

Utilization of Blood and Appropriateness of Blood Transfusion in a Department of Obstetrics and Gynecology in Karachi

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ABSTRACT

Aim: To assess the utilization of blood and appropriateness of blood transfusion using utilization indices in the gynecology and obstetrics department of a tertiary care center.

Materials and methods: A retrospective observational study was carried out in Gynae unit 3 of Abbasi Shaheed Hospital from July 1, 2016, to December 31, 2016. For this study, case records of all women who had an elective or emergency procedure were compiled and reviewed. The blood utilization indices, cross-matched to the transfusion ratio (C/T ratio = number of units cross-matched/number of units transfused), transfusion probability (%T = number of patients transfused/number of patients cross-matched × 100), and transfusion index (TI = number of units transfused/number of patients cross-matched) were calculated for all.

Results: A total of 598 patients underwent major elective and emergency surgical procedures in the department. These patients were requested to prepare 1,074 units of blood. From a total of 1,074 units cross-matched, 374 were transfused. Thus, only 34.8% of the cross-matched blood was utilized. Of the 598 patients for whom blood was cross-matched, only 279 (46.65%) patients were transfused. The overall blood transfusion indices of the requested blood, C/T ratio, %T, and TI, were 2.87, 46%, and 0.62.

Conclusion: Our study showed underutilization of blood in terms of cross-matched to the transfusion ratio but the probability of transfusion and the transfusion index were appropriate.

Clinical significance: Blood ordering practices need to be reviewed periodically in all units.

Keywords: Blood utilization, Maximal surgical blood ordering schedule, Transfusion.

Journal of South Asian Federation of Obstetrics and Gynaecology (2019); 10.5005/jp-journals-10006-1725

INTRODUCTION

Ordering blood is a common practice and transfusions are an important part of resuscitating and managing obstetrical emergencies. The request for blood is usually made prior to the operation and is based on the assumption of worst-case scenarios.¹ This results in cross-matching of huge number of units that are left unutilized.²

The utilization rate varies from 5% to 40% worldwide. Overordering of blood has been reported worldwide since Friedman first reported the maximal surgical blood ordering system.³ Many studies favor adoption of the maximal surgical blood order schedule for reducing overordering and improving utilization of blood.^{2,4} This calculation is derived from institutional usage statistics calculated by blood indices.³

Rational transfusion is a concept introduced to reinforce the fact that blood should only be transfused if necessary.⁵ According to current estimates, about 1.2–1.5 million units of blood are being transfused annually in Pakistan. In a developing country like Pakistan, this wastage of resources is totally uncalled for.⁶ Since WHO discouraged single-unit transfusions, two-unit transfusions have taken their place that has further aggravated the problem, taking a bigger bite from our meager resources.⁷

The blood ordering practices can be evaluated using indices that have been well described. These indicators then help formulate a maximal surgical blood ordering schedule (MSBOS). The Boral and Henry's cross-matched to transfusion ratio (C/T ratio),⁸ probability of a transfusion for a given procedure (denoted by %T) proposed by Mead et al.,⁹ and the transfusion index (TI), i.e., the average number of units used per patient cross-matched are few indicators that have been previously used.¹⁰

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How to cite this article: Husain S, Imtiaz R, Husain S, et al. Utilization of Blood and Appropriateness of Blood Transfusion in a Department of Obstetrics and Gynecology in Karachi. *J South Asian Feder Obst Gynae* 2019;11(6):345–348.

Source of support: Nil

Conflict of interest: None

The implementation of the blood conserving protocol has succeeded in limiting this underutilization.^{2,4} The MSBOS is a blood conserving protocol that enables clinicians to ascertain the likely need of cross-matched blood prior to a surgery. Using the prior record from the cases and the blood arranged for these cases, a figure is reached upon that denotes the number of units that should be cross-matched for that procedure.³ The local blood ordering practices and subsequent transfusion of this ordered blood need to be evaluated first. This evaluation serves the primary purpose of assessing the blood ordering practice and provides a basic framework for MSBOS.

