Blood Transfusion Practices at Al-Thawra Teaching Hospital, Sana'a-Yemen

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Abstract

Objectives: To evaluate the blood transfusion practices, the quality and quantity and the use rate of blood and blood components among patients at Al-Thawra Teaching Hospital. Methods: This a descriptive study that has been conducted for the purpose of studying the blood transfusions fate and practices for all crossmatched units in the blood bank at Al-Thawra hospital during one month period, from December 2003 – December 2004. Data were collected from blood bank and from different departments in the hospital. Results: 960 units were crossmatched during the period of the study. The study showed that crossmatched units for male patients (56%) were higher than for female (44%). The recipient male/female ratio was 1.27: 1. The mean age of recipients was 31.6 years ± 18.3 SD. The commonest type of blood was blood group O (48%). 87.5% of crossmatched blood was done for stored whole blood in spite of availability of other components. Medical indications represented the highest percentage (40%). 26% of all crossmatched blood units were returned to the bank. The majority of collected blood was by family donation system. It was obvious that there was over-ordering and irrational use of the blood from the high percentage of unused crossmatched blood and the use of stored whole blood. Conclusion: Blood transfusion is necessary for saving the life of the patient who is in need, but blood should be only given when necessary, to minimize its complications and to cut off extra cost for cross matching of unneeded blood. The collection of blood from voluntary non-remunerated blood donors from low-risk populations should be encouraged. Modernization of blood banks with automated separator of the blood components is mandatory.

Keywords: **Blood, blood bank, blood components, donors, recipients, Yemen.**

I. INTRODUCTION

Blood transfusion is an old method of restoring person believed to be dying by passing blood of another into his vein. The earliest attempt of blood treatment was an effort to save the life of the dying Pope Innocent VIII in 1492 having him drink the blood of 3 healthy boys [1,2]. Although, the association of blood with life and vitality was recognized by primitive man, the transfusion of blood was not possible until Harvey described the circulation in 1628 [3]. The era of blood transfusion started with the discovery of the ABO blood groups system by Landsteiner in 1931. In addition, his discovery of Rhesus factor in 1940 provided an explanation for previously mysterious hemolytic reactions in occasional blood recipients [4]. This technique of red cells antibody detection, lead to recognition of many new blood group antigen system and introduction of reliable cross-matching of patient and donor blood. Nowadays, transfusion medicine has become a fundamental part of medical practice in all medical disciplines and different specialties. The major function of the hospital transfusion service is promptly providing appropriate quantity of safe blood and blood components to patients in critical needs. Requirement of blood and blood component is increasing day by day but the number of donors doesn't increase correspondingly, hence, our hospitals face shortage of blood periodically. Furthermore, when a unit of blood is crossmatched for a particular patient, it is temporarily removed from the blood inventory and is unavailable for use by another patient, thereby leading to a shortage of blood in the blood bank. Also, crossmatching is not an inexpensive procedure. It requires costly reagents, equipment, and manpower. So avoidance of unnecessary crossmatching is essential [5]. Although modern technology has made blood transfusion a generally safe procedure; a definite risk is involved, so transfusion should be given thereby only when the benefit to the patient exceeds the inherent danger [6]. While advances have been dramatic in most industrialized countries, blood transfusion in the developing countries has tended to stagnate at post II World War level, with chronic shortage, lack of component therapy and unsolved safety problems [1]. In Yemen the blood transfusion services still in the primitive stage, in spite of that they provide hospitals with a large quantity of requested blood. At Al-Thawra Teaching Hospital the Blood bank is approximately daily, receiving 80 blood requests, collecting 70 Units of blood and delivering 70 Units of blood (Blood bank record). Despite the lack of previous study in this field, in Yemen, this study seems to be very important because the need for blood and blood components is increasing day by day, due to life modernization. There is a paucity of donors, because of lack of awareness of this vital national problem. Also lack of modern equipment's in blood banks which depend mainly on

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family donor system all over the country makes the blood insufficient and unsafe.

II. Objectives of the Study:

General objective:

to highlight the blood transfusion practices in Al-Thawra Teaching Hospital.

Specific objectives:

1. To determine the relative distribution of cross-matched blood in different departments of the hospital.
2. To evaluate the use rate of blood and blood components among patients who need blood.
3. To determine the crossmatched to transfused ratio (C/T) and the resulted extra-amount of unneeded crossmatched blood.
4. To ensure that the components required are made available in both quantity and quality.

Material and Methods:

The study is a descriptive study for whole cross-matched units of blood, done in the blood bank at Al-Thawra Hospital during the period January 2003 to January 2004. Data collection started at blood bank then completed in the different departments through the patients and their files. A structured questionnaire was filled from the request paper.

Data analysis:

Variables were recorded in one chart. Variables were analyzed by SPSS program.

