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Research Paper – Araştırma Makalesi

COMPARISON OF THE EFFECTS OF THE IN SITU SIMULATION AND SIMULATED CLINICAL IMMERSION METHODS ON CANCER NURSING STUDENTS' EXTRAVASATION MANAGEMENT: RANDOMIZED CONTROLLED TRIAL

YERİNDE VE KLİNİK SİMÜLASYON YÖNTEMLERİNİN KANSER HEMŞİRELİĞİ ÖĞRENCİLERİNİN EKSTRAVAZASYON YÖNETİMİ ÜZERİNE ETKİSİNİN KARŞILAŞTIRILMASI: RANDOMİZE KONTROLLÜ ÇALIŞMA

Vildan KOCATEPE [1],Yasemin USLU[2],Vesile UNVER[3], Aysin KAYIS[4],Ukke KARABACAK[3],Mehmet Emin AKSOY[5]

Özet

Yerinde simülasyonun gerçek bir klinik ortamda gerçekleşmesi dolayısıyla iyi bir öğrenme ortamı sağladığı düşünülmektedir. Yerinde ve klinik simülasyon yöntemlerinin kanser hemşireliği öğrencilerinin ekstravazasyon yönetimi üzerine etkisinin karşılaştırılması amacıyla gerçekleştirildi. Araştırma, randomize kontrollü öntest-sontest karşılaştırmalı desende yürütüldü. Katılımcılar, simüle edilmiş Klinik Simülasyon Grubuna (n=19) veya Yerinde Simülasyon Grubuna (n=24) rastgele atandı. Çalışma verileri Ekstravazasyon Yönetimi Bilgi Testi, Öğrenci Memnuniyeti ve Kendine Güven Ölçeği, Durumluk Kaygı Envanteri ve Objektif Yapılandırılmış Klinik Değerlendirme kullanılarak toplandı. Klinik Simülasyon ve Yerinde Simülasyon gruplarındaki katılımcıların uygulama öncesi ve sonrası bilgi düzeyi ve kaygı puan ortalamaları arasında istatistiksel olarak anlamlı fark saptanmadı (p>.05). Her iki grupta uygulama sonrası memnuniyet ve özgüven puan ortalamaları benzerdi. Her iki simülasyon tabanlı öğrenme ortamında da öğrencilerin bilgi, beceri, kaygı, özgüven ve doyumları benzerdi. Yerinde simülasyonun hemşirelik eğitiminde kullanılması önerilebilir. Maliyet etkinliği ve imkanlar göz önüde bulundurularak her iki simülasyon yöntemi de kullanılabilir.

Anahtar Kelimeler: Simülasyon, yerinde simülasyon, klinik simülasyon, ekstravazasyon yönetimi, kanser hemşireliği

Abstract

In situ simulation is thought to offer a good learning environment due to the fact that it is carried out in real clinical practice. This study was performed to compare the effect of in situ simulation and simulated clinical immersion environment on cancer nursing students extravasation management. The study was carried out with a randomized controlled pretest-posttest comparative design. The participants were randomly assigned to either the simulated clinical immersion group (n=19) or the in situ simulation group (n=24). The study data were collected using Extravasation Management Knowledge Test, Objective Structured Clinical Assessment, Students' Satisfaction and Self-Confidence Scale and the State Anxiety Inventory. The pre-posttest mean scores for the knowledge level and anxiety mean scores of the participants in the simulated clinical immersion group and the in situ group were not statistically significant (p>.05). The satisfaction and self-confidence scale mean scores and the skill levels of the students in both settings were similar after the implementation (p>.05). The students' knowledge, skills, anxiety, self-confidence and satisfaction were similar in both simulation-based learning environments. In situ simulation can be recommended for use in nursing education. Considering cost-effectiveness and resources, both simulation methods can be used.

Keywords: Simulation, in situ simulation, clinical immersion simulation, extravasation management, cancer nursing

Geliş Tarihi (Received Date): 14.07.2023, Kabul Tarihi (Accepted Date): 08.09.2023, Basım Tarihi (Published Date): 30.09.2023. [1] Faculty of Health Sciences, Department of Nursing, Izmir Demokrasi University, Izmir, Türkiye, [2] Faculty of Nursing, Istanbul University, Istanbul, Türkiye, [3] Faculty of Health Sciences Department of Nursing, Acibadem Mehmet Ali Aydinlar University, Istanbul, Türkiye, [4]Acibadem Atakent Hospital, Chemotherapy Unit, Istanbul, Türkiye, [5]Department of Medical Engineering, Faculty; Center of Advanced Simulation and Education (CASE), Acibadem Mehmet Ali Aydinlar University, Head, Istanbul, Türkiye. **E-mail:** vildan.kocatepe@idu.edu.tr **ORCID ID's:** V.K.; https:/orcid.org/0000-0001-6928-6818, Y.U.; https:/orcid.org/0000-0001-5727-3753, V.U.; https:/orcid.org/0000-0002-2892-9503, A.K.; https:/orcid.org/0000-0002-4254-4861, U.K.; https:/orcid.org/0000-0002- 1696-2779, M.E.A.; https:/orcid.org/0000-0003-3227-2660.

