

Basic strategy in nursing education: management of Diabetes Mellitus by simulation method

Hemşirelik eğitiminde temel strateji: simülasyon yöntemi ile Diabetes Mellitus yönetimi

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Gönderilme tarihi:09.09.2020

Kabul tarihi:21.12.2020

Abstract

Purpose: In this study, it was aimed to test the design by evaluating the success of the students taking the Internal Medicine Nursing Course in education with Diabetes Mellitus simulation method which is prepared according to EİUS: ST-IX stages expressed by The International Nursing Association for Clinical Simulation.

Materials and methods: In project, the study is completed with 169 students who take Internal Medicine Nursing Course. Student opinions and achievement scores were used for evaluating the project results.

Results: The 30.2% of the participants are men, 69.8% are women. It's detected that DM simulation grade average of the students 2.7929 ± 1.05715 in evaluation five-point Likert scale, the practice grade average 79.3195 ± 7.31386 , end-of-term grade average 65.2959 ± 8.60482 . It was found that the higher Diabetes Mellitus simulation score of the students, the higher the application and term grade scores and students with low simulation scores also have a low final grade. The students stated their opinions on simulation training with the expressions 'I eliminated my pre-internship anxiety', 'I learned to interpret the disease' "Very enjoyable and instructive".

Conclusion: The use of the Internal Medicine Nursing Course in education with Diabetes Mellitus simulation method which is prepared according to EİUS: ST-IX stages expressed by The International Nursing Association for Clinical Simulation is thought to increase the clinical practice success, can evaluate the most realistic medical conditions, clinical problems and contribute to nursing care planning of students.

Key words: Simulation, nursing, EİUS: ST-IX, diabetes mellitus.

Bakan G, Azak G, Ozdemir U. Basic strategy in nursing education: management of Diabetes Mellitus by simulation method. Pam Med J 2021;14:538-547.

Öz

Amaç: Bu çalışmada İç Hastalıkları Hemşireliği dersi alan öğrencilerin The International Nursing Association for Clinical Simulation and Learning tarafından açıklanan EİUS: ST-IX aşamalarına göre hazırlanan Diabetes Mellitus simülasyon yöntemi ile eğitiminde, başarılarının değerlendirilmesi ile tasarımının test edilmesi amaçlanmıştır.

Gereç ve yöntem: Araştırmada İç Hastalıkları Hemşireliği dersi alan 169 öğrenci ile çalışma tamamlanmıştır. Araştırma sonuçlarını değerlendirmek için öğrenci görüşleri ve başarı puanları kullanılmıştır.

Bulgular: Katılımcıların %30,2'si erkek, %69,8'i kadındır. Diabetes Mellitus simülasyon puan ortalamaları 5'li likert değerlendirmede $2,7929 \pm 1,05715$ olarak, uygulama not ortalaması $79,3195 \pm 7,31386$, dönem sonu not ortalaması $65,2959 \pm 8,60482$ olarak saptanmıştır. Öğrencilerin Diabetes Mellitus simülasyon puanları yükseldikçe uygulama notu ve dönem sonu notunun yükseldiği ve simülasyon puanı düşük olan öğrencilerin dönem sonu notunun da düşük olduğu bulunmuştur. Öğrenciler simülasyon eğitimine ilişkin görüşlerini 'Staj öncesi endişemi attım', 'Hastalığı yorumlamayı öğrendim', 'Çok keyifli ve öğretici' ifadeleri ile belirtmişlerdir.

Sonuç: Hemşirelik eğitiminde The International Nursing Association for Clinical Simulation and Learning tarafından açıklanan EİUS: ST-IX aşamalarına göre hazırlanan Diabetes Mellitus simülasyon yönteminin kullanımının, öğrencilerin klinik uygulama başarılarını arttırdığı, gerçeğe en yakın tıbbi durumları, klinik problemleri değerlendirebilmelerine ve hemşirelik bakımını planlamalarına katkı sağladığı düşünülmektedir.

Anahtar kelimeler: Simülasyon, hemşirelik, EİUS: ST-IX, diyabetes mellitus.

