

ANALYSIS OF BLOOD USAGE IN ELECTIVE SURGICAL PROCEDURES IN A DISTRICT GENERAL HOSPITAL, SRI LANKA:STEP TOWARDS MAXIMUM SURGICAL BLOOD ORDERING SCHEDULE (MSBOS)

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Abstract— Objective is to evaluate the current practice of blood ordering and utilization in elective surgical procedures. It aims the formulation of MSBOS to streamline the blood usage and stock management.

Retrospective study was conducted for six months period. All cross match requests related to all elective surgical procedures were analyzed for number of blood units requested and transfusions during first half of 2017. Cross match: transfusion (C: T) ratio, Transfusion index (TI) and Transfusion probability (%T) were calculated for each procedure.

Total number of surgical procedures those requested blood transfusion were 35. 2348 cross matches have been done for 1707 patients. 9% of the total blood transfusions (n =2073) is for elective surgeries. Only 192 (8%) procedures have utilized cross matched blood and 92% were uncomplicated. Cross match: Transfusion (C: T) ratio is higher than the standard for all the surgeries except for open reduction internal fixation (ORIF) surgery (1.6:1). The procedures which have Transfusion Index (TI) > 0.5 is the total knee or hip replacement surgery (0.7) and ORIF . Only four surgeries have %T of > 30 %.

Indices used to determine the efficiency of blood ordering and utilization are C: T ratio, TI and %T. C: T ratio <2.5 and / or TI of ≥ 0.5 indicates efficient blood usage. %T of $\geq 30\%$ indicates significant blood usage. According to this study most of surgeries could be managed by Group and Save method without cross matching blood for each procedure. The requirement of a MSBOS was obvious.

MSBOS is a guide to optimize blood usage without compromising standard patient care.

Keywords— Maximum surgical blood ordering schedule, blood usage in elective surgeries

I. INTRODUCTION Sri Lankan National Blood Transfusion Service 100% depends on voluntary non-remunerated blood donors. Blood is a precious source and safe and rational use of blood to reduce unnecessary and unsafe transfusions and to improve patient outcomes is the recommended practice. Blood prescribing

is performed by clinicians. Blood prescribing clinicians are not aware of the blood stock management and over ordering of blood is a common practice. In the absence of an explicit Maximum Surgical Blood Ordering schedule, requesting is on clinicians' assessment.

The Maximum Surgical Blood Order Schedule (MSBOS) is a table of elective surgical procedures which lists the number of units of blood routinely cross-matched preoperatively for each procedure. This is formulated after retrospective analysis of the actual blood usage of the elective surgical procedures of the particular institution.

This study was done with the objective of evaluating the current practice of blood ordering and utilization in elective surgical procedures. It aims the formulation of MSBOS to streamline the blood usage and stock management and reduce the unnecessary blood wastage.

II. METHODOLOGY

This is a retrospective, hospital based study conducted for the duration of six months. All cross match requests related to elective general, orthopaedic, genito-urinary, otorhinolaryngology and facio-maxillary surgeries and renal biopsies were analysed for number of blood units requested and transfusions during first six months of 2017. The following indices were calculated for each surgical procedure;

1. Cross match: transfusion (C: T) ratio - Number of units cross matched divided by the number of units transfused
2. Transfusion index (TI) - Number of units transfused divided by the number of patients cross matched
3. Transfusion probability (%T) - Number of patients transfused divided by the number of patients cross matched X 100

The use of cross-match to transfusion ratio (C/T ratio) was first described by Boral Henry in 1975.(1) Ideally, C/T ratio should be 1.0 but a ratio of 2.5 and below was suggested to be indicative of efficient blood usage.(2) Transfusion index (TI) implies the appropriateness of numbers of blood unit's cross-matched. A value of 0.5 or more is indicative of efficient blood usage. The transfusion probability (%T) for a given surgical procedure was first suggested by Mead et

al in 1980. A value of 50% and above has been recommended as appropriate.

III.III.

RESULTS

Total number of surgical procedures those requested blood transfusion were 35 during the study period. 2348 cross matches were done for 1707 patients. Out of total cross matched patients only 204 patients have been received transfusions.

Cross match: Transfusion (C: T) ratio is higher than the standard for all the surgeries except for open reduction internal fixation (ORIF) surgery (1.6:1). The procedures -- which have Transfusion Index (TI) > 0.5 is the total knee

Table 1. Surgical Procedures, Number of Patients Cross matched & Transfused with C:T ratio, TI & T%

or hip replacement surgery (0.7) and ORIF (0.6).

