

## PAPER DETAILS

TITLE: The Effect of the Simulation Training on the Care of the Febrile Child: A Randomized Control Trial






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# The Effect of the Simulation Training on the Care of the Febrile Child: A Randomized Control Trial

Ateşi Olan Çocuğun Bakımında Simülasyon Eğitiminin Etkisi: Randomize Kontrollü Bir Çalışma

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## ABSTRACT

**Objective:** The purpose of this research is to examine the effect of simulation training on the students' knowledge of pediatric nursing care of a febrile child.

**Methods:** This study was conducted with 48 students. Students were randomized into experimental (n=24) and control (n=24) groups. Data were collected through Sociodemographic Characteristics Form, Trait Anxiety Inventory, and Nursing Care Knowledge Form-Febrile Child. Statistical analysis of the study was performed in Statistical Package for the Social Sciences program. Wilcoxon and Mann-Whitney U tests were used for statistical analysis.

**Results:** It was found that the students' knowledge scores in the experimental group were increased from  $10.25 \pm 1.51$  to  $11.33 \pm 1.30$  following the simulation training ( $P=.010$ ). In the control group, it was found that the students' knowledge scores decreased from  $10.33 \pm 2.07$  to  $10.20 \pm 1.66$  after the theoretical training ( $P=.596$ ).

**Conclusion:** In this research, the simulation training was useful, and the student's knowledge scores increased. Simulation training is recommended to increase the knowledge of pediatric nurses about the care of children with fever.

**Keywords:** Pediatrics, nursing education, simulation training, febrile child

## ÖZ

**Amaç:** Bu araştırmanın amacı, simülasyon eğitiminin öğrencilerin ateşi olan bir çocuğun pediatri hemşireliği bakımı konusundaki bilgilerine etkisini incelemektir.

**Yöntemler:** Bu araştırma 48 öğrenci ile yürütülmüştür. Öğrenciler deney (n=24) ve kontrol (n=24) gruplarına randomize edilmiştir. Veriler; Sosyodemografik Özellik Formu, Spielberger Kaygı Envanteri ve Ateşi Olan Çocuğun Hemşirelik Bakımı Bilgi Formu aracılığıyla toplanmıştır. Çalışmanın istatistiksel analizi SPSS programında yapılmıştır. İstatistiksel analizler için Wilcoxon ve Mann-Whitney U-testleri kullanılmıştır.

**Bulgular:** Deney grubundaki öğrencilerin bilgi puanlarının simülasyon eğitimi sonrasında  $10,25 \pm 1,51$ 'den  $11,33 \pm 1,30$ 'a yükseldiği bulunmuştur ( $P=.010$ ). Kontrol grubunda ise eğitim sonrasında öğrencilerin bilgi puanlarının  $10,33 \pm 2,07$ 'den  $10,20 \pm 1,66$ 'ya düştüğü bulunmuştur ( $P=.596$ ).

**Sonuç:** Bu çalışmada simülasyon eğitimi yararlı olmuş ve öğrencilerin bilgi puanları artmıştır. Öğrencilerin ateşi olan çocuğun bakımı ile ilgili bilgilerinin artırılması için simülasyon eğitimleri önerilmektedir.

**Anahtar Kelimeler:** Pediatri, hemşirelik eğitimi, simülasyon eğitimi, ateşli çocuk

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## INTRODUCTION

Facing the complex environment in hospitals is a challenging situation for students who have just gained their knowledge and have not yet fully acquired their skills. Students need support to develop the knowledge and skills that they will use in healthcare settings.<sup>1</sup> After graduation, newly graduated

nurses have to think critically to solve challenging clinical problems and meet conflicting patient needs.<sup>2</sup>

However, traditional nursing education is based on theoretical lessons and clinical training.<sup>3</sup> For this reason, educators should provide sufficient clinical training experience to their students. However, the limited time spent in the clinic<sup>4</sup> and working with pediatric patients may cause the students' lack of clinical experience and a gap between their theoretical knowledge and practice experience.<sup>5</sup> This important problem can be solved with the help of a training method that combines theory and practical skills. This training method is a simulation.<sup>6</sup>

The Society for Simulation in Healthcare defines simulation as follows: "a technique that creates a situation or environment to allow persons to experience a representation of a real event for practice, learning, evaluation, testing, or to gain an understanding of systems or human actions."<sup>7</sup> Simulation in nursing has positive effects on increasing the clinical experience of students by adapting them to pediatrics,<sup>8</sup> palliative care,<sup>9</sup> cardiovascular intensive care,<sup>10</sup> emergency care,<sup>11</sup> pediatric oncology,<sup>12</sup> and pediatric burn<sup>13</sup> scenarios where students do not have the opportunity to gain experience. An increase in the knowledge level of specific nursing care,<sup>10,14</sup> nursing skills,<sup>15,16</sup> self-confidence,<sup>1,17</sup> satisfaction,<sup>18,19</sup> and critical thinking skills<sup>20</sup> is observed in the participants who received simulation training.

