Blood Ordering Strategies in the Armed Forces — A Proposal

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Abstract

Over ordering blood is a common practice in medicine. This can be corrected by a simple means of changing the blood ordering pattern. A retrospective study was carried out in a tertiary care hospital of Armed Forces for a three year period to study the blood ordering strategies in the hospital. The total units demanded and the corresponding units issued were estimated. Thereafter, transfusion probability and ratio of units cross-matched to actual units transfused (C/T ratio) was calculated. In this study, using Mead's criterion, transfusion probability and C/T ratio, transfusion guidelines for all cases requiring transfusion is proposed. The study also identifies the common cases where 'Type and Screen' (T&S) procedure could be introduced in cases where the transfusion probability is low. The other group where transfusion probability is high, a maximum surgical blood ordering schedule (MSBOS) has been determined to identify the number of units to be cross-matched and kept ready before the procedure. The implementation of this proposal will avoid over-ordering of blood and will promote maximum utilization.

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Key Words : Maximum surgical blood ordering schedule; Transfusion protocol; Type & Screen

Introduction

The primary goal of blood transfusion centres has been to provide adequate and safe supply of blood products. In recent years, influenced by an increasing demand for cost-effectiveness, there has been an increased awareness of the need for optimum distribution and utilization of safe blood and blood products. A variety of strategies for ordering blood and blood products have been proposed and developed to supply safe blood products in adequate amount as efficiently and as economically as possible. Therefore, a revision of blood ordering strategy is considered the mainstay of improving blood utilization while maintaining safety.

Blood ordering before surgery is clearly excessive. There is a tendency amongst surgeons, particularly trainee surgeons to 'play it safe' by keeping cross-matched blood always available even for relatively minor procedures. A transfusion service may follow any of the several policies that lead to more efficient use of blood inventory control and consequently a reduction in blood bank operating costs. The most important policy is the 'Type and Screen'(T & S) whereby units are not cross matched until an actual need for transfusion occurs [1].

Another policy that has proved to be successful in the practice of blood banking is the maximum surgical blood order schedule (MSBOS). This is a criterion developed from institutional usage statistics providing a figure for the number of units to be cross matched for any given surgical procedure [2].

Material and Methods

A retrospective study was carried out by scrutiny of records of the Blood Bank in a tertiary care hospital of the Armed Forces for a three year period to study the blood ordering strategies in the hospital. The blood requisitioned for surgical, medical, obstetrics and gynaecological (Obs & Gyne), orthopaedics and burns cases was compiled and reviewed. The total units demanded and the corresponding units of blood issued were estimated. Thereafter, the transfusion probability was calculated. A ratio of units cross-matched to the actual unit transfused, (C/T ratio) was calculated with a view to review the transfusion policy. After compilation of cases requiring transfusion and calculation of C/T ratio, the cases were classified as those where the probability of transfusion was low and could be managed by 'T & S' and those where the probability of transfusion was high, MSBOS was determined.

Results

The detailed analysis of the overall blood demand and issue schedule with transfusion probability and C/T ratio for a three year study period for different broad groups and the commonly encountered sub groups amongst them is depicted in Tables 1 to 5.

Discussion

In many blood transfusion centres large number of units of blood are cross matched each day for patients who are most unlikely to require transfusion. To avoid units of blood being reserved unnecessarily the policy in such cases is simply grouping the patient's red cells and screening the serum for abnormal antibodies i.e. 'T & S' [1].

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Table 1

Surgical cases

Year	Units demanded	Units transfused	Transfusion probability	C/T ratio
1st year	1215	380	31%	3.3:1
2nd year	1308	388	29%	3.4:1
3rd year	1180	361	31%	3.3:1
Common subgroups				
Benign Prostrate Hypertrophy				
1st year	112	27	24%	4.2:1
2nd year	98	15	15%	6.5:1
3rd year	103	19	18%	5.4:1
Cholecystectomy				
1st year	182	13	07%	14:1
2nd year	239	25	15%	9.5:1
3rd year	176	31	17%	5.7:1
Renal calculus				
1st year	95	25	26%	3.8:1
2nd year	58	14	24%	4.1:1
3rd year	116	11	09%	10.5:1
Neurosurgical procedures				
1st year	236	77	33%	3.1:1
2nd year	167	55	32%	3:1
3rd year	70	27	35%	2.8:1
Oncosurgical procedures				
1st year	171	91	53%	1.9:1
2nd year	217	92	42%	2.4:1
3rd year	274	125	45%	2.2:1
Kidney transplantation				
2nd year	52	03	06%	17.3:1
3rd year	50	03	06%	17.3:1

