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Orginal Article

Evaluation of Blood Transfusion Need in Hospitalized Covid-19 Patients*

*Hastanede Yatan Covid-19 Hastalarında Kan Transfüzyon İhtiyacının Değerlendirilmesi**

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Abstract

Aim: Blood product management and need during the Covid 19 pandemic is a controversial issue. The effect of reduced blood donation due to the pandemic on blood product management has not yet been determined. The aim of this study is to determine the rate of blood transfusion in COVID-19 patients.

Material and Methods: The 9-month period between 01.07.2019-31.03.2020 before the pandemic and the 9-month period between 01.04.2020-01.01.2021 during the pandemic period were determined as the time period for scanning the data. The numbers of whole blood, erythrocyte concentrate (EC) , fresh frozen plasma (FFP), pooled platelet concentrate, apheresis platelet concentrate , apheresis granulocyte concentrate, and cryoprecipitate concentrate produced in our hospital provided for COVID-19 services and intensive care units (ICU) or obtained from Kızılay were analyzed.

Results: 56,936 patients, including the patients hospitalized in the ICU, were treated in our hospital in the 9-month period before the pandemic and 34,931 patients were hospitalized in the fisrst 9-month period during the pandemic. The number of blood products used in the operating room decreased by 62% and the number of blood products used throughout the hospital decreased by 22%. The number of blood donors decreased from 5414 in the pre-pandemic period to 3879 during the pandemic period. The transfusion rate per patient increased from 0.40 (the pre-pandemic period) to 0.47 (the pandemic period). The rate of transfusion per patient was 1.5 in the pre-pandemic period in ICUs while it was 1.6 during the pandemic period.

Conclusion: Although the number of transfusions per patient increased during the pandemic in our center, it was shown that the number of inpatients and transfusions decreased with the decrease in elective surgeries.

Key words: Covid 19 Pandemic, Blood Product, Blood Transfusion, Blood Saving Strategies

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Öz

Amaç: Covid 19 salgını sırasında kan ürünü yönetimi ve ihtiyacı tartışmalı bir konudur. Pandemi nedeniyle azalan kan bağışının kan ürünü yönetimine etkisi henüz belirlenmemiştir. Bu çalışmanın amacı, COVID-19 hastalarında kan transfüzyonu oranını belirlemektir.

Gereç ve Yöntemler: Pandemi öncesi 01.07.2019-31.03.2020 arasındaki 9 aylık dönem ve pandemi dönemindeki 01.04.2020-01.0.2021 arasındaki 9 aylık dönem verilerin taranma süresi olarak belirlendi. Hastanemizde üretilen ve Kızılay'dan temin edilen; COVID-19 servisleri ve yoğun bakım ünitelerinde (YBÜ) kullanılan ; tam kan, eritrosit konsantresi (EC), taze donmuş plazma (TDP), havuzlanmış trombosit konsantresi, aferez trombosit konsantresi, aferez granülosit konsantresi ve kriyopresipitat konsantresi sayıları analiz edilmiştir.

Bulgular: Pandemi öncesi 9 aylık dönemde yoğun bakımda yatan hastalar dahil 56.936 hasta hastanemizde tedavi gördü ve pandemi döneminde ilk 9 aylık dönemde 34.931 hasta hastaneye yatırıldı. Ameliyathanede kullanılan kan ürünü sayısı %62, hastane genelinde kullanılan kan ürünü sayısı ise %22 azaldı. Pandemi öncesi dönemde 5414 olan kan bağışçısı sayısı, pandemi döneminde 3879'a geriledi. Hasta başına transfüzyon oranı 0,40'tan (pandemi öncesi dönem) 0,47'ye (pandemi dönemi) yükseldi. Yoğun bakımlarda hasta başına transfüzyon oranı pandemi öncesi dönemde yüzde 1,5 iken pandemi döneminde yüzde 1,6 oldu.

Sonuç: Pandemi sürecinde merkezimizde hasta başına düşen transfüzyon sayısı artmasına rağmen elektif cerrahilerin azalmasıyla birlikte yatan hasta ve transfüzyon sayılarının azaldığı gösterilmiştir.

