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Nurses' self-efficiency levels in safe blood and blood component transfusion: The case of Turkey

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ABSTRACT

Objective: The study aimed to determine nurses' self-efficacy levels for safe transfusion of blood and blood components.
Method: The design of this study is descriptive and cross-sectional. Before starting the study, ethics committee approval and institution approval was obtained. The participants were informed about the purpose of the study, and their written consent was obtained. The research was conducted between the dates 01 March 2022 and 01 May 2022, a private hospital in Turkey. The study sample consisted of 482 nurses. Data were collected using descriptive characteristics form and the Safe Blood and Blood Products Transfusion Self-Efficacy Scale (SBT-SES).
Results: The total SBT-SES scores of the nurses were high (202.7 ± 50.1), and the behavioral sub-factor self-efficacy scores were moderate (48.2 ± 19.5). When the SBT-SES scores were analyzed based on demographic characteristics, it was found that those who had received previous safe blood transfusion training scored higher than those who had not, and women scored higher than men ($p < 0.05$). In addition, no relationship was found between age, working time, number of weekly blood transfusions, and self-efficacy levels.
Discussion: As a result, nurses' self-efficacy levels towards blood transfusion are high. However, the behavioral sub-factor self-efficacy level is not sufficient.
Conclusion: Based on these results, in order to increase the behavioral self-efficacy levels of nurses, our recommendations are as follows: investigating appropriate training methods, considering the sex factor when choosing training methods and techniques, investigating the barriers to safe transfusion behaviors, and measuring self-efficacy levels at regular intervals.

1. Introduction

The administration of blood or blood products into circulation for therapeutic purposes is defined as blood transfusion, and is a complicated form of treatment practiced quite frequently [1]. Safe blood transfusion (SBT) involves administering the right blood and blood product to the right patient at the right time, monitoring the patient for reactions, and providing feedback to the blood center [2].

Transfusion is used for many purposes, such as replacing blood loss, increasing the oxygen-carrying capacity of the blood, and has an important role in sustaining life [3,4]. However, even under ideal conditions, it may cause many life-threatening complications such as acute hemolytic reaction, allergic and anaphylactic reactions, septic transfusion reaction, acute lung injury, and circulatory overload [1,5,6]. SBT is the most valuable measure to reduce the risk of complications. The lack of knowledge and self-efficacy of healthcare professionals increases the risk of transfusion-related mortality and morbidity [4,7,8]. It has been reported that approximately 85 % of preventable complications are caused by human errors [9,10]. Nurses are actively involved in the whole process, from blood and blood product collection from donors to the post-transfusion period [9,11], and are primarily responsible for implementing transfusion. They should have a high level of self-efficacy in this regard. SBT Self-efficacy refers to the confidence in one's own abilities, knowledge, and skills related to transfusion-related processes.

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A high level of self-efficacy is associated with having the necessary knowledge about the processes, the ability to apply procedures correctly, and the ability to manage potential risks [12].

When the literature was examined, no studies were found in which self-efficacy was measured using specific scales for blood transfusion. In this direction, spending time and energy to determine nurses' SBT self-efficacy levels is needed for patient safety. The study aims to determine nurses' SBT self-efficacy levels.

The research questions are as follows:

1. What are nurses' SBT self-efficacy levels?
2. Does SBT self-efficacy level differ depending on demographic characteristics (sex, education level, previous SBT training, clinic of employment)?
3. Is there a relationship between demographic characteristics (age, working time, number of weekly blood transfusions) and SBT self-efficacy levels?

2. Materials and methods

The design of this study is descriptive and cross-sectional. Before starting the study, ethics committee and institution approval were obtained (Decision no 09.2022.508, dated 05.20). The participants were informed about the purpose of the study, and their written consent was obtained. In implementing the research process, the World Medical Association (WMA) - Ethical Principles for Medical Research Involving Human Subjects were adhered to.

