Original Article

Assessing Knowledge of Nurses on Blood Transfusion in Turkey

Oznur Usta Yesilbalkan, PhD
Associate Professor, Ege University Faculty of Nursing, Medical Nursing Department, Izmir, Turkey

Asiye Akyol
Professor, Ege University Faculty of Nursing, Medical Nursing Department, Izmir, Turkey

Filiz Ozel, PhD
Assistant Professor, Kastamonu University Faculty of Health Science, Kastamonu, Turkey

Hulya Kankaya, PhD
Ege University Faculty of Nursing, Medical Nursing Department, Izmir, Turkey

Birgul Vural Doğru, PhD
Assistant Professor, Mersin University, School of Health, Department of Nursing, Mersin, Turkey

Gulumser Argon, PhD
Professor, Ege University Faculty of Nursing, Medical Nursing Department, Izmir, Turkey

Correspondence: Kankaya Hulya, Ege University Faculty of Nursing Bornova-Izmir, Turkey
e-mail: hulya.sarsilmaz@gmail.com

Abstract

Background: Blood transfusion is an important and lifesaving process in acute or chronic conditions. However, blood or blood products transfusion has some risks; therefore, before transfusion its clinical benefits and necessity for each patient is should be evaluated and considered carefully.
Objective: The aim of this study was to assess knowledge of nurses who took the course (before than after) on blood transfusion.
Methodology: In the study, a pre-test and a post-test were given to a single group of participants. The study was conducted with the nurses working in Izmir who participated in the "Blood and Blood Products Practice Course for Nurses". In the study, 25 nurses who filled out the questionnaires completely before and after the course were included in the sample. The study data were collected by the researchers before and after the course using the 12-item socio-demographic characteristics questionnaire and the 35-item blood transfusion questionnaire. The study data were analyzed using the SPSS 17.0 software package.
Results: The mean age of the participants was 27.36 (± 5.31) and 72% of them were in the 18-30 age group. Comparison of the nurses' pre- and post-course mean knowledge scores revealed that their pre- and post-course mean scores were 42.86 (±13.84) and 68.90 (± 6.08) respectively, and that the difference was statistically significant (Z = -4144, P = 0.000).
Conclusions: The results demonstrated that the blood transfusion update course significantly increased the participating nurses'mean knowledge scores. Therefore, it was proposed to give in-service trainings and courses on blood transfusion to nurses working in all units.

Keywords: Nurse, Blood Transfusion, Knowledge, Turkey

Introduction

Every year, millions of people around the world undergo blood transfusions (Hijji, Oweis, & Dabbour, 2012). As a result of the identification of blood groups at the beginning of the twentieth the century, overcoming anticoagulation problems, the development of sterile techniques and overcoming equipment problems thanks to technical opportunities, a new branch of science called "transfusion medicine" was born (Ordekci, 2006). Blood transfusion is an important and

lifesaving process in acute or chronic conditions. However, blood or blood products transfusion has some risks; therefore, before transfusion its clinical benefits and necessity for each patient ~~is~~ should be evaluated and considered carefully (Reed et al., 2013).

Blood is a living tissue composed of specific structures, each of which has separate functions (Akyol, 2013). Blood transfusion is the direct administration of blood or a blood product to an individual's circulatory system (Atamer, 2009). Blood products include both blood components and plasma fractionation products (Jones A, &Heyes, 2014). Among the purposes of transfusion are increase blood volume, to replace missing blood components (erythrocytes, thrombocytes, leukocytes, clotting factors, plasma proteins), to increase blood oxygenation capacity in patients with anemia, to correct lipoproteinemia, to provide blood exchange, to transport oxygen to tissues, to restore bleeding and coagulation disorders (Akyol, 2013; Sarı,&Altuntaş, 2007). Today, although the level of knowledge about the administration of blood and blood products has increased, the complications related to safe blood transfusion are still largely due to human errors. The most frequent causes of errors during the use of blood in clinical practices are incorrect blood group transfusions (inappropriate ABO), inappropriate storage conditions, and unconfirmed patient identity (Sarı, &Altuntas, 2007; Celkan, 2004). During the preparation and storage of blood, the main objectives are to preserve vitality and functions of cells in the blood products and components, to prevent physical and chemical changes, and to reduce the spread of bacteria and viruses (Celkan, 2004). Key points to be considered during blood transfusion performed in clinics are as follows: Hospitals should have guidelines for standard transfusion practices (Ordekci, 2006). Hospital workers should perform transfusions in line with these guidelines (Ordekci, 2006; Hurrell, 2014). The World Health Organization (2008) defines safe blood as "blood which does not pose a risk or cause a disease in the recipient, and does not contain any infectious agents or harmful impurities". Today, safe blood transfusion is the primary goal of all blood centers (Altındis, Aslan, &Kalaycı, 2011). Due to inappropriately performed blood transfusions, acute reactions can develop or even deaths can occur (Ordekci, 2006; Hurrell, 2014).

