

# Analyzing ordering schedule of blood and its products in Shahid Mohammadi hospital, Bandar Abbas, Iran

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## Original Article

### Abstract

**Introduction:** Supplying healthy blood and blood products for patients is amongst the high-priority goals of every country in the world. It is evident that meeting this goal needs a large organization with ideal human resources and equipments. Improper ordering of blood by hospitals and medical centers not only increases the Iran Blood Transfusion Organization expenses, but also prevents proper distribution of blood units among the medical centers and will result in false shortage, expiration of blood and blood products, and reduction of blood quality. In this study, we decided to analyze how blood and its products are used in hospitals and also why blood is not used in various departments of the most important teaching hospital of Hormozgan Province.

**Methods:** A total of 8523 order forms for receiving blood and its products, which have been sent to blood bank of Shahid Mohammadi Teaching Hospital within September 2011 to March 2012, were studied in this descriptive retrospective study. The collected data from the blood bank were analyzed using SPSS 16 Software.

**Results:** In this study, out of 8523 blood order forms, 5864 forms belonged to men (68.8%) and 2659 forms belonged to women (31.2%). A total of 21474 units of blood products including red blood cells, plasma, platelet and cryo were ordered. The total C/T for RBC measured 2.8 and its total Ti was 0.59.

**Conclusion:** Results of this study show that consuming blood in contrast to standard is ideal. Maximum surgical blood ordering schedule (MSBOS) shall be designed only for parts that have a high C/T ratio and for preparing blood only determining blood group and antibody screening (T&S) were necessary.

**Key words:** Cross Match - Transfusion – Bandar Abbas

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### Introduction:

Supplying healthy blood and blood products for patients is amongst the high-priority goals of every

country in the world. It is evident that meeting this goal needs a large organization with ideal human resources and equipments. The mentioned

conditions are expensive for the Blood Transfusion Organization. Immethodical blood and its products orders increase Blood Transfusion Organization expenses (1,2). Improper blood orders by hospitals and medical centers not only increases the Iran Blood Transfusion Organization expenses, but also prevents proper distribution of blood among the medical centers and brings about a false shortage, expiration of blood and blood products, and reduction of blood quality, cancelling some surgeries, etc. (3,4). Many studies on how blood and its products are consumed have been conducted during 1970's and 1980's; most of them indicate immethodical consumption of blood and its products, especially in the surgical departments. These data convinced us to revise and determine a proper schedule for ordering and using blood and its products (5,6).

For analyzing demand and consumption of blood in hospital departments Henry and Boral suggested two indexes, Cross-match/transfusion (C/T) and Transfusion index (Ti) during 1970's. C/T index in fact is the ratio of the cross-matched bloods to the transfused blood, with  $2.5 > C/T$  ratios indicate an ideal use of blood and its products. Ti index in fact implies the ratio of transfused units to number of cross-matched patients; with  $0.5 \leq Ti$  ratios indicate a considerable need to blood. It means that both the ordered and cross-matched bloods have been transfused mostly. When C/T and Ti are low patients, it is better to use Type & Screen grouping system. In this study, we decided to analyze the consumption amount of blood and its products and also why blood is not consumed in various departments of the most important teaching hospital of Hormozgan Province.

## Methods:

A total of 8523 order forms for receiving blood and its products, which have been sent to blood bank of Shahid Mohammadi Teaching Hospital within September 2011 to March 2012, were examined in this descriptive retrospective study. For this purpose, initially a questionnaire including certain information such as age, gender, number of the ordered units and type of product, number of consumed and unconsumed units was prepared.

Hospital departments were asked in this study and after collecting information from blood bank forms, and then they were coded and analyzed using SPSS 16. C/T and Ti were measured for all patients and for each department, separately.

## Results:

In this study, out of 8523 blood order forms, 5864 forms belonged to men (68.8%) and 2659 forms belonged to women (31.2%). A total of 21474 units of blood products including red blood cells, plasma, platelet and cryo were ordered during the six month period of this study, out of which 11302 units were consumed and 10172 units were returned. Out of total consumed units, 4016 units were RBC, 3269 units were plasma, 2283 were platelet and 1734 units were cryo. Table 1 shows consumed and unconsumed amounts of plasma, platelet and cryo by departments and figure 2 shows consumed and unconsumed amounts of RBCs

The total C/T for RBC measured 2.8 and its total Ti was 0.59. The highest C/T ratio belonged to emergency department (14.3) which was followed by surgical emergency department (8.6). C/T index by departments is shown in figure 1.

The highest Ti value belonged to cardiac operation room department ( $Ti=1.5$ ) which was followed by Orthopedic operation room department ( $Ti=1.3$ ). Table 1 shows Ti values by departments.