Anahtar Kelimeler: Covid 19 Pandemisi, Kan Ürünleri, Kan Transfüzyonu, Kan Kurtarma Stratejileri

Introduction

SARS-COV-2 (Severe Acute Respiratory Syndrome causing Coronavirus) has started to spread all over the world leading to a pandemic since the end of 2019, causing highly contagious respiratory COVID-19 disease. During the COVID-19 pandemic, the blood donation rate decreased due to restrictions, while the high rate of asymptomatic infection has raised concerns about blood safety (1-3). However, to the best of our knowledge, there is no case reports that the SARS-COV-2 virus is transmitted by blood transfusion.

Due to the COVID 19 pandemic, intensive care units (ICU) occupancy have increased in all centers. Many studies have been conducted on the care and treatment of COVID-19 patients. However, there are limited studies on the need for blood transfusion in COVID-19 patients (4-8). The aim of this study is to determine the rate of blood transfusion in COVID-19 patients. According to the results of this study, blood saving strategies can be developed during the pandemic.

Material and Methods

Blood component transfusion and donor numbers in the pre-pandemic and pandemic period at the Hospital Blood Center were retrospectively screened. The official announced date in Turkey was considered as the onset of COVID-19 pandemic. The 9-month period between 01.07.2019-31.03.2020 before the pandemic and the 9-month period between 01.04.2020-01.01.2021 during the pandemic period were determined as the time period for scanning the data. The numbers of whole blood, erythrocyte concentrate (EC), fresh frozen plasma (FFP), pooled platelet concentrate, apheresis platelet concentrate , apheresis granulocyte concentrate, and cryoprecipitate concentrate produced in our hospital provided for COVID-19 services and ICUs or obtained from Kızılay were analyzed. The total number of inpatients, the number of patients in ICUs and COVID-19 service-ICUs, and the number of patients whose COVID-19 ICD code was defined in the periods specified in the operating system of our hospital were determined. Among these data, patients who needed blood and blood products were included in the study.

Results

The data in the study were obtained using the nine-month pre-pandemic and nine-month post-pandemic data of the GUTF Hospital Blood Center. The date of the first COVID 19 case diagnosed in Turkey (31.03.2020) was taken as the onset of the pandemic and the data until the end of the year were determined as pandemic period in the study. As the pre-pandemic period, the period between 01.07.2019 - 31.03.2020 was de-

termined to be equal to the 9-month period during which the data were obtained during the pandemic period. Before the pandemic, between 01.07.2019 - 31.03.2020, 56,936 patients, including the patients hospitalized in the ICU, were treated in our hospital, and 34,931 patients were hospitalized between 01.04.2020-01.01.2021 during the pandemic period. During the pandemic period, the number of hospitalized patients and the number of operations decreased. A total of 38,506 operations were performed in our hospital in the 9-month period before the pandemic, and the number of operations performed during the pandemic period was 21,300 with a decrease of 44%.

In the pre-pandemic period, 2,007 blood products were used in the operating room and 20,578 blood products were used in the inpatient service and ICUs throughout the hospital. During the pandemic period, 744 blood products are used in the operating room; 16,009 blood products were used in the inpatient service and ICU. Compared to the pre-pandemic period, the number of blood products used in the operating room decreased by 62% and the number of blood products used throughout the hospital decreased by 22%. The number of blood donors decreased from 5414 in the pre-pandemic period to 3879 during the pandemic period. The number of blood donors decreased by 28%during the pandemic period (Table 1). The total number of transfusions performed in the inpatient service, ICU and operating room was 22,585 in the pre-pandemic period while it was 16,753 in the pandemic period. The number of blood product transfusions during the pandemic period decreased by 25.8%. Considering the decrease in the number of inpatients, the transfusion rate per patient increased from 0.40 (the pre-pandemic period) to 0.47 (the pandemic period) (Table 2).