Since fever is one of the most common symptoms of childhood diseases,<sup>21</sup> "fever management in children" is a very important nursing intervention. Nursing students' experience of what to do as a nurse in the face of this situation, which they will most often encounter when they start working in pediatric clinics, allows a more comprehensive understanding of fever management,<sup>22</sup> and thus, their self-confidence and skill can increase.<sup>1</sup> Therefore, this research focuses on fever management, which has an important place in pediatric nursing education. Although there are many simulation-based studies with different scenarios in pediatric populations in the literature,<sup>23-27</sup> no study on fever management and nursing care has been found. This distinguishes our study from other studies in the literature.

### Aim

This research aims to examine the effect of simulation training on the nursing students' knowledge scores in pediatric practice care of a febrile child.

### Hypothesis

H<sub>0</sub>: The nursing care knowledge about the febrile child of the students who had simulation training is not higher than the students who had traditional training.

H<sub>1</sub>: The nursing care knowledge about the febrile child of the students who had simulation training is higher than the students who had traditional training.

## METHODS

### Research Design

This research is a randomized controlled experimental one, and the INACSL Standards of Best Practice were used for the method of this study.<sup>28</sup>

### Participants

The research was conducted with 48 students who took the Pediatric Nursing Course for the first time in the Fall Term of the 2017/2018 academic year and who are not working as a nurse,

volunteering to participate in the research. This course was carried out in the form of 5 hours of theory and 8 hours of practice every week. In the control group, students received only traditional theoretical education. In the experimental group, students received simulation training as well as traditional theoretical education.

During this period, the class size was 101 students. The 48 students reached corresponded to 47.52% of the class size. In the sample calculation, it was aimed to reach 63 students with a confidence interval of 80%, but only 48 students volunteered to participate in the study. However, in the post hoc analysis conducted with the G\* power program (version 3.1.9.7), it was concluded that the effect size of the difference in knowledge level between the groups was 0.75 and the power of the study was 0.81.

### Intervention Protocols

Stage 1: Before randomization, all students filled out the Sociodemographic Characteristics Form, Trait Anxiety Inventory, and Nursing Care Knowledge Form-Febrile Child forms.

Stage 2: Nursing Care Simulation Training in Child with Fever was given to the students in the experimental group.

Stage 3: Nursing Care Knowledge Form-Febrile Child was administered again to both groups 3 weeks after the training (post-test) as seen in Figure 1.

### Simulation Training

Simulation training was carried out with 3 baby medium-fidelity simulators in Nursing Simulation Laboratory. Expert opinion for the simulation scenario was obtained from 3 faculty members who have doctorate degree in Pediatric Nursing and have studies on simulation. As a result of the opinions received from the experts, necessary arrangements were made and the scenario was finalized. The implementers of the simulation scenario are faculty members and staff specialized in the field of Pediatric Nursing.

### Simulation Scenario

A 12-month-old baby patient presented with the complaint of febrile convulsions that lasted for 2 days.

The knowledge that students will acquire:

- To know how to measure and evaluate the baby's body temperature.
- To know how to make the warm compresses for the baby correctly.
- To know how to apply the antipyretic drug given at the request of the physician.
- To know how to calm the mother and baby.