Bakan G, Azak G, Özdemir Ü. Hemşirelik eğitiminde temel strateji: simülasyon yöntemi ile Diabetes Mellitus yönetimi. Pam Tıp Derg 2021;14:538-547.

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Introduction

Diabetes Mellitus (DM) is a disease that develops due to the lack of or the ineffectiveness of insulin and continues lifelong, accompanied by acute and chronic complications [1]. According to the Diabetes Atlas of the International Diabetes Federation (IDF), the prevalence of DM in the adult (20-79-year-old) population in the world is 9.3%. IDF reported that the diabetic population, which was currently 463 million in the world, would be 700 million in 2045 [2]. In the Turkish Epidemiology Survey of Diabetes TURDEP-II, the rate of type 2 diabetes was found to be 13.7% in Turkish adults [3, 4]. DM, with its increasing frequency and high mortality, is one of the most serious health problems today [1, 4]. An interdisciplinary and multidisciplinary team approach should be applied in the management of DM, and responsibilities should be shared in order for the patient to achieve the targeted glycemic control [5]. Nurses play an important part in the DM team. Nursing application emphasizes holistic care. A nurse helps a patient and his/her family to learn, not only the facts and the necessary psychomotor skills, but also the methods and strategies that will help them to transform knowledge into behavior by providing training and giving support and counseling to patient [5-7].

The American Nurses Association and the American Association of Diabetes Educators define the task of a diabetes nurse as follows: "a diabetes nurse works with patients with diabetes, with their families, and with other groups and society at large in order to identify the care and educational needs of patients with diabetes, make nursing diagnosis, and apply nursing care and training". The Federation of European Nurses in Diabetes (FEND) defines a diabetes nurse as follows: "a diabetes nurse is a clinician who assumes the roles of educator, counselor, manager, researcher, communicator, and change agent, and has advanced knowledge and skills of diabetes management" FEND places emphasis on the involvement and work of diabetes nurses in a multidisciplinary team [8].

Nursing students face circumstances like DM management, in which they are supposed to exhibit their cognitive, affective, and psychomotor skills during the post graduate period. It is not possible for students who are educated

with the traditional education methods of today to gain these skills by only observing clinical practices. In order for nurses to undertake tasks in circumstances like DM management requiring correct intervention in accordance with the principles of patient security, interactive methods should be used in nursing education that allow students to participate in the learning process in an active way. It is known that one of these methods, simulation, contributes to students improving both their cognitive and psycho-motor skills by providing them with experience of clinical conditions in a realistic learning environment [9-13]. In the study by Terzioglu et al. [14] (2012), students stated that skills development practices in a laboratory setting, given before they begin to work in a clinical setting are useful to them. In the study by Karadag et al. [15] (2015), students working with a simulated patient stated that this method "allowed them to learn in an effective manner" and to "have a chance to work with a real patient". Since 2003, the use of simulation has been encouraged by the National Council of Nursing in the USA, in order to allow students to prepare for a complex clinical environment and to create a realistic learning environment based on critical thinking where real life situations are experienced [16, 17].

In a study by Dobbs et al. [7] (2006) on the simulation of insulin application in nursing education, students stated that they were confident in the care of a patient who received insulin treatment, and they were satisfied with the clinical environment and the teaching method in general. In the study, emphasis was also laid on the fact that clinical simulation is an effective method in nursing education along with clinical experience and other teaching methods [18]. It is also known that simulation applications allow the establishing of an association between theory and clinic practices and the development of psychomotor skills, decision making, critical thinking, self-confidence, and therapeutic communication methods [12, 19-23].

A sample simulation through which the transfer of the theoretical knowledge of students into practice during patient cares with DM was submitted in the current study. It was planned to test the prepared DM simulation design and assess student success, and, thus, to make a contribution to the literature. The simulation

prepared to teach DM management to students was applied through the stages of the Best Practice Standards: Simulation Design IX (EIUS: ST-IX) explained by INACSL (The International Nursing Association for Clinical Simulation and Learning) (INACSL Standards Committee, 2016). These stages are a total of 11 items with guiding information in each item for trainers who want to prepare simulations; Needs assessment, Measurable objectives, Format of simulation, Clinical scenario or case, Fidelity, Facilitator/Facilitative approach, Briefing, Debriefing and/or feedback, Evaluation, Participant preparation, Pilot test [24, 25].