The research was conducted between 01 March 2022 and 01 May 2022, private hospitals in Turkey. The hospital where the data was collected is a tertiary hospital with many medical specialties and medical-surgical services represented. It has twelve branches in different cities in Turkey. The study population consisted of 1.400 nurses working in 12 branches of the same hospital in seven different cities (6 branches in Istanbul; Samsun, Konya, Bursa, Ankara, Sivas, Izmir). Nurses working in polyclinics and units where blood transfusion is not performed were not included in the study. Nurses working in units other than these services were included in the study (Internal Service, Child Services, Intensive Care Unit, Emergency and Surgery Service). The sample size was calculated with the sampling formula with a known population, and it was determined that 302 individuals should be included in the study. The sampling calculation was calculated with a 95 % confidence level and a 5 % margin of error. The stratified sampling method was used considering the cities, and 493 nurses were included in the study, considering the sample would have losses. Six participants were excluded from the study due to incomplete completion of the forms, and the data of five participants were determined as outliers due to normal distribution analysis. As a result, 482 participants constituted the sample.

2.1. Data collection tools

For data collection, printed forms were given to the participants, who were asked to fill them in 20 min.

2.1.1. Descriptive characteristics form

It was prepared by the researchers to determine participants' descriptive characteristics. This form includes seven questions about age, working time, the number of weekly blood transfusions, sex, education level, working area, and previously received SBT training variables.

2.1.2. Safe blood and blood products transfusion self-efficacy scale (SBT-SES)

The Safe Blood and Blood Products Transfusion Self-Efficacy Scale (SBT-SES) was developed by Dülger and Okuroğlu [13] in 2022 to scale nurses' SBT self-efficacy levels. Approval was received from the authors to use this scale. The scale contains 49 items and four sud-factor. Behavioral sub-factor, measures the ability to exhibit the necessary behaviors for safe blood transfusion and consists of 16 items. Cognitive sub-factor measures the state of having the necessary knowledge for safe blood transfusion and consists of 14 items. Attitudinal sub-factor measures the belief and attitudes in the necessity of safe blood transfusion practices and consists of 13 items. Negative sub-factor measures the avoidance of undesirable practices regarding safe blood transfusion and consists of six items. The six items in the negative sub-factor are reverse and should be reverse coded during the analysis.

The scale is a 5-point likert type. The minimum score that can be obtained from the total scale is 49, and the maximum score is 245. The minimum and maximum scores are 16–80 for the behavioral sub-factor, 14–70 for the cognitive sub-factor, 13–65 for the attitudinal sub-factor and 6–30 for the negative sub-factor. As the score obtained from the scale increases, it is considered that nurses' SBT self-efficacy increases.

Cronbach's Alpha value for the whole scale was reported to be 0.96 [13]. In our study, the Cronbach's Alpha value of the scale was 0.97.

2.2. Statistical analysis of the study

Normal distribution analyses were performed to decide on the tests to be used in the data analysis; the results are given in Table 1.

As a result of the normal distribution analysis, when the mean-median value was close to each other, and the kurtosis and skewness values should be between −1.96 and +1.96 [14] were examined, it was determined that the values fit the normal distribution. As a result of the analysis, the values of five participants were found to be outliers, and these data were excluded from the study. In descriptive analyses, comments were made using numbers and percentages. Independent Sample T Test (in the presence of two categorical data) and Ona Way ANOVA Test (in the presence of three or more categorical data) were used to compare mean the differences. The presence of a relationship between the data was analyzed by the Pearson Correlation test.

3. Results

This study examined nurses' SBT self-efficacy levels, differentiation in SBT self-efficacy levels according to demographic characteristics and the relationship between age, working time, number of blood transfusions administered weekly and self-efficacy levels.

When demographic characteristics were analyzed, it was found that the mean age of the participants was 26 years (±5.49), the mean working time was 2.4 years, and the mean number of weekly blood transfusions was 3 units. When the participants were analyzed regarding other characteristics, it was found that 82.6 % were female, 50.6 % were bachelor's degree, 45 % worked in the intensive care unit, and 83.4 % had previously received SBT training.