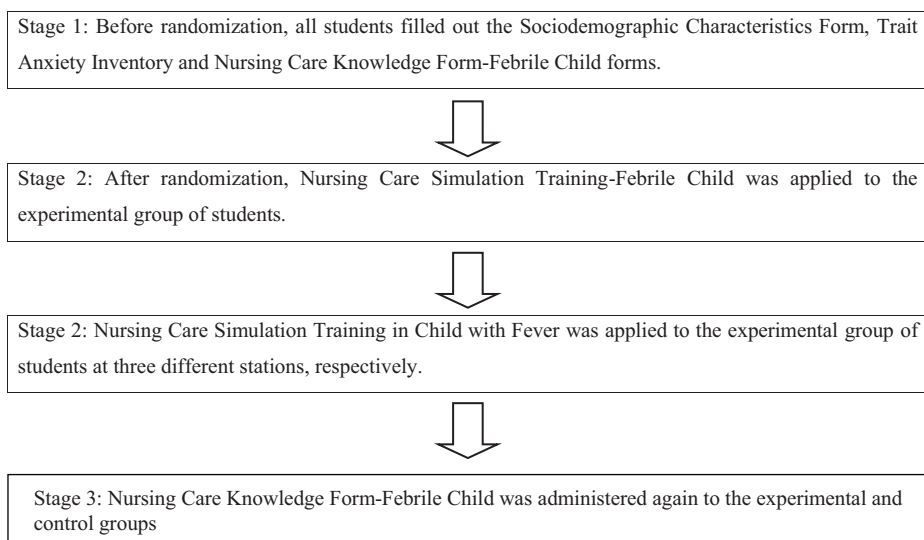
The process of the scenario took approximately 15–20 minutes. The scenario was carried out with a total of 3 people, a nurse, a mother, and a baby. The role of nurse and mother was performed by the researchers. A medium-fidelity simulator was used for the patient.

### Outcome

The outcome of this research was the students' knowledge scores.

### Randomization

Randomization of the students was performed using Simple Random Sequence Generator through the website [www.random.org](http://www.random.org).



**Figure 1.** Flowchart of the research.

### Data Collection

Sociodemographic Characteristics Form, Trait Anxiety Inventory,<sup>29</sup> and Nursing Care Knowledge Form-Febrile Child were used to collect data in the research.

### Sociodemographic Characteristics Form

In this form, there are 2 questions about the students' gender, and graduated high school (medical-health educational high school or not).

### Trait Anxiety Inventory

The Trait Anxiety Inventory is a 40-item scale developed by Spielberger et al<sup>30</sup> and adapted into Turkish by Oner and Le Compte.<sup>29</sup> This scale can be applied to individuals over the age of 14. An increase in the score obtained from the scale indicates an increase in anxiety. The score that can be obtained from the scale varies between 20 and 80. Cronbach's alpha coefficient of the scale is between 0.83 and 0.87.<sup>29</sup> In this study, Cronbach's alpha coefficient of the scale was found 0.545.

### Nursing Care Knowledge Form-Febrile Child

In this form, it was aimed to determine the nursing health care information that should be given to a 12-month-old male patient who came with the complaint of febrile convulsions that lasted for 2 days. Students were given 16 knowledge sentences about fever measurement in children and evaluation of factors increasing-reducing fever. The students were expected to evaluate these given knowledge sentences and to mark the "True" or "False" option. Expert opinion was taken for the form. For the use of the form, the opinions of 3 faculty members who are experts in the field of Pediatric Nursing were obtained. For each correct answer, the student was given 1 point and for each incorrect answer, the student was given 0 points, and the total knowledge score was found. There was no cut-off score in the form.

### Statistical Analysis

Descriptive statistics such as number, percentage, and mean were used in the research. The knowledge scores of the experimental and control groups pre-post simulation were compared with the Wilcoxon test. Knowledge scores and anxiety scores between the experimental and control groups pre-post simulation were

evaluated with the Mann-Whitney *U* test. The statistical significance value was determined as  $P < .050$ .

### Blinding

To avoid bias in the research, information about which group the students were in was not shared with the researcher who performed the statistical analysis of the research, single-blind was provided.

### Ethical Considerations

Ethical approval was obtained from the Non-Interventional Clinical Research Ethics Committee of the Non-Interventional Clinical Research Ethics Committee of İzmir Katip Çelebi University (Date: August 9, 2017 approval number 156/2017). Participants were informed about the research and written consent was obtained from them.

## RESULTS

As shown in Table 1, 70.8% ( $n=34$ ) of the participants participating in the research were female students. The participants' mean age was  $20.75 \pm 1.24$  (min = 19, max = 26). As high as 4.2% ( $n=2$ ) of the students graduated from Medical High School.