In the literature, it's emphasized that nurses should have adequate knowledge of blood transfusion and should be knowledgeable about safe transfusion practices and clinical procedures (Hijji, Oweis, & Dabbour, 2012; Saillour-Glenisson et al., 2002).

In few studies revealed that nurses had poor knowledge and low experience to safe blood transfusion in every step. In the other studies, the most of nurses gave correct responses to questions on transfusion safety (Hijji, Oweis, & Dabbour, 2012; Hurrell, 2014). In their study, Aslani et al. (2010) and Talati et al. (2016) showed that less than half of the nurses gave correct responses about blood/blood components and their transfusion. In their study, Hijji et al. (2012) Saillour-Glenisson et al. (2002) and Dubey et al. (2013) showed that more than half of the nurses gave correct responses about blood transfusion (Hijji, Oweis, & Dabbour, 2012; Saillour-Glenisson et al., 2002; Aslani, Etemadyfar, &Noryan, 2004; Talati, Gupta, & Jain, 2016; Dubey, Sonker, & Chaudhary, 2013).

Nurses do play role blood transfusion. There are some gaps in the implementation of blood transfusion. Their knowledge and skills are very important for the safety and effectiveness of blood transfusion (Hijji, Oweis, & Dabbour, 2012; Kyriazi, 2011). If they can do it correctly, the probability of incidence of blood transfusion risks will be reduced to a minimum (Talati, Gupta, & Jain, 2016). Therefore, nurses should be knowledgeable to make accurate decisions related to their practices, their knowledge is essential to the high quality, safe and effective patient care (Hijji, Oweis, & Dabbour, 2012). So they should assess, plan the necessary intervention, implement, and evaluate transfusion related complications in each step of the blood transfusion (Rao et al., 2013).

The American Society of Registered Nurses (2008) concluded that there was an urgent need of training to educate nurses on the blood transfusion risks, the most recent safety guidelines, nurse interventions, and decision-making. It was also emphasized that nurses' knowledge and practices should be regularly checked (Hijji, Oweis, & Dabbour, 2012). Taking all these into account, for the nurses, a course on "Blood and Blood Products" was performed and changes in the nurses' knowledge scores were assessed.

Methodology

The aim of this study was to assess knowledge of nurses who took the course (before than after) on blood transfusion.

Study design and sample: In the study, a pre-test and a post-test were given to a single group of participants. The study was conducted with the nurses working in different hospitals in Izmir who participated in the "Blood and Blood Products Practice Course for Nurses" given by the Faculty of Nursing of Aegean University. The teaching/learning method of the course was lecture presentation and question-answer. The course consisted eight hours of teaching/learning. The teachers were experts in the field about blood transfusion. The teachers of the course did not be also the researchers. The course is limited to 50 people. Forty-five nurses participated in the course, and 31 of them filled in the questionnaires completely. The time allocated to fill in the questionnaires was 30 minutes. Due to possible difficulties to reach the participants, post-course assessment was made with the same questionnaires. In the study, no sample selection was made; 25 nurses who filled out the questionnaires completely before and after the course were included in the sample (response rate: 55.5%) in the same day and same place where the course was made.

Ethical considerations: The nurses gave detailed information about the research. Before the study was conducted, written approvals from the institution where the study was to be conducted and verbal consents from the participants were obtained.

Intruments: The study data were collected by the researchers before and after the course using the 12-item socio-demographic characteristics questionnaire and the 35-item blood transfusion questionnaire. The items included in the sociodemographic characteristics questionnaire were as follows: (age, gender, marital status, education level, clinics where the participant works, length of service in the profession, length of service in the clinic, average working hours per week, the number of patients receiving healthcare daily, the number of blood transfusions performed weekly, meetings the participant participated in, associations the participant is affiliated with)

The questions are prepared by the teachers in the direction of the subject contents used in education included 35 questions on the following topics: the history of transfusion (5 questions; 16 points), the definition of blood and blood components and guidelines on their properties, preparation, storage and transfusion (5 questions; 36 points), haemovigilance-blood bank applications, infections transmitted through transfusion (10 questions; 10.5 points), blood transfusion complications / transfusion reactions (5 questions; 12.5 points), nurses' responsibilities for blood transfusions in line with hospital quality standards (5 questions; 12.5 points), regulations and changes regarding the transfusion of blood and blood products (5 questions; 12.5 points). Knowledge scores for blood transfusions are rated out of 100 points (of the 35 questions, 3 are open-ended questions and 32 are multiple-choice questions). The higher the score was the higher the blood transfusion knowledge level was. This form was assessed on 5 nurses (lecturers and nurses specializing in hematology) and in order to check the clarity of the items, and no changes were recommended.

