Blood Requisition and Utilization Practice in Surgical Patients in a Teaching Hospital, Western Nepal

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ABSTRACT

Background

In surgical patients transfusion of blood is often a life-saving measure. Preoperative over-ordering of blood is very common and leads to holding up of the blood bank reserve and wastage of resources.

Objective

The main objective of this study was to evaluate the practice of cross-match and utilization of blood for general surgeries in a teaching hospital of Nepal, to identify the surgical procedures where type and screen can be introduced and to formulate a maximum surgical blood-order schedule for those procedures where a complete cross-match appears mandatory.

Method

Three hundred and eighty-eight patients of different general surgical procedures over a period of one year were evaluated. Blood units cross matched and units transfused intra-operative and post-operatively were recorded. Blood utilization was evaluated using the following indices: cross-matched to transfused ratio, transfusion probability and transfusion index. The maximum surgical blood-order schedule was calculated using Mead's criterion.

Result

Of the 601 blood units arranged for 388 patients, only 108 units were transfused in 81 patients. The cumulative non-utilisation of cross-matched blood was 82%. Based on these data, the maximum surgical blood-order schedule was calculated for seven common surgical procedures where cross-matching was justified.

Conclusion

Unwarranted cross-matching of blood is done in most procedures, especially cholecystectomies, hernia operations, breast surgeries, skin grafting, thyroidectomies etc. where a group and screen is adequate. Implementation of the recommended maximum surgical blood-order schedule and introduction of type and screen for eligible surgical procedures is a safe, effective and economic solution.

KEY WORDS

Blood, cross-match, group and screen

INTRODUCTION

Blood products are vital resources that play a major role in the resuscitation and management of surgical patients.[1] However, published evidence indicate that requests for blood products in elective surgical settings are excessive and that only a small proportion of cross matched blood or its derivatives is ultimately utilized.[2,3] Inappropriate or excessive cross-matching results in wastage of valuable resources, financial burden, blood being unavailable for the use of other patients for the specified time period and avoidable strain on national and local blood transfusion services in terms of workload.[4,5] Subsequent non-utilization and wastage is defended by the excuse that it is a safety measure in case of an excessive or unexpected blood loss during surgery.[6]

The maximum surgical blood ordering schedule (MSBOS) estimates the amount of blood that will be needed for the individual procedure and it has been shown to minimize the problem of inappropriate cross-matching and over requesting of blood.[4,5,7,8] It enables identification of procedures that can be carried out with a group and save only instead of a cross-match and reservation of blood.[8] Standardized indices such as a cross-match to transfusion ratio (C/T ratio) ≤ 3.0, transfusion probability (%T) ≥30 and transfusion index (TI) ≥ 0.5 have been used to justify procedure specific cross-matching of blood and the establishment of institutional MSBOS.[5,7,9,10]

The objective of this study was to evaluate the practice of cross-match and utilization of blood for surgical procedures in a surgical unit of teaching hospital and make formulation of MSBOS for procedures where cross-match appears mandatory.

METHODS

A hospital based cross-sectional study was carried out in general surgery unit of Manipal Teaching Hospital, Pokhara, Nepal from September 2013 to October 2014 on patients in whom blood was cross-matched. This study was conducted after obtaining the clearance from the ethical committee of the institute. Patients who received preoperative blood transfusion, who were not operated or in whom only blood grouping was performed were excluded from the study. Data on patient demography, number of units cross matched and saved, number of units transfused and the surgical procedure performed were obtained from patient records. The utilization of blood was calculated using the following standardized indices.[5,7,8]

• Cross-match to transfusion ratio (CT ratio)= number of units cross matched/ number of units transfused

A ratio of 2.5 was considered as significant for blood usage.

• Transfusion probability (% T)= (number of patients transfused / number of patients cross-matched) x 100

A value of 30 was considered indicative of significant blood usage.

• Transfusion Index (TI)= number of units transfused / number of patients cross matched

A value of 0.5 was considered indicative of significant blood utilization

MSBOS was calculated by Mead's criterion.[11]

• Maximal Surgical Blood Order Schedule (MSBOS)= 1.5X TI.

Data were entered in statistical software SPSS version 16.0. Categorical data are presented as frequency and percentage. P values were considered significant if <0.05.

RESULTS

Out of total 601 blood units arranged for 388 patients, only 108 units were transfused in 81 patients. This means that only 18% of blood was utilized while 82% of blood was not needed (Fig. 1). Fifty nine percent of patients were female and 41% male. "O" positive was the commonest blood group and only 0.33% had a negative blood group. The procedure specific utilization of blood was calculated using the standardized indices CT ratio, %T and TI as indicated in the materials and methods (Table 1). It shows that cross-matching is not necessary in procedures like laparoscopic cholecystectomy, hernia repair, thyroidectomy, skin grafting, modified radical mastectomy, enucleation for hydatid cyst etc. Rather in these procedures, blood grouping will be more economical and justifiable. Maximal Surgical Blood Order Schedule (MSBOS) for common surgeries is shown in Table 2.