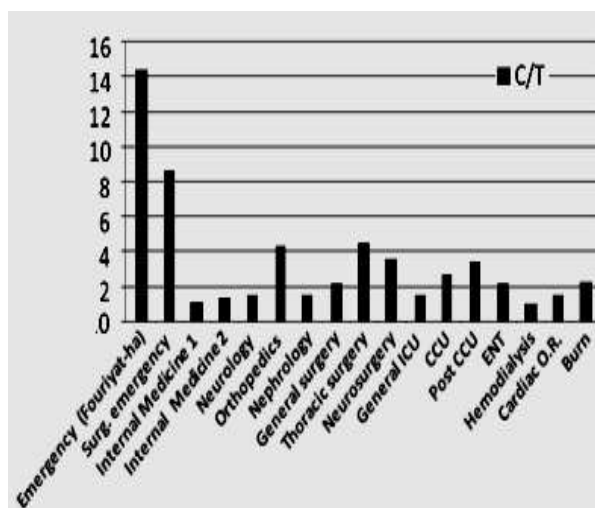


Figure 1. (C/T) crossmatched to transfused bloods ratio by different departments of Shahid Mohammadi Hospital

**Table 1. Distribution of blood and its products by departments in Shahid Mohammadi Teaching Hospital, Bandar Abbas City**

No	Department	Packed cell		FFP		Platelet		Cryo		C/T	Ti
		Are consumed	Are not consumed	Are consumed	Are not consumed	Are consumed	Are not consumed	Are consumed	Are not consumed		
1	Emergency (Fouriyat-ha)	147	1966	2	37	29	47	-	36	14.3	0.18
2	Surg. emergency	253	1930	24	41	23	80	6	-	8.6	0.25
3	Internal Medicine 1	417	59	492	240	2	523	147	12	1.1	0.54
4	Internal Medicine 2	137	53	184	38	8	274	159	42	1.3	0.50
5	Neurology	25	12	-	-	23	13	23	-	1.5	0.71
6	Orthopedics	167	552	3	-	83	-	3	2	4.3	0.37
7	Nephrology	97	51	16	50	39	132	115	42	1.5	0.56
8	General surgery	145	169	36	50	2	65	-	-	5.2	0.35
9	Thoracic surgery	80	280	2	-	67	27	-	-	4.5	0.41
10	Neurosurgery	56	145	-	26	43	19	2	-	3.5	0.36
11	General ICU	442	245	427	148	252	1028	630	18	1.5	0.56
12	CCU	20	33	4	41	-	5	-	-	2.6	0.66
13	Post CCU	46	110	1	245	-	19	5	-	3.4	0.61
14	ENT	38	46	25	-	44	7	8	-	2.2	0.57
15	Hemodialysis	182	1	-	-	4	16	41	-	1.0	1.12
16	Cardiac Operation Room	262	125	286	46	29	383	2	-	1.5	1.33
17	Burn	50	63	-	-	23	-	-	-	2.3	0.53

## Conclusion:

The results show that the highest C/T ratio (14.3) belongs to emergency department. It shows the immethodical order of blood in this department. Surgical emergency, general surgery, thoracic surgery, orthopedics, neurosurgery and POST CCU departments had the highest C/T ratio, respectively.

In contrast to the mentioned departments, internal surgery, internal medicine, neurology, nephrology, burn, hemodialysis, heart operation room, general ICU, CCU, and ENT are in a good condition in contrast to the standard level.

The results of this study also show that the most orders for plasma (FFP) belonged to emergency, internal medicine, heart operation room and general ICU departments. There was a significant relationship between FFP ordering and its consumption rate in the mentioned department. The highest rate of immethodical ordering of FFP belonged to POST CCU.

For platelet consumption, most orders belonged to internal emergency, internal medicine, general ICU, heart ICU and heart operation room departments. The immethodical and unreasonable ordering of platelet in POST CCU is evident. It is

followed by internal medicine and general ICU in terms of leaving platelets useless.

Cryo usage rate in contrast to other blood products has a considerably lower frequency and generally there is a reasonable relationship between its demand and consumption in different departments.

Alaodollehei et al. studied C/T and Ti in Babol's Yahyanejad Hospital and reported them as 2.01 and 0.86, respectively which had an ideal condition rather the standard condition. In this study, the highest C/T belonged to elective surgery (4.17), midwifery and maternity (5) and men surgery (4.03) departments. In other departments, C/T ratio was below the standard ratio and had a better condition (6).

In another study Blaine et al. in the Gondar Teaching Hospital in Ethiopia reported C/T and Ti for the whole hospital as 2.3 and 0.77, respectively; whereas C/T and Ti for the surgical emergency department were 1.7 and 0.81, respectively (7).

In Tehran's Firoozgar Hospital, Khalili Aelam et al. studied the elective surgical operation and found C/T 21.5; it suggested a very low (4.75) usage of the cross-matched blood units (8).

In another descriptive study made in Hamedan's Be'that Hospital, Rafiei Mehr (2009) demonstrated

that the general indexes of C/T and Ti have an ideal condition and the highest and lowest C/T belonged to surgery and burn department and the highest and lowest Ti belonged to hematology and urology departments, respectively (9).