1. INTRODUCTION

Simulation is a teaching method that improves the cognitive, affective and psychomotor skills of students by simulating situations that may be encountered in real life in a reliable environment (Committee, 2016, pp. 39-47). Simulation is one of the most efficient ways to connect theoretical learning environments and real-life situations, providing fidelity in learning environments. Simulation-based learning is a safe and adequate imitation of reality (Kusler - Jensen, 2014, pp. 385-394.; Murray, Grant, Howarth, and Leigh, 2008, pp. 5-8).

Simulation based learning in nursing education has been shown to improve nursing students' competence, increase their technical skills (Khalaila, 2014, pp: 252-258) and knowledge (Keleekai et al., 2016, pp. 376-384), in helping in crisis management and team communication (Abe, Kawahara, Yamashina, and Tsuboi, 2013, pp. 33-40), improve student self-confidence (Hicks, Coke, and Li, 2009) and critical thinking skills (Lapkin et al., 2010, pp. 207- 222; Sundler et al.; 2015, pp. 1257-1261; Berragan ,2011, pp. 660-663).

There are many types of simulation modalities that can be used in health care related education; one of them is simulated clinical immersion. The simulated clinical immersion refers to the delivery of education in an environment that is very similar to the clinical environment. Simulation based learning aims to create a copy of real clinical implementations (Judd, Alison, Waters, and Gordon, 2016, pp. 271-277). The most important factor affecting the effectiveness of the simulation is its fidelity to the real-life situation (Sørensen et al., 2013, p. 220).

Another modality of simulation is the in situ simulation. In situ simulation is the realization of simulation based learning in a real patient care environment (Walker et al., 2013, pp. 453-458). In situ simulation is thought to increase the reality of the simulation experience as learning occurs in the clinical area (Grierson, 2014, pp. 281-289). In situ simulation in nursing education is one of the relatively new simulation methods. Although it is an important training method in the development of professional competencies and improving patient safety, it has been emphasized that there is a need for studies to evaluate the effectiveness of this method (Villemure, 2016, p. 23). There are few studies comparing the effectiveness of the simulated clinical immersion and in situ simulation methods used in nursing education.

Due to increased number of cancer cases and better management of toxicity in patients receiving chemotherapy, chemotherapy drugs have been used in higher doses and in more combinations (Connor and McDiarmid, 2006, pp. 354-365). The use of such combinations leads to increased complications among the patients. Extravasation is one of the most important complications of intravenous chemotherapy treatments (Reynolds, MacLaren, Mueller, Fish, and Kiser, 2014, 617-632;Dychter, Gold, Carson, and Haller, 2012, pp. 84-91; Diehl-Svrjcek, Dawson, and Duncan, 2007, pp. 274-279). It is difficult to perform extravasation diagnosis and management in real patients.

The aim of this study was to determine the effect of performing the same extravasation management scenario in two different environments (in situ and simulated clinical immersion) on the cancer nursing students' extravasation management.

2. METHODS

2.1.Study Design

The research was carried out in a randomized controlled pretest-posttest comparative design in accordance with the CONSORT criteria. The study data was collected at a simulation center and a university hospital in Istanbul in 2018 academic year.

2.2.Participants

The participants of the study were chosen from fourth year internship nursing students at a university (N=66); those who took the course of cancer nursing were chosen as the participants (N=43). The students were randomly assigned to the simulated clinical immersion group (n=19) and to the in situ group (n=24) using Random Allocation Software 2.0.0. The simulated clinical immersion group was the control group of the study and performed the implementation in the patient room in the simulation center. The in situ group performed the implementation in the University Hospital's daily chemotherapy unit.

