Clinical and Experimental Health Sciences

The Effect of Patient Safety Training Program Based on Constructivist Learning Model on Nurses' Critical Thinking and Clinical Decision – Making: A Randomized Controlled Trial

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ABSTRACT

Objective: The aim of this study was to determine the effect of the Patient Safety Education Program based on the Constructivist and Traditional Learning Models on nurses' knowledge levels, critical thinking tendencies, and perceptions of clinical decision-making regarding patient safety.

Method: This study employed a randomized controlled experimental design. A total of 60 nurses were randomly assigned into three groups: the intervention group (n = 20), control group (n = 20), and placebo group (n = 20). The study was conducted in the internal medicine and surgical clinics at a city hospital. Data were collected using the Nurse Information Form, Patient Safety Knowledge Test, California Critical Thinking Disposition Inventory, and Clinical Decision-Making in Nursing Scale.

Results: The majority of the intervention group were male (65%), single (65%), with undergraduate degrees (75%). Their mean age was 28.90±4.49 years. The control group was mostly female (60%), single (70%), with undergraduate degrees (80%). Their mean age was 28.95±6.82 years. The placebo group included males and females equally (50%), 65% single, and 85% with undergraduate degrees. The intervention group's patient safety knowledge scores were higher post-test compared to the control and placebo groups. Follow-up 6 months, the intervention group's total and subscale scores on the critical thinking disposition were also higher than those of the control and placebo groups. Similarly, after 6 months of follow-up, the intervention group's total and subscale scores on clinical decision-making were higher than those of the other groups, indicating a significantly enhanced clinical decision-making perception compared to the control and placebo groups.

Conclusion: The findings indicate that patient safety training based on the Constructivist Learning Model effectively improves nurses' knowledge levels regarding patient safety and enhances their perceptions of clinical decision-making. However, it does not sufficiently increase their critical thinking tendencies.

Keywords: Constructivist learning model; patient safety; in-service training; critical thinking disposition; clinical decision-making; traditional learning model

1. INTRODUCTION

Healthcare services assume a complex structure, and the increasing demands for care, along with rapid developments in information and technology in the 21st century, lead to higher expectations from healthy and sick patients regarding the quality and safety of healthcare services (1). Ensuring patient safety is a prerequisite for meeting these expectations (2).

Patient safety is a concept that significantly affects the quality, effectiveness, and provision of healthcare services. As one of the primary goals and criteria of healthcare institutions, patient safety involves all precautions taken by the institution and its healthcare team members to prevent errors during care delivery and to mitigate the consequences of any errors that occur (1,3-5). The main objective of patient safety is to prevent avoidable errors before they occur, mitigate potential risks, report incidents to the necessary authorities, and implement corrective measures to minimize recurrence (1,6). Nurses, as key members of the healthcare team, play an essential role in achieving these goals due to

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their long-term and active involvement in patient care and the provision of healthcare services (7-9).

In line with Quality Standards in Health (QSH) in institutions affiliated with the Ministry of Health, face-to-face and online patient safety training programs are conducted as part of in-service training to enhance nurses' knowledge, skills, attitudes, and competencies regarding patient safety (10-12). However, these programs are predominantly instructor-centered; various methods, techniques, and materials are often not employed. Trainees have limited opportunities to ask questions, conduct analyses, think critically, learn independently, and structure knowledge. This limitation may prevent nurses from acquiring comprehensive and lasting knowledge and skills related to patient safety, internalizing them, and exhibiting desired behavioral changes. Consequently, errors such as incorrect drug administration, infection development, or wrong patient/wrong site procedures continue to occur (10-12). To prevent or minimize such errors, patient safety training programs should be based on educational models aligned with the teaching-learning process (13). The Constructivist Learning Model (CLM) is particularly effective in promoting active, learner-centered knowledge construction and enhancing critical thinking and decision-making skills.

Recent studies emphasize that CLM-based education programs facilitate the use of prior knowledge and experiences, encourage responsibility, promote learning through experience, and enhance critical thinking, evidence-based decision-making, problem-solving, and creativity. These studies demonstrate that CLM-based programs improve nurses' ability to apply knowledge in practice, enhance clinical reasoning, and support safe patient care (13-22).

However, only a limited number of studies have evaluated CLM-based patient safety training programs for nurses (23-24,28). To the best of our knowledge, this study is the second to develop, implement, and evaluate a Patient Safety Education Program based on the Constructivist Learning Model, assessing its effect on nurses' knowledge about patient safety, critical thinking tendency, and perception of clinical decision-making. The first study in this field was conducted by Tuba Ötün and Emine Şenyuva (2022), titled *"An Important Stage in the Development Process of a Patient Safety Education Program: Needs Analysis (A Qualitative Study)"* (29). This study represented an important preliminary step in the development of CLM-based patient safety training programs, employing a qualitative needs analysis to identify nurses' educational gaps, learning needs, and challenges related to patient safety practices. Its findings informed the design of a structured training program tailored to nurses' real-world clinical contexts, highlighting specific areas for intervention and demonstrating the feasibility and relevance of constructivist learning–based patient safety training in nursing practice. Building on this foundation, the present study differs from the first by evaluating the program's effectiveness through a randomized controlled trial, incorporating 1 – and 6-month follow-ups, and comparing outcomes with traditional and placebo training programs. Consequently, it provides robust evidence for the field and offers guidance for future research.

2. METHODS

2.1. Aim

The aim of this study was to determine the effect of a Patient Safety Education Program based on Constructivist and Traditional Learning Models on nurses' knowledge levels, critical thinking tendencies, and perceptions of clinical decision-making regarding patient safety.

2.2. Design

This study employed a randomized controlled experimental design with three groups: intervention, control, and placebo.

2.3. Hypotheses

H1: Post-test patient safety knowledge scores differ significantly among the intervention, control, and placebo groups.

H2: One-month follow-up patient safety knowledge scores differ significantly among the intervention, control, and placebo groups.

H3: Six-month follow-up patient safety knowledge scores differ significantly among the intervention, control, and placebo groups.

H4: Post-test critical thinking disposition scores differ significantly among the intervention, control, and placebo groups.

H5: One-month follow-up critical thinking disposition scores differ significantly among the intervention, control, and placebo groups.