Nurses' SBT self-efficacy levels as seen in Table 2, sub-factors and total scale scores were analyzed and presented separately. According to the results of the analysis, it was determined that the mean score of the cognitive sub-factor (59 ± 16.9) was at a very high level; the mean score of the attitudinal sub-factor, negative sub-factor, and total score of the SBT-SES was at a high level (49.9 ± 13.6; 25.6 ± 6.9; 202.7 ± 50.1, respectively); and the mean score of the behavioral sub-factor (48.2 ± 19.5) was at a medium level (Table 2).

Whether SBT self-efficacy levels differed depending on sex, previous SBT training status, and education level was analyzed. As a result of the analysis, it was found that the mean SBT-SES total score of female participants (205 ± 49.2) was higher than male participants (192.07 ± 52.8) ($p = 0.032$) and gender was found to have a moderate effect on the total score obtained from the scale (Cohen's d=0.29). In addition, it was found that individuals who stated that they had previously received SBT training scored higher ($p < 0.05$) in all sub-factors except the behavioral sub-factor ($p > 0.05$) and in the total scale for those who did not receive training (205.2 ± 49.9 for those who received training; 190.3 ± 49.2 for

Table 1
Normal distribution analyzes.

	Kolmogorov-Smirnov		Mean	Median	Skewness	Kurtosis
	Statistics	p				
Attitudinal Sub-Factor	0.195	<0.001	49.9	52	-1.519	1.538
Behavioral Sub-Factor	0.297	<0.001	48.2	50	-1.748	1.795
Cognitive Sub-Factor	0.258	<0.001	59	68	-1.743	1.808
Negative Sub-Factor	0.282	<0.001	25.6	30	-1.657	1.645
Total of the SBT-SES	0.199	<0.001	202.7	223.5	-1.622	1.501

Table 2
Descriptive statistics of self-efficacy levels for safe blood and blood products.

SBT-SES Scores	Minimum	Maximum	Mean	±Std. Deviation
Attitudinal Sub-Factor	13	65	49.9	13.6
Behavioral Sub-Factor	16	80	48.2	19.5
Cognitive Sub-Factor	14	70	59	16.9
Negative Sub-Factor	6	30	25.6	6.9
Total Score of the SBT-SES	62	245	202.7	50.1

Table 4
Examination of the relationship between safe blood and blood products transfusion self-efficacy level and descriptive characteristics.

		Age	Working Time	Number Of Weekly Blood Transfusions
SBT-SES	**Pearson Correlation**	0.043	0.084	-0.033
	p	**0.343**	**0.065**	**0.469**
	N	482	482	482

those who did not receive training). It was found that the status of receiving previous SBT training had a moderate effect on the total score obtained from the scale (Cohen's d=0.30) (Table 3).

The presence of a relationship between SBT self-efficacy level and age, working time, and number of blood transfusions per week was analyzed by the Pearson correlation test (Table 4), and no significant relationship was found between the variables ($p > 0.05$).

4. Discussion

In 2019, the World Health Organization announced that patient safety is a global public health issue [15]. All over the world, policies and procedures are in place to safely prescribe and administer blood and blood product transfusions, but patient safety issues persist [9]. The incidence of blood transfusion-related complications is 77.5 per 100.000 blood components, of which 19.1 are reported to be serious reactions, which is quite high [16]. In order to prevent complications, nurses need to have the self-efficacy to manage the whole process correctly and effectively before, during, and after transfusion [9].

According to the data of this study, nurses have high levels of SBT self-efficacy. However, it is striking that their self-efficacy levels in the behavioral sub-factor are at a moderate level (Table 2). In ensuring patient safety, transfusion instructions must be followed completely. In studies, the main cause of hemolytic reactions was reported to be human errors outside the blood bank, with a rate of 70 % [6]. This data suggests that moderate behavioral self-efficacy is insufficient for a critical practice such as blood transfusion.