2.3.Procedure in Implementing the Scenario

The scenario was developed based on the standards of the INACSL (The International Nursing Association for Clinical Simulation and Learning) and the theoretical framework developed by Jeffries (2010, pp. 405-420). The role of the patient was played by a professional actor. The level of fidelity was enhanced by artificial extravasation on the hand of the standardized patient with the application of a bracelet (Figure 1). Students took part in the scenario individually. In both groups, the scenario was the same, and standardized patients were employed in both groups. The scenarios took 10-13 minutes for each student. The knowledge levels of the students were evaluated twice, before and after the scenario. A debriefing session was held in groups of 8-10 students after the scenario. The learning objectives set for the groups were similar, and the only difference was the setting where the scenario was carried out.
Scenario Aim: The aim of the scenario was to assess the management of extravasation.
Scenario Objectives: Ensuring patient safety, establishing communication, recognizing signs of extravasation, classifying extravasation, following appropriate steps in extravasation management.
In Situ Simulation: The patient room in the simulation center used for the simulated clinical immersion environment was designed as a daily chemotherapy room.

Simulated Clinical Immersion: The real patient room used was in the University Hospital's daily chemotherapy unit for the in situ simulation environment. The scenarios were implemented in an empty room of the hospital.

Figure-1: Moulage of Standardized Patient

2.4.Data Collection

A questionnaire was used to evaluate the participants' level of knowledge before and after the simulation (Figure 2).

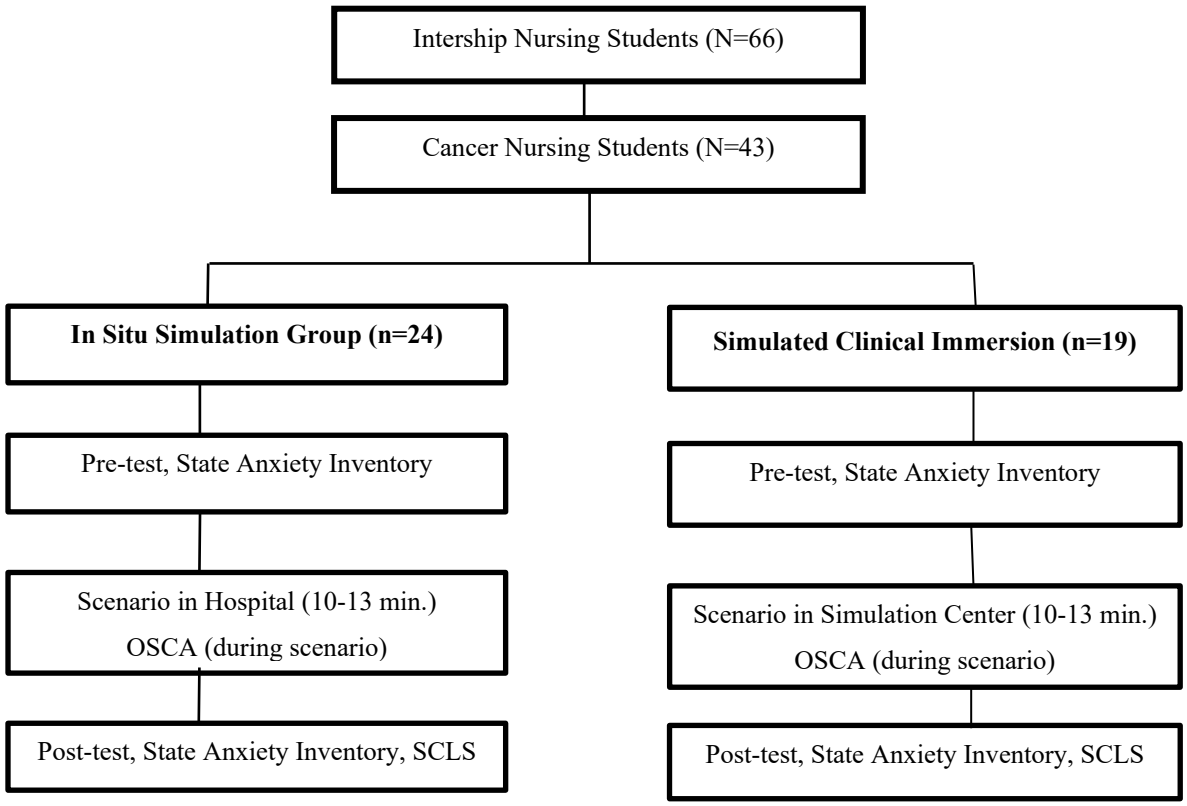

Figure 2. Study flowchart

OSCA: Objective Structured Clinical Assessment, SCLS: Students' Satisfaction and Self-Confidence Scale

Objective Structured Clinical Assessment (OSCA): The skills of the participants were evaluated during the scenario, which consisted of twenty items concerning the diagnosis of extravasation, required nursing interventions and record keeping. The answers to these items were evaluated according to the following options: "done completely (3)", "should be improved (2)" and "not done (1)". Getting a high score from the scale shows that they are more successful in skills. The administration of the OSCA was carried out in the form of observation by an educator. In this study, the internal consistency Cronbach's alpha coefficient was 0.693.