H6: Six-month follow-up critical thinking disposition scores differ significantly among the intervention, control, and placebo groups.

H7: Post-test clinical decision-making scores differ significantly among the intervention, control, and placebo groups.

H8: One-month follow-up clinical decision-making scores differ significantly among the intervention, control, and placebo groups.

H9: Six-month follow-up clinical decision-making scores differ significantly among the intervention, control, and placebo groups.

2.4. Participants

The study population consisted of all nurses (N = 643) working at a city hospital affiliated with the Ministry of Health in Istanbul, Türkiye. The required sample size was calculated using a known population formula (α = 0.05, 95% confidence interval), taking into account the effect size reported in a previous study on constructivist learning model–based patient safety training (30) and using G*Power software. The minimum required sample size to achieve adequate statistical power was calculated as 64 nurses, with at least 18 participants per group. To account for potential attrition, 20 nurses were recruited for each group, resulting in a total sample of 60 nurses. In addition, a post hoc power analysis was conducted, confirming that the final sample size provided sufficient statistical power to detect the expected effects.

The study included bedside nurses working in various internal medicine and surgical units who volunteered to participate and had not previously received patient safety training. Participants were randomly assigned to the intervention, control, and placebo groups using the website https://www.random.org to ensure true randomization. The first 20 nurses were allocated to the intervention group, the next 20 to the control group, and the remaining 20 to the placebo group. Providing detailed information on the allocation process enhances transparency and helps to minimize selection bias.

Throughout the study period, participant retention was monitored, and all nurses completed the intervention as planned. No participant withdrew from the study, and the dropout rate was 0%, which was within the range anticipated during the sample size calculation.

2.4.1. Randomisation and Blinding

A single-blind design was employed in this study. The nurses were blinded to the type of training they received, which helped to minimize performance and response bias. Details regarding the randomisation procedure and the implementation and maintenance of blinding throughout the study are presented in this subsection to ensure methodological rigor, transparency, and reproducibility.

2.4.2. Group Definitions

- **Intervention group:** Nurses participating in Patient Safety Training based on the Constructivist Learning Model
- **Control group:** Nurses participating in Patient Safety Training based on the Traditional Learning Model
- **Placebo group:** Nurses participating in the training provided by the Turkish Ministry of Health

2.5. Measures

Data were collected using the Nurse Information Form, Patient Safety Knowledge Test, California Critical Thinking Disposition Scale, Clinical Decision-Making Scale in Nursing, Nurse Diary.

2.5.1. Nurse information form

Developed by the researchers, including 10 questions on descriptive and professional characteristics of nurses (22-24,28).

2.5.2. Patient Safety Knowledge Test (PSKT)

It was developed by the researchers based on the relevant literature to assess nurses' knowledge of the importance of patient safety, as well as patient safety principles and practices (1,30,31,32). The test comprised 35 multiple-choice questions, each with five answer options, covering topics related to patient safety and its core principles. To ensure language and content validity, the test was reviewed by five field experts, including a nurse faculty member, a nurse, and a physician. Based on their feedback, 10 questions were removed, and adjustments were made to improve clarity and content.

The revised test was administered to 50 nurses who had previously participated in patient safety training. The KR-20 reliability coefficient of the PSKT was found to be 0.85, indicating good reliability (32). Considering content validity, item distribution across subjects, target question levels, item difficulty, and item discrimination indices, the final version of the test consisted of 20 questions.

In the present study, the PSKT was administered to the intervention, control, and placebo groups. The reliability coefficients were as follows: pre-test, 0.81; post-test, 0.84; 1-month follow-up, 0.86; and 6-month follow-up, 0.89. The test was therefore considered reliable. Scores ranged from 0 to 20, with higher scores indicating greater knowledge of patient safety principles and practices.

2.5.3. California Critical Thinking Disposition Inventory (CCTDI)

The scale was developed by Facione, Facione& Giancarlo (1990-1998), and the Turkish validity and reliability study was conducted by Kokdemir (2003). The scale consists of 51 items under the six subscales of analyticity, open-mindedness, inquisitiveness, self-confidence, truth-seeking, and systematicity. The 6-point Likert type scale is scored between (1) Strongly Disagree and (6) Strongly Agree. The lowest and highest scores to be obtained from the scale are 60 and 360, respectively. A scale score below 240 indicates low critical thinking disposition, while a scale score of 300 and above shows high critical thinking disposition (33). In the present study, the Cronbach's alpha internal consistency coefficient of the scale was found as 0.86 pre-test, as 0.83

post-test, as 0.87 follow-up 1 month, and as 0.89 follow-up 6 month.

2.5.4. Clinical Decision-Making in Nursing Scale (CDMNS)

The Turkish validity and reliability study of the scale developed by Jenkins (1983) was conducted by Durmaz-Edeer and Sarikaya (2015). The scale consists of 40 items under the four subscales of Search for Alternatives and Options, Canvassing of Objectives and Values, Evaluation and Reevaluation of Consequences, and Search for Information and Unbiased Assimilation of New Information. The 5-point Likert type scale is scored between (1) Never and (5) Always. The score to be obtained from the total scale ranges between 40 and 200, while the scores obtained from each subscale vary between 10 and 50. A high score to be obtained from the scale shows a high level of decision-making perception, while a low score indicates a low level of decision-making perception (34,35). In the present study, the Cronbach's alpha internal consistency coefficient of the scale was found as 0.90 pre-test, as 0.96 post-test, as 0.97 follow-up 1 month, and as 0.97 follow-up 6 month.

2.5.5. Nurse Diary

The Nurse Diary was used as a qualitative data collection tool to support and enrich the quantitative findings of the study. The diary was developed by the researchers in line with the objectives of the patient safety training program and the constructivist learning model. It aimed to capture nurses' reflections, experiences, and perceptions related to patient safety practices, critical thinking, and clinical decision-making in their daily clinical work. Participants in the intervention group were asked to complete the Nurse Diary on a regular basis during the follow-up period. The diary included open-ended prompts encouraging nurses to reflect on how the training influenced their awareness of patient safety, application of safety principles, problem-solving processes, and clinical decision-making in patient care situations. Nurses were instructed to record their observations and experiences in their own words to ensure authenticity and depth of data. The Nurse Diary entries were collected at the end of the follow-up period and analyzed using qualitative content analysis to identify recurring themes and patterns related to the impact of the training program.