Data analysis: The study data were analyzed using the SPSS 17.0 software package. The percentage distributions were used to analyze the socio-demographic characteristics. In the intra-group comparisons, the Wilcoxon signed-rank test was used for non-parametric distribution. In the inter-group comparisons, Mann-Whitney U test and Kruskal-Wallis were used for non-parametric distribution. Spearman correlation analysis was used to determine the relationship between some means/scores.

Results

The mean age of the participants was 27.36 ($\pm$ 5.31) and 72% of them were in the 18-30 age group. The majority of the nurses were female, single, had a bachelor's degree and were not the members of a professional association. While 80 % of the participants' length of service in the profession varied between 0 and 4 years (mostly 0-2 years), their length of service in the clinic varied between 0 and 2 years. The average number of the patients to whom they gave transfusion weekly was 4.64 ($\pm$5.53) and 52.0 % of them were previously trained about transfusion. Comparison of the nurses' pre- and post-course mean knowledge scores revealed that their pre- and post-course mean scores were 42.86 ($\pm$13.84) and 68.90 ($\pm$ 6.08) respectively, and that the difference was statistically significant (Z = -4144, P = 0.000) (Table 1).

Table 1: Comparison of the nurses' pre- and post-course mean knowledge scores

	n	Mean (SD)	Z /p
Pre-course mean knowledge scores	25	42.86 (13.84)	*Z= -4.144*
Post-course mean knowledge scores	25	68.90 (6.08)	*p=0.000*

Table 2: Comparison of the nurses' mean course scores in terms of their socio-demographic characteristics

		Before the course	After the course	
	n	X (SD)	X (SD)	Z /p
Age groups				
18-30 years	**18**	44.56 (14.71)	68.72 (6.80)	*Z:-3.354* *p=0.001*
31-40 years	**7**	38.50 (11.03)	69.36 (4.06)	*Z:-2.366* *p=0.018*
		U=50.00 *p=0.429*	*U=59.00* *p=0.808*	
Gender				
Female	**23**	43.02 (14.40)	69.02 (6.19)	*Z:-3.339* *p=0.000*
Male	**2**	41.00 (4.95)	67.50 (6.36)	*Z:-1.342* *p=0.180*
		U=18.00 *p=0.614*	*U=15.00* *p=0.422*	
Length of service in the profession				
0-4 years	**20**	43.83 (14.29)	69.05 (6.44)	*Z:-3.603* *p=0.000*
≥5 years	**5**	39.00 (12.45)	68.30 (4.93)	*Z:-2.023* *p=0.043*
		U=41.50 *p=0.561*	*U=43.00* *p=0.634*	
Length of service in the clinic				
0-2 years	**21**	44.64 (14.34)	69.12 (6.22)	*Z:-3.720* *p=0.000*
≥3 years	**4**	33.50 (4.55)	67.75 (5.98)	*Z:-1.826* *p=0.068*
		U=21.50 *p=0.126*	*U=36.00* *p=0.656*	
The average number of the patients undergoing transfusion per week				
1-9 patients	**18**	42.33 (12.41)	69.78 (4.88)	*Z:-3.659* *p=0.000*
10-20 patients	**7**	44.21 (18.07)	66.64 (8.50)	*Z:-1.859* *p=0.063*
		U=60.00 *p=0.885*	*U=50.00* *p=0.430*	

Table 3: Correlation between the nurses' knowledge scores and some variables

Variables	Post-course mean score
Age	*r= -0.134*
	p=0.522
Length of service in the profession	*r= -0.127*
	p=0.545
Length of service in the clinic	*r= -0.199*
	p=0.341
The number of the patients undergoing transfusion per week	*r= -0.181*
	p=0.387

No statistical significance was determined when the nurses' pre- and post-course mean knowledge scores were compared in terms of variables such as age group, gender, length of service in the profession, length of service in the clinic and the average number of the patients undergoing transfusion per week [(age group; U=50.00, p=0.429 before the course; U=59.00, p=0.808after the course), (gender; U=18.00, p=0.614 before the course; U=15.00, p=0.422 after the course), (length of service in the profession; U=41.50, p=0.561 before the course; U=43.00, p=0.634 after the course), (length of service in the clinic; U=21.50, p=0.126 before the course; U=36.00, p=0.656 after the course), (the average number of the patients undergoing transfusion per week; U=60.00, p=0.885 before the course; U=50.00, p=0.430 after the course)] (Table 2).

