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Hemovigilance Questionnaire in Pediatric Emergency and Pediatric Intensive Care Units

Çocuk Acil ve Çocuk Yoğun Bakım Ünitelerinde Hemovijilans Anket Çalışması

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Abstract

Introduction: Hemovigilance is a monitoring procedure that covers all transfusion steps from the collection of blood and blood components to the follow-up of end recipients. This procedure provides information about unexpected and undesirable effects caused by the use of blood products and evaluates them, and aims to prevent their occurrence and recurrence.

Methods: Data were collected by filling in the questionnaire form created to determine the level of knowledge of pediatric emergency and pediatric intensive care nurses on blood and blood products transfusion via the online access link.

Results: A total of 45 people answered the questionnaire sent. It was learned that 88.9% of the participants in the study completed undergraduate and graduate degrees. Of the responding nurses, 31 (68.9%) reported that there were hemovigilance nurses in their hospitals, and 39 (86.7%) received in-service training on the use of blood and blood products. The questions that the nurses gave the most wrong answers were about the storage periods of blood products. The question "If it is not transfused how long can the blood product be stored in the refrigerator for the longest time?" was answered correctly at a rate of 40%. The correct answer was 33.3% to the question "How long is fresh frozen plasma stored after thawing" and 20% to the question "What are the storage conditions of thrombocyte suspension". All the nurses answered, "If there is a reaction during transfusion, I will stop the transfusion".

Conclusion: The hemovigilance system has emerged as a tool to increase the quality and safety of transfusions. This study provides data on the knowledge gaps of nurses who care for critically ill children. We think that the educations will contribute to hemovigilance practices by increasing the knowledge level of transfusion with both national-level pieces of training and in-service training for healthcare personnel.

Keywords: Hemovigilance, blood transfusion, transfusion reaction, pediatric intensive care

Öz

Giriş: Hemovijilans; kan ve kan bileşenlerinin elde edilmesinden başlayarak son alıcıların takibine kadar bütün transfüzyon basamaklarını kapsayan, kan ürünlerinin kullanımı sonucu oluşan beklenmeyen ve istenmeyen etkiler hakkında bilgi toplanması ve değerlendirilmesini sağlayan, bunların oluşumunu ve tekrarlamasını önlenmeyi hedefleyen izleme prosedürüdür. Ülkemizde de 2016 yılından itibaren ulusal hemovijilans sistemi uygulaması başlatılmıştır.

Yöntemler: Çocuk acil ve çocuk yoğun bakım hemşirelerinin kan ve kan ürünleri transfüzyonu konusunda bilgi düzeylerinin belirlenmesi amacıyla oluşturulan anket formunun internet erişimli link üzerinden doldurulması ile veriler toplanmıştır.

Bulgular: İnternet üzerinden gönderilen anketi toplamda 45 kişi yanıtladı. Çalışmaya katılanların %88,9'unun lisans ve yüksek lisans tamamladığı öğrenildi. Yanıt veren hemşirelerden 31'i (%68,9) hastanelerinde hemovijilans hemşiresi bulunduğunu, 39'u (%86,7) kan ve kan ürünleri kullanımı hakkında hizmet içi eğitim aldığını bildirmiştir. Çalışmaya katılan hemşirelerin en çok yanlış cevap verdikleri sorular kan ürünlerinin saklanma süreleri ile ilgili olanlardı. "Kan merkezinden getirtilen kan ürünü transfüze edilmedi ise en uzun ne kadar süre buzdolabında saklanabilir?" sorusuna %40, "Taze donmuş plazma eritildikten sonra hangi koşullarda ne kadar süre saklanır?" sorusuna %33,3 ve "Trombosit süspansiyonunun saklama koşulları nelerdir?" sorusuna %20 oranında doğru cevap verildi. Tüm hemşireler "Transfüzyon sırasında reaksiyon olursa transfüzyonu durdururum" doğru cevabını verdiler.

Sonuç: Hemovijilans sistemi transfüzyonların kalitesini ve güvenliğini artırmaya yönelik bir araç olarak ortaya çıkmıştır. Bu çalışma kritik hasta çocuklara bakım veren hemşirelerin bilgi eksikliklerine ilişkin veri sağlamaktadır. Sağlık personeline yönelik gerek ulusal düzeyde gerekse hizmet içi eğitimlerin transfüzyon konusunda bilgi düzeylerini artırılarak hemovijilans uygulamalarına katkıda bulunacağını düşünmekteyiz.