We undertook this study to assess the utilization of blood and appropriateness of blood transfusion using utilization indices in a gynecology and obstetrics unit of Abbasi Shaheed Hospital.

MATERIALS AND METHODS

For this study, case records of all women who had an elective or emergency procedure in the Department of Obstetrics and

Gynecology, Abbasi Shaheed Hospital, from July 1, 2016, to December 31, 2016, were compiled and reviewed.

A performa was filled. It included age of the woman, number of units cross-matched for the procedure, and transfused number of patients who had blood cross-matched and transfused. The type of surgery and the type of case were also gathered from the records and entered into the performa.

Data were coded, entered, and analyzed with the help of SPSS version 15 (SPSS Inc., Chicago, IL) for descriptive statistics. Blood utilization indices were calculated as follows:

- Cross-match to transfusion ratio (C/T ratio) = number of units cross-matched/number of units transfused. Appropriate blood utilization is denoted by a ratio of 2.5 or less.¹¹
- Transfusion probability (%T) = number of patients transfused/number of patients cross-matched \times 100. Appropriate blood utilization is denoted a value of 30% or more.⁹
- Transfusion index (TI) = number of units transfused/number of patients cross-matched. Appropriate blood utilization is denoted a value of 0.5 or more.³
- The MSBOS was calculated as 1.5 times of TI.

The main outcome of the study was utilization of blood as determined by the abovementioned parameters.

In lieu of formal ethics committee or formal institutional review board approval, Helsinki's declaration was followed. No subjects were harmed and confidentiality was maintained.

RESULTS

In the period defined, a total of 598 women had an elective or emergency surgical procedure in the department. These women arranged a total of 1,074 units of blood.

Majority of the women underwent emergency procedures (321, 53.7%), with cesarean sections (408, 68.2%) and dilatation and evacuation (84, 14%) forming the brunt of the cases. The most common indications for the cesarean section were cesarean performed during labor (146, 35.8%) and cesarean for the previous cesarean section (136, 33.3%), as shown in Table 1.

From a total of 1,074 units cross-matched, 374 were transfused. Thus, only 34.8% of the cross-matched blood was utilized. Of the 598 patients for whom blood was cross-matched, only 279 (46.65%) patients were transfused.

A total of 514 units of blood were cross-matched for women who had an emergency surgery. Only 213 units of these 514 cross-matched units were transfused. Out of these 321 women who had an emergency procedure, 162 received transfusion. A total of 560 units of blood were cross-matched and 143 units were transfused for women who had an elective surgery (Table 2).

The overall blood utilization indices, C/T ratio, %T, and TI, were 2.87, 46%, and 0.62 in the study population (Table 3). The values of these indices for elective and emergency cases were different. In elective cases, the C/T ratio was 3.9 compared to 2.25 in the emergency cases. The %T and TI for elective cases were 42% and 0.51, while those for emergency cases were 50% and 0.71.

For cases, the highest C/T ratios were for hysterectomy (7.36), ovarian cystectomy (5.66), and the previous cesarean section (5.66).

The transfusion probability (%T) was less than 30% for ovarian cystectomy, the previous cesarean section, and cesareans performed for intrapartum complications.