2.6. Trainings

2.6.1. Development of Patient Safety Training Program Based on Constructivist Learning Model (PSTPBCLM)

The training program was developed based on data obtained from a needs analysis and in accordance with the relevant literature (1,14,22-28,31,36-40). Initially, the general purpose and objectives of the program, its content (Session I: Patient Safety Concept and Historical Development, Session II: Effective Communication, Session III: Correct Patient Identification, Session IV: Medication Safety, Session V: Infection Risk, Session VI: Fall Risk), teaching methods and techniques (lecturing, question–answer, brainstorming, collaborative learning, fishbone analysis, case examples, role-play, bingo, demonstration, concept mapping, group work), teaching materials (colored pens and pencils, paper board, overhead projector/barcovision, videos, patient identity samples, poster creation, Kahoot application), assessment methods (verbal evaluation), as well as the date, duration, location, and budget of the training were determined. Subsequently, for each session, the specific purpose and objectives, content, teaching methods and techniques, teaching materials, and assessment methods were defined in line with the overall aims of the program. In the first session of the training program, the "Rules to Be Observed in Training" were collaboratively established with the nurses, and the purpose, objectives, and content of the program were shared with them. Attention was also given to ensuring a physically suitable training environment. Knowledge was not directly transmitted from the trainer to the participants; instead, nurses were encouraged to actively construct knowledge under the guidance of the trainer, and necessary conditions were provided to facilitate this process. Each session began with warm-up activities, such as "Who Came Out of the Hat?", "Word Hunt from Ear to Ear," and "Creating an Object in Different Shapes," to prepare the nurses for the session and its subject matter.

During the sessions, nurses were encouraged to actively participate, study both individually and collaboratively, conduct research and analysis, produce and apply knowledge, share experiences, express themselves, and monitor their behaviors. Teaching methods and techniques that supported learning by doing and experiencing were employed, and a suitable learning environment was maintained. To facilitate comprehension, examples were provided, thought-provoking questions were asked, and necessary explanations were given. Individual differences among the nurses were considered, and repetitions and reinforcements were applied as needed. Small rewards were offered to motivate participants who performed well in individual and group activities. Each session was evaluated by the nurses both verbally and in writing, allowing them to express themselves and supporting the development of their social and communication skills. Additional support was provided outside the sessions as required.

2.6.2. Patient Safety Training Program Based on Traditional Learning Model (PSTPBTLM)

In accordance with the Quality Standards in Health (QSH), healthcare professionals working in institutions affiliated with the Ministry of Health of the Republic of Turkey are required to receive online or face-to-face training on patient safety as part of the in-service training plan. PSTPBTLM was developed based on relevant literature (1,14,22-28,38). Initially, the general purpose and objectives of the training program were determined. Subsequently, considering the general objectives, specific goals, content, teaching methods

and techniques, teaching materials, and assessment methods for each session were established, along with the dates, locations, and budget of the training.

In the first session of PSTPBTLM, the "Rules to Be Observed in Training" were established with the participants, and the purpose, objectives, and content of the program were shared. Training slides prepared according to the program were primarily delivered through lecturing. Each session was evaluated by the nurses both verbally and in writing.

2.6.3. The Training Program Developed for the Placebo Group

The training program developed for the placebo group was designed based on the standard in-service training programs provided to health personnel who were not directly involved in patient safety but employed in institutions affiliated with the Republic of Turkey Ministry of Health. The program comprehensively covered the organizational structure and functioning of the Ministry of Health, including the Central Organization, Affiliated Units, Field Services, and their respective responsibilities. In addition, the content addressed stress management strategies, principles of protecting public property, official correspondence and documentation procedures, as well as the duties, authorities, and responsibilities of state officials recruited according to Law No. 657. Furthermore, strategies for preventing and managing violence against women were included. The program was delivered through lectures, printed materials, and group discussions to ensure that participants could understand and apply the theoretical concepts. Unlike the Patient Safety Education Program, the placebo program did not include interactive patient-safety scenarios, practical exercises, or activities aimed at enhancing clinical decision-making and critical thinking skills. This distinction ensured that the placebo program served as a control while maintaining engagement and educational relevance for the participants.

2.7. Data Collection

Data were collected between October 10, 2018, and October 1, 2020, following approval from the ethics committee, institutional permission, and individual consent. The CONSORT 2010 guidelines were used for reporting the study (Figure 1).

Training Procedure

- To prevent interaction between the intervention and control groups, the control group first received Patient Safety Training based on the Traditional Learning Model (PSTPBTLM) and was subsequently evaluated.
- After completion of this training, the developed Patient Safety Training Program based on the Constructivist Learning Model (PSTPBCLM) was applied to the intervention group.

Measurements and Timing

- Prior to the training, all nurses completed the Information Form, PSKT, CCTDI, and CDMNS.
- Pre-tests and post-tests were administered immediately before and after the training for each group, with follow-up assessments conducted at 1 month and 6 months.
- The control and placebo groups were trained first to prevent access to the content of the intervention program and to eliminate the possibility of being influenced.

Blinding Technique

- The study was conducted using a single-blind design; researchers collecting data were unaware of group allocation.
- Although nurses were aware of the type of training they received, assessments were conducted by independent researchers, minimizing measurement bias.

Nurse Diary

- Nurses in the intervention and control groups maintained a Nurse Diary at the end of each session.
- The diaries were used to evaluate participation and adherence to the training process and served as a data collection tool for recording practical information.