Anahtar Kelimeler: Hemovijilans, kan transfüzyonu, transfüzyon reaksiyonu, çocuk yoğun bakım

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Introduction

Although it is known that there has been experience in blood transfusion since ancient times, blood and blood components came into routine use with the discovery of blood group antigens, typing methods and donor-recipient comparison tests at the beginning of the 20th century.[1] As well as determining the indications for use of blood and/or blood components, it is very important to store the components, to transport them safely to the recipient, and to know and follow the reactions that occur during or after the transfusion of the component.[2] Hemovigilance is a series of follow-up procedures that cover the entire transfusion chain from collection of blood and blood components to follow-up of recipients, aiming to collect and evaluate information about unexpected and undesirable effects resulting from the therapeutic use of blood products, and to prevent their occurrence and recurrence. Hemovigilance was first defined in France in 1993, and then came to the fore in the European Union documents in 1995.[3] Definitions related to the hemovigilance system may differ from country to country. The main goal of hemovigilance is to increase the safety of the blood donor and recipient by preventing the recurrence of undesirable reactions and events. The data in the hemovigilance system should be analyzed periodically, the results should be reported, and the reports should be shared with the relevant authority so that undesirable events and effects do not recur. According to the results, preventive and corrective measures should be taken, and early warning systems should be established.[4]

Studies on hemovigilance in our country first started in 2004, and the establishment of a transfusion committee became obligatory in hospitals using blood and blood components with the published circular. The working principles and duties of the committee included evaluating the transfusion reactions observed in the hospital and taking precautions to prevent them. With the National Blood and Blood Products Guideline published in 2009 in addition to the Blood and Blood Products Regulation, standard forms for hemovigilance notifications came into force. In 2016, hemovigilance system implementation was started in our country within the scope of national legislation.[4]

In our country, some studies have been carried out in order to evaluate blood transfusion safety and knowledge level. However, although awareness about hemovigilance and interest in hemovigilance nursing have increased recently, no studies have been conducted on this subject in pediatric intensive care units before. In this study, it was aimed to determine the level of knowledge of pediatric emergency and pediatric intensive care nurses about transfusion and its reactions and to evaluate the practices related to transfusion in a multicenter manner. After the study, it was planned to increase the knowledge level of health personnel about hemovigilance by adjusting the trainings and to draw attention to the importance of hemovigilance nursing.

Materials and Methods

In the study, a questionnaire form was created by using the literature in order to determine the level of knowledge of pediatric emergency and pediatric intensive care nurses about blood and blood product transfusion. The data of the research were collected by filling out the prepared questionnaire form by the participants via an internet-accessible link. Data collection period was determined as 2 months. In total, questionnaires were sent to 112 people from 48 centers and responses were received from 45 people. The questionnaire consisted of 15 questions to measure the knowledge level of hemovigilance, as well as questions about age, gender, years of working in the profession, working position, department, and whether or not they received in-service training on hemovigilance.

Statistical Analysis

Demographic data were presented in the study. Results were given as percentages and numbers.

The study was conducted with the approval of the Akdeniz University Clinical Research Ethics Committee (date: 13.01.2021, no: KAEK-11).

Results

Responses were received from a total of 45 people who were sent internet-enabled survey link. Thirty (66.7%) of the participants were in the age range of 25-35 years, 3 (6.6%) were under the age of 24 years, and 12 (26.7%) were over the age of 35 years. Considering the educational status, it was learned that 5 people (11.1%) completed an associate degree, 40 people (88.9%) had a bachelor's and master's degree. Eighteen (40%) of all participants worked in the responsible nurse position, while 36 (80%) worked in the pediatric intensive care unit. There were 8 (17.8%) nurses whose working period was less than 4 years, 23 (51.1%) nurses working between 5-9 years and 14 (31.1%) nurses with a working period over 10 years. Among the respondents, 36 nurses (80%) were working in the pediatric intensive care unit, and 9 nurses (20%) were working in the pediatric emergency service.

Of the nurses who responded, 31 (68.9%) reported that there were hemovigilance nurses in their hospitals, and 39 (86.7%) received in-service training on the use of blood and blood products. Demographic characteristics of the study group are shown in Table 1.