III. Results:

Demographic data:

960 cross-matched units of blood were studied. Information regarding age, sex, blood group and Rh was available for the recipients. 538 (56%) units were crossmatched for male patients. 422 (44%) units were crossmatched for female patients. The male/ female ratio was 1.27:1.

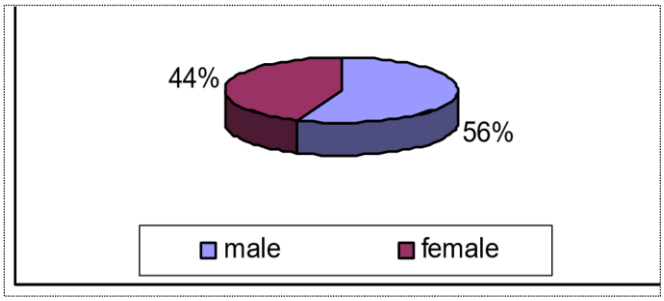

Figure 1: Distribution of crossmatched units of both sex.

The mean age of patients for whom the cross-matching tests were done was 31.6 ±18.3 "median 30" years. Table (1) shows the age groups of the recipient patients, whereby 65% were under the age of 50 years and 87.5% of patients were under the age of 70 years. Table 1: Frequency of cross-matched units among age groups

Age group	Frequency	Percentage
1-<10	115	12%
10-<20	123	12.8%
20-<30	123	12.8%
30-<40	102	10.6%
40-<50	166	17.3%
50-<60	97	10.1%
60-<70	114	11.9%
70-<80	120	12.5%

Most of the blood group cross-matched during the period of the study were O+ve, found in 459 (48%) patients, followed by A+ve, B+ve, O-ve, A-ve, AB+ve and AB-ve. The least frequent was B-ve, found in one patient only as shown in table (2).

Table 2: Frequency of the blood group in the recipients

Blood group	No patients	Percentage
O+ve	459	48%
O-ve	68	7%
A+ve	297	31%
A-ve	25	2.6%
B+ve	96	10%
B-ve	1	0.1%
AB+ve	10	01%
AB-ve	3	0.3%

Blood bank service:

During the period of study all blood groups were available except only 4 units were not available at the blood bank (three units were AB-ve and one unit was AB+ve) and these were requested from other hospitals. The rare groups were not available.

The necessary pre-transfusion tests such as: VDRL, HbsAg, HCV antibodies and HIV were done for all units and written on all bags before cross-matching. There are no written rules and instructions for donors and no predonation questionnaire. Also, the donor is not seen by a physician before donation.

Component of blood available in blood bank:

Three types of blood & blood components were available:

- Whole blood (stored and fresh)
- Frozen plasma (stored & fresh)
- Packed RBCs

Most blood requests were for stored whole blood 842 (87.5%) followed by fresh whole blood, fresh frozen plasma and packed red blood cells requested for 67 (7%), 19(2%) and 17(1.8%) respectively.

Departments:

960 units were cross-matched for patients in different departments. Most of the units were cross-matched for patients in surgical ward 551 (58%) units, for different indications, followed by medical, emergency and pediatric department cross-matched for 125 (13%), 106(11%) and 96(10%) patients respectively. The least cross-matched units, 82 (8.5%) were for gynecological and obstetrical department. It was observed that there is no surveillance system in the wards to assess the incidence and prevalence of transfusion risks.

Indications for blood transfusion

The indications for transfusion were classified into 4 categories regardless the department from which the patient came. During the period of the study the highest frequency for crossmatched units were for medical indications 387 (40%) units, and the smallest number of crossmatched units were for gynecological and obstetrical indications 76 (8%) units, see figure (2).

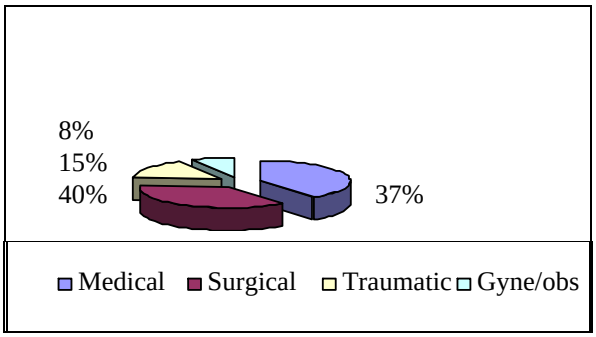

Figure 2: Indications for blood transfusion.

The most common medical indication was anemia 212 (55%) units, followed by blood diseases, gastrointestinal bleeding and renal failure represented 89(23%), 54(14%) and 31(8%) patients respectively. Surgical indications for transfusion ranked the second. The highest number of crossmatched units were for patients whom they will undergo cardiac surgery 147 (41%) units, and the least number was for pediatric surgery 10(3%) units, see figure (3).