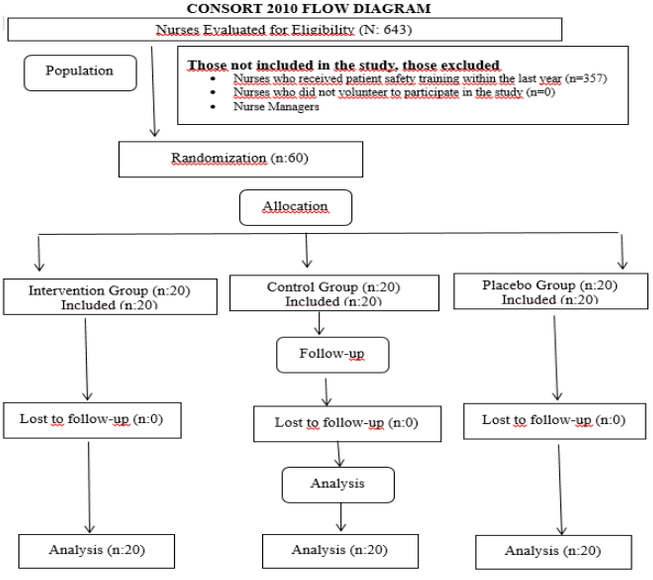

Figure 1. *CONSORT diagram of the study*

2.8. Statistical Analysis

The data were analyzed using IBM SPSS Statistics version 21.0. The normality of the data distribution was assessed via skewness and kurtosis values (<±1.5), which indicated that

the data were not normally distributed. Descriptive analyses included frequency, percentage, minimum, maximum, mean, and standard deviation. The internal consistency of the scales was evaluated using Cronbach's α coefficient. For intergroup and intragroup comparisons, the Chi-square test, Kruskal–Wallis test, regression analysis (Partial Eta Squared, R^2), and Post Hoc Tukey test were performed. Statistical significance was set at a 95% confidence interval (p<.05).

2.9. Ethics Approval

Ethical approval for this study was granted by the Ethics Committee of a Training and Research Hospital (Approval Date: 25 October 2018; Approval Number: 3323). Authorization to utilize the measurement instruments was obtained from the respective authors. In addition, written informed consent was obtained from all participating nurses, who voluntarily agreed to take part in the study.

3. RESULTS

The analysis revealed no statistically significant differences between the intervention, control, and placebo groups in terms of age and years of nursing experience (p>.05). Thus, the intervention group (n=20), control group (n=20), and placebo group (n=20) showed a homogeneous distribution.

3.1. Descriptive Characteristics

The majority of the intervention group were male (65%), single (65%), with bachelor's degree (75%). They worked in [specify special units, e.g., ICU, surgical, internal medicine] as nurses (100%) and in shifts (95%). Their mean age was 28.90 ± 4.49 years, and mean duration of nursing service was 5.50 ± 4.42 years.

The control group was mostly female (60%), single (70%), with bachelor's degree (80%). They worked in [specify special units] as nurses (100%) in shifts (95%). Their mean age was 28.95 ± 6.82 years, and mean nursing experience was 5.75 ± 6.48 years.

The placebo group included males and females equally (50%), 65% single, and 85% with bachelor's degree. They worked in [specify special units] as nurses (100%) in shifts (100%). Their mean age was 28.75 ± 4.10 years, and mean duration of nursing service was 5.60 ± 5.10 years.

Table 1 presents the baseline descriptive and professional characteristics of the nurses. No statistically significant differences were found among the intervention, control, and placebo groups in terms of age, gender, education level, marital status, or years of professional experience (p > .05), indicating that the groups were homogeneous at baseline.

3.2. Comparison of Nurses' Patient Safety Knowledge Scores within Groups, Between Groups and According to Time

Table 2-3-4 shows the difference test for PSKT score-a (pre-test point), PSKT score-b (post-test point), PSKT score-c (follow up 1 month point) and PSKT score-d (follow up 6month point) within and between groups in the intervention, control and placebo groups.

Intervention group PSKT score-b and PSKT score-c and PSKT score-d were higher compared to their mean score in the PSKT score-a (p<.001). PSKT score-aand PSKT score-b PSKT mean scores of the control and placebo groups were higher than their scores PSKT score-cand PSKT score-d (p<.01). It was observed that there was a significant difference between the groups in terms of PSKT score-a, and the score of the control group was higher than the intervention group (p<.05). With this result, a hypothesis H3 was rejected. There was a significant difference between the groups in terms of PSKT score-b, PSKT score-c and PSKT score-d, and the score of the intervention group was higher than the control and placebo groups (p<.05; p>.001). With this result, hypotheses H_1 and H_2 were accepted (Table 2).

3.3. Comparison of Nurses Critical Thinking Disposition Scores within Groups – Between Groups and According to Time

CTD total and analytical, open-mindedness, truth-seeking and systematicity subscale mean scores of the intervention group were higher than CTD score-b and CTD score-c and CTD score-d CTD score-a (p<.01; p<.001). In the control group, CTD score-b total and analyticality, open-mindedness and systematicity subscale mean scores were higher than CTD score-a, while CTD score-b and CTD score-c of the placebo group were higher than CTD score-a and CTD score-d (p<.001). There was no significant difference between the groups in terms of CTD score-a, CTD score-b and CTD score-c (p>.05). With this result, hypotheses H4 and H5 were rejected. It was determined that there was a highly significant difference between the groups and in terms of CTD score-d (p<.001). It was observed that the score of the intervention group was much higher than the control and placebo groups (p<.05; p>.001). With this result, hypothesis H_6 was accepted (Table 3).

3.4. Comparison of Nurses' Clinical Decision-Making Scores within Groups – Between Groups and According to Time

CDM total and all subscale mean scores of the intervention group and the placebo group in the CDM score-b, and CDM score-c and CDM score-d were found to be higher than their CDM score-a (p<.01; p<.001). The placebo group's CDM score-a on the subscale of "search for information and unbiased assimilation of new information" was higher than their CDM score-b, CDM score-c, and CDM score-d (p<.001). There was no significant difference between the groups in terms of CDM score-a (p>.05). There was a highly significant difference between the groups in terms of CDM score-b, CDM score-c and CDM score-d (p<.001). The score of the intervention group was much higher than the control and placebo groups (p<.05; p>.001). With this result, hypotheses H_7, H_8 and H_9 were accepted (3) (Table 4).