Table 2

Medical cases

Year	Units demanded	Units issued	Transfusion probability	C/T ratio
1st year	1005	581	58%	1.7:1
2nd year	1068	811	76%	1.3:1
3rd year	1244	778	62%	1.6:1
Common subgroups Anaemia (of all causes)				
1st year	301	222	74%	1.4:1
2nd year	507	341	67%	1.5:1
3rd year	406	288	71%	1.4:1
Haematological malignancies				
1st year	186	152	82%	1.2:1
2nd year	302	208	69%	1.4:1
3rd year	185	150	81%	1.2:1
Other oncological cases				
1st year	118	81	69%	1.5:1
2nd year	140	100	71%	1.4:1
3rd year	221	157	71%	1.4:1
Biopsy (kidney/liver) ERCP				
1st year	160	03	02%	53:1
2nd year	120	15	12%	8:1
3rd year	088	05	06%	17.6:1
Upper gastrointestinal bleeding				
1st year	141	68	48%	2.1:1
2nd year	128	69	54%	1.8:1
3rd year	071	71	52%	1.9:1

Table 3

Obstetrics and Gynecological

Year	Units demanded	Units issued	Transfusion probability	C/T ratio
1st year	505	109	22%	4.6:1
2nd year	508	98	19%	5.2:1
3rd year	622	123	19%	5.0:1
Common subgroups Hysterectomy				
1st year	201	47	23%	4.3:1
2nd year	175	27	15%	6.5:1
3rd year	265	54	20%	4.9:1
LSCS				
1st year	171	11	06%	15.5:1
2nd year	199	21	10%	9.5:1
3rd year	223	15	07%	15:1
Pregnancy with anaemia/sepsis				
1st year	26	16	61%	1.6:1
2nd year	12	09	75%	1.3:1
3rd year	25	12	48%	2.1:1
PPH/APH				
1st year	18	11	61%	1.6:1
2nd year	12	05	42%	2.4:1
3rd year	15	07	47%	2.1:1

The idea of providing pre surgical testing, without cross matching, for elective surgery without significant blood loss is not new. Many authors [3] analyzed blood use in elective surgery and the frequency of antibody detection by screening tests, they demonstrated the safety of substituting 'T & S' in place of routine cross matching in a number of elective surgical procedures. In addition, they emphasized the reduction in the hospitalization charges for the patient, improved distribution of blood supplies and the more effective utilization of the time of the blood bank technologist if a 'T & S' approach was adopted.

The practice of establishing MSBOS has been observed to be highly successful [1,2]. In this, the data concerning blood usage for each procedure performed 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 never achievable. Therefore a C/T ratio of 2:1 for all procedures has been accepted as a reasonable goal. MSBOS is a viable option to avoid unnecessary, excessive cross matching of blood for elective surgical procedures.

Mead et al [4] suggested that surgical procedures which would have a less than 30% probability of using blood be recommended for 'T&S'. They also recommended that for procedures with a greater than 30% probability of transfusion, the cross match orders

Table 4

Orthopedics

Year	Units demanded	Units issued	Transfusion probability	C/T ratio
1st year	295	122	41%	2.4:1
2nd year	171	63	37%	2.7:1
3rd year	231	102	44%	2.3:1
Common subgroups				
All fractures				
1st year	238	92	39%	2.6:1
2nd year	148	56	38%	2.6:1
3rd year	184	70	38%	2.6:1
Amputations				
1st year	33	22	67%	1.5:1
2nd year	11	06	55%	1.8:1
3rd year	40	28	70%	1.4:1

Table 5

Burns and Reconstructive Surgery cases

Year	Units demanded	Units issued	Transfusion probability	C/T ratio
1st year	127	94	74%	1.4:1
2nd year	110	75	68%	1.5:1
3rd year	80	54	67%	1.5:1

should not exceed 1.5 times the number of units transfused per patient. It is also pointed out that surgical blood estimates of three units or less were generally unreliable and for these procedures a 'T & S' approach was recommended. An estimate of greater than three units was more reliable and usually some blood was used, but even in these cases the C/T ratio was too high.

If a 'T & S' policy is implemented as an alternative for elective surgery rarely requiring transfusion, the advantages far outweigh any disadvantages which are more often-perceived than real [5]. The advantages in terms of blood utilization and cost have been well established. It also leads to improved inventory control, which permits more enhanced production of blood components and prevents obsolescence of blood. The perceived disadvantages of a 'T & S' procedure, which have been suggested include lack of availability of cross matched blood when urgently needed and decreased hospital blood inventory to cover unexpected disaster or major emergency situations.