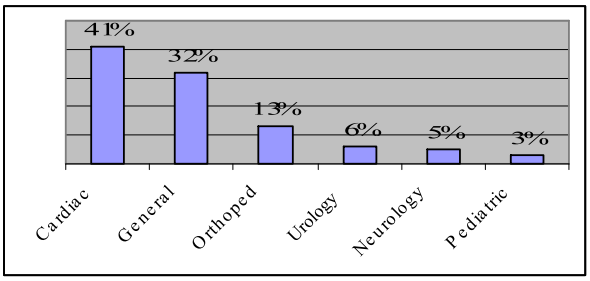

Figure 3: Surgical indications for blood transfusion.

Traumatic indications for blood transfusion ranked the third, 142 (15%) units. Most crossmatched units for traumatic indications were for patients after road traffic accident and gunshot injury 65 (46%) units for each, and small number was for patients with fall down 10(7%) and stab wound injury only two units (1.4%).

Gynecological and obstetrical indications for blood transfusion were the least common indication and ranked the fourth, 76 (8%) units. The most common crossmatched units were for gynecological indications 49 (64.5%) units, e.g. dysfunctional uterine bleeding & hysterectomy. The rest were for obstetrical indications, 27 (35.5%) units.

Returned blood:

During the period of the study it was found that from whole crossmatched blood 247 (26%) units were returned to blood bank and 222 (90%) units of the returned blood were returned after leaving the blood bank immediately, (transfusion was cancelled) 25 (10%) units were returned after some time of delivering them from the blood bank. The median time of delay between delivering the blood and returning it to the blood bank was approximately 3 hours.

The high percentage of returned blood (48%) was from the surgical ward, whereas the lowest percentage of returned blood was from the medical and gynecological & obstetrical wards (13%) for each.

Blood dispersion from the blood bank:

The blood was given to the patients by three ways:

1. *580 (61%) units were given for the patients by guarantee until the patient gives donors to the bank. Most of the units given by guarantee were for patients in surgical ward (55%) and the least number for the pediatric ward (6%).*
2. *221(23%) units were given to the patients who previously brought donors to the blood bank before transfusion. Most of these units were for patients in the surgical ward (92%) and the smallest number was for patients in the medical ward (0.5%).*
3. *156 (16%) units were given free to the patients, without guarantee or donors. The majority of the units were for patients in the medical ward (40%) and the smallest*

percentage (3%) was for patients in gynecological and obstetrical ward.

IV. Discussion:

This is the first study as we know that was designed to follow the fate of blood transfusion at Al-Thawra Teaching Hospital. In the daily practice it may be observed some over prescribing and irrational use of the blood observed in high percent of returned blood and in prescribing whole blood for patients who need only one blood component.

In the present study, there is little increase in male patients (56%) who need blood, because male persons are the active part of the population and they may face trauma and/or stress which may necessitate blood transfusion. In contrast to study done in North England by Wells et al, nearly half (49.3%) of the crossmatched units were for female patients [8].

The median age of patients for whom crossmatching tests were done was around 30 years. This result is similar to that reported from South Africa [9]. While in the study done by Wells et al. the median age of patients was 67 years [8]. In other study done in Sweden in 1993, the median age was 71 years and only 10% of patients were under the age of 50 years and 38% were for patients under the age of 70 years [10].

In this study, however, (65.5%) of patients were under 50 years and (87.5%) were under 70 years. Thus, there is a big difference (about 40 years) between our country and Western countries regarding the age of patients who are in need for blood. This difference may be due to young population pyramid of our country in which young people form most of the society. In contrast to old population pyramid of Western countries where the percentage of old people is high. In addition, the increase in the incidence of all forms of trauma, rheumatic heart disease, gastrointestinal bleeding and chronic renal failure in the active young people may reflect this difference.

In this study, the most common blood groups for which crossmatching tests were done were blood group O and A, found in (54.5%) and (34%) respectively. Whereas the blood group B was infrequent. The majority of the patients were Rh+ (90%) and a minority was Rh- (10%). These results reflect the blood group distribution in the general population (hospital records) and approximately are similar to that recorded in Saudi Arabia and in Caucasians [11-13].

From this study it was clear that the most common indication was the medical indication (40%) followed by surgical (37%), traumatic (15%), and the least common indication for blood was the gynecological and obstetrical indication (8%). This can be explained by the fact that the hospital is a referral hospital for blood and gastrointestinal diseases as well as for cardiac surgery and major trauma. These results are in accordance with North England study which found (51.6%) for medical indications followed by surgical (40.7%) and small percentage were for gynecological and obstetrical indication. However, other study in Sweden showed that the highest percentage of indications was for surgical followed by medical in (47%) and (29%) correspondingly [10]. In North England study the traumatic indications were only (3%) of all indications [8], compared to 15% in our study. This indicates that trauma is more frequent in our country than in England.