Methods

Study design

This study is planned as cross-sectional.

Setting and sample

214 students who took the Internal Diseases Nursing course in the 2016-2017 academic year formed the universe of the research. All of the universe was taken as a sample group, but 45 students who did not attend or did not take part in the simulation training were excluded from the study. The study was completed with 169 students, 30.2% male and 69.8% female. The sample group was 79% of the population. The students were divided into 32 groups, each consisting of five or six people, and the simulator training was carried out by turns by each group under the supervision of an educator. Students' opinions and achievement scores were used to evaluate the research results. The fact that educators and students want to increase their knowledge and skills and gain experience for DM management requires the use of an interactive method in teaching this subject. These kind of studies which were to examine the contribution of simulation training for DM management to student success in the areas of needs assessment and measurable objectives, consist of two stages of EIUS: ST-IX. The goals

for the management of diabetes were prepared in accordance with the students' knowledge and experience. The issues and procedures that constitute the basis for the clinical practices of nursing were used in setting goals. The goals set for students were as follows: being aware of DM symptoms and findings; being able to carry out DM management by conducting activities like checking blood glucose levels, following up patients to prevent complications, assisting patients in complying with the treatment plan, administering medication ordered by the doctor; being able to provide psychosocial support to patients' relatives; being able to educate patients' families about the management of diabetes. While performing all these applications, students use critical thinking, decision-making, a willingness to perform evidence-based practice, and effective communication skills.

Measurements/instruments

In the tenth stage of the EIUS: ST-IX, evaluation; the views of students can be expressed orally, and their skills can be assessed through checklists and objectively structured clinical exams. The students were assessed for DM management through the skill checklist prepared by researchers given below (Table 1). Five-point Likert scale was used to evaluate the results at the skill checklist. While preparing the skill checklist, relevant procedures and guides were used. Student's awareness of DM signs and symptoms, for DM management; to control the blood glucose level, to monitor the patient to prevent complications, to ensure the patient's compliance with the treatment plan and to apply the drug at the physician's request, etc. practicing activities, providing psychosocial support to patients' relatives, and training the family on diabetes management were evaluated. Critical thinking, decision-making, willingness to practice evidence-based, and effective communication skills were also evaluated while performing all these applications.

Table 1. Skill checklist for DM management

Evaluation Area	Expectations from Student
Patient Safety	Hand hygiene Introducing oneself to the patient Identifying the patient
Critical Thinking and Communication	
Patient Evaluation	Check the patient's findings
Identifying problems	Identify nursing diagnoses • Hyperglycemia due to non-compliance with diet, exercise, and medication • and etc.....
Interventions and evaluation	• Monitor hyperglycemia and hypoglycemia symptoms •• and etc.....
Rating Score	1 = no, 2 = insufficient, 3 = partially good, 4 = good, 5 = very good

Data collection/procedure

In the teaching of DM management within the scope of format of simulation, the third stage of EİUS: ST-IX; the students taking the Internal Medicine Nursing class were primarily targeted. In order to realistically transfer clinically found symptoms and findings of patient with diabetes into the simulation medium, a standardized simulated patient method was used in the creation of simulation scenarios. The students were selected and trained in this simulation method in which the role of the patient was portrayed by a healthy individual acting in accordance with structured steps to portray the patient and his/her symptoms. In order for students to have a realistic experience, the scope of clinical scenario or case and fidelity, which are the fourth and fifth stages of the EİUS: ST-IX, involves preparation of the simulation medium and the formation of the criteria and the most realistic simulation scenario by reviewing clinical cases and samples. Accordingly, the individualistic characteristics and medical story of the patient were determined in the scenario for DM management as follows.

In addition to this information, the following expectations that students should fulfill were identified in the scenario (Table 2): in terms of the cognitive level, safe drug administration and provision of training for the patient and his/her family; in terms of the affective level, making eye contact with the patient, communicating with the patient and the patient's relatives,

attitudes towards the patient's family; in terms of psychomotor skills, blood glucose level assessment, insulin treatment, and medication administration.