Many previous studies reported that nurses had a high level of SBT knowledge [17–19]. There are studies reporting the opposite of this

Table 3
Comparison of safe blood and blood products transfusion self-efficacy level according to descriptive characteristics.

Characteristics	n (%)	Attitudinal Sub-Factor Mean±SD	Behavioral Sub-Factor Mean±SD	Cognitive Sub-Factor Mean±SD	Negative Sub-Factor Mean±SD	SBT-SES Total Score Mean±SD
Sex						
Female	398(82.6)	50.4 ± 13.4	48.9 ± 19.1	59.7 ± 16.6	25 ± 6.4	205 ± 49.2
Male	84(17.4)	47.7 ± 14.6	44.7 ± 20.9	56 ± 18	21.7 ± 8.3	192.1 ± 52.8
Independent Sample t -test & p value		1.638 **& 0.102**	1.801 **& 0.072**	1.839 **& 0.067**	2.384 **& 0.059**	2.152 **& 0.032**
Cohen's d						0.29
Previous SBT Training						
Yes	402(83.4)	50.6 ± 13.5	48.9 ± 19.2	59.7 ± 16.8	26 ± 6.6	205.1 ± 49.9
No	80(16.6)	46.5 ± 13.6	44.7 ± 20.3	55.6 ± 17.1	23.5 ± 7.9	190.3 ± 49.2
Independent Sample t -test & p value		2.511 **& 0.012**	1.749 **& 0.081**	1.991 **& 0.047**	2.589 **& 0.011**	2.436 **& 0.015**
Cohen's d		0.30		0.24	0.36	0.30
Education Level						
High School	140(29)	49.1 ± 14.5	47 ± 21.1	58.3 ± 18.2	26.3 ± 6.5	200.7 ± 53.7
Bachelor's Degree	244(50.6)	49.6 ± 14.2	47.6 ± 20.1	58.4 ± 17.5	25.7 ± 6.5	201.2 ± 52.2
Master Degree	98(14.4)	52.1 ± 10.3	51.3 ± 14.6	61.8 ± 12.7	24.4 ± 8.1	209.5 ± 37.6
Ona-Way ANOVA F & p value		1.581 **& 0.207**	1.598 **& 0.203**	1.631 **& 0.197**	2.283 **& 0.103**	1.128 **& 0.324**
Clinic of Employment						
Internal Service	76(15.8)	49.9 ± 15.2	48.3 ± 21.3	59.1 ± 19	26.6 ± 6.3	203.9 ± 55.7
Surgery Service	130(27)	50.5 ± 13.4	49.1 ± 19.2	59.8 ± 16.5	25.5 ± 7	204.9 ± 49
Emergency	36(7.5)	49.6 ± 14.7	48.2 ± 20.2	58.7 ± 17.5	25.8 ± 6.6	202.3 ± 52.6
Intensive Care Unit	216(45)	49.8 ± 12.9	47.7 ± 18.8	58.7 ± 16.2	25.1 ± 7.2	201.3 ± 48.1
Child Services	24(12.2)	48.6 ± 14.8	46.7 ± 21	58.1 ± 18.1	26.8 ± 5.3	200.2 ± 54
Ona-Way ANOVA F & p value		0.116 **& 0.977**	0.137 **& 0.969**	0.116 **& 0.977**	0.902 **& 0.463**	0.132 **& 0.97**

situation. Ahmed et al. [20] in an educational research hospital in Sudan, Mohd-Noor et al. [5] in a hospital in Malaysia, Panchawagh et al. [21] in a tertiary hospital in India reported that nurses' knowledge of SBT was a low level. We think that this difference is due to the different blood transfusion policies implemented between countries [22–25]. One of the biggest obstacles to SBT policies in low and middle income countries has been reported as the lack of trained health professionals [26]. In this respect, it is important to increase the support provided by international health organizations for implementing SBT policies and completing necessary training in countries in need.