Table 1. Demographic characteristics of the study group

	Yes	No
Is there a hemovigilance nurse in your institution?	68.8%	31.1%
Have you received in-service training on blood transfusion?	86.7%	13.3%
Do you have/do you use consent form from patient and relatives for blood transfusion?	84.5%	15.5%
Do you do cross-match control at the bedside? (For erythrocyte suspension or whole blood)	57.8%	42.2%
Do you routinely use a leukocyte filter?	53.3%	46.6%
Do you check the components during blood transfusion, do you record them on your forms?	77.8%	22.2%

Seven (15.6%) nurses reported that there was no consent form for patients and their relatives for blood transfusion, and 3 (6.7%) nurses reported that the forms were not used routinely. Thirty-five (77.8%) nurses reported that component control and recording with a special form were routinely performed during blood transfusion. It was reported that the transfusion control form was signed by the physician and nurse together in 66.7%, by two nurses in 24.4%, by two physicians in 4.4%, by a single nurse in 2.2% and by any health personnel in 2.2%. Eighteen (40%) nurses gave the correct answer to the question "If the blood product brought from the blood center is not transfused to the patient, how long can it be stored in the refrigerator?". The question "How long and under what conditions is FFP stored after melting?" was answered correctly by 33.3% (n=15) and the question "What are the storage conditions of the platelet suspension?" was answered correctly by 20% (n=9). The rate of correct answer for the question "How is temperature control ensured before blood transfusion is given?" was 80% (n=36). Bedside cross match was performed at a rate of 57.8% (n=26), and leukocyte filter was routinely used at a rate of 53.3% (n=24). The rate of answering the question "If you are using a leukocyte filter, for which blood products do you use?" was 88.9% (n=40), the rate of answering the question "In which blood product or products is the leukocyte filter definitely not used?" was 73.3% (n=33). The correct answer was given by 33.4% (n=15) for the question "Which components can be used with blood transfusion?". All nurses gave the correct answer, "If there is a reaction during the transfusion, I will stop the transfusion". The rate of answering the question "What should be the initial rate of blood transfusion?" was 66.7% (n=30). The answers of the study group to all questions related to hemovigilance are given in Table 2.

Discussion

Transfusion of blood products in critically ill patients is among common procedures in pediatric intensive care units. Erythrocyte suspension, thrombocyte suspension and fresh frozen plasma transfusions are performed mainly. It should not be forgotten that these procedures, which have positive effects on the survival and healing process of the patients, can also cause side effects and increase morbidity and mortality. In addition, this practice is not without risk as it may lead to undesirable events or accidents for both the donor and the receiver.[5] The hemovigilance system has emerged as a tool dedicated to improving the quality and safety of transfusions.[6] It is very important for healthcare professionals to have sufficient knowledge and skills in order to perform safe blood transfusion. The person administering the transfusion should have sufficient knowledge and skills about giving the right blood to the right patient, informing the patient or his/her relatives about the transfusion, keeping the blood appropriately, observing the patient for signs of reaction during warming and transfusion, preventing possible complications and knowing what to do when complications develop.[7]

In his study on the hemovigilance system, Demirağ and Hindistan[8] found that 84.6% of the nurses knew that they were supervised by a hemovigilance nurse. In our study, 68.9% of the respondents stated that there were hemovigilance nurses in their hospitals; however, as stated in the 2020 National Hemovigilance Guideline, there are hemovigilance nurses in all secondary and tertiary hospitals in our country.[4]

It is very important to bring the blood and blood products to the appropriate temperature before the transfusion and to use the correct method to be applied for this. In the survey

Table 2. Responses of the study group to questions related to hemovigilance

	Correct	Incorrect
If the blood product brought from the blood center is not transfused to the patient, how long can it be stored in the refrigerator?	40%	60%
How is temperature control ensured before blood transfusion is given?	80%	20%
In which blood product or products is the leukocyte filter definitely not used?	50%	50%
Which components can be used with blood transfusion? (you can tick a few options)	33.3%	66.7%
What is the first application you will do if the patient develops a reaction in blood transfusion?	100%	0%
What should be the initial rate of blood transfusion?	33.3%	66.7%
How long and under what conditions is FFP stored after melting? (You can tick more than one option)	33.3%	66.7%
What are the storage conditions of the PLT suspension?	20%	80%
If you are using a leukocyte filter, for which blood products do you use?	40%	60%

we conducted, the rate of giving the correct answer to the question about how to provide heat control was 80%. Although this rate remained around 40% in a study conducted by Hijji et al.[9], in a study conducted by Erkoç[10] in Northern Cyprus, the rate of correct answers to this question by the nurses participating in the study was found to be 75.5%.

