ARAŞTIRMA MAKALESİ / *RESEARCH ARTICLE*

Knowledge of Health Professionals on Blood Transfusion Practices, Storage, Clinical Use and Reactions

Sağlık Profesyonellerinin Kan Transfüzyon Uygulamaları, Saklanması, Klinik Kullanımı ve Reaksiyonları Hakkında Bilgi Düzeyi

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ABSTRACT

Aim: *Blood transfusion is also a tissue transplant and continues to be applied in many areas. Blood Transfusion training should be given to all healthcare professionals, and information should be updated in light of new developments. In our study, we aimed to evaluate the knowledge of physicians and nurses about the clinical use and transfusion of blood products.*

Material and Method: *A questionnaire consisting of 16 questions was applied to 147 doctors and nurses working in the surgical and coronary intensive care units of XXXX Hospital between 01.10.2021 and 15.10.2021 to determine and compare their knowledge levels on blood and blood product transfusion. Questionnaire questions were prepared under four main headings: Basic transfusion information, clinical use of blood products, transfusion reactions, and storage of blood products.*

Results: *65.3% (n: 96) of the participants were female, and the mean age was 29.6±6.5. The mean age of the doctors and nurses, respectively (35.3±8.1 vs. 27.4±4.0 <0.001), was statistically significant. No employee could answer all questions correctly, and only four physicians answered 15 questions correctly. Nurses could answer a maximum of 13 questions (n: 3). While physicians gave statistically significant answers to 4 questions in total, it was determined that other healthcare professionals gave statistically better answers than physicians in only one question (Question 14). All employees' average correct answers were 9 (range 7–10). Physicians gave correct answers to 10 (9–12) questions and other healthcare professionals 9 (7–10) questions, and it was not statistically significant.*

Conclusion: *It is essential to maintain the knowledge level of physicians and health workers in transfusion practices after graduation. It should be ensured that they benefit from scientific meetings and in-service training regarding current developments.*

Key words: *blood transfusion; health care professionals; hemovigilance; blood supply safeties*

ÖZET

Amaç: *Kan transfüzyonu da bir doku naklidir ve birçok alanda uygulanmaya devam edilmektedir. Transfüzyon eğitimi tüm sağlık çalışanlarına verilmeli ve yeni gelişmeler ışığında bilgiler güncellenmelidir. Çalışmamızda hekim ve hemşirelerin kan ürünlerinin klinik kullanımı ve transfüzyonu hakkındaki bilgilerini değerlendirmeyi amaçladık.*

Materyal ve Metot: *Kan ve kan ürünleri transfüzyonu konusunda bilgi düzeylerinin belirlenmesi ve karşılaştırılması amacıyla xxxxx Hastanesi cerrahi ve koroner yoğun bakımları ile servislerinde çalışan 147 doktor ve hemşireye 01,10,2021–15,10,2021 tarihleri arasında toplam 16 sorudan oluşan bir anket uygulanmıştır. Anket soruları Temel transfüzyon bilgileri, Kan ürünlerinin klinik kullanımı, Transfüzyon reaksiyonları, Kan ürünlerinin saklanması konularında dört ana başlık olarak hazırlanmıştır.*

Bulgular: *Katılımcıların %65,3 (n: 96) kadın idi ve yaş ortalaması 29,6±6,5 olarak saptandı. Doktorların ve hemşireleri yaş ortalaması sırasıyla (35,3±8,1 vs. 27,4±4,0<0,001) istatistiksel olarak anlamlı bulundu. Hiçbir çalışan tüm sorulara doğru yanıt veremedi ve sadece dört hekim 15 soruya doğru yanıt verdi. Hemşireler en fazla 13 soruya cevap verebildi (n: 3). Toplamda dört soruda hekimler istatistiksel olarak anlamlı yanıt verirken, diğer sağlık çalışanları yalnız bir soruda (soru 14) hekimlerden istatistiksel olarak daha iyi yanıt verdikleri belirlendi. Toplamda tüm çalışanların doğru cevap verme ortalaması 9'du (7–10 aralığı). Hekimler 10 (9–12), diğer sağlık çalışanları 9 (7–10) soruya doğru yanıt vermişlerdi ve istatistiksel olarak anlamlı saptanmadı.*

Sonuç: *Hekim ve sağlık çalışanlarının transfüzyon uygulamalarındaki bilgi düzeylerinin mezuniyet sonrası da devam ettirilmesi önemlidir. Güncel gelişmeler ile ilgili olarak hizmet içi eğitimlerin yansıra bilimsel toplantılardan da yararlanmaları sağlanmalıdır.*

Anahtar kelimeler: *kan transfüzyonu; sağlık profesyonelleri; hemovijilans; kan ürün güvenliği*

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Introduction

Blood is known as a tissue with many functions consisting of cells and structures. Therefore, blood transfusion is also a tissue transplant[1]. It has many indications such as acute bleeding, surgical operations, increasing the hemoglobin level in anemia of serious chronic diseases, and correcting bleeding disorders. The basic rule in transfusion is to safely supply, transport, store and transfuse the blood components required for the patient[2].

