Türk Kadın Sağlığı ve Neonatoloji Dergisi

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Original Article

Evaluation of the Use of Blood and Blood Components of Etlik Zübeyde Hanım Gynecology and Obstetrics Clinics Training and Research Hospital Between 2021 and 2023

Etlik Zübeyde Hanım Kadın Hastalıkları ve Doğum Eğitim Araştırma Hastanesi'nde Kan ve Kan Bileşenlerinin 2021-2023 Yılları Arasında Kullanımlarının Kliniklere Göre Değerlendirilmesi

R. Sinan Karadeniz [1], Büşra Seçilir *[1], Emine Terzi [1], Mustafa Ertürk [1]

[1] Etlik Zübeyde Hanım Women's Health Training and Research Hospital, Blood Centre, Ankara, Türkiye

Abstract

Objective: The aim of this study is to determine the distribution of blood components by hospitals, to obtain information on hospital preferences for blood products, to determine the quantities of blood products requested and used, and to examine rates of noncompliance with blood product requirements.

Material and Method: This is a single-centre retrospective study conducted between January 2021 and December 2023. In this study, we retrospectively analysed the changes in the number of blood transfusions, blood products, inpatients and outpatients.

Results: In our study, a total of 8702 units of blood products including 5705 units of erythrocyte suspension (65.63%), 2750 units of fresh frozen plasma (31.63%), 183 units of pooled platelets (2.10%), 54 cryoprecipitate (0.62%) were used in Etlik Zübeyde Hanım Gynaecology and Obstetrics Training and Research Hospital in the last 3 years.

Conclusion: Erythrocyte suspension was the most commonly used blood product in the last 3 years. The least used blood product was cryoprecipitate. Due to supply options and transfusion combinations, blood transfusion should be individualised considering the cost-benefit ratio. Case-by-case assessment of blood transfusion rates would be useful to achieve a significant reduction in blood transfusion collection and especially disposal rates.

Keywords: blood products; blood transfusion; COVID-19; obstetrics; gynecology; oncology

Corresponding author *: Etlik Zübeyde Hanım Women's Health Training and Research Hospital, Blood Centre, Ankara, Türkiye.
Email: busracelik81@gmail.com
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Öz

Amaç: Bu çalışmanın amacı kan bileşenlerinin hastanelere göre dağılımını belirlemek, hastanelerin kan ürünleri tercihleri hakkında bilgi edinmek, talep edilen ve kullanılan kan ürünleri miktarlarını belirlemek ve kan ürünü taleplerine uyumsuzluk oranlarını incelemektir.

Gereç ve Yöntem: Bu çalışma Ocak 2021 ile Aralık 2023 tarihleri arasında yapılmış tek merkezli retrospektif bir çalışmadır. Bu çalışmada kan transfüzyonu sayısı, kan ürünü sayısı, yatan ve ayaktan hasta sayısındaki değişimi retrospektif olarak analiz ettik.

Bulgular: Çalışmamızda 5705 ünite eritrosit süspansiyonu (%65,63), 2750 ünite taze donmuş plazma (%31,63), 183 ünite havuzlanmış trombosit (%2,10), 54 adet kriyopresipitat (%0,62) olmak üzere toplam 8702 ünite kan ürünü Etlik Zübeyde Hanım Kadın Hastalıkları ve Doğum Eğitim ve Araştırma Hastanesi'nde son 3 yılda kullanılmıştır.

Sonuç: Son 3 yıl içerisinde en çok kullanılan kan ürünü Eritrosit Süspansiyonudur. En az kullanılan kan ürünü ise kriyopresipitattır. Tedarik seçenekleri ve transfüzyon kombinasyonları nedeniyle kan transfüzyonu, maliyet-fayda oranı dikkate alınarak bireyselleştirilmelidir. Kan transfüzyonu oranlarının vaka bazında değerlendirilmesi, kan transfüzyonu toplama ve özellikle imha oranlarında önemli bir azalma sağlamak için faydalı olacaktır.