As shown in Table 2, there was no statistically significant difference between the experimental and control groups in terms of pre-simulation trait anxiety score ( $P=.820$ ) and knowledge score ( $P=.482$ ). In post-simulation, the students' knowledge scores in the experimental group were found higher than the students'

**Table 1. Sociodemographic Characteristics of the Participants**

Sociodemographic Characteristics	n	%
<b>Sex</b>		
Female	34	70.8
Male	14	29.2
<b>Graduated high school</b>		
High school	39	81.3
Medical high school	2	4.2
Other	7	14.6

**Table 2. Differences Between Groups in Terms of Anxiety and Knowledge Scores**

	Experimental Group	Control Group	MWU	P
Pre-simulation				
Trait Anxiety Inventory Scores	41.70 ± 8.16	42.54 ± 7.82	277.00	.820
Knowledge Scores	10.25 ± 1.51	10.33 ± 2.07	254.50	.482
Post-simulation				
Knowledge Scores	11.33 ± 1.30	10.20 ± 1.66	183.00	<b>.026</b>

MWU, Mann-Whitney U test.

**Table 3. Differences Between Pre- and Post-Simulation in Terms of Knowledge**

	Pre-Simulation	Post-Simulation	Wilcoxon	P
Knowledge Scores		Experimental group		
	10.25 ± 1.51	11.33 ± 1.30	-2.579	<b>.010</b>
		Control group		
	10.33 ± 2.07	10.20 ± 1.66	-0.530	.596

knowledge scores in the control group and this difference was statistically significant ( $P=.026$ )

As shown in Table 3, it was found that the knowledge scores of the students in the experimental group in pre-simulation were  $10.25 \pm 1.51$  and increased to  $11.33 \pm 1.30$  in post-simulation. This increase was statistically significant ( $P=.010$ ). In the control group, it was found that the student's knowledge score was  $10.33 \pm 2.07$  before the training but decreased to  $10.20 \pm 1.66$  afterward, but this decrease was not statistically significant ( $P=.596$ ).

## DISCUSSION

Fever is defined as "a state of elevated core temperature, which is often, but not necessarily, part of the defensive response of multicellular organisms to invasion by live micro-organisms or inanimate matter recognized as pathogenic or alien by the host."<sup>31</sup> However, there is no definite clarity on the diagnosis of fever in the literature.<sup>32</sup> Approximately 10%-40% of annual admissions to pediatric emergency units are due to fever.<sup>33-37</sup> Because body temperature varies according to the body area where the measurement is made; the thermometer used; the measurement time; and the age, gender, and race of the child, it is obvious how devastating the lack of knowledge will be.<sup>38</sup> Especially in the days of the coronavirus disease 2019 pandemic that we have experienced recently, while the increase in body temperature is accepted as one of the symptoms of the disease, the diagnosis of fever becomes even more important.<sup>39-41</sup>

In recent years, there has been a noticeable increase in learning opportunities in nursing education. The use of simulation has become important as it is desired to prevent crowded clinics and facilitate the teaching of some skills that are not suitable to be taught in the pediatric population.<sup>42,43</sup>

In this research, we found that the knowledge of the students who had simulation training in clinical practice increased. Similar to this research, Komeagaç and Bektas<sup>44</sup> determined that the

knowledge level of the students who had simulation training was higher than the students who did not receive simulation training as a result of the simulation research they conducted with 110 nursing students on the evaluation of children with fever.<sup>44</sup> Similar to this research, Rideout and Raszka<sup>45</sup> provided simulation training to all students in their research and observed that students' knowledge scores about fever management increased in the post-training period.<sup>45</sup> Similar to this research, Ha<sup>46</sup> worked with a simulator and a standardized patient in nursing students in her research and observed that the students who received fever management training with the simulator had a shot at clinical performance proficiency.<sup>46</sup> In their research, Chang et al<sup>47</sup> gave training to the participants in the experimental group about the management of fever with brochures and additionally gave simulation training. Participants in the control group were trained only with brochures. Chang et al<sup>47</sup> compared the participants' knowledge scores after the training and found that the participants' knowledge scores in the experimental group were higher.<sup>47</sup>

It is essential to develop nursing care knowledge and skills in nursing education. In this research, it was found that the knowledge scores of the students who had simulation training were higher than the students who did not have simulation training. The results we obtained are important results of the Remember category, which is the first category of Bloom's taxonomy.<sup>48</sup> It also provides a solid basis for the Understand-Apply-Analyze-Evaluate and Create categories, which are the next categories of taxonomy.<sup>49</sup> Our results demonstrated the importance of incorporating simulation training as a part of the curriculum to improve the cognitive skills of nursing students.

## Study Limitations

In this research, we only evaluated the knowledge scores of the participants. This situation can be considered a limitation of our research.

**Ethics Committee Approval:** Ethics committee approval was received for this study from the ethics committee of İzmir Katip Çelebi University (Date: August 9, 2017, Number:156).

**Informed Consent:** Written informed consent was obtained from the students who participated in this study.

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