During the pandemic period, 2,326 patients were admitted to our hospital with the diagnosis of COVID-19. 2,383 blood products were administered to patients with a diagnosis of COVID 19 who were hospitalized (Table 3). The number of blood products transfused to patients hospitalized for non-COVID reasons during the pandemic period was 14,370 (Table 4). While 4,680 patients were followed in the ICU before the pandemic, 3,608 patients were followed in the COVID ICU and other ICUs during the pandemic period. The rate of transfusion per patient was 1.5 in the pre-pandemic period in ICUs while it was 1.6 during the pandemic period (Table 5). During the pandemic period, 461 patients were admitted to the COVID ICU. The distribution of blood products transfused to patients hospitalized in the COVID ICU is presented in the graphic (Chart 1).

Table 1: Distribution of blood products in pre-pandemic and pandemic period

	PRE-PANDEMIC (01.07.2019 -31.03.2020)	DURING PANDEMIC (01.04.2020 - 01.01.2021)
Number of donors (n)	5414	3879
Blood component obtained from the Turkish Red Crescent (n)	14374	11547
Blood component produced in Gazi University Hospital (n)	13247	8158
Whole blood transfusion (n)	10	4
EC: Erythrocyte concentrate transfusion (n)	11755	8993
FFP: Fresh frozen plasma transfusion (n)	6329	4497
Total platelet concentrate transfusion (n)	3753	2672
Apheresis –Pooled (n)	2215-1538	1715-957
Apheresis granulocyte concentrate transfusion (n)	5	1
Cryoprecipitate concentrate transfusion (n)	748	591

Table 2: Distribution of transfusion rates in pre-pandemic and pandemic period

	Before Pandemic		During Pandemic	
	n	%	n	%
Erythrocyte Concentrate	11755	19,6	8993	25,7
Fresh Frozen Plasma	6329	10,5	4497	12,8
Platelet Concentrate	3753	6,5	2672	7,6
Cryoprecipitate Concentrate	748	1,3	591	1,6
Total	22585		16753	
Number of transfusions/	0,40		0,47	
Number of Patients				

Table 3: Blood product rates transfused for Covid 19 patients		
	Before Pandemic	During Pandemic
	n	n
Erythrocyte Concentrate	1255	53,9
Fresh Frozen Plasma	627	26,9

Table 4: Blood product rates transfused for Covid 19 (-) patients		
	Before Pandemic	During Pandemic
	n	n
Erythrocyte Concentrate	7738	53,8
Fresh Frozen Plasma	3870	26,9
Platelet Concentrate	2308	16,1
Cryoprecipitate Concentrate	454	3,2
Total	14370	
Number of transfusions/ Number of Patients	0,4	

Table 5: Distribution of blood products in ICUs in pre-pandemic and pandemic period				
	Before Pandemic		During Pandemic	
	n	%	n	%
Erythrocyte Concentrate	3085	65,9	2587	71,7
Fresh Frozen Plasma	2384	50,9	2157	59,7
Platelet Concentrate	942	20,1	773	21,4
Cryoprecipitate Concentrate	377		220	
Total	6788		5737	
Number of transfusions/ Number of Patients	1.5		1.6	

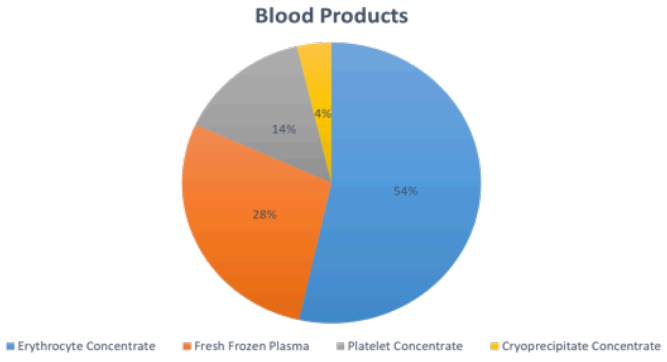

Chart 1: The distribution of blood products transfused to patients hospitalized in the COVID ICU

Discussion

The main finding of this study was that although the number of donors decreased and the need for transfusion per patient increased during the COVID-19 pandemic, the need for blood products did not increase due to the decrease in the number of elective surgeries and inpatients.