Anahtar Kelimeler: kan ürünleri; kan transfüzyonu; COVID-19; kadın doğum; jinekoloji; onkoloji

1. Introduction

Blood transfusion is a life-saving treatment that is equivalent to a tissue transplant and carries many risks. Despite intensive studies, the use of blood and blood components is unavoidable, as artificial substances that can replace blood and its components cannot be produced for the time being (1). The most important point in the clinical use of blood is that blood transfusions should be administered in the minimum amount to meet the needs with correctly selected blood components for appropriate indications. The aim is to help patients who need blood components with the least possible harm (2). A common goal of hospitals around the world is to make better use of available blood resources by maximizing the number of patients that can be cared for and reducing blood waste. Managing blood is difficult because blood products are perishable, supply is stochastic and demand is highly uncertain. In addition, red blood cells are categorized into different groups and must be compatible with patients. Due to the difficulties in procuring blood products, their optimal use and their high risks, they are only recommended if the expected benefits for the patient outweighs the possible risks. This is because unsafe and unnecessary transfusions expose patients to serious adverse transfusion reactions and infection risks (3). In addition, access to blood products for patients who really need them is limited. Since alternative products that can replace these products have not yet been developed worldwide, it is important to use blood and blood products rationally and minimize waste. The World Health Organization (WHO) has stated that hospitals and transfusion centers are among the main contributors to healthcare waste (4). Studies show that waste can be caused by donor selection, blood collection, blood product manufacturing, transportation and transfer process, storage of blood products in inappropriate conditions, excessive reserve of blood products, expiry date of products, quality control results and seropositivity, lack of training and wrong indications (5,6). Keeping the cost of blood products under control is one of the most important issues facing healthcare professionals. The main goal is to optimize the use of blood products and keep costs under control. Studies show that the waste of blood products can be significantly reduced if the guidelines for the use of blood products are followed. The provision of safe and sufficient blood should be an integral part of every country's national health policy. The WHO recommends that all activities related to the collection, testing, storage, processing and distribution of blood should be coordinated at the national level through integrated blood supply networks. In 2018, 73% of countries reporting to the WHO had a national blood policy, and most of them were developed countries (3). On March 20, 2019, the "Technical Assistance Project for the Development of a Blood Transfusion Management System in Turkey" funded by the European Union and the Republic of Turkey was launched in Turkey with the Ministry of Health as the beneficiary organization. The main objective is to reduce waste and control costs by making arrangements to ensure that blood collected from a limited number of donors is used for patients who need it most.

The aim of this study was to determine the distribution of blood components by hospital, to obtain information on hospital preferences for blood products, to determine the quantity of blood products requested and used, and to investigate the rate of incompatibilities in hospital requests for blood products.

2. Materials and Methods

This study was a retrospective chart review of patients treated with blood and blood products between 01.01.2021 and 01.01.2024 at Etlik Zübeyde Hanım Gynecology and Obstetrics Training and Research Hospital, a reference hospital. The change in the use of blood products by the patients registered in the hospital information system, i.e. erythrocyte suspension (ES), platelet suspension, fresh frozen plasma (FFP), cryoprecipitate and whole blood, was evaluated retrospectively by year and unit without differentiating by age, sex, nationality, diagnosis, internal medicine-surgery clinic, intensive care unit. The study protocol was approved by the Ethics Committee for Non-Interventional Studies of Etlik Zuebeyde Hanım Research and Training Hospital (Decision No:4/9 24.04.2024). All participants signed written and verbal informed consent and the principles of the Declaration of Helsinki were adhered to.

The study included female patients over 18 years of age who were treated and followed up in our hospital and in whom blood and blood products were used. Exclusion criteria were patients who refused treatment, patients who did not agree to participate in the study, male patients and patients under 18 years of age. The International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) codes of hospitalized patients were also retrieved from the hospital database.

Statistical analysis

SPSS 20 (IBM Corp. published 2011. IBM SPSS Statistics for Windows, version 20.0, Armonk, NY: IBM Corp.) was used to analyze the data. The data were analyzed using visual (histograms, probability plots) and analytical methods (Kolmogorov–Smirnov/ Shapiro–Wilk tests) to determine their normal distribution. A p-value < 0.05 was considered an indication of statistical significance.