When the relationship between the nurses' mean knowledge scores and some variables such as age, length of service in the profession, length of service in the clinic and the average number of the patients undergoing transfusion per week were compared, no statistical significance was determined (p > 0.005) (Table 3).

Discussion

In health care, blood transfusion is a key component in routine and emergency situations such as hematological conditions, cancers, gynecological conditions, pregnancy, childbirth, childhood illness and trauma (Elias et al., 2016). Evidence-based clinical guidelines for blood components, transfusion monitoring systems and quality assurance programs are vital in preventing blood transfusion errors (https//www

asrn.org/journal-nursing/285-blood-transfusion-error-prevention-nurses role.html). Nurses have an important responsibility to ensure the quality safety of the administration of blood and blood products (Dubey, Sonker, & Chaudhary, 2013; Vasiliki, 2011; Zaccheo, 2009). In an article on the role of nurses in the prevention of blood transfusion errors, it is pointed out that according to the American Nurses Association, there is an urgent need for training programs to educate nurses on how to reduce the risks related to blood transfusions, the most recent safety guidelines and nurse interventions (https//www asrn.org/journal-nursing/285-blood-transfusion-error-prevention-nurses role.html; Hijji et al., 2013). Studies conducted on blood products have demonstrated the effectiveness of continuing education given on this subject (Reza et al., 2009).

The present study is the first study conducted in Turkey to improve nurses' blood transfusion knowledge. It was conducted to assess the nurses' awareness of blood transfusions and to improve their knowledge of blood transfusions. The results of the present study demonstrated that nurses had acceptable knowledge score (68.90/100) about the blood transfusion after the course.

In the present study, the nurses' post-course scores (68.90 ± 6:08) were higher than their pre-course scores (42.86 ± 13.84). In Kaur et al.'s study (2014), the mean score in the pre-training assessment was 51% while in the post-training assessment the mean score was 85.4%; the difference was statistically significant (Assessment of Impact of Training in Improving

Knowledge of Blood Transfusion among Clinicians) (Kaur et al., 2014). In their study, Aslani et al. (2010) showed that 18.8% of the nurses gave correct responses to "optimum time between the issue of blood/blood components and their transfusion" (Aslani, Etemadyfar, & Noryan, 2004). Bayraktar and Erdil (2000) measured the nurses' knowledge and practice related to blood transfusions where only a few had scores higher than 50 out of 100 (Abd Elhy, & Aziz Kasemy, 2017). In Hiji et al.'s study (2013), the nurses' blood transfusion knowledge scores were generally low ranging from 27 to 56 of a possible score of 70 (Hijji et al., 2013). In their study, Talati et al. (2016) found that the overall mean correct response rate for all the 20 questions was 60.7 % (Talati, Gupta, & Jain, 2016). In another study, the results showed that knowledge is insufficient and compliance with transfusion best practices is limited. (Improving Blood Transfusion Safety: A Survey on the Knowledge and Attitudes of Health Professionals in Blood Transfusion at the Yalgado Ouedraogo University Hospital Center, Burkina Faso). Elhy and Kasemy (2017) found that more than half of nurses had poor knowledge regarding to blood transfusion (61.2%) (Nurses' Knowledge Assessment Regarding Blood Transfusion to Ensure Patient Safety) (Abd Elhy, & Aziz Kasemy, 2017).