However, there are also studies in which it is seen that nurses do not know enough about the appropriate methods to be used to bring the blood to the appropriate temperature.[7,11,12]

The pre-transfusion control procedure should be performed at the patient's bedside, with the recipient and donor identities double-checked. All labels and compliance tests also need to be double checked. 93.5% of the respondents stated that these controls were carried out by at least two health personnel (2 nurses or 1 physician and 1 nurse). It has been emphasized in the literature that pre-transfusion controls should be performed by at least two healthcare professionals.[13] In this way, it has been shown that incorrect transfusions are reduced.

The results of our survey also show that healthcare professionals have good knowledge on this subject.

In the study by Demirkol et al.[14] on acute transfusion reactions in critically ill children, the frequency of acute transfusion reactions was found to be 17.8%. In case of a reaction development during transfusion, the transfusion should be stopped immediately and vital signs should be checked rapidly. All of the nurses participating in the survey gave the correct answer of "I stop the transfusion when a reaction develops during the transfusion". This rate was found to be 97.8% in the study by Panchawagh et al.[15] Similar rates have been found in many studies conducted on this subject, and this can be attributed to the fact that this subject is given a lot of attention in the training given since the results of transfusion reactions can significantly increase mortality and morbidity.

The questions for which the nurses who participated in the study mostly gave wrong answers were about the storage times of blood products. Only 20% of the participants gave correct answer for the platelet storage conditions, and 33.3% gave correct answer for waiting conditions right after the FFP was melted. The question about platelet storage conditions was the least correctly answered question in the questionnaire, and the platelet suspension can be stored for up to 5 days by shaking horizontally at +20-24 °C, longer storage increases the risk of bacterial proliferation and septicemia.[16] The second most common wrong answer was given to the question "How long and under what conditions is FFP stored after melting?". After melting, fresh frozen plasma can be stored in the refrigerator at +2 to +6 °C for 24 hours.[16] Panchawagh et al.[15] also reported that the question on the storage conditions of blood products was answered incorrectly at a rate of 78.2% in his study performed in India. We can attribute this situation to the confusion caused by the fact that many blood products can be stored in different storage conditions and times, and to the lack of information as stated in similar studies.

One of the frequently misunderstood issues is about the fluids with which blood products are compatible. 33.3% of the respondents answered this question correctly. Physiological saline, ABO compatible plasma and 5% albumin are compatible fluids. Apart from these, no liquid or medicine should be given or pushed from the same set with the blood set. It has been reported that acute hemolytic reaction develops with the administration of inappropriate fluids with transfusion.[16]

Although 86.7% of the respondents stated that they received in-service training on the use of blood and blood products, it is striking that there is a lack of information on blood and blood product transfusion, especially on storage conditions. In his study, Tramalloni et al.[17] revealed that hospitals would improve their transfusion practices in a positive way when effective training on transfusion was provided.

Study Limitations

A total of 45 people were able to participate in the survey, wider participation could have been more effective in determining the needs. Since some of the nurses participating in the survey were chief nurses and some were clinical nurses, the answers were not the answers of a homogeneous group. These two points constitute the limitations of our study.

Conclusion

We think that with national trainings and in-service trainings for health personnel, the level of knowledge on transfusion can be increased and these trainings will contribute to hemovigilance practices. In addition, it will be useful to determine which processes of hemovigilance are not well-known by health workers and to carry out studies on that subject. In addition to educational studies on hemovigilance, it may be beneficial to prepare and distribute guides and booklets about the subjects for which there is lack of knowledge.

The contribution of the hemovigilance system, which includes corrective and preventive actions to detect undesirable errors and events in the blood transfusion chain and to prevent their occurrence and recurrence, to blood transfusion safety is undoubtedly very important for our country as well as all over the world.

Ethics

Ethics Committee Approval: The study was conducted with the approval of the Akdeniz University Clinical Research Ethics Committee (date: 13.01.2021, no: KAEK-11).

Informed Consent: Survey work.

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Authorship Contributions

Surgical and Medical Practices: A.K., N.Ü.T., G.A., Concept: A.K., N.Ü.T., P.A., Design: A.K., N.Ü.T., P.A., O.D., Data Collection or Processing: P.A., G.A., Analysis or Interpretation: A.K., N.Ü.T., P.A., O.D., Literature Search: A.K. N.Ü.T., O.D., Writing: A.K. N.Ü.T., O.D.

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