In 2020, the need for blood donation was 2,704,636 units, and the Turkish Red Crescent met 90% of them. A total of 229,132 units of blood were used in 13 centers serving as Temporary Regional Blood Centers, 29% of which was provided by the Turkish Red Crescent. Turkish Red Crescent met 95% of the need for 2,448,445 units of blood of 1,131 hospitals with the status of Transfusion Center[3].

Although transfusion applications save lives when necessary, they can also cause life-threatening complications if appropriate conditions are not provided. Transfusion-related complications may occur due to erroneous practices such as not recording the patient's personal information correctly, using the wrong tube, inconsistency, not paying attention to the administration time, and giving it with inappropriate fluids[4]. According to the British Serious Hazard of Transfusion (SHOT) data, the most important cause of transfusion-related deaths is ABO incompatibility, and 19 ABO-incompatible transfusions and 1495 near-miss events were reported between 2016 and 2020. Again, in the same reporting system, 39 transfusion-related deaths were reported in 2020, and 14 (35.9%) of them were found to be preventable[5].

It is important for healthcare professionals to have sufficient knowledge and skills in order to perform safe blood transfusion. Persons who put and apply transfusion indications should have sufficient knowledge and skills about giving the right blood to the right patient, informing the patient about transfusion, keeping the blood appropriately and observing the patient for signs of reaction during transfusion, preventing possible complications and what to do when complications develop. In our study, we aimed to evaluate the knowledge of physicians and nurses about the clinical use and transfusion of blood products.

Material and Methods

In order to determine and compare their knowledge levels on blood and blood product transfusion, a questionnaire consisting of 16 questions was applied to 147 doctors and nurses working in the surgery and cardiology intensive care units of our center between 01.10.2021 and 15.10.2021.

In the questionnaire titled "Investigation of Knowledge Levels of Health Care Professionals on Blood Transfusion and Reactions", eight questions were asked including demographic information such as age and gender, as well as professional information such as duration of work, transfusion practices in their clinics, and whether they participated in in-service training on blood transfusion. Questionnaire was prepared under four main headings (Table 1):

1. Basic transfusion information
2. Clinical use of blood and blood products
3. Transfusion reactions
4. Storage of blood products

Continuous variables were expressed as mean and standard deviation, and categorical variables were expressed as percentages. Student-t test was used to compare data with normal distribution, and Mann-Whitney U test or Chi-square (X^2) test was used to evaluate data that did not show normal distribution. p value <0.05 was considered statistically significant.

Results

0%.65 (n: 97) of the participants were female and the mean age was 29.6±6.5. The mean age of the doctors and nurses respectively (35.3±8.1 vs. 27.4±4.0<0.001) was found to be statistically significant compared to other healthcare professionals. The number of employees in surgical departments was 109 (74.1%). A statistically significant difference was found among those who worked for 0–5, 5–10, 10 years or more according to the working year. 57.8% (n: 85) of the participants had been working for less than 5 years and 66.7% (n: 98) stated that they had received transfusion training. In the question about how the transfusion decision was made, the number of employees who knew the decision correctly according to the hemoglobin and hematocrit values was found to be 112 (76.2%), and no statistical significance was found (Table 2).

Table 1. *Survey questions*

1. Age:
2. Title:
3. Department:
4. Years in profession?
5. Transfusion frequency in your inpatient clinic?
6. Who makes the transfusion decision?
7. Did you join any training, course or seminar etc. related to blood transfusion?
8. Which of the following is taken into consideration when planning a blood transfusion decision in your clinic?

Basic transfusion information

1. Which of the following is false regarding the transfusion of blood products?
2. Which is wrong about the identity verification process of the recipient before the transfusion?
3. Which of the procedures to be done after the blood product is taken from the transfusion center and brought to the service is incorrect?
4. Which of the applications in the blood product request is wrong?

Clinical use of blood products

1. Which of the following is false?
2. Which of the following is not one of the transfusion transmitted diseases should be screened in our country?
3. Which of the following is false regarding transfusion in emergencies?

Transfusion reactions

1. Which of the following is not a cause of transfusion errors?
2. Which of the following is not a manifestation of acute hemolytic transfusion reaction?
3. Which of the following is not one of the things that should be done in an acute hemolytic transfusion reaction?
4. Which of the following is not a finding seen in transfusion-related acute lung injury?
5. Which of the following is not a suspicious finding of allergic reaction?
6. It is not one of the characteristics of transfusion-related circulatory overload (TACO)?