Students' Satisfaction and Self-Confidence Scale (SCLS): In order to evaluate the participants'satisfaction and self-confidence following the implementation, the SCLS developed by Jeffries and Rizzolo (2006) was employed. Its validity and reliability for the Turkish language were carried out by Unver et al. (2017, pp. 60-74).

State Anxiety Inventory: The inventory was developed by Spielberger et al. (1970), and its reliability and validity for the Turkish language were analyzed by Oner (Oner Altıok and Ustun, 2013, pp. 747-766). It includes two types of statements. A predetermined and invariant value was added to this number; this invariant value was 50. The resulting score indicated the individual's anxiety score.

2.5.Ethical Consideration

Ethical approval was obtained from the ethical committee of the Acıbadem University where the study was conducted before initiation of the study (25.10.2018; approval number:2018-16/3). The personnel working in the chemotherapy unit were informed of this research. This trial is conducted in accordance with ethical principles of the Declaration of Helsinki.

3. RESULTS

The cancer students were 40 (93%) females and 3 (7%) males. Their mean age was 21.5±0.82. The pretest scores for the students in the simulated clinical immersion group were similar to those in the in situ simulation group. The distribution was homogenous ($p>.05$). For both groups, it was found that the knowledge levels were very similar before and after the scenarios ($p>.05$). Although not significant, the knowledge scores of both groups increased following the scenarios (Table 1).

Table-1. Pre- and Post-Test Mean Scores of the cancer nursing students

Knowledge Scores	Simulated Clinical Immersion (N=19)		In situ simulation (N=24)			
	Min-Max (0-20)	$\overline{X}$ ±SD	Min-Max (0-20)	$\overline{X}$ ±SD	Test	p
Pre-test	8-18	14.14±2.34	9-18	14.04±2.64	209.500[1]	.648
Post-test	11-19	15.52±2.19	10-18	14.45±2.22	170.000[1]	.149
		t=-1.470[2]		t=-.785		
		p=.142		p=.433		

[1] Mann Whitney U test, [2] Wilcoxon test

The State Anxiety Inventory scores were 40.94±8.86 in the simulated clinical immersion group and 37.45±9.99 in the in situ simulation group before scenarios. Following the scenarios, the scores was found to be 42.00±9.33 in the simulated clinical immersion group and 38.12±10.21 in the in situ simulation group. The State Anxiety Inventory mean scores for both groups were not significantly different before or after the scenarios (p>.05). The State Anxiety Inventory mean scores for the students in each group were also found to be not significant (p>.05) (Table 2).

Table-2: State anxiety scores of the cancer nursing students

State anxiety scores	Simulated Clinical Immersion (N=19)	In situ simulation (N=24)		
	$\overline{X}$ ±SD	$\overline{X}$ ±SD	Test	p
Before the simulation	40.94±8.86	37.45±9.99	167.500[1]	.138
After the simulation	42.00±9.33	38.12±10.21	169.000[1]	.148
	t=-.545[2]	t=-.030[2]		
	p=.586	p=.976		

[1] Mann Whitney U test, [2] Wilcoxon test

The mean satisfaction scores were found to be 4.38±0.41 in the simulated clinical immersion group and 4.65±0,43 in the in situ simulation group. The mean self-confidence scores were found to be 4.30±0.44 in the simulated clinical immersion group and 4.44±0.46 in the in situ simulation group. The difference between these scores was not statistically significant (p>.05) (Table 3).

Table-3: Mean satisfaction and self-confidence scores of the cancer nursing students

	Simulated Clinical Immersion (N=19)	In situ simulation (N=24)	Test	p
	$\overline{X}$ ±SD	$\overline{X}$ ±SD		
Satisfaction with Current Learning	4.38±0.41	4.65±0.43	160.000[1]	.082
Self-confidence in Learning	4.30±0.44	4.44±0.46	178.500[1]	.222

[1] Mann Whitney U test

The mean OSCA skill scores were 20.26±3.72 in the simulated clinical immersion group and 20.95±4.09 in the in situ simulation group. The difference between these scores was not statistically significant (p>.05) (Table 4).

Table-4: Objective Structured Clinical Assessment (OSCA) Scores of the cancer nursing students

OSCA Skills Score	Min-Max (3-60)	$\overline{X}$ ±SD	Test	p
Simulated Clinical Immersion	15-30	20.26±3.72	209.500[1]	.649
In Situ Simulation	15-31	20.95±4.09		

[1] Mann Whitney U test was used.