As the World Health Organization stated in the Guidelines for Safe and Adequate Blood Supply During the Influenza Pandemic published in 2011, blood donation can be greatly reduced as a result of donors being infected, unable to donate or avoiding public meetings (3). In our hospital, there was 28% decrease in the number of donors during the pandemic compared to the pre-pandemic period. We think that the reason for this is the fear of being infected during blood donation and the unwillingsness to go to the hospital except for mandatory situations.

Barriteau et al., reported that 41 (13.4%) of 305 COVID-positive patients needed transfusion in their study. The transfusions were 11.1% EC, 1.6% Platelet suspension, 1.0% FFP, 1.0% cryoprecipitate. They concluded that COVID-19 patients require less blood transfusion than other patients (4). In the 9-month period during the pandemic in our hospital, 2326 COVID 19 positive patients were hospitalized, 2039 blood products were given to these patients in the inpatient service and 344 blood products were given in the ICU. During the pandemic period, 643 blood products were administered to 461 patients hospitalized in the COVID ICU in our hospital. Of the blood products administered, 54% were EC, 28% FFP, 14% thrombocyte suspension, and 4% cryoprecipitate concentrate. Similar to the study of Barriteau et al., the most commonly used blood product was EC for COVID patients in our hospital. The number of transfusions/total patients in the ICU before and during the pandemic was 1.5 and 1.6, respectively. For COVID-19 patients in the ICU, the number of transfusions/total patients was 1.4. The insignificant increase in the transfusion rate per patient during the pandemic period may suggest that COVID 19 infection does not cause an increased blood product transfusion. Similarly, Wang et al. concluded that COVID-19 did not lead to increased blood demand (5).

It was concluded that during the pandemic, the total number of hospitalized patients and transfusions decreased by 39% and 25%, respectively, compared to the pre-pandemic period. Although the number of individual transfusions and inpatients has decreased, the rate of transfusion per patient was 0.40 in the pre-pandemic period and 0.47 in the pandemic period. The reason for this increase in the number of transfusions/patients may be the relative increase in emergency cases due to the cessation of elective cases, with a high probability of bleeding, requiring ICU follow-up, indulging, or trauma cases.

In the study by Velázquez-Kennedy et al., there was a 17.6% decrease in the number of transfusions between March 1 and April

30, 2020 compared to the same period before the pandemic. Again, during the pandemic period, a 58.6% decrease in elective surgical operations and a 61.7% decrease in the use of EC in related surgeries and a 50.2% decrease in the use of blood components in all surgical clinics were observed. However, the need for transfusion in ICU and COVID-19 inpatient services has increased significantly. In the ICU, there was a 116% increase in transfusion of 458 units in 2020, compared to 212 units of transfusion in 2019. In 2020, it was determined that 545 units were transfused to COVID-19 patients (6). Similar to this study, the number of transfusions performed in our hospital during the pandemic period decreased by 25%, elective surgical operations decreased by 44%, and accordingly, the total number of blood products used in operations decreased by 62%.

COVID-19 has presented an unprecedented challenge in many branches of medicine, such as blood banking. Patient blood management is a multidisciplinary strategy to provide optimal decision support by using evidence-based guidelines and transfusing the most appropriate blood products with the minimum dose required for the clinical situation. It is an evidence-based practice where the need for blood products is managed by ensuring appropriate management of a limited resource while providing better patient outcomes and reducing healthcare costs. In the study by Hofmann et al., which reflects the experiences of patient blood management practitioners in different countries, it was mentioned that the COVID 19 pandemic could be an accelerator in this regard due to problems such as increased blood demand and potential blood safety (7). Therefore, PBM strategies are imperative to manage blood supply difficulties during natural disasters or disease outbreaks and the long-term socioeconomic impacts after these crises (8).

This study has some limitations. First of all, it is an archival study designed retrospectively. In addition, more than one transfusion to a patient was not evaluated separately, so the rate of transfusion per patient was evaluated. Since it is a single center data and non-COVID patients are accepted during the pandemic process, the findings of similar studies may differ in other centers.

Conclusion

In conclusion, although the number of transfusions per patient increased during the pandemic in our center, it was shown that the number of inpatients and transfusions decreased with the decrease in elective surgeries.

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