

## Crossmatch to Transfusion Ratio as a New Quality Indicator in Blood Banking

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### ABSTRACT

**Aim:** To evaluate the cross-match/transfusion (C/T) ratio, which is a new indicator used in blood transfusion centers, in terms of different clinics in our institution.

**Methods:** The number of cross-matches and transfusions performed in our Blood Transfusion Center during the nine-month period between April 2018 and December 2018 were obtained from Hospital Information Management. A ratio of 1.2 and below is considered indicative of optimum blood usage.

**Results:** During the 9-month study period 9407 crossmatches and 8691 transfusions were performed included in the study was and the total number of was. The C/T ratio of our hospital in the study period was found to be 1.08 x 100. The best C/T ratios were seen in Departments of Cardiovascular Surgery and Plastic Reconstructive and Aesthetic Surgery. The worst ratio was 1.67 which was detected in Department of Chest Surgery, followed by 1.37 which was detected in Department of Infectious Diseases and Clinical Microbiology.

**Conclusions:** It can be stated that, the C/T ratios in our hospital have reached the international standards of blood centers.

**Keywords:** Cross-match, Transfusion, Blood center

### INTRODUCTION

Blood transfusion is needed in chronic diseases such as accidents, wars and disasters, various criminal attempts, surgical interventions, hemophilia, leukemia, aplastic anemia, and serious clinical conditions such as pregnancy where any other therapeutic option is not available [1]. Individuals who make up the society need blood and blood products from time to time for themselves, their families or their immediate surroundings for various reasons throughout their life. Since blood and blood products cannot be obtained under laboratory conditions, vitally important blood should be obtained from healthy individuals [2]. The annual blood need of a country is about 1 million units per year [3]. It should be remembered that 5% of the society donates voluntary blood to meet this rate in developed countries. In our country, the blood donation rate is at the level of 1.5% of the society [4]. It is clear that with this rate, the need for blood cannot be met. Keeping this shortcoming in mind, unnecessary blood demand should be avoided.

Unnecessary blood request is an event that crucially affects the stock in the blood centers. As a result of each unnecessary request, the blood component prepared by cross-match loses a certain time from its shelf life [5]. In the effective operability of blood centers, the ratio of the amount of cross-match product to the transfused is important. This rate is the best

indicator of proper blood use for the hospital and the communication between the clinician and the blood center. Quality Indicators of Transfusion Centers were revised in April 2018 and “evaluation of cross-match / transfusion (C/T) ratio” came into force [6].

In this study, it is aimed to evaluate the C/T ratio, which is a new indicator used in blood transfusion centers, in terms of different clinics in our institution, and to make necessary improvements regarding the use of erythrocyte suspension in our hospital by examining our data.

### METHODS

In this study, the number of crossmatches and transfusions performed in S.B.Ü. Bozyaka Training and Research Hospital Blood Transfusion Center during the nine-month period between April 2018 and December 2018 were obtained from

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Hospital Information Management System.

The C/T ratio in the relevant period for every department was computed using the following equation:

[Crossmatch to transfusion ratio = Number of unit's cross-matched / number of units transfused]

A ratio of 1.2 and below is considered indicative of optimum blood usage.

## RESULTS

During the 9-month study period 9407 crossmatches, and 8691 transfusions were performed included in the study wasand the total number of was. The C / T ratio of our hospital in the studyperiod was found to be 1.08 x 100. This ratio complies with the <2 standard, which is an indicator of effective functioning of blood centers.