Table 1. *Descriptive and professional characteristics of nurse*

Variables	Intervention Groupx (n:20)		Control Groupy (n:20)		Placebo Groupz (n:20)		TOTAL		Test Statistic	Anlamlılık (p)
	n	%	n	%	n	%	n	%	X2	p
Gender										
Female	7	35,0	12	60,0	10	50,0	29	48,3	2,536	
Man	13	65,0	8	40,0	10	50,0	31	51,7	,281	
Marital Status										
Single	13	65,0	14	70,0	13	65,0	40	66,7	,150	
Married	7	35,0	6	30,0	7	35,0	20	33,3	,928	
Educational Status										
Health Vocational High School	1	5,0	1	5,0	0	0,0	2	3,3	-	
Associate Degree	2	10,0	3	15,0	1	5,0	6	10,0	-	
Bachelor's Degree	15	75,0	16	80,0	17	85,0	48	80,0		
Postgraduate	2	10,0	0	0,0	2	10,0	4	6,7		
Working Unit										
Ward	7	35,0	7	35,0	8	40,0	22	36,7	,144	
Specify special units	13	65,0	13	65,0	12	60,0	38	63,3	,931	
Duty										
Nurse	20	100,0	20	100,0	20	100,0	20	100,0	-	
Manager	0	0,0	0	0,0	0	0,0	0	0,0	-	
Work Schedule										
Daytime	1	5,0	1	5,0	0	0,0	2	3,3	-	
Shift work	19	95,0	19	95,0	20	100,0	58	96,7	-	
	Mean±SD		Mean±SD		Mean±SD		Mean±SD		KW	p
Age	28,90±4,49		28,95±6,82		28,75±4,10		28,87±5,19		,387	,824
Duration of Employment as a Nurse	5,50±4,42		5,75±6,48		5,60±5,10		5,62±5,31		,077	,962

n: number, %: percentage, Mean: average, SD: standard deviation, X^2: Chi-square, KW: Kruskal-Wallis

Table 2. *Comparison of nurses' PSKT score means within groups - between groups and according to time*

Variables	Intervention Groupx (n:20)		Control Groupy (n:20)		Placebo Groupz (n:20)		Testing and Significance
	Mean±SD	Min-Max	Mean±SD	Min-Max	Mean±SD	Min-Max	
PSKT score-aa	74,25±17,42	25-100	86,00±6,20	75-95	79,75±8,03	55-90	F:4,108 p:0,022* y>x
PSKT score-bb	93,50±6,90	75-100	84,50±8,09	70-95	81,75±8,16	65-95	F:11,299 p<0,001*** x>y,z
PSKT score-cc	92,75±5,73	85-100	81,50±9,19	60-95	77,25±7,52	65-90	F:19,439 p<0,001*** x>y,z
PSKT score-dd	94,00±5,53	85-100	78,00±8,65	60-95	74,25±8,63	55-85	F:38,539 p<0,001*** x>y,z
F1	25,309		7,308		9,425		
p	p<0,001*** a<b,c,d		p=0,007** a,b>c>d		p=0,001** a,b>c>d		
F2	21,301						
p	p<0,001***						
R2	0,428						

**p<0.05, **p<0.01; ***p<0.001 , R2: Impact factor (Partial Eta Squared)*

F: One-way analysis of variance (One-way ANOVA), F1: One-way analysis of variance in repeated measurements (time), F2: Bidirectionalanalysis of variance in repeated measurements (Time x Group

PSKT score-a[a] : Patient Safety Knowledge Test - Pre-training

PSKT score-b[b]: Patient Safety Knowledge Test - Post-training

PSKT score-c[c]: Patient Safety Knowledge Test - One month after training

PSKT score-d[d] : Patient Safety Knowledge Test - 6 months after training

Table 3. *Comparison of critical thinking disposition scores of nurses within groups - between groups and according to time*

Critical Thinking Disposition	Intervention Group (n:20)		Control Group (n:20)		Placebo Group (n:20)		Test statistics (F1)	Significance (p1)	R2
	Mean±SD	Min-Max	Mean±SD	Min-Max	Mean±SD	Min-Max			
CTD score-aa	219,08±23,21	175,94-250,60	235,22±20,75	187,94-275,77	225,47±16,80	191,73-251,28	3,169 1,220 0,984 2,366 1,952	0,050 0,303 0,380 ,103 ,083	,034
CTD score-bb	248,62±28,84	185,32-295,74	261,13±24,56	230,11-326,49	255,32±22,21	209,78-287,48			
CTD score-cc	243,02±25,61	207,60-297,08	254,19±33,21	199,64-326,49	254,00±27,08	191,30-310,20			
CTD score-dd	251,50±26,38	219,49-303,81	245,42±25,73	200,78-303,07	233,19±29,08	195,39-299,70			
F1	7,302		4,809		10,278				
P	,001*** b,c,d>a		,005** b>a		,001*** b,c>a,d				
F2	23,412								
p			0,001***						
R			0,517						

**p<0.05; **p<0.01; p<0.001 Avg: Mean, SS: Standard Deviation, R2: Impact coefficient (Partial Eta Squared), F: One-way analysis of variance in repeated measurements -One-way ANOVA (time), F1: Bidirectional analysis of variance in repeated measurements (Time x Group)*

CTD score-aa : Critical Thinking Disposition- - Pre-training
CTD score-bb : Critical Thinking Disposition- Post-training
CTD score-cc : Critical Thinking Disposition- One month after training
CTD score-dd:Critical Thinking Disposition- 6 months after training

Table 4. *Comparison of nurses' clinical decision-making score means within groups - between groups and according to time*

Critical Thinking Disposition	Intervention Group (n:20)		Control Group (n:20)		Placebo Group (n:20)		Test statistics (F1)	Significance (p1)	R2
	Mean±SD	Min-Max	Mean±SD	Min-Max	Mean±SD	Min-Max			
CTM score-aa	125,75±2,53	119,00-130,00	126,80±2,57	121,00-130,00	128,05±19,03	108,00-164,00	0,212	0,810	,615
CTM score-bb	166,90±5,01	159,00-177,00	149,40±20,93	109,00-169,00	126,60±2,27	122,00-132,00	52,240	p<0,001*** x>y>z	
CTM score-cc	169,50±3,65	164,00-180,00	125,75±2,53	119,00-130,00	125,20±2,50	122,00-130,00	1491,249	p<0,001*** x>y,z	
CTM score-dd	170,35±4,74	159,00-180,00	126,50±8,60	115,00-161,00	125,85±2,66	121,00-129,00	377,226	p<0,001*** x>y,z	
F1	495,669		19,996		,313				
P	<,001*** b,c,d>a		<,001*** b>a,c,d		,594				
F2	45,486								
p	,001***								
R	0,259								

**p<0.05; **p<0.01; p<0.001 Avg: Mean, SS: Standard Deviation, R2: Impact coefficient (Partial Eta Squared),F: One-way analysis of variance in repeated measurements - One-way ANOVA (time), F1: Bidirectional analysis of variance in repeated measurements (Time x Group)*

CDM score-aa : Clinical Decision-Making- Pre-training
CDM score-bb : Clinical Decision-Making- Post-training
CDM score-cc : Clinical Decision-Making- One month after training
CDM score-dd : Clinical Decision-Making- 6 months after traini

4. DISCUSSION

The primary aim of this study was to determine the effect of a Patient Safety Training Program based on Constructivist and Traditional Learning Models (PSTPBCLM and PSTPBTLM) on nurses' knowledge levels, critical thinking dispositions, and perceptions of clinical decision-making regarding patient safety. In this context, the findings obtained from this study were compared with the results of previous research, and the similarities and differences were discussed.