4. DISCUSSION

Simulation based learning is a reliable teaching model for students both technical and nontechnical skills (Shin, Park, and Kim, 2015, pp. 176-182). In addition, it provides a reliable learning environment for improving the safety of patients (Kunst, Mitchell, and Johnston, 2017, pp. 29-35).

Research suggests that the high level of fidelity provided during simulation based skills training leads to better learning outcomes (Jeffries and McNelis, 2010, pp. 405-420). The feelings experienced during the simulation and the environment in which the simulation take place affect the learning levels of the students. Organizing the physical environment simulated by educators is important for students in achieving learning objectives. Studies comparing the different types of simulation determined that there is no statistically significant difference between the skills performance scores of the students (Brydges, Carnahan, Dubrowski, Pollex, and Mallette, 2012, pp. 236-242; Tuzer, Dinc, and Elcin, 2016, pp. 120-125). Similarly, in the current study, the students' knowledge and skill scores were not significantly different in the two different simulation types. The results of the study are in line with the previous findings suggesting that education in both simulation settings has a positive effect on learning and that both simulation settings can be employed.

Studies concerning simulated clinical immersion indicate that it positively affects learning and increases student satisfaction and self-confidence. A study that analyzed in situ simulation conducted with the pediatric emergency care team concluded that the team's trauma patient evaluation scores increased and their satisfaction was high (Auerbach et al., 2014). Lubbers and Rossman analyzed the results of the use of a medium fidelity simulation and found that the student satisfaction and self-confidence following the simulation experience were improved (2017, pp. 140-144). Unver et al. analyzed senior nursing students' perceptions about their readiness to intervene in emergency situations and concluded that the nursing students were satisfied with the simulation activities (2018, pp. 3-9). Similarly, in this study, students had high satisfaction scores in both simulation environments.

Stressed students may experience difficulties in developing relationships with healthcare professionals and a decreased ability to cope with problems and maintain their social relations. Stress may increase the anxiety levels of students. It is reported that the students' stress levels increase in educational environments where the fidelity of the simulation methods is higher (Luctkar-Flude, Wilson-Keates, and Larocque, 2012, pp. 448-452). However, in the current study, the anxiety levels of the students were found to be similar, although they were part of different simulation environments. The reason for this may be that the fidelity of both the simulated clinical immersion group and the in situ simulation group was the same. McLaughlin et al. concluded that the in situ multidisciplinary pediatric trauma simulation program increases the anxiety level at the beginning, but long-term exposure to the program may lead to greater confidence and therefore reduce anxiety levels (2018, pp. 1353-1362). However, McGuire and Lorenz concluded that educational experiences based on simulation increase student anxiety (McGuire and Lorenz, 2018, pp. 45-49.).

The studies of in situ simulation are mostly about leadership and teamwork. It was reported that in situ simulation is much more effective in improving leadership and team work in contrast to the simulated clinical immersion (Couto, Kerrey, Taylor, FitzGerald, and Geis, 2015, pp. 76-84). Bierer et al. analyzed in situ simulation to manage the crisis during thoracic surgery. They reported that the in situ intraoperative crisis simulation was an effective method for identifying hidden threats to patient safety and of providing training for nontechnical skills (Bierer et al., 2018, 287-292).

Francoeur et al. also examined in situ simulation. One month before moving to the newborn intensive care unit, the staff participated in a three-day simulation practice in the newly opened intensive care unit. Following the training with simulation, all of the participants reported that they were better prepared to care for real patients and that they were more self-confident in carrying out the tasks (Francoeur et al., 2018, pp. 148-156).

5. CONCLUSION

This study revealed similar results concerning the effectiveness of in situ simulation implementation compared to that of simulated clinical immersion in regard to extravasation management. No statistically significant results were found for the cancer nursing students in either group concerning their pre-posttest knowledge scores and their OSCA scores. In addition, there was no significant difference concerning the student satisfaction, self-confidence and anxiety mean scores for the students in the two different simulation modalities. In situ simulation practices enable nurses to more easily adapt to the clinical environment at the level of graduate education rather than at the level of undergraduate education. Therefore, at the level of graduate nursing education, in situ simulation can be employed in addition to the simulated clinical immersion environments. On the other hand, in situ simulation requires careful planning to avoid disturbing the clinical dynamics. In future studies, it may be better to evaluate the cost-effectiveness of both simulation modalities and their effect on clinical practice.

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