgeries (45%) followed by oncological (15.5%) and obstetric & gynecological (7.2%) indications. Blood transfused was maximum for cardiothoracic surgeries (52.6%) followed by oncological (18%) & general surgical (10%) indications.

Specialty wise utilization of PRBC units in the form of C/T ratio, TI and TP are tabulated in Table 2. High C/T ratios were observed in Obstetrics and Gynecology (3.6) and Orthopedic (2.4) specialties. Low values of TI were observed in Obstetrics and Gynecology (0.23) and Gastro-intestinal surgeries (0.57). Similarly minimum values of TP were observed for Obstetrics and Gynecology (43.9%) and orthopedic (46.8%) specialties.

DISCUSSION

As a management tool for rationalizing blood usage, auditing has being an important part of quality assurance programme in a transfusion centre. It can provide necessary information for improving transfusion medicine practice & has been shown that the implementation of audit with monitoring, can significantly reduce the use of blood products with considerable cost-saving.[1]

In many hospitals in India, blood units are fully cross matched and reserved for patient for eventualities even though many of them may have a low probability of being transfused. In patients requiring surgery, blood components are often ordered due to anticipated rather than actual blood loss.[11] This leads to overuse of blood products and unnecessary exposure of the patient to various transfusion transmitted infections. This anticipatory demand also increases the workload on the blood bank staff, encroaching upon their time, which could be utilized for processing blood for more needy patients. Moreover, these over ordered blood units remain reserved and the patients who are actually in need are often deprived of these blood units, due to an artificially created low stock of blood components in the blood bank.

It was found in a study on trauma patients that 33-62% of all transfusions given were unnecessary or inappropriate and thus responsible for creating shortage of blood and components in blood bank at that point of time.[12] A type and screen (T&S) policy for pre-transfusion testing would be the best alternative in such cases. It will free up the blood units for actual needy patients and will be cost effective. The estimated savings from eliminating the AHG phase of a crossmatch is approximately $1.00 in cost and 30% in technologist's time.[13] In the experience of a Florida based transfusion setup, implementation of T and S policy lead to savings of $12,244.00 in just 04 months.[14] As a rough estimate, in India approximately 8 million units are transfused annually. Thus the money saved on implementation of T & S policy in Indian transfusion services will be significant.[13]

In our study, though cardiothoracic surgeries had maximum share i.e. 52.6% (Table 1 & 2) of all the PRBC utilized, an acceptable C/T ratio of 1.5 was maintained. On the other hand, Orthopedics and Obstetrics and Gynecology (O&G) specialty, amounted to only 9.5%, and 3.5% respectively of all PRBC utilized, but were associated with a high C/T ratio of 2.4 and 3.6 respectively, giving a clear indication of over demanding. A similar high C/T ratio was also observed in other studies, ranging from 3.4 to 7.4 for O&G specialty.[9,15-17] Haemorrhage from obstetric causes (ante- & post-partum) is the most common cause of maternal mortality in the developing world17 and the prospect of haemorrhage may be the cause of this tendency to over order in O&G speciality.

The way forward to end this logjam is an effectively working hospital transfusion committee (HTC). HTC is a multi-disciplinary team and involves all departments in the hospital that are involved in providing and prescribing blood and blood products. The members of HTC include, representatives from medicine, surgery, obstetrics and gynaecology, orthopaedics and nursing superintendent as members. The secretary of the committee is the head from transfusion medicine department.[18]

On a simplistic level, the HTC sets appropriate policies and procedures, reviews and revises them and monitors practice against them. One such policy is of Maximum Surgical Blood Order Schedule (MSBOS), where the anticipated number of units are only grouped and typed, instead of performing complete cross match with various donor units.[19] The practice of establishing MSBOS has been observed to be highly successful with up to 32% reduction in excessive cross match.[20] In this, the data concerning blood usage for each procedure in the hospital is reviewed over several months and the C/T ratio calculated. Ideally a C/T ratio of 1:1 would be most desirable and most efficient, but it is difficult to achieve. Therefore a C/T ratio of 2:1 for all procedures has been accepted as a reasonable goal. In our study the C/T ratio has varied from 1.4 to 3.6 according to the specialties (Table 2). In addition, there are newer methodologies in the form of electronic decision support system and electronic remote blood issue, which significantly reduce the amount of unused blood orders from 70 to 25%.[21]

The attitude of over demanding by clinical specialties can be altered with the improved awareness amongst clinical specialties about better transfusion practices, in the form of lectures, interactive seminars or training capsules, and through constant telephonic interactions between Transfusion Medicine staff and clinical specialties, so as to spread awareness regarding transfusion medicine practices with its associated hazards, among the clinicians, resident doctors, surgeons and nursing staff.

CONCLUSION

In conclusion, there was a considerable difference in demand and utilization of PRBC component. The surgical blood ordering practices in our study, which proves the fact that blood components are more generously demanded than what, is actually required. The hospital transfusion committee can create greater awareness about the correct and rational use of blood and blood products. To avoid unnecessary and excessive cross-matching of blood for elective surgical procedures, establishment of MSBOS will surely be a valid option. However in any hospital to monitor the correctness and efficient use of these products, MSBOS must have to be reviewed and audited periodically.