The principles behind the development of a standardized schedule for preoperative blood ordering, or MSBOS, popularized by Friedman et al [2] are closely related to those which led to a 'T & S' approach. Indeed, the two concepts are usually combined when guidelines for blood ordering are provided to the staff of the hospital. Many studies [6-9] have shown that blood is generally over ordered and the implementation of

Table 6

Proposed Transfusion Guidelines

Surgical cases	
I. Cholecystectomy TURP for BPH Pyelolithotomy for renal calculus Kidney transplantation Hernia (inguinal/incisional) repair	Type and Screen
II. All oncosurgical procedures Neurosurgical procedures	50% unit demanded Cross matched
Medicine cases	
I. All cases	80% units demanded Cross matched
II. Biopsy/ERCP	Type and Screen
Obstetrical and gynecological cases	
I. Total abdominal/vaginal hysterectomy LSCS	Type and Screen
II. Pregnancy with anaemia/sepsis PPH/APH	70% units demanded Cross matched
Orthopedics cases	
I. All fractures	40% units demanded Cross matched
II. Amputation	70% units demanded Cross matched
Burns/reconstructive surgery cases	
I. All cases	75% units demanded Cross matched

MSBOS and the introduction of 'T & S' procedure has led to a safe, effective and economic solution to ordering of blood.

Based on transfusion probability in this study, Mead's criterion [4] and C/T ratio, transfusion guidelines for all cases requiring transfusion are proposed in Table 6. The implementation of this will avoid over ordering of blood and will promote maximum utilization of this valuable resource.

The principal aim of this study was to identify the common procedures / conditions where 'T & S' can be introduced and to formulate a blood transfusion guideline for these procedures where a complete cross match appears mandatory. The introduction of 'T & S' and MSBOS will lead to more efficient transfusion in our hospitals as in other countries [10]. This will also change the blood ordering patterns to attain optimum blood use.

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Radiological Quiz

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A male patient, 35 years, presented with complaints of low-grade fever, weight loss and dry cough for the preceding 15 days. On examination, pulse was 110/min, respiratory rate 30/min, and chest was clear. Liver was palpable 7 cm below right costal margin (span 18 cm). Spleen was palpable 3 cm below left costal margin.

Blood counts showed haemoglobin level of 9.0 g/dl. Sputum study for acid-fast bacilli and Mantoux test were negative.

The chest radiograph (PA view) is given in Fig 1. CT scan chest is given in Fig 2. Ultrasound of abdomen showed enlarged liver (18.2 cm), spleen (15.5 cm) and demonstrated multiple ill defined lesions measuring 3-4 mm in diameter. CT scan abdomen is shown in Fig 3. What is the diagnosis?

Fig. 1 : Chest X-ray, PA view

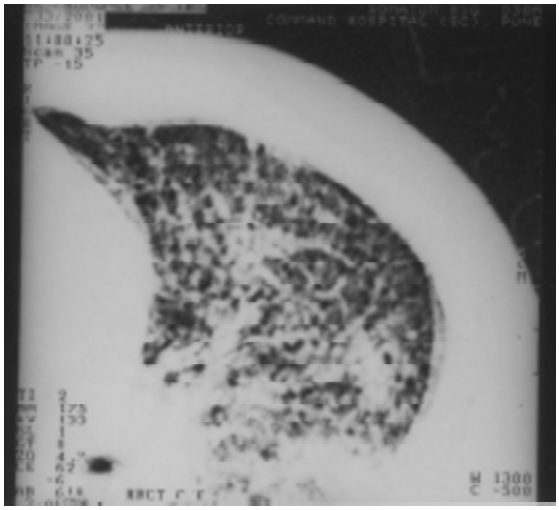

Fig. 2 : CT scan chest

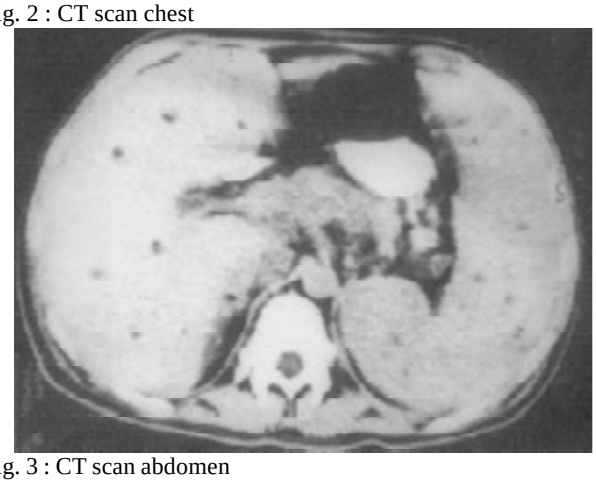

Fig. 3 : CT scan abdomen

Answer to the quiz - pg. 359

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