This increase was significant but not at the desired level, which is in line with the literature (Aslani, Etemadyfar, & Noryan, 2004; Hijji et al., 2013). In the previously study was determined that the nurses' mean score related to blood transfusion was between 17 and 40 (Dubey, Sonker, & Chaudhary, 2013; Hijji et al., 2013; Reza et al., 2009; Bayraktar, & Erdil, 2000). On the other study was revealed that the most of the nurses did not give correct responses to questions on knowledge and attitude on blood transfusion safety (Aslani, Etemadyfar, & Noryan, 2004; Kaur et al., 2014; Kabinda, Miyanga, &Donnen, 2014). In Talati et al.'s study (2016), the number of the nurses who knew the side effects related to blood transfusion was low (21%) whereas pre-transfusion procedures were known by most of the nurses (92%) In another study on the subject, half of the interns (56.6%) correctly answered questions on blood transfusion components transfused (Talati, Gupta, & Jain, 2016; Kumarage, Fernando, & Gunasekara, 2017). We thought that deficiencies of knowledge and practice in nurses about blood transfusion have

improved by updating practical and theoretical education program and all health care professionals, especially nurses, should be encouraged to participate this program at regularly. This program may include practical sessions, workshops and distance learning programs (Dubey, Sonker, & Chaudhary, 2013).

In the present study, while there was not a statistically significant difference between the nurses' pre- and post-course scores in terms of age groups and gender variables (p > 0.05). In Dubey et al.'s (2013) study investigating blood transfusion-related knowledge of laboratory technicians and clinic nurses working at blood centers, no significant difference was determined between genders and between age groups, which is in line with the results of the present study (p > 0.05) (Dubey, Sonker, & Chaudhary, 2013). Despite that in Abd Elhy and Kasemy's (2017) study, there was significant difference between nurses' knowledge and age groups, genders (Nurses' Knowledge Assessment Regarding Blood Transfusion to Ensure Patient Safety) (Abd Elhy, & Aziz Kasemy, 2017).

In Bicer et al.'s study (2013), the nurses were trained on the transfusion of blood / blood products and determined that they had the most accurate information about erythrocyte suspension transfusion (81.1%) before the training, and that their knowledge of thrombocyte suspension storage (65.6%) and conditions for the transfusion of blood products (% 44.4) was less. In the same study, the nurses' knowledge levels about erythrocyte suspension transfusion (97.8%), platelet suspension storage conditions (92.2%) and conditions for the transfusion of blood products (96.4%) increased significantly after the training (Bicer et al., 2013).

In this study, post-course mean scores of the participants whether their length of service was less than 4 years or 5 or more years increased, but this increase was not statistically significant (p>0.05). These results were different in the present study. Nurses whose clinical experience were more than 5 years and less than 5 years was determined to be insignificant in nurses' knowledge levels related to blood transfusion (Dubey, Sonker, & Chaudhary, 2013; Bayraktar, & Erdil, 2000; Kennedy C, & Arundel, 1998).

It was thought that the participants' length of service in profession and in their current position was less than 5 years did not gain them the proficiency to have knowledge and experience of

blood transfusion which is one of the important parameters in patient safety.

In this present study, pre-course knowledge scores of the participants who performed fewer blood transfusions weekly were lower than were those of the participants who performed more blood transfusions weekly; however, after the course, the difference was not significant (p>0.05). In Saillour-Glenisson et al.'s (2002) study investigating nurse-associated factors in security procedures, a strong relationship was determined between the scores for inaccurate knowledge and the low number of transfusion interventions (Saillour-Glenisson et al., 2002).

No statistically significant relationship was determined between the nurses' pre- and post-course mean knowledge scores and variables such as their age, length of service, and the average number of patients to whom they gave blood transfusion weekly (p>0.05). Similar to the present study, in a study by Reza et al. (2009) no significant relationship was determined between the knowledge levels of health care workers and the variables such as the number of transfusions performed daily, length of service, age and course participation (Reza et al., 2009).

Although a large number studies were performed to measure health professionals' knowledge related to blood transfusion practices, the number of studies conducted to investigate the effectiveness of planned education on the subject was not many, which made it difficult to discuss and generalize the results.

Nurses' lack of knowledge on blood transfusions may lead to the emergence of serious complications in patient care. Therefore, nurses should update their practical and theoretical knowledge in blood transfusion. In this context, it is recommended that nurses working in all units should be given in-service trainings and courses on blood transfusion, that the continuity of the in-service trainings and courses should be ensured. Also, the health care budget should be shared by government to supply resource (eg. good laboratory, training and certification programs, standard guidelines, technical support) blood transfusion practice.

The results of the present study demonstrated that the blood transfusion course increased the nurses' knowledge mean scores significantly. However, the limited number of studies on the subject adversely affected the generalization of the results. Moreover, this study was conducted in the western part of Turkey; therefore, the results obtained from this study cannot be generalized. For this reason, similar studies should be performed with a larger population and sample. It is also recommended that all nurses, regardless of age, length of service, and the clinic they work in, perform the theoretical and practical training programs should be regularly conducted and repeated at certain intervals and the results should be evaluated.

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