Another issue is that no studies in the literature measure nurses' SBT self-efficacy levels. Measuring only knowledge is not sufficient in skill assessment. Because the existence of knowledge does not mean that this knowledge will turn into behavior [12]. Our study observed that while the nurses exhibited a high level of self-efficacy in SBT overall, the specific Sub-Factor of behavioral self-efficacy registered at an intermediate level. Likewise, the finding that individuals who had undergone prior transfusion training demonstrated higher self-efficacy levels than those without such training did not yield any significant difference in the behavioral sub-factor (see Table 3; $p > 0.05$). This suggests that there may be challenges in translating acquired knowledge into practical application. When choosing a training method for safe transfusion, it is important to prefer methods that aim to transform knowledge into behavior and increase self-efficacy in addition to increasing the level of knowledge. We think studies comparing SBT training methods regarding behavior change and self-efficacy development levels are important.

Abbass et al. [27] reported that nurses working in a pediatric unit gained positive behaviors toward SBT at the end of the training program based on the analysis, design, development, implementation, and evaluation model developed by Mastrian et al [28]. Lee and Tsang [29] reported that virtual reality simulation training for blood transfusion increased students' knowledge and self-confidence levels in their study with student nurses. Soliman and Elhapashy [30] reported that the training module they implemented for nurses working in the hematology department was effective in gaining SBT skills. It is important to conduct similar studies. Because inadequate self-efficacy in the behavioral factor may pose a risk regarding quality and safety in patient care. In addition, we think it is important to identify the barriers to transforming knowledge into behavior in studies and to plan regulatory activities in this regard.

In the study data, women's self-efficacy level was higher than men's (Table 3). There is no relationship between SBT self-efficacy level and age, working time, and number of weekly blood transfusions (Table 4).

Considering sex initially, many studies conducted in previous years have found that male and female nursing students differ in terms of personality traits, emotional expression, professional identities, social roles, learning abilities, and other aspects [31,32]. Some studies also report that sex differences affect nurses' emotional intelligence, empathy, and problem-solving ability [33]. These characteristics are important for skill learning. In parallel with the literature, sex was an effective factor in gaining self-efficacy. Providing training with different techniques according to sex may be a solution.

The second issue is the possible illusion that more experienced nurses or nurses who administer more blood transfusions may have more knowledge and self-efficacy than those who administer fewer transfusions. Soliman and Elhapashy [30] reported that nurses' SBT application levels did not differ according to age, working time, education level, and number of transfusion applications. Their results are similar. It is well known that frequent practice effectively develops self-efficacy, while knowledge and skills that are not used for a long time are lost over time [9]. However, even if there is sufficient knowledge of the skill, frequent practice alone is not sufficient to transform this knowledge into behavior and increase self-efficacy.

As a result, nurses' self-efficacy levels towards blood transfusion are high. However, the self-efficacy level in the behavioral sub-factor is not sufficient level for SBT.

4.1. Recommendation

Based on the study results, the following recommendations can be made:

- Planning studies in which training methods that will not only increase the level of knowledge of nurses but also create behavioral change and increase self-efficacy are investigated, their effectiveness is compared, and post-training behavioral change is evaluated,
- Investigating the barriers to the transformation of high-level SBT knowledge into behavior,
- Considering the sex factor when selecting training methods and techniques,
- Measuring nurses' self-efficacy towards SBT at regular intervals and planning regulatory interventions when needed,
- Increasing the support provided by international health organizations to low and middle income countries for the implementation of SBT policies.

Ethics

This study was approved by Ethics committee of Marmara University the Noninvasive Clinic Ethics Committee **(Decision no 09.2022.508, dated 05.20)**.

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Declaration of Competing Interest

The authors report no declarations of interest.

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