3. Results

In our study, a total of 8702 units of blood products including 5705 units of erythrocyte suspension (65.63%), 2750 units of fresh frozen plasma (31.63%), 183 units of pooled platelets

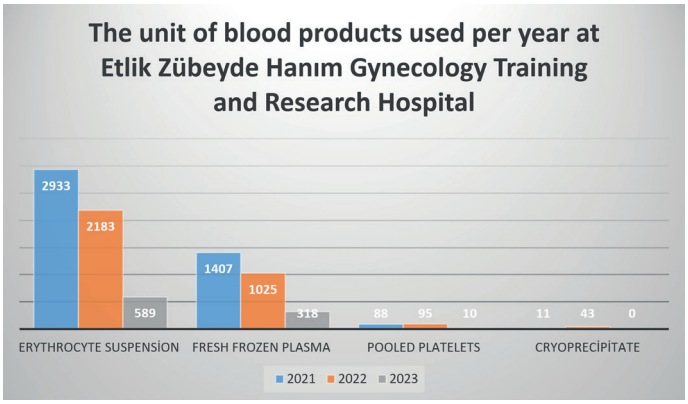

Figure 1. The unit of blood products used per year at Etlik Zübeyde Hanım Gynecology Training and Research Hospital shows

(2.10%) and 54 units of cryoprecipitate (0.62%) were used in Etlik Zübeyde Hanım Gynecology Training and Research Hospital during the last 3 years (Figure 1). Erythrocyte suspension was the most commonly used blood product each year. Cryoprecipitate was the least used blood product per year. In 2021, a total of 4439 units of blood products were used, including 2933 units of erythrocyte suspension (66.07%), 1407 units of fresh frozen plasma (31.69%), 88 units of pooled platelets (1.98%) and 11 units of cryoprecipitate (0.24%). In 2022, a total of 3336 units of blood products were used, including 2183 units of red blood cell suspension (65.43%), 1025 units of fresh frozen plasma (30.72%), 85 units of pooled platelets (2.54%) and 43 units of cryoprecipitate (1.28%). In 2023, a total of 917 units of blood products were used, including 589 units of red blood cell suspension (64.23%), 318 units of fresh frozen plasma (34.67%) and 10 units of pooled platelets (1.09%). No cryoprecipitate was used in 2023.

In 2021, most blood products were used in the fields of obstetrics, gynecology and puerperium. The most commonly used blood product was erythrocyte suspension and the least used product was cryospecipitate. In 2022, the services that used the most blood products were gynecology, gynecology service and high risk pregnancies service. In 2023, the services that used the most blood products were gynecology, obstetrics and gynecologic oncology. The most commonly used blood product was erythrocyte suspension and the least used product was platelets (Table 1).

In the first year (2021), 22 adverse reactions were reported in 1487 patients (4428 units of blood products) who received a transfusion of blood products. The reaction rate was reported as 1.41%. In 2022, an adverse reaction was reported in 21 out of

Table 1. The number of crossmatches and the number of transfusions by hospital service per year

	2021		2022		2023	
Hospital Services	Cross-match	Transfusion	Cross-Match	Transfusion	Cross-match	Transfusion
Infertility	181	144	134	94	27	16
High-Risk Pregnancy Service	108	77	83	71	0	0
Perinatology Intensive Care	34	28	31	29	0	0
Chemotherapy (Gynecologic Oncology)	314	254	5	4	0	0
Gynecology	692	534	515	433	260	213
Outpatient 18 (Gynecologic Oncology)	172	132	3	3	3	3
Gynecologic Oncology	684	537	234	211	118	84
Early Pregnancy 3A Service	188	156	98	94	20	18
Maternity Service	378	309	430	420	151	118
High-Risk Pregnant Woman Maternity Service	59	17	314	267	19	14
Emergency	0	0	3	3	0	0
Postpartum Service	871	706	556	554	109	79
Total	3681	2933	2632	2183	761	589