4.1. Nurses' Patient Safety Knowledge Scores

With regard to patient safety knowledge, the findings of the current study demonstrated that the PSKT scores of the intervention group were significantly higher than those of the control and placebo groups immediately after the training,

at the 1-month follow-up, and at the 6-month follow-up. This suggests that the constructivist approach, which emphasizes active learner participation, the use of various teaching strategies, and the reconstruction of knowledge, had a lasting positive effect on knowledge retention. In the literature, Öztürk et al. (2017) reported that after a two-day, 12-hour patient safety training program with 184 nurses, posttest scores were significantly higher compared to pretest scores (41). Similarly, Hwang et al. (2016) found that training was effective in improving patient safety knowledge (42), and Lukewich et al. (2015) noted a consistent increase in knowledge levels throughout nursing education (43). The findings of the present study are in line with these studies, but it differs in that it directly compared two different educational models (constructivist versus traditional) and demonstrated the superiority of the constructivist model in ensuring the permanence of learning.

4.2. Nurses Critical Thinking Disposition Scores

Critical thinking is one of the core competencies required to sustain the professional identity of nursing and to provide safe, high-quality care. In this study, the CTD scores of the intervention group were higher than those of the control and placebo groups at the 6-month follow-up, suggesting that PSTPBCLM had a lasting positive effect on nurses' critical thinking disposition. Caliskan and Dogan (2022) emphasized that the effective acquisition and use of knowledge and skills in nursing is only possible through critical thinking skills (44). While some studies have found that nurses' critical thinking dispositions are at a low level (44-49), others have reported moderate levels (50-52). The present study supports the claim that constructivist-based education, which incorporates different teaching methods and encourages the evaluation of multiple perspectives, can enhance critical thinking tendencies when applied consistently. Moreover, it is believed that repeating such programs at regular intervals after graduation could further improve nurses' critical thinking abilities.

4.3. Clinical Decision-Making of Nurses

In terms of clinical decision-making, the results showed that the CDM scores of the intervention group were significantly higher than those of the control and placebo groups immediately after training, at the 1-month follow-up, and at the 6-month follow-up. This finding indicates that PSTPBCLM positively influenced nurses' perceptions of clinical decision-making. In the literature, studies have reported varied results: while some found nurses' decision-making perceptions to be at low levels (53-55), others reported moderate (46,56-59) or even high levels (35). In general, however, perceptions are most often found to be at low or moderate levels (35). The present study contributes to this body of evidence by showing that the use of different training methods for each group may account for the differences observed and that the constructivist model significantly improves clinical decision-making perceptions.

Overall, the results of this study provide strong evidence that constructivist-based training programs are more effective than traditional approaches in improving nurses' patient safety knowledge, critical thinking dispositions, and perceptions of clinical decision-making. By actively engaging learners, fostering interaction, and supporting the reconstruction of knowledge, PSTPBCLM not only improved short-term outcomes but also demonstrated long-term sustainability of learning effects. These findings highlight the importance of integrating constructivist-based approaches into both undergraduate nursing education and continuing professional development programs. In addition, the study differs from earlier research by employing a rigorous randomized controlled design with intervention, control, and placebo groups, thereby strengthening the validity of the results.

In conclusion, the present study contributes to the literature by demonstrating that constructivist-based patient safety training can have a significant and lasting impact on nurses' competencies. The findings suggest that repeating such programs at regular intervals after graduation would further enhance critical thinking and decision-making skills, thereby contributing to safer and more effective nursing practice.

The study's strengths include its randomized controlled trial design, the inclusion of follow-up assessments at follow up 1 and 6 month, and the fact that it is the first study conducted in this area that demonstrates the impact of a patient safety training based on the constructivist learning model on nurses' knowledge, critical thinking tendencies, and clinical decision-making skills.

The limitations of the study are that it was conducted at a single institution and relied solely on self-reports from the participating nurses.

5. CONCLUSION

The research results indicate that the patient safety training based on the constructivist learning model supports the development of nurses' knowledge levels regarding patient safety and their perceptions of clinical decision-making, but does not sufficiently enhance their critical thinking tendencies. Based on these results, it can be recommended: to provide PSTPBCLM in in-service training and to repeat this training at regular intervals in order for nurses to provide quality and safe patient care/service and to develop their critical thinking disposition and clinical decision-making perceptions, to increase the knowledge and skills of the trainers in terms of using constructive learning methods and techniques and assessment methods, andto organize PSTPBCLM in a way to include all healthcare professionals.

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REFERENCES

[1] Sur H, Palteki T, Yazıcı G. Hasta güvenliği. Ankara: Palme Yayınevi; 2019. (Turkish)

[2] Korkmaz AÇ. Geçmişten günümüze hasta güvenliği. İnönü Üniversitesi Sağlık Hizmetleri Meslek Yüksekokulu Dergisi. 2018;6(1):10–19. (Turkish)

[3] Bayın G. Sağlık hizmetlerinin geliştirilmesi sürecinde hasta ve toplum katılımının rolü. TAF Preventive Medicine Bulletin. 2016;15(5):458–466. (Turkish)

[4] Makary MA, Daniel M. Medical error—the third leading cause of death in the US. BMJ. 2016;353:i2139. https://doi.org/10.1136/bmj.i2139

[5] Sayek F. Hasta güvenliği: Türkiye ve Dünya. In: Çakmakçı M, Akalın E, editors. TTB Raporları/Kitapları. Ankara: Türk Tabipleri Birliği Yayınları; 2011. (Turkish)

[6] Saufl NM. National patient safety goals. Journal of Perianesthesia Nursing. 2009;24(2):114–118.