Table 1. Blood cross-match and transfusion patterns for different surgical subspecialties

Surgical subspecialties (elective surgeries)	Crossmatched		Transfused	
	Patients	Units	Patients	Units
Cardiothoracic & vascular	23568	25100	20677	16733

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Gastro-intestinal	3542	4038	3028	2019
Oncological	5859	8611	5009	5742
Orthopedic	4335	7283	2028	3035
Obs and Gynae	4872	4034	2137	1121
General Surgery	3590	6634	2800	3159
Total	**45766**	**55700**	**35679**	**31809**

Table 2: Blood utilization for different major surgical subspecialties

Surgical subspecialties (elective surgeries)	CT	TI	TP (%)
Cardiothoracic & vascular	1.5	0.71	87.7
Gastro-intestinal	2	0.57	85.5
Oncological	1.5	0.98	85.5
Orthopedic	2.4	0.7	46.8
Obstetrics and Gynaecology	3.6	0.23	43.9
General Surgery	2.1	0.88	78

CT ratio: crossmatch to transfusion ratio
TI: transfusion index
TP (%): transfusion probability in percentages (%T)

REFERENCES

1. World Health Organization. Strategies for Safe Blood Transfusion. WHO Blood Transfus Saf.. 2016. http://www.rsc.org/dose/title of subordinate document. Accessed 15 Jan 2016.
2. Arora D, Arora B, Khetarpal A.. Seroprevalence of HIV, HBV,HCV and syphilis in blood donors in Southern Haryana. Ind J Path & Microbiol. 2010;53:308-9.
3. Bhattacharya P, Chakraborty S, Basu S. Significant increase in HBV, HCV, HIV and syphilis infections among blood donors in West Bengal, Eastern India 2004-2005:exploratory screening reveals high frequency of occult HBV infection. World J Gastroenterol.2007;13:3730-3773.
4. .Kakkar N, Kaur R, Dhanoa J. Voluntary donors–need for a second look. Ind J Path & Microbiol. 2004;47:381-383.
5. Shah N, Shah J, Jhaveri P, Patel K. Sero prevalence of HBV, HCV, HIV and syphilis among blood donors at a tertiary Care Teaching Hospital in Western India. Gujarat Med J. 2013;68(2):35-39.
6. Olawumi HO, Bolaji BO. Blood utilization in elective surgical procedures in Ilorin. Tropical Journal of Health Sciences. 2006;13:15-17.
7. Friedman BA, Oberman HA, Chadwick AR, et al. The maximum surgical blood order schedule and surgical blood use in the United States. Transfusion. 1976;16(4): 380-387.
8. Silberstein LE, Kruskall MS, Stehling LC, et al. Strategies for the review of transfusion practices. Journal of the American Medical Association. 1989;262(14):1993-1997.
9. Thabah R, Sailo LT, Bardoloi J, Lanleila M, et al. Maximum Surgical Blood Order Schedule a newly set-up tertiary care hospital. Anaesth pain intensive care. 2013;17(1):28-32.
10. Subramanian A, Sagar S, Kumar S, et al. Maximum surgical blood ordering schedule in a tertiary trauma center in northern India: a proposal. J Emerg Trauma Shock. 2012;5(4):321-327.
11. Vishwanathan C, Jain R, Kamath M. Blood Utilization Review in a Tertiary Care Hospital. Ind J Hemat blood transf. 1999;17:26-31.
12. The clinical use of blood in medicine, obstetrics, pediatrics, surgery and anaesthesiology, trauma and burns. WHO Blood Transfus Saf, Geneva. 2016. http://www.rsc.org/dose/title of subordinate document. Accessed 15 Jan 2016.
13. Choudhary R, Aggarwal N. Safety of type and screen method compared to conventional antiglobulin crossmatch procedures for compatibility testing in Indian setting. Asian J Transfus Sci. 2011;5(2):157-159.
14. Alghamdi S, Gonzalez B, Howard L, et al. Reducing blood utilization by implementation of a type-and-screen transfusion policy a single-institution experience. Am J Clin Pathol. 2014;141(6):892-895.
15. Kaur P, Basu S, Kaur G, et al. An analysis of the pattern of blood requisition and utilization in a tertiary care center. NRIJM. 2013;4(2):123-127.
16. Musa A, Ndakotsu M, Hassan A. Pattern of blood transfusion request and utilization at a Nigerian University Teaching Hospital. Sahel Med. 2014;3(3):225-230.
17. Akinola OI, Fabamwo AO, Tayo AO, et al. Evaluation of blood reservation and use for caesarean sections in a tertiary maternity unit in south western Nigeria. BMC Pregnancy Childbirth. 2010;10:57-61.
18. Kaur G, Kaur P. Hospital transfusion committee: Role and responsibilities. Indian J Pathol Microbiol.2014;57:352-354
19. Melanie SK. Transfusion therapy: Harmening MD, editor. Modern blood banking and transfusion practices. 6th ed. Philadelphia: FA Davis company; 2012. pp 352-366.
20. Rouault C, Gruenhagen J. Reorganization Of Blood Ordering Practices. Transfusion.1977;18:448-453.
21. Hibbs S, Noel S, Miles D. The impact of electronic decision support and electronic remote blood issue on transfusion practice. Transfus Med.2014;24:274-279.