DISCUSSION

Blood and its derivatives play a major role in the management of surgical patients. The practice of routine cross-matching in unwarranted cases appears to continue probably driven by habit and a perceived sense of safety in the event of unexpected haemorrhage.[6,11] Preoperative over-ordering of blood has been documented since 1973 when Friedman et al. published their findings.[10] The percentage of cross-matched patients receiving transfusion for general surgical procedures range from 5% to 40%.[5,10,12] In our study, this was 18%. Inappropriate reservation of blood results in its reduced availability for other patients in need and a greater tendency for it to pass its expiry date and be discarded.[13] Therefore, the practice of blood reservation and transfusion in surgical practice should be subject to regular evaluation in healthcare institutions. Cross-match is justified in procedures that carry a CT ratio <2.5, a %T >30% or a TI >0.5.[7,10,12] The criteria justifying blood reservation were met for in large bowel surgeries (including anterior resection, abdomino-perineal resection and hemicolectomy), splenectomy, and gastric surgeries. Routine cross-match is unnecessary in surgeries like laparoscopic cholecystectomy, hernia

Table 1. **Procedure specific blood utilization indices of selected surgeries.**

Surgery	No. of cases	Cross-matched units	Transfused units	Patients Transfused	Transfusion Probability (%T)	C:T ratio	Transfusion Index (TI)
Lap Cholecystectomy	107	187	8	5	4.60	23.37	0.07
CBD exploration	23	63	8	5	23	7.87	0.34
Incisional Hernia	17	29	1	1	5.80	29	0.05
Renal Surgery	15	30	10	8	53	3	0.66
Thyroidectomy	15	31	3	3	20	10.33	0.20
Debridement	14	27	8	6	42	3.37	0.57
Retropubic Prostatectomy	11	20	7	6	55.40	2.85	0.63
Enterorraphy	11	24	9	7	63	2.66	0.81
Graham's patch	15	30	4	2	13.30	7.50	0.26
Splenectomy	8	20	8	7	88	2.50	1
Modified Radical Mastectomy	14	22	3	2	21.40	7.33	0.21
Split skin grafting	11	20	3	2	18.20	6.66	0.27
Resection anastomosis	7	13	5	4	57.10	2.60	0.71
APR/LAR Partial	5	12	9	4	80	1.33	1.80
Pericystectomy	9	18	2	1	11.11	9.0	0.22
Gastric Surgery	8	16	10	5	62.50	1.60	0.07
Ileo/Colostomy closure	7	14	1	1	14.28	14	1.25
Soft tissue tumor excision	10	20	3	2	20	6.66	0.30
Below/Above Knee Amputation	7	14	6	4	57	2.83	0.85
Whipple's procedure	2	8	6	2	100	1.33	3.0

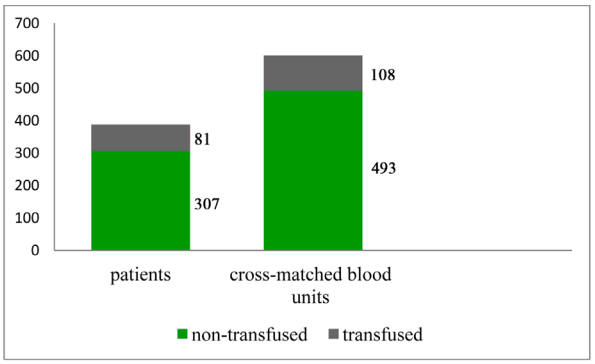

Figure 1. **Blood ordering and transfusion pattern of patients.**

Table 2. **Maximal Surgical Blood Order Schedule (MSBOS) for procedures with significant blood usage.**

Surgery	Transfusion Index (TI)	MSBOS =1.5 X TI
Renal Surgery	0.66	0.99
Retropubic Prostatectomy	0.63	0.95
Resection anastomosis	0.71	1.06
APR/LAR	1.80	2.70
Gastric Surgery	1.25	1.88
Below/Above Knee Amputation	0.85	1.28
Whipple's procedure	3.00	4.50

repair, appendectomy, breast surgeries, thyroidectomies, Graham's patch repair for peptic ulcer perforation etc. where a blood group and save should suffice. It requires close cooperation between surgeons, anesthetists and the blood bank. An individual MSBOS needs to be established at each hospital by a hospital transfusion committee based on a retrospective analysis of actual blood usage of the hospital to improve the cost effectiveness of the hospital transfusion services.[6,12,14] The schedule also should be regularly monitored and evaluated to verify compliance and updates.

CONCLUSION

This study demonstrates that cross-matching blood for selected surgical procedures exceeds requirement and such practice we suspect is widespread in our healthcare system. A type and screen policy for routine surgeries should be implemented to save valuable time and resources in developing countries. We recommend further study of this issue and the development of evidence based blood ordering schedules in each hospital. Moreover, the hospital with blood transfusion committee should formulate maximum surgical blood ordering policies for elective surgical procedures and conduct regular auditing.

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