Storage of blood products

1. Which of the following is false regarding the storage and transfer of blood products?
2. Which of the following is false about massive transfusion?
3. Which of the following is incorrect regarding the duration of use of blood products?

Table 2. *The general characteristics of the participanst and their approach to transfusion decisions according to their educational information*

Variables	All group n: 147 (%)	Doctors n: 41(%)	Other healthcare professionals n: 106 (%)	P value
Age, mean (SD)	29.6±6.5	35.3±8.1	27.4±4.0	**<0.001**
Department (surgical)	109(74.1)	28 (68.3)	81 (76.4)	0.31
Profession years				
0–5	85 (57.8)	20 (48.8)	65 (61.3)	**<0.001**
5–10	29 (19.7)	–	29 (27.4)	
10 and above	33 (22.4)	21 (51.2)	12 (11.3)	
Transfusion frequency				
Seldom	10 (6.8)	2 (4.9)	8 (7.5)	0.72
Often	137 (93.2)	39 (95.1)	98 (92.5)	
Transfusion training	98 (66.7)	16 (39)	82 (77.4)	**<0.001**
Transfusion decision accuracy	112 (76.2)	29 (70.7)	83 (78.3)	0.33

In total, 16 multiple choice questions were asked to all healthcare professionals (Table 1). No employee could answer all the questions correctly, and only 4 physicians answered 15 questions correctly. Nurses were able to answer a maximum of 13 questions (n: 3). The least correct answer number was 7 (7.5%). The most correct answer by the participants was question 1 (98%). It was found that other healthcare professionals responded better than doctors to questions asked about procedures such as questions 3 and 14. It was observed that physicians responded significantly better than other healthcare personnel, especially to the questions of blood transfusion reactions. While physicians gave statistically significant answers to 4 questions in total, it was determined that other healthcare professionals gave statistically better answers than physicians in only one question (Question 14). Table 3 shows the response rates to the questions.

Table 3. *Comparison of questions between physicians and other healthcare professionals*

n (%)	All group n: 147	Doctors n: 41	Other healthcare professionals n: 106	P value
Q 1	144 (98)	41 (100)	103 (97.2)	0.56
Q 2	64 (43.5)	16 (39)	48 (45.3)	0.49
Q 3	90 (61.2)	19 (46.3)	71 (67)	0.02
Q 4	120 (81.6)	36 (87.8)	84 (78.2)	0.34
Q 5	108 (73.5)	31 (75.6)	77 (72.6)	0.71
Q 6	98 (66.7)	38 (92.7)	60 (56.6)	**<0.001**
Q 7	11 (7.5)	3 (7.3)	8 (7.5)	0.99
Q 8	130 (88.4)	37 (90.2)	93 (87.2)	0.78
Q 9	43 (29.3)	29 (70.7)	14 (13.2)	**<0.001**
Q 10	64 (43.59	16 (39)	48 (45.3)	0.49
Q 11	79 (53.7)	32 (78)	47 (44.3)	**<0.001**
Q 12	32 (21.8)	14 (34.1)	18 (17)	0.02
Q 13	87 (59.2)	32 (78)	55 (52)	**0.004**
Q 14	61 (41.5)	10 (24.4)	51 (48.1)	**0.009**
Q 15	91 (61.9)	27 (65.9)	64 (60.4)	0.54
Q 16	78 (53.1)	28 (68.3)	50 (47.2)	0.02

Q: Question.

Table 4. *Comparison of physicians and other health workers according to survey sections*

	All group n: 147	Doctors n: 41	Other healthcare professionals n: 106	P value
Basic transfusion informations	3 (2–4)	2 (2–3)	3 (2–4)	0.18
Clinical use of blood products	2 (1–2)	2 (2–2)	1 (1–2)	0.003
Transfusion reactions	3 (2–4)	4 (3–4)	3 (2–3)	**<0.001**
Storage of blood products	2 (1–2)	2 (1–2)	2 (1–2)	0.81
Total	9 (7–10)	10 (9–12)	9 (7–10)	0.005

The average of correct answers of all employees was 9 (range 7–10). Physicians gave correct answers to 10 (9–12) questions and other healthcare professionals 9 (7–10) and it was not statistically significant. The general average of transfusion reactions questions among all question groups was found to be significantly higher in the physician group (Table 4).

Discussion

In this study, the knowledge of age, professional years and transfusion training of physicians and nurses working in our hospital on blood and blood product use and reaction was made. Both groups were compared in terms of basic transfusion information, clinical use of blood products, transfusion reactions, and storage of blood products, and it was determined that physicians were better than nurses in terms of use and reaction.