[7] Famolaro T, Yount ND, Hare R, Thornton S, Meadows K, Fan L, Birch R, Sorra J. Hospital survey on patient safety culture: 2018 user database report. Rockville, MD: Agency for Healthcare Research and Quality; 2018.

[8] Kim KJ, Yoo MS, Seo EJ. Exploring the influence of the nursing work environment and patient safety culture on missed nursing care in Korea. Asian Nursing Research. 2018;12(2):121–126. https://doi.org/10.1016/j.anr.2018.04.003

[9] Sammer CE, Lykens K, Singh K, Mains DA, Lackan NA. What is patient safety culture? A review of the literature. Journal of Nursing Scholarship. 2010;42(2):156–165. https://doi.org/10.1111/j.1547-5069.2009.01330.x

[10] Hergül FK, Özbayır T, Gök F. Ameliyathanede hasta güvenliği: sistematik derleme. Pamukkale Tıp Dergisi. 2016;9(1):87–98. (Turkish)

[11] Topçu İ, Türkmen AS, Şahiner NC, Savaşer S, Şen H. Physicians' and nurses' medical errors associated with communication failures. Journal of the Pakistan Medical Association. 2017;67(4):600–604.

[12] Yıldız FT, Yıldız İ. Hemşirelerin ilaç uygulama hatalarına yönelik bilgi ve tutumlarının değerlendirilmesi. Türk Fen ve Sağlık Dergisi. 2020;1(1):29–41. (Turkish)

[13] West E. Constructivist theory concept-based learning in professional nursing ethics: implications for nurse educators. Teaching Ethics. 2016;16(1):1–10. https://doi.org/10.5840/tej201633129

[14] Bhattacharjee J. The constructivist approach to teaching and learning. International Research Journal of Interdisciplinary and Multidisciplinary Studies. 2015;1(4):65–74.

[15] Dikmen Y, Ak B, Usta YY, Ünver V, Korhan E, Cerit B, Yonder M. Effect of peer teaching used in nursing education on the performance and competence of students in practical skills training. International Journal of Educational Sciences. 2017;16(1–3):14–20. https://doi.org/10.1080/09751.122.2017.1311583

[16] Güler G, Kırca AŞ, Süt HK, Hür S. Çalışan ebeler ile ebelik öğrencilerinin eleştirel düşünme eğilimleri. Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi. 2021;10(1):88–97. (Turkish) https://doi.org/10.37989/gumussagbil.816259

[17] Lenburg CB, Abdur-Rahman VZ, Spencer TS, Boyer SA, Klein CJ. Implementing the COPA model in nursing education and practice settings: promoting competence, quality care, and patient safety. Nursing Education Perspectives. 2011;32(5):290–296. https://doi.org/10.5480/1536-5026-32.5.290

[18] Mbise S, Lekule CS. Constructivist teaching pedagogy: A strategy for innovation, industrialization and sustainable development. International Journal for Research in Educational Studies. 2020;6(10):1–26. https://doi.org/10.53555/es.v6i10.1403

[19] Özbudak E, Koç Z. Hemşirelik uygulamalarında eleştirel düşünmenin önemi. Sağlık ve Toplum. 2021;31(2):38–48. (Turkish)

[20] Özkara BÖ. Uzaktan eğitim ortamındaki öğrencilerin yapılandırmacı öğrenmeye yönelik tercihlerinin araştırılması. Yükseköğretim ve Bilim Dergisi. 2018;8(2):378–387. (Turkish) https://doi.org/10.5961/jhes.2018.279

[21] Roberts DS, Ingram RR, Flack SA, Hayes RJ. Implementation of mastery learning in nursing education. Journal of Nursing Education. 2013;52(4):234–237. https://doi.org/10.3928/01484.834.20130319-02

[22] Dong Y, Yin H, Du S, Wang A. The effects of flipped classroom characterized by situational and collaborative learning in a community nursing course: a quasi-experimental design. Nurse Education Today. 2021;105:1–6.

[23] Pavlic D, Burns HH, Wong A, Lehmer J. Comparative health systems immersion in South Korea: a constructivist competency-based approach. Journal of Professional Nursing. 2019;1–6.

[24] Rieger KL, Chernomas WM, McMillan DE, Morin FL. The arts as a catalyst for learning with undergraduate nursing students. Arts & Health. 2019;1–20.

[25] Theobald KA, Ramsbotham J. Inquiry-based learning and clinical reasoning scaffolds. Nurse Education in Practice. 2019;38:59–65.

[26] Yang L, Jiang D, Nie H, Tang S. Cooperative learning model on nursing skills. Biomedical Research. 2018;29(9):1788–1791.

[27] Stankiewicz M, Webster J, Wallis M, Tallot M, Chaboyer W. Constructivism teaching method in pressure injury education. Wound Practice and Research. 2016;24(2):100–107.

[28] Trujano L, Peña L. Constructivist educational intervention in nursing students. Investigación y Educación en Enfermería. 2015;33(3):432–439.

[29] Ötün T, Şenyuva E. Hasta güvenliği eğitim programı geliştirme sürecinde önemli bir aşama: İhtiyaç analizi (nitel bir çalışma). Sağlık Bilimleri Üniversitesi Hemşirelik Dergisi. 2022;4(3):111–120. (Turkish) https://doi.org/10.48071/sbuhemsirelik.1111256

[30] The Joint Commission International (JCI). International patient safety goals. Available from: https://www.jointcommissioninternational.org/standards/international-patient-safety-goals/ (Accessed: 01 March 2025).

[31] T.C. Sağlık Bakanlığı. Sağlıkta kalite standartları (SKS) Hastane. Ankara: Sağlık Bakanlığı Sağlık Hizmetleri Genel Müdürlüğü; 2020. Available from: https://shgmkalitedb.saglik.gov.tr/... (Accessed: 13 March 2025).