Beizaie et al. analyzed amount of the reserved blood (in reserve and cross-matched forms) before elective surgeries since 2001 to 2009 in Mashhad's 22 Bahman Hospital. Total C/T ratio decreased from 14.1 to 3.7. The results imply the effect of New York Guideline in 2006 (10).

Results of C/T and Ti of this study are consistent with the results of the mentioned study. Comparing these results with other studies makes it clear that elective surgeries are amongst operations to which the highest rate of immethodical blood orders in all hospitals are dedicated. The high ratio of C/T (14.3) in emergency department seems unreal and it seems that it is due to a parallel activity with other department; thus a wise management is needed to prevent iterative orders to the blood bank department. Obstetrics and Gynecology department is a department where surplus blood ordering is high. What makes this study differentiated from other similar studies is lack of Obstetrics and Gynecology department in our study.

It is worthy to say that type of disease or surgery was not specified in some forms and we failed to conclude based on such variables.

Proper use of blood and its products not only prevents any excessive and heavy expense over the Blood Transfusion Organization, but also improves the quality of blood and their distribution among the patients in need. In order to achieve this goal, experts of blood bank decided to prepare and implement a proper blood and its products ordering schedule. Designing Maximum surgical blood ordering schedule (MSBOS) is one of effective measures in this regard. In this schedule, any surgical operation to blood is specified which prevents unreasonable storage of blood and conducting unnecessary tests (6).

Results of this study show that using blood in contrast to standard condition is ideal. Maximum surgical blood ordering schedule (MSBOS) shall be designed only for parts that have a high C/T ratio and for preparing blood only determining blood group and antibody screening (T&S) were

necessary. Departments with high C/T need a scientific revision for preparing a MSBOS before surgical operations. Determining Rh, ABO and T&S tests are sufficient for this purpose. The highest unnecessary orders of FFP and platelet belong to POST CCU which it needs revisions too.

Generally for optimal use of blood and its products, some in-service training should be planned for physician assistants and paramedics, also continuous supervisions on how blood and its products are used in the hospitals are necessary.

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# بررسی الگوی مصرف خون و فرآورده‌های خونی در مرکز آموزشی و درمانی شهید محمدی بندرعباس

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## چکیده

**مقدمه:** تهیه و تأمین خون و فرآورده‌های خونی سالم جهت بیماران نیازمند از اهداف مهم سلامتی هر کشوری است. بدیهی است که جهت انجام این امر خطیر سازمانی بزرگ با منابع انسانی و لوازم و وسایل مطلوب مورد نیاز است. درخواست نامناسب خون از طرف بیمارستان‌ها و مراکز درمانی نه تنها منجر به افزایش هزینه‌های سازمان انتقال خون می‌شود بلکه سبب عدم توزیع مناسب خون بین مراکز درمانی و کمبود کاندب، کهنه شدن خون و فرآورده‌های خونی، کاهش کیفیت خون می‌گردد. در این مطالعه ما تصمیم گرفتیم تا به بررسی میزان مصرف خون و فرآورده‌های آن و علت احتمالی عدم مصرف در بخش‌های مختلف مهمترین بیمارستان آموزشی استان هرمزگان بپردازیم.

**روش کار:** این مطالعه توصیفی، گذشته‌نگر بر روی ۸۵۲۳ فرم درخواست خون و فرآورده‌ها از مهرماه ۹۰ تا پایان اسفند ماه ۱۳۹۰ که به آزمایشگاه بانک خون بیمارستان آموزشی شهید محمدی فرستاده شده بود، انجام شد. اطلاعات جمع‌آوری شده از واحد بانک خون با استفاده از نرم‌افزار SPSS 16 مورد بررسی قرار گرفتند.

**نتایج:** در مطالعه حاضر از ۸۵۲۳ فرم درخواست خون مورد بررسی ۵۸۶۴ نفر (۶۸/۸٪) مرد و (۳۱/۲٪) ۲۶۵۹ مورد زن بودند. ۲۱۴۷۴ واحد فرآورده شامل گلبول‌های قرمز، پلاسما، پلاکت و کرایو درخواست گردیده است. در ارتباط با فرآورده گلبول قرمز شاخص  $C/T$  کل بدست آمده برابر ۲/۸ است و همچنین شاخص  $TI$  کل ۰/۵۹ می‌باشد.

**نتیجه‌گیری:** از نتایج مطالعه حاضر می‌توان استنباط نمود که مصرف خون در مقایسه با استاندارد از وضعیت مطلوب برخوردار است. تنها در بخش‌هایی که از نسبت  $C/T$  بالایی برخوردارند باید اقدام به طراحی جدول الگوی حداکثر درخواست خون برای جراحی ( $MSBOS = Maximum Surgical blood Ordering Schedule$ ) نموده و جهت آماده نمودن خون تنها اقدام به تعیین گروه خون و غربالگری آنتی بادی ( $T&S$ ) نمود.

**کلیدواژه‌ها:** کراس مچ - تزریق خون - بندرعباس

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