Having completed above mentioned sections, the ethically required oral consent of the students were taken which was needed for the sixth and seventh stages of the EİUS: ST-IX, the briefing and the facilitator/facilitative approach. The scenario prepared by educators was written in detail with the consideration of possible issues in order to guide the educator/facilitator during the simulation:

The simulated scenario was given to the students, and they were given a short presentation on the case during the simulation process. The following expectations related to the scenario were shared with students in this guide.

- Performing a physical examination of the patient and making a diagnosis,
- Assessment of laboratory findings,
- Administration of medication,
- Application of nursing practices for DM management in order of priority,
- Being able to assess the results of nursing care provided to the patient,
- Record all applications for the patient.

Table 2. Clinical case

Patient;			
Name and surname: F.Y.	Weight: 86 kg		
Gender: Female	Height: 160 cm		
Age: 45	Patient's relative: husband		
Primary medical diagnosis: Type 2 diabetes			
Allergy: There is no established allergy			
Medical History: F.Y. She is married with two children, and she is 45 years old and a homemaker. Five years ago, treatment with Diaformin 1000 mg tb. 2x1 PO was started, but the patient did not use her medication as she felt good and never went to the hospital although she was told to come back for a check every three months. She did not perform the recommended exercises, did not modify her diet and ate two meals a day. Recently, the patient complained of polydipsia, polyphagia, polyuria, and fatigue. F.Y. complains of coldness, tingling, and numbness in the feet. A small wound appeared on the toe and was not cared for one week. Her husband insisted that she visit the doctor and came to the endocrinology outpatient clinic for an examination. At the outpatient clinic, the doctor performed a foot examination and requested blood tests. She was admitted to the ward because of high blood sugar level and the foot wound.			
Background: 5-year hypertension			
Family History: Mother DM, father Hypertension			
Habits: 1 pack of cigarettes per day for 20 years			
Drugs Used at Home: Diaformin 1g tb. 2x1, Delix 5 mg 1x1 tb, Ecopirin 100 mg 1x1 tb			
Body mass index (BMI):.....(kg/m ²)			
F's Physical Examination and Laboratory Findings			
<ul style="list-style-type: none"> • Fever: 36.8 N: 90 / minute rhythmic, BP: 140/90 mmHg • Uneasiness, Fatigue, Weakness • Weight gain (three pounds in one month) 			
Blood Glucose Level:	279/mgdl	Potassium:	3.1 mEq
Hemoglobin A1c:	11.3%	Sodium:	140 mEq
Blood Urea Nitrogen:	15 mg/dl	Triglyceride:	253 mg/dl
Creatinine:	0.9 mg/dl	Erythrocyte:	4.200.000
Albumin: Hemoglobin:	4.0 g/dl	Total Cholesterol:	255 mg/dl
Hematocrit:	10.4 gr/dl	High Density	53 mg/dl
	35.6 %	Lipoprotein:	163 mg/dl
		Low Density	11.5
		Lipoprotein:	
		Leucocyte:	

*Diabetic (DM) Diet 1400 calori; *Panto 40 mg vial 1x1 IV; *Humalog vial 3x12 **Unit** SC;

*Lantus vial 1X24 **Unit** SC; *Diaformin 1000 mg. 2x1 tb PO; *Delix 5 mg 1x1 tb PO;

*Ecopirin 100 mg 1x1 tb PO; *Patient Education

The supplementary resources below were recommended for the students to prepare them for the ninth stage of the EIUS: ST-IX, participant preparation, before simulation practice. To achieve success in the simulation, qualifying the students on the topic of DM is one of the most important steps. In this respect, it is necessary to make sure that students have sufficient knowledge about nursing subjects related to DM including etiology and pathophysiology, clinical signs and symptoms, medical treatment types used in DM management, evaluation of patient from the physical aspect, ensuring patient safety, prevention of complications, and providing emotional support and home care.

There were some limitations in the study. Due to financial restrictions, it was not possible to hire a professional actor for the role of the

patient. Instead, students taking courses in internal diseases were trained and played the role of the patient. In future studies, projects could be created in order to obtain financial support.