**Table 1.** The crossmatch/transfusion ratios by for every department in our hospital.

|    |                                                             | N of crossmatches | N of transfusions | C/T Ratio   |
|----|-------------------------------------------------------------|-------------------|-------------------|-------------|
| 1  | Division of Hematology Department of Internal Medicine      | 2576              | 2497              | 1.03        |
| 2  | Department of Internal Medicine                             | 1935              | 1795              | 1.08        |
| 3  | Department of General Surgery                               | 915               | 847               | 1.08        |
| 4  | Department of Orthopedics and Traumatology                  | 403               | 370               | 1.09        |
| 5  | Department of Neurosurgery                                  | 210               | 190               | 1.10        |
| 6  | Department of Urology                                       | 227               | 194               | 1.17        |
| 7  | Division of Oncology Department of Internal Medicine        | 165               | 134               | 1.23        |
| 8  | The Bone Marrow Transplantation Unit                        | 110               | 104               | 1.06        |
| 9  | Department of Emergency Medicine                            | 902               | 692               | 1.30        |
| 10 | The Hemodialysis Unit                                       | 180               | 174               | 1.03        |
| 11 | The Palliative Care Unit                                    | 76                | 70                | 1.09        |
| 12 | The General Intensive Care Unit                             | 190               | 177               | 1.07        |
| 13 | The Internal Medicine Intensive Care Unit                   | 394               | 364               | 1.08        |
| 14 | Department of Anesthesiology and Reanimation                | 148               | 147               | 1.01        |
| 15 | The Burn Intensive Care Unit                                | 131               | 124               | 1.06        |
| 16 | The Organ Transplantation Unit                              | 368               | 331               | 1.11        |
| 17 | Department of Infectious Diseases and Clinical Microbiology | 59                | 43                | 1.37        |
| 18 | Department of Plastic Reconstructive and Aesthetic Surgery  | 20                | 20                | 1           |
| 19 | Department of Neurology                                     | 68                | 64                | 1.06        |
| 20 | Department of Otorhinolaryngology                           | 39                | 30                | 1.3         |
| 21 | Department of Underwater and Hyperbaric Medicine            | 10                | 8                 | 1.25        |
| 22 | Department of Cardiovascular Surgery                        | 21                | 21                | 1           |
| 23 | Division of Nephrology Department of Internal Medicine      | 272               | 257               | 1.06        |
| 24 | Department of Chest Surgery                                 | 5                 | 3                 | 1.67        |
|    | <b>Total</b>                                                | <b>9407</b>       | <b>8691</b>       | <b>1.08</b> |

## DISCUSSION

The aim of this study is to evaluate the C/T ratio, which is a new indicator used in blood transfusion centers, in different clinics in our institution. When the C/T ratios in our hospital are evaluated, it is seen that our institution has reached the international standards of blood centers.

Blood shortage is a major problem for most blood banks in our country because of a great demand and a poor donation culture. In our country, the need for blood is largely provided by relatives of patients, and the amount of blood donated by voluntary citizens remains at quite a low level. The San GUİS study, which compared 43 training hospitals in terms of

transfusion approaches in ten European Union countries, is one of the important studies that question blood transfusion. In this study, it has been stated that blood transfusion rates vary highly between hospitals in standard operations and homogeneous patient groups. For example, in coronary artery bypass grafting operations, this rate was found to be between 0-96% and in total hip prosthesis between 0 and 100 %, while it showed that blood was not used in some centers for the same operation in patients with similar clinical features, while blood was almost always used in other centers [7]. This condition was interpreted as, "Blood transfusion is an application that takes place according to the request of a physician, not to the need of a patient" [8]. Today, the ratio between the cross-matched and transfused blood or blood products is important in evaluating the working performance of blood centers. The C/T ratio is the total number of unit's cross-matched in advance of surgery units divided by the total units actually transfused. According to international standards of blood centers C/T ratio is desired to be <2 [6]. There are many benefits of determining the C/T ratio according to different departments within the institution. First of all, the distribution of unused blood albeit prepared for the patients among physicians and services is monitored. Secondly, in-service training can be given to physicians and services with a high C/T ratio. Although blood products within the hospital can reach the required place within 30 min in blood transport containers, blood products that are not used out of necessity can lead to product losses. Since reservations are made in the name of the patient in the blood center, the clinicians are responsible for informing the blood center if the blood need for the patient has disappeared [5]. The good functioning of the communication processes, even if protocols are created, still depends on the discretion of human beings.

When deciding on a transfusion, it is absolutely necessary to review whether the patient really needs transfusion, which blood product is needed, and how many units of blood should be transfused to the patient. In the study comparing 3 major hospitals abroad, the withdrawal rate of blood requirement was found to be 4%, 15% and 25%, respectively, and the corresponding C/T ratios were 1.3, 2, 2.2 [9]. While the C/T ratios in Erciyes University blood bank were 2.5 before 2005, this rate decreased to 1.4 with the encouragement of giving up unnecessary blood use in hospitals in 2007 [10].

The reasons for achieving the target values of our hospital may be listed as the periodic trainings organized by the Hemovigilance Unit regarding the blood transfusion center being close to the clinics where transfusion is performed, compliance with critical blood stock policies, communication with clinics and transfusion indications.

## CONCLUSION

When the C/T ratios in our hospital are evaluated, it is seen that our institution has reached the international standards of blood centers. Since any unnecessary cross-match tests were

not performed in our hospital, an advantage in terms of cost and personnel functionality has been gained.

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## CONFLICT OF INTERESTS

Authors declare that there is no conflict of interest in this article

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