Table 2. Blood products used in 2021, 2022 and 2023 and the number of patients who developed side effects related to these products and the reactions observed

	Years		
Number of Patients	2021	2022	2023
Total Erythrocyte suspension (n)	2933	2183	589
Febrile non -hemolytic reaction (n)	1	1	1
Mild allergic reaction (n)	3	2	-
Hypotensive transfusion reaction (n)	2	1	2
Total Platelet suspension (n)	88	95	10
Febrile non -hemolytic reaction (n)	-	-	-
Mild allergic reaction (n)	-	1	-
Hypotensive transfusion reaction (n)	-	-	-
Total Fresh frozen plasma (n)	1407	1025	318
Febrile non -hemolytic reaction (n)	2	-	-
Mild allergic reaction (n)	14	16	5
Hypotensive transfusion reaction (n)	-	-	-

957 patients (3303 blood products) who received a transfusion of blood products. The adverse reaction rate was determined to be 2.19%. In 2023, 8 adverse reactions were reported in 285 patients (917 blood products) who received blood product transfusions. The reaction rate was 2.80% (Table 2).

4. Discussion

The need for blood and blood products is increasing day by day. Despite all the studies, no artificial product has yet been found that can replace blood, so its use remains unavoidable. Blood transfusions are equivalent to tissue transplants or even organ

transplants and represent a risky and life-saving treatment method (7). Against this background, we wanted to determine in our study where and how much blood and blood products have been used in our hospital in the past 3 years. In 2021, with the outbreak of the COVID-19 pandemic in the province where our hospital is located and in other major provinces, the Ministry of Health of the Republic of Turkey developed a Clean Hospitals Strategy. As part of this strategy, hospitals were divided into two groups: Hospitals where COVID-19 cases were treated (1- Pandemic Hospitals) and hospitals where COVID-19 cases were referred to the hospitals in the first group (2- Clean Hospitals). With this distinction, sensitive patients such as oncology patients and pregnant women whose treatment could not be postponed were mainly treated in clean hospitals. Although such a dual care strategy seems reasonable, the current study cannot provide comparative analytical data to evaluate the effectiveness of this strategy. However, it shows how the frequency of blood product use in our hospital has changed over this period according to changing needs. On the other hand, a change in our patient population was observed in 2023 due to a change in hospital staff and a change in the building where the service is provided. In this case, our results were affected. However, the most commonly used product in all 3 years is the erythrocyte suspension, which is consistent with the literature.

When we look at the literature, the results of the studies are the results of general hospitals rather than specialty hospitals. In the study conducted by Küçüktaş et al. on the evaluation of the use of blood and blood components by the hospital at Düzce College Health Application and Research Center, in 7341 units of blood product transfusions, the transfusion rate of erythrocyte suspensions was 59% and the transfusion rate of fresh frozen plasma was 22%. They found that 18% of platelet suspensions, 0.05% of cryoprecipitate transfusions and 0.05% of whole blood transfusions were performed. the study used 4327 units of ES, 1587 units of FFP, 1344 units of platelet suspension, 42 units of cryoprecipitate and 41 units of whole blood (8).

In an original retrospective study conducted by Yüksel et al. 2019 in an emergency department with 227 patients, it was found that the most commonly transfused blood product was ES, both in the literature and in their own study: “In our study, ES was the most commonly transfused, as in the literature.” (9). In their retrospective study conducted by Doğan et al. in the emergency department, they found that ES was widely used, which is consistent with the literature: “We found that 84.8% of 469 blood and blood products were erythrocyte suspensions, which is consistent with the literature” (10). Circular No. B100THG100004/5190 on the use of whole blood, published by the Directorate General of Treatment Services of the Ministry of Health in 2006 and updated in 2016, states that whole blood is accepted worldwide as a raw material and is used in transfusion medicine only for certain indications and that the Ministry has set a target to increase the use of whole blood to 5%. It has been stated that this percentage can be reduced to approximately (11).