Blood transfusion is a procedure that is performed in emergencies, inpatient clinics, post-traumatic, intraoperative and many other fields of medicine. It is a complex, multidisciplinary and multi-stage process, although it is thought of as a simple process because we use it frequently in our daily practice. Each step must be performed according to the written procedure, as any incorrect or incomplete step can lead to a fatal outcome. Blood transfusion is now considered a tissue transplant, and procedures are emerging in relation to the subject. Pre-transfusion verifications are essential for patient and employee safety. Although it is tried to close the deficiencies in blood transfusion with in-service trainings after university education, this process should be learned by all authorized health professionals. We measured the level of knowledge of physicians and nurses working in areas where blood transfusion is

common in our hospital, by asking questions about the basic knowledge of blood transfusion, its clinical use, reactions and storage.

In our study, it was seen that the level of knowledge of physicians about transfusion reactions requiring medical knowledge was higher than that of other healthcare professionals, and this was statistically significant. There was a significant difference between the two groups according to their transfusion education status. In a survey conducted between public and private health centers in Pakistan, it was shown that as the years of service increase, the knowledge and experience of transfusion increases[6]. In another study to investigate awareness and perceptions of blood safety and blood donation among healthcare professionals in a teaching hospital in Kolkata, only 69.7% of resident physicians, 43.3% of other healthcare professionals, 23.3% of physicians and 8% of nurses. It has been shown that 1% do not know the mandatory tests required in transfusion[7]. In our study, 92% of physicians and 56.6% of other healthcare professionals answered the question of mandatory tests (question 6) that should be done in transfusion correctly, and the difference between them was found to be statistically significant (38 (92.7%) vs. 60 (56.6%) p<0.001).

Among the necessary steps for safe transfusion, the correct identification of the patient and blood sample is very important. It is essential that the patient's identification number (ID) bracelet matches the ID barcode of the blood or blood product. In the study of Hiji et al. with 49 nurses, it was reported that 29% of the nurses confirmed the ABO compatibility of the blood bag and ID bracelet, while 4% checked the patient identification wristband, blood bag, blood request form and the information recorded in the patient observation form[8]. In our study, the correct response rates of physicians regarding the approach to transfusion reactions were found to be significantly higher than those of other healthcare professionals.

Limitations of the study are the data of this survey are limited to the responses given by healthcare professionals working at a training and research hospital so, the results should not be generalized and the number of participants were less than as expected, more participation could be achieved.

Conclusion

In our center doctors and other healthcare professionals have enough exposure to blood transfusions but there is a need to further enhance their knowledge regarding complications of transfusions and rational clinical use of blood and blood products. In addition, it should be encouraged by the country's health authority to provide transfusion training and to ensure that repeated at certain periods.

References

1. Ördekçi S. Kan ve Kan Ürünleri Transfüzyonu. Bakırköy Tıp Derg. 2006;2(2):83–93.
2. Bryant BJ, Alperin JB, Indrikovs AJ. Blood bank on-call physician's experiences at a large university medical center. Transfusion. 2005;45(1):35-40. doi:10.1111/j.1537-2995.2005.04097.x
3. Türk Kızılayı. Kan Hizmetleri 2020 Raporu.; 2020. https://www.kanver.org/Upload/Dokuman/Dosya/khgmweb-2020-12-08-2021-62161230.pdf
4. McClelland DBL. Handbook of Transfusion Medicine, 4rd Ed. (McClelland DBL, editor).; 2007. doi:10.1046/j.1365-3148.2002.00410.x
5. D Poles et al., on behalf of the the British Serious Hazard of Transfusion (SHOT) Steering Group. The 2020 Annual SHOT Report. S Narayan.; 2021.
6. Aziz S, Ayub R, Shah N, Siddiqui S. Knowledge of Blood Transfusions , Its Complications & Informed Consent Among Medical Students of Public & Private Sector Medical colleges of Peshawar. Khyber J Med Sci. 2014;7:159–61.
7. Mitra K, Mandal P, Nandy S, Roy R, Joardar G, Mishra R. A Study on Awareness and Perceptions Regarding Blood Safety and Blood Donation among Health Care Providers in a Teaching Hospital of Calcutta. Indian J Community Med. 2001;26(1):21. https://www.ijcm.org.in/article.asp?issn=0970-0218.
8. Hijji B, Parahoo K, Hossain MM, Barr O, Murray S. Nurses' practice of blood transfusion in the United Arab Emirates: an observational study. J Clin Nurs. 2010;19(23-24):3347–57. doi:https://doi.org/10.1111/j.1365-2702.2010.03383.x