Data analysis

In the eleventh stage of the EIUS: ST-IX, the pilot test, all stages of the EIUS: ST-IX prepared for this section were reviewed so that the teaching of DM management could be performed in accordance with its planned objectives without difficulty or deficiency. The correlation analysis and anova test was used to evaluate the relationship between students' grades and DM simulation grade.

Results

Having completed the application of simulation scenario in the scope of debriefing and/or feedback, the eighth stage of EIUS: ST-IX, the analysis stage, which is the most important stage of the simulation and where an assessment is performed as to whether information was understood and integrated into practice. The students were asked to do a self-assessment, and their awareness were raised by questions such as the following: What is the primary nursing diagnosis in this case? What are primary nursing interventions that you would use? What are outcomes of this patient care? What did you gain by this simulation practice? What do you think you did well? Was your knowledge and skills sufficient for the management of this case? After these questions, students' views are included at Table 3.

According to the Skill Checklist with five-point Likert scale, the DM simulation grade average of the students included in the study was determined to be 2.7929±1.05715, the practice grade average was determined to be 79.3195±7.31386, and the end-of-term grade average was determined to be 65.2959±8.60482.

A positive, moderate level significant relationship was found in the correlation between students' practice grade, end-of-term grade, and DM simulation grade (Table 4). As DM simulation grades increased, the application grade and the end-of-term grade also increased.

When simulation grades of students were compared to their application grades and end of term grades, a significant difference was found between their application grades and their simulation grades (F=11.681, p=0.001). The difference was found to originate from two groups who received grades of 1 and 2 on the Bonferroni-corrected anova test. The practice grades of the students who got low simulation grades were also found to be low on this test (Table 5).

The difference between the end-of-term grades of the students with their simulation grades was found to be significant (F=6.868, p=0.001). The difference was found to originate from two groups who received grades of 1 and 2 on the Bonferroni-corrected anova test. The practice grades of the students who got low simulation grades were also found to be low on this test (Table 5).

Table 3. The students' views

- It was a preliminary for internship"; I expressed my concern before my internship
- I learned to comment on disease.
- It was very enjoyable and informative.
- I wish we could do that for every disease.
- It was useful to collect information by ourselves and raise our awareness of what we have learned.
- I quickly got used to the hospital

Table 4. The relationship between the students' application grade and end-of-term grade and DM simulation grade (n=169)

	Practice grade	End of term grade	DM Simulation grade
Practice Grade	1.000		
End of term grade	.508**	1.000	
DM simulation grade	.432**	.372**	1.000

**p<0.01

Table 5. Comparison of simulation grades of students on the basis of their application grades and end of term grades (n=169)

VARIABLES	n	DM Simulation grade		
		Ort \pm SS	f and p value	
Practice Grade	1	21	72.09 \pm 10.72	f= 11.681 p= 0.001
	2	43	77.37 \pm 6.21	
	3	64	8.23 \pm 5,04	
	4	32	80.93 \pm 6.42	
	5	9	86.11 \pm 4.91	
End of term grade	1	21	59.90 \pm 9.74	f= 6.868 p= 0.001
	2	43	62.76 \pm 6.56	
	3	64	66.28 \pm 8.45	
	4	32	7.25 \pm 73.55	
	5	9	65.29 \pm 8.60	

Discussion

Simulation is one of the training methods widely used all over the world for many years. Although simulation has also been widely used in our country, especially in recent years, the number of studies aimed at evaluating the achievement of the simulation is limited. This study was conducted to test a prepared simulation design and assess the achievement of the students. Findings of the study provide preliminary information in relation to the use of innovative practices in addition to conventional training methods.

The use of simulation is recommended in order for clinical practices to be performed safely [24, 25]. Adult training emphasis on the participation of students rather than on interaction with the lecturer [26]. Clinical practice training conducted in a laboratory environment assists students in becoming skillful at critical thinking and thus maintaining patient safety. No study in relation to the management of patients with DM through simulation is available in the literature. This scenario was designed to be similar to DM cases that they would likely encounter in clinic. We found that the simulation increased end of term grades of the students, their self-confidence, decreased their preclinical concerns according to students' statements, and had a positive effect on learning. After the training with the simulation method, the skills of the students to evaluate the DM patient, to identify the problems, to apply and evaluate nursing interventions were evaluated with the

checklist, and it was determined that the training was effective in developing the specified skills.