The TI was less than 0.5 for dilatation and evacuation, hysterectomy, ovarian cystectomy, the previous cesarean section,

Table 1: Case distribution and total units cross-matched and transfused

Characteristics (n = 598)		n (%)
Type of operation	Elective	277 (46.3)
	Emergency	321 (53.7)
Cases	Cesarean	408 (68.2)
	D and E	84 (14.0)
	Hysterectomy	32 (5.4)
	Polypectomy	13 (2.2)
	Myomectomy	9 (1.5)
	Ovarian cyst	17 (2.8)
	Ovarian carcinoma suspected	6 (1.0)
	Tubal surgery	2 (0.3)
	Others	15 (2.5)
	Ectopic	12 (2.0)
Cesarean indications (n = 408)	APH	20 (4.9)
	PIH	48 (11.8)
	Previous cesarean	136 (33.3)
	Placenta accreta	14 (3.4)
	Intrapartum cesarean	146 (35.8)
	Referred cases	44 (10.8)
	Total units of blood cross-matched	1074
	Total units of blood transfused	374
	Total units of blood wasted	700
	Total number of patients cross-matched	598
Total number of patients transfused	279	

Others = procedures not included in the general list mostly performed as a day case

and cesareans performed after the onset of labor due to intrapartum complications (Table 3).

DISCUSSION

Blood transfusion is quintessential to surgery, where replacing losses is highly desirable. The appropriateness of blood transfusion has been a matter of debate since its inception into medical practice. It is a daunting reality that only 30% of cross-matched blood for elective surgeries is utilized.¹¹

The present study shows underutilization of cross-matched blood in the study setting. Only 38.4% of the cross-matched units were utilized. The utilization rates reported from India, and Kuwait were 28% and 69.7%, respectively.^{2,11} The utilization rate varies from 5% to 40% worldwide.³

The cross-matched to transfusion ratio in our analysis was 2.87, which is higher than the optimum limit. The C/T ratio was higher for elective cases than emergency cases (3.9 vs 2.25). This ratio is much higher than the ratio reported by Belayneh et al.¹² who reported an overall ratio of 2.3 and segregated ratios for elective and emergency cases of 2.9 and 1.8, respectively. A possible reason for this underutilization is the lack of confidence in operating surgeons regarding availability of blood should the need arise. Another common reason cited by senior colleagues is the uncooperative nature of anesthetists. A review showed that the visual estimation of blood loss by anesthetists and gynecologists/obstetricians varies significantly.¹³

The highest C/T ratios were for hysterectomy (7.36), ovarian cystectomy (5.66), and the previous cesarean section (5.66).

Table 2: Units cross-matched and transfused according to cases

		<i>No. of units cross-matched</i>	<i>No. of units transfused</i>	<i>Patients transfused n (%)</i>	<i>Patients cross-matched n (%)</i>
Type of surgery	Elective	560	143	117 (41.9)	277 (46.3)
	Emergency	514	231	162 (58.1)	321 (53.7)
Cases	Cesarean	764	270	197 (70.6)	408 (68.2)
	D and E	84	32	32 (11.5)	84 (14.0)
	Hysterectomy	81	11	11 (3.9)	32 (5.4)
	Polypectomy	21	7	7 (2.5)	13 (2.2)
	Myomectomy	36	16	9 (3.2)	9 (1.5)
	Ovarian cystectomy	17	3	3 (1.1)	17 (2.8)
	Suspected ovarian carcinoma	14	7	6 (2.2)	6 (1.0)
	Tubal surgery	2	0	0 (0.0)	2 (0.3)
	Others	15	2	2 (0.7)	15 (2.5)
	Ectopic	40	26	12 (4.3)	12 (2.0)
Indication of cesareans	APH	80	48	20 (10.2)	20 (4.9)
	PIH/eclampsia	96	49	41 (20.8)	48 (11.8)
	Previous cesarean	272	48	40 (20.3)	136 (33.3)
	Placenta accreta	56	28	14 (7.1)	14 (3.4)
	Intrapartum cesarean	146	39	39 (19.8)	146 (35.8)
	Referred	114	58	43 (21.8)	44 (10.8)