Only few orthopaedic surgeries like ORIF, CRIF, TKR/THR and DHS and ERPC and myomectomy have %T of > 30 %.

biological nature of blood products carries risk of

Surgery	No of Cross matches	No of patients Cross matched	No of Transfusions	No of patients transfused	Cross Match: Transfusion (C:T) Ratio	Transfusion Index (TI)	Transfusion Probability (T%)
Elective LSCS	538	530	39	30	13.79:1	0.001	7.20%
Forceps delivery	14	14	00	00	-	0	0
TLH	164	100	08	06	20.5:1	0.08	4.90%
TAH	213	71	14	10	15.21:1	0.2	6.50%
Myomectomy	18	8	02	02	9:1	0.1	44.40%
VH & R	58	29	04	04	14.5:1	0.1	13.00%
TOT/TVT	10	10	00	00	-	0	0
ERPC	41	30	10	10	4.1:1	0.3	31.00%
LAVH	04	4	00	00	-	0	0
Lap. & Dye test	37	37	00	00	-	0	0
Lap. Cystectomy	10	10	00	00	-	0	0
Diagnostic Laparoscopy	43	43	00	00	-	0	0
Cerclage Removal	03	3	00	00	-	0	0
Laparotomy	312	280	16	10	19.5:1	0.5	5.00%
Thyroidectomy	34	17	02	01	17:1	0.1	11.00%
Lap. Cholecystectomy	91	50	02	02	45.5:1	0.04	4.00%
SFL	53	53	01	01	53:1	0.01	1.00%
Mastectomy	34	17	00	00	-	0	0
Feeding Gastrostomy/ Jejunostomy	10	10	00	00	-	0	0
Wound Toilet	71	65	23	20	3.08:1	0.3	28.00%
Amputation (BK/toe/...)	76	40	08	05	9.5:1	0.2	20.00%
Open prostatectomy	24	24	00	00	0	0	0
Herniotomy & Repair	14	14	00	00	0	0	0
Ureterolithotomy	8	8	00	00	0	0	0
APR	18	8	02	01	9:1	0.1	44.00%
DHS	215	70	26	26	8.26:1	0.3	32.00%
AMH	86	51	12	12	7.16:1	0.23	23.00%
CRIF	21	11	08	08	2.6:1	0.38	38.00%
Plate Fixation	24	24	04	04	6:1	0.16	16.00%
ORIF	20	12	12	12	1.6:1	0.6	66.00%
SUFE	12	12	00	00	-	0	0
TKR/THR	10	4	07	07	1.7:1	0.7	70.00%
Tracheostomy	16	16	00	00	-	0	0
Renal Biopsy	30	30	00	00	-	0	0
Abscess exploration	16	12	04	03	4:1	0.25	25.00%
Total	2348	1717	204	174			

IV. Discussion

Blood and blood component transfusion is an important mode of patient management. Blood is a scarce source and the production and testing are costly procedures. The

transfusion transmitted infections though it is remarkably reduced with current screening and testing facilities. Blood transfusion can be considered as a ‘mini transplantation’ and it has its own immunological risk factors too. Resuscitation with blood and blood products plays a major role in preparation and management of surgical patients. But over estimation of anticipated blood loss and over ordering of red cell concentrates are a recognized problems worldwide. Elective surgical

procedures contributes to reservation of a significant number of red cell concentrates out of the total blood stocks. This affects not only on the blood stock management but also it contributes to unnecessary blood discard, waste of consumables and unwanted work load for the blood bank staff.

A blood ordering schedule serves as a guideline to anticipated normal blood usage for elective surgical procedures, with the intention to relate the ordering of blood to the likely hood that a transfusion will be required.[3] A maximum surgical blood ordering schedule (MSBOS) is a list of common elective surgical procedures performed, along with the maximum number of blood units being cross-matched preoperatively for each procedure.[1,2] The principle of which is to decrease the quantity of blood being cross-matched, by assigning each elective surgical procedure a tariff of transfusion. A MSBOS is designed to order adequate blood units for up to 90% of the patients undergoing an elective surgical procedure. The ratio of the number of units' crossmatched red cells for a given surgical procedure to the number of units actually transfused should not exceed 2:1.[4,5]

Each institution should formulate their own MSBOS according to the available facilities and resources after studying the pattern of blood usage. The analyzed data was presented at the Hospital Transfusion Committee meeting.

The indices used to determine the efficiency of blood ordering and utilization are C: T ratio, TI and %T. C: T ratio <2.5 and / or TI of 0.5 or more indicates efficient blood usage. %T of 30% and above consider indicative of significant blood usage. According to this study majority of surgeries could be managed by Group and Save method without cross matching blood for each procedure.

The requirement of a MSBOS was agreed unanimously by the clinicians and the blood bank.

The MSBOS was prepared and distributed among surgical units. This must be reviewed annually.

Abbreviations

MSBOS – Maximum Surgical Blood Ordering Schedule

LSCS – Lower Section Caesarian Section

ERPC – Evacuation of Retained Products of Conception

TOT/TVT –

TAH – Total Abdominal Hysterectomy

TLH – Total Laparoscopic Hysterectomy

VH & R- Vaginal Hysterectomy & Repair

SFL – Saphino-femoral Ligation

Lap. - Laparoscopic

BK – Below Knee

ORIF – Open reduction Internal Fixation

CRIF – Closed reduction Internal Fixation

AMH – Austin Moore Hemiarthroplasty

DHS – Dynamic Hip Screw

TKR – Total Knee Replacement

THR – Total Hip Replacement

APR – Abdominal Perineal Resection

SUFE – Slipped Upper Femoral Epiphysis repair

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