The aim of the simulation was to provide students with knowledge, critical thinking ability, and skills [9, 27]. Sarabia Cobo et al. [21] determined that simulation training prepared nursing students for the administration of palliative care and was a low- cost method for improving students' communication and other skills. Studies regarding the usage of simulation in nursing training have pointed out that simulation is a learning method that assists students in gaining knowledge and skills and also contributes to the development of their critical thinking, problem solving skills, self-affectivity, and self-confidence [17, 28, 29]. The students expressed their thoughts on working with simulated patient as follows: "It provides effective learning"; "It provides the chance to work with a real patient"; "I became aware of the primary care necessities of the patient"; "I learned how to communicate with the patient"; "It helped me notice my deficiencies"; "I learned to deal with the patient holistically"; "We learned patient evaluation methods"; "We learned how to intervene with patients in rarely seen urgent cases"; "we are ready for a clinical environment"; "it is an appropriate environment for entertainment and relaxation while learning" [15, 30]. The students who participated in our study expressed their thoughts as follows: "It was a preliminary for internship"; "I got rid of my concerns before my internship"; "I learned how to comment on a disease"; "It was very enjoyable and informative"; "I wish we could do that for

every disease”; “It helped us collect information by ourselves and increased our awareness of what we have learned”; “I rapidly got used to the hospital”. The study findings are similar to those of other studies.

Lee et al. [31] found in their study conducted on nursing students using a simulation scenario prepared for a patient with asthma that students’ problem solving and clinical decision making skills developed and patient safety improved through developed simulation scenarios and evaluation checklists. In a review study conducted by D’Souza et al. [18] of 45 published works that students became skillful at clinical decision making and performing applications, and it was recommended that a simulation scenario should also be prepared for different cases. The students who participated in our study expressed similar thoughts, e.g. “We wish we could do that for every disease” and stated that simulations of different cases would make them feel ready and alleviate their concerns before applying treatment to a patient.

Terzioglu et al. [14] found that the preparation of students who received education with classical method is insufficient; they feel incompetent and lack confidence in a clinical environment; patients and nurses don’t trust students and don’t allow them to perform application; there are differences between things that are explained and those that are actually applied. The main purpose in nursing education is to graduate nurses who can combine theory and practice, think critically throughout the learning process and have effective problem-solving skills. The usage of simulation in nursing training allows students to increase their self-confidence and increase their decision-making skills by providing experience-based learning. Students can go through fear and anxiety based on their lack of experience. The level of anxiety directly affects students’ clinical decision-making skills and learning. Doing a lot of practice allows students’ anxiety to decrease and their self-confidence and work quality to increase [9, 32-34].

In conclusion, it is thought that usage of the simulation method in nursing training increases students’ clinical practice success by helping them to plan more realistic medical cases, to assess clinical problems, and to plan nursing care. In the post-graduate period,

nursing students are supposed to use their cognitive, affective, and psycho-motor skills like DM management. Today, it is not possible for students to acquire these skills through current conventional methods. Nurses are required to improve their knowledge and competence through learning methods like simulation in nursing training in order to conduct effective DM management. From this point of view, through a simulation method designed in accordance with ST-IX and prepared by INACSL, a sample was given that helped students to use their theoretical knowledge in practice during intervention with a patient with Diabetes Mellitus.

Conflict of interest: The authors declare that there is no conflict of interest.

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Acknowledgment

This study was presented as an oral presentation (summary) at the '18th World Congress on Clinical Nursing and Practice' in Prague, Czech Republic on September 21-22, 2018.

This study was supported by Scientific Research Coordination Unit of Pamukkale University under the project number 2018KKP201.

Ethics committee approval: In order to collect the data for the study, permission was received from Medical Ethics Committee of university (60116787-020/43832).

Contributions of authors

G.B. conceptualized and designed the article. G.B., A.A. designed the material-method section. G.B., A.A., Ü.Ö. collected the data. G.B., A.A. evaluated the data in the results section. The discussion section of the article was written by G.B. In addition, all authors discussed the study and approved its final version.