Table 3: The blood utilization indices

	<i>Units cross-matched</i>	<i>Units transfused</i>	<i>Patient transfused</i>	<i>Patient cross-matched</i>	<i>Index (C/T ratio)*</i>	<i>Transfusion probability (%T)*</i>	<i>Transfusion index (TI)*</i>
Total	1,074	374	279	598	2.87	46	0.62
Type of surgery							
Elective	560	143	117	277	3.9	42	0.51
Emergency	514	231	162	321	2.22	50	0.71
Cases							
Cesarean	764	270	197	408	2.82	48	0.66
D and E	84	32	32	84	2.65	38	0.38
Hysterectomy	81	11	11	32	7.36	34	0.34
Polypectomy	21	7	7	13	3	53	0.53
Myomectomy	36	16	9	9	2.25	100	1.77
Ovarian cystectomy	17	3	3	17	5.66	17	0.17
Suspected ovarian carcinoma	14	7	6	6	2	1	1.16
Tubal surgery	2	0	0	2	–	0	0
Others	15	2	2	15	7.5	13	0.13
Ectopic	40	26	12	12	1.53	1	2.16
Indication of cesareans							
APH	80	48	20	20	1.66	1	2.4
PIH/eclampsia	96	49	41	48	1.95	85	1.02
Previous cesarean	272	48	40	136	5.66	29	0.3
Placenta accreta	56	28	14	14	2.0	1	2
Intrapartum cesarean	146	39	39	146	3.74	26	0.26
Referred	114	58	43	44	1.96	97	1.32

*(i) Cross-match to transfusion ratio (C/T ratio) = number of units cross-matched/number of units transfused. Appropriate blood utilization is denoted by a ratio of 2.5 or less. (ii) Transfusion probability (%T) = number of patients transfused/number of patients cross-matched × 100. Appropriate blood utilization is denoted by a value of 30% or more. (iii) Transfusion index (TI) = number of units transfused/number of patients cross-matched. Appropriate blood utilization is denoted a value of 0.5 or more. Bold values indicate inappropriate blood utilization

Injudicious ordering of blood is apparent from these figures for these procedures.

In our study, the transfusion probability was less than 30% only for ovarian cystectomy, the previous cesarean section, and cesareans performed after the onset of labor due to intrapartum complications, showing an overall appropriate blood ordering in reference to this index. The overall probability was 46%, which is higher than quoted by other studies.^{14,15} The probability was higher for emergency procedures than elective procedures (42% vs 50%).

The current literature supports that in the absence of significant risk factors, blood type and screen testing for the cesarean section should be eliminated.¹⁰ A large number of factors affect this decision.¹⁶

The TI was less than 0.5 for dilatation and evacuation, hysterectomy, ovarian cystectomy, the previous cesarean section, and cesareans performed after the onset of labor due to intrapartum complications. The overall TI was 0.62, which is similar to that previously reported.²

In Pakistan, like other developing countries, the compliance with international guidelines is seldom observed. The doctors are not used to following any standard criteria. They base their decisions to order blood on several parameters such as past experience, personal judgment, and prescribing by habit.⁷

In our study, all cases had their blood cross-matched. The hospital blood bank's policy is to ensure that a donor pays and bleeds before blood is reserved for the patient. In case blood is not utilized by the patient but has not been cross-matched, the money is refunded. In most cases, the group and save strategy can prove efficient and reduce the burden of arranging blood.¹⁷

Another aspect that needs discussion is the fact that the distance from the blood bank to the operating room is a significant restricting parameter when proposing a group and save strategy. But this can be overcome with good counseling and optimum transport facilities. The blood ordering practices need to be reviewed from time to time and a MSBOS devised for efficient use of resources. Further studies need to be undertaken to evaluate the effect of its implementation in the set-up.

CONCLUSION

Our study showed underutilization of blood in terms of cross-matched to transfusion ratio but the probability of transfusion and TI was appropriate. A blood ordering policy needs to be formulated and implemented in the set-up to ensure appropriate utilization of blood.

ETHICAL APPROVAL

In lieu of formal ethics committee or formal institutional review board approval, Helsinki's declaration was followed. No subjects were harmed and confidentiality was maintained.

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