Blood components

The preparation of blood components allows a single blood donation to provide treatment for two or three patients and also avoids the transfusion of blood components that patient may not require [14]. Whole blood should only be used when increased oxygen carriage and massive circulatory volume expansion are required, which is a rare situation. Also stored whole blood should be assumed not to possess any worthwhile hemostatic function [14].

The actual study reveals that despite of presence of other blood components to a considerable degree in the blood bank of the hospital, most of the blood requests, during the study period were for stored whole blood (87.5%) for different indications. The percentage of requested other components of blood, like packed RBCs, and plasma was very small. This result is in contradiction with blood transfusion practices worldwide where the whole blood is requested in small number of patients who need blood volume replacement [15-17].

As it was noticed in patients with anemia that actually need the oxygen-carrying capacity of red cells and not the plasma for volume replacement, most of the blood requests were for whole stored blood (87.3%) and only small percentage (16.7%) for red cells. This practice, represent a major irrational use of blood.

It is possible that the cause of not ordering blood components frequently, despite its availability, is that the separation of the blood components is usually done manually which is rudimentary and not effective at all. Thus, the separation of the blood components should be done by modern, automatic machine of blood separation and stored in suitable conditions.

Although, blood was screened for only four known blood transmitted diseases (HIV, HBV, HCV and syphilis), that not exclude other blood transfused diseases for which no screening was done e.g., malaria, HTLV-1 and Cytomegalovirus and others not known and no tests are available to detect them such as hepatitis D and G virus. Also the viremia, but antibody negative "window period" remains a major problem globally. But the automated genomic amplification techniques such as Polymerase Chain Reaction (PCR) to individual donations may be able to resolve this problem with little regard for high costs. However, near-absolute safety of blood cannot be ensured through technical/ laboratory solutions alone without regard for all the other vital and complementary elements such as brief history concentrating on common risk factors, which are essential to quality and safety. As well as elimination of any suspected donor and collection of blood only from selected voluntary non-remunerated donors ensure save blood [18].

The study revealed that the over-ordering of the blood is obviously clear from the high percentage of returned blood (26%) leading to shortage of blood. When a unit of blood is crossmatched for a particular patient it is removed from the

bank capacity and is made unavailable for using by another patient, who may need it at that time. Most of the returned blood (90%) was returned to the bank after, median time of "3" hours, making this blood unsafe due to hemolysis and contamination. The highest percentage of returned blood was from the surgical wards (38%) due to postponing of the operation or there was no bleeding during operation.

Blood dispersion from the bank

In the present study, the donation of blood was mainly depending on family donation system. This means that the relatives are donating for a particular patient. This type of blood donation is abandoned worldwide and is replaced by voluntary non-remunerated donors. In Taiwan, since 1974 all donations depend on this system [19]. Consequently, there are major problems if there is no organized blood transfusion service and no coordinated plan for a modern blood transfusion service. Since the unavailability of blood in a life-threatening condition is obviously a catastrophic situation for the patient and his relatives to make the blood available immediately. And since the organization of a volunteer donor program requires sophisticated and long-term arrangements, the problem is approached in the only possible way, by making the patient, family and friends responsible for providing donors.

The majority (61%) of units were given by guarantee, which obligates the patient to bring 2 donors for each unit. That means they must replace double amount, making this blood unsafe for recipients, because the obligated family will arrange this even from high risk group of donors. 23% of blood was given to patients who have relatives' donors before. There are several reasons why this "family donor system" is unsatisfactory, unsafe and dangerous:

- It may not be possible for patient's family to find suitable donors and the family may feel obligated to donate even if they know that they have some health problem which prohibits blood donation.
- This may also encourage "blood selling practice" from whom the Hb level is low and the risk of certain transmissible diseases is higher. Although it is well known that certain category in Yemen can sell their blood, due to poverty and khat or drugs addiction, it was not possible to investigate this issue in this study, because this type of behavior is usually done in secret.
- Finally, since this blood is dedicated to a particular patient, it may often be transfused to that patient even if not ultimately needed.

Only 16% of blood was given free of charge, which is the correct way for blood transfusion.

In conclusion the stored whole blood was the commonest blood component transfused in spite of availability of some blood components. This type of transfusion and over ordering of the blood, lead to shortage and exhaustion of the blood bank and expose the blood to hemolysis and contamination and the patient to many complications. The absence of suitable policy for blood collection and dispersion and the dependency mostly on the "family donor system" as a main source for blood, cause extra cost for patient and hospital. Also the "Family donor system" is unsafe and dangerous blood.

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