[32] Hasançebi B, Terzi Y, Küçük Z. Madde güçlük indeksi ve madde ayırt edicilik indeksine dayalı çeldirici analizi. Gümüşhane Üniversitesi Fen Bilimleri Enstitüsü Dergisi. 2020;10(1):224–240. (Turkish) https://doi.org/10.17714/gumusfenbil.615465

[33] Kökdemir D. Belirsizlik durumlarında karar verme ve problem çözme [PhD thesis]. Ankara: Ankara Üniversitesi; 2023. (Turkish)

[34] Jenkins HM. Clinical decision making in nursing scale. In: Waltz CF, Jenkins LS, editors. Measurement of Nursing Outcomes: Measuring Nursing Performance in Practice, Education and Research. New York: Springer Publishing Company; 2001. p. 33–37.

[35] Durmaz-Edeer A, Sarıkaya A. Adaptation of clinical decision making in nursing scale to undergraduate students of nursing: reliability and validity study. International Journal of Psychology and Educational Studies. 2015;2(3):1–9. https://doi.org/10.17220/ijpes.2015.03.001

[36] Abualhaija N. Using constructivism and student-centered learning approaches in nursing education. International Journal of Nursing and Healthcare Research. 2019;5(7):1–6. https://doi.org/10.29011/IJNHR-093.100093

[37] Choe K, Park S, Yoo S. Effects of constructivist teaching methods on bioethics education for nursing students: a quasi-experimental study. Nurse Education Today. 2013;1–6. https://doi.org/10.1016/j.nedt.2013.09.012

[38] Ekpenyong L, Edokpolor JE. Constructivist approaches: an emerging paradigm for teaching and learning of business education. ABENJ. 2016;20(3):145–149.

[39] Gülen S, Taş E, Darga H. Yapılandırmacılık: örnek uygulamanın değerlendirilmesi ve kalıcılığa etkisi. Dicle Üniversitesi Ziya Gökalp Eğitim Fakültesi Dergisi. 2015;25:278–301. (Turkish)

[40] Hampton MD. Constructivism applied to psychiatric-mental health nursing. International Journal of Mental Health Nursing. 2012;21:60–68. https://doi.org/10.1111/j.1447-0349.2011.00755.x

[41] Öztürk H, Kahriman İ, Babacan E. Tıbbi hatalar ve hasta güvenliği: hemşirelere yönelik eğitimlerin etkinliğinin değerlendirilmesi. Sağlıkta Performans ve Kalite Dergisi. 2017;14:57–72.

[42] Hwang JI, Yoon TY, Jin HJ, Park Y, Park JY, Lee BJ. Patient safety competence for final year health professional students. Journal of Interprofessional Care. 2016;30(6):732–738. https://doi.org/10.1080/13561.820.2016.1218446

[43] Lukewich J, Edge DS, Tranmer J, Raymond J, Miron J, Ginsburg L, VanDenKerkhof E. Undergraduate nursing students' confidence in patient safety learning. International Journal of Nursing Studies. 2015;52(5):930–938. https://doi.org/10.1016/j.ijnurstu.2015.01.010

[44] Çalışkan BB, Doğan R. Hemşirelik öğrencilerinin eleştirel düşünme becerilerinin karar verme ve empatiye etkisi. Journal of Medical Sciences. 2022;3(2):116–122. (Turkish)

[45] Aydın A, Kurudirek F. Hemşirelik öğrencilerinin eleştirel düşünme düzeylerinin yaratıcılığa etkisi. İnönü Üniversitesi Sağlık Hizmetleri MYO Dergisi. 2021;9(1):140–149. (Turkish) https://doi.org/10.33715/inonusaglik.831126

[46] Sözen KK, Karabulut N. Clinical decision making and critical thinking in nursing students. Adıyaman University Journal of Health Sciences. 2021;7(1):71–79. https://doi.org/10.30569/adiyamansaglik.814122

[47] Uyanık G, Tanrıverdi G. Intercultural communication competence and critical thinking tendency in nursing students. Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi. 2021;24(2):239–245. https://doi.org/10.17049/ataunihem.860851

[48] Aras AY. Hemşirelik öğrencilerinin eleştirel düşünme eğilimleri. Master's thesis. Ondokuz Mayıs University; 2019. (Turkish)

[49] Günaydın N, Barlas UG. Critical thinking and empathic disposition of nursing students. Middle Black Sea Journal of Health Science. 2015;1(3):1–8. https://doi.org/10.19127/mbsjohs.27159

[50] Taşçı T, Durmuş M, Gerçek A, Kaya A. Factors affecting critical thinking tendencies of nursing students. Journal of Nursology. 2022;25(1):45–49. https://doi.org/10.54614/JANHS.2022.687987

[51] Oktay AA, Taş F, Doğaner A, Gülpak M, Avnioğlu S. Critical thinking tendencies of health school students. Çukurova Medical Journal. 2019;44(1):33–43. https://doi.org/10.17826/cumj.444884

[52] Mahmoud AS, Mohamed HA. Critical thinking disposition among nurses. International Journal of Nursing Sciences. 2017;4:128–134. https://doi.org/10.1016/j.ijnss.2017.02.006

[53] Pramilaa R. Clinical decision-making skills among nurses. Manipal Journal of Nursing and Health Sciences. 2018;4(1):1–7.

[54] Woda A, Hansen J, Paquette M, Topp R. Simulation sequencing and clinical decision making. Nurse Education in Practice. 2017;26:33–38. https://doi.org/10.1016/j.nepr.2017.06.008

[55] Canova C, Brogiato G, Roveron G, Zanotti R. Decision-making in nurses and nursing students. Journal of Clinical Nursing. 2016;25(5–6):811–818. https://doi.org/10.1111/jocn.13101

[56] Farčić N, Barać I, Plužarić J, Ilakovac V, Pačarić S, Gvozdanović Z, Lovrić R. Personality traits and clinical decision-making. PLOS ONE. 2020;15(5):e0233435. https://doi.org/10.1371/journal.pone.0233435

[57] Keskin AY. Hemşirelik öğrencilerinin klinik karar verme algıları. Master's thesis. Ankara University; 2020.

[58] Barutcu CD. Problem-solving ability and clinical decision making. Medical Journal of Suleyman Demirel University. 2019;26(1):22–29. https://doi.org/10.17343/sdutfd.422401

[59] Özden D, Özveren H, Gülnar E. Clinical decision-making levels of nursing students. Clinical and Experimental Health Sciences. 2018;11(1):41–47.