The most important supplier of blood products in our country is the Turkish Red Crescent. The Turkish Red Crescent covers 90% of the blood product needs of all hospitals. On the other hand, each hospital can carry out platelet apheresis procedures within its capacity. According to the Turkish Red Crescent, 2 million 809 thousand 237 units of blood were donated in 2019. In 2020, it was 2 million 370 thousand 912 donations (12). The Red Crescent donation rate fell by 15.6% nationwide between 2019 and 2020. In the first 3 months of the pandemic (April-July 2020), a decrease in donations of up to 22 was reported Al-Riyami et al. (13). In a multicenter study conducted by, it was reported that 75% of participating centers experienced a decline in blood donation rates (14). Similarly, a study conducted in China found that blood donor rates dropped by 67 with the outbreak of the epidemic. A report from Colombia also reported a drop in blood donations of up to 65% (15). A report from Italy noted a 32% drop in blood donations, although there was no shortage of blood products in all departments except infectious disease and intensive care units. The decline in blood donations at national level was lower in our country than in many other countries. This could be due to the fact that blood donations are mainly collected by state blood banks under the control of the Turkish Red Crescent. The Turkish Red Crescent, like other organizations, actively promotes blood donation through social media, television and posters (13-17).

Another reason is that 60% of blood donations in our country come from family members. In our study, it was found that no whole blood suspension was used in our hospital in the last 3 years. It turned out that 0.05%, which is less than the 5% targeted in the Ministry of Health circular, was used. In the study we conducted, the most commonly used blood product in the 3 years in question was therefore an erythrocyte suspension, which is consistent with the literature.

With the emergence of the COVID-19 pandemic, the government of our country imposed school closures, the switch to hybrid learning in schools and weekend curfews from April 2020. The bans were in force until July 1, 2021. During the pandemic, outpatient and inpatient admissions fell by 34.3% and 39.8% respectively compared to the pre-pandemic period. The rate of ES transfusions throughout the hospital fell significantly during

the pandemic. The use of the operating theater in this hospital also fell by 21.3 during the pandemic compared to the pre-pandemic period. The decline in operating room activity in this hospital is in line with that of Delabranche et al. However, it is not as severe as reported in their study (18). They reported that during this period, the number of inpatient procedures decreased by 62, the number of surgical procedures decreased by 57, and outpatient surgery was rarely performed. Similarly, the number of elective surgeries in the United States has decreased by 91% during the COVID-19 pandemic (19). Some other studies at a single center reported the postponement of most or all elective surgeries; this is consistent with several guidelines recommending the postponement of elective surgeries (20-23). In this hospital, there was not such a dramatic decline. This is primarily due to the additional diagnostic and treatment needs of pregnant patients referred from pandemic hospitals.

As this study is a retrospective study, prospective and more comprehensive studies are needed to substantiate the results obtained. The most important strength of our study is that, as a maternity hospital, we analyzed our clinical data to include the period of the pandemic. The most important limitation is that we did not have access to patient demographic data. Due to supply difficulties and transfusion complications, blood transfusion should be individualized considering the gain/loss ratio. Assessment of blood transfusion rates at regular intervals will be useful to significantly reduce the blood transfusion rate and especially the disposal rate.

Author contribution

Study conception and design: RSK, ET; data collection: BCS; analysis and interpretation of results: RSK, BCS, ET, ME; draft manuscript preparation: RSK, BCS, ET, ME. All authors reviewed the results and approved the final version of the manuscript.

Ethical approval

The study was approved by the Ethics Committee for Non-interventional Studies of Etlik Zübeyde Hanım Women's Health Training and Research Hospital (Protocol no. 04/24.04.2024).

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The authors declare that the study received no funding.

Conflict of interest

The authors declare that there is no conflict of interest.

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Araştırma fikri ve tasarımı: RSK, ET; veri toplama: BCS; sonuçların analizi ve yorumlanması: RSK, BCS, ET, ME; araştırma metnini hazırlama: RSK, BCS, ET, ME. Tüm yazarlar araştırma sonuçlarını gözden geçirdi ve araştırmanın son halini onayladı.

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