Original Article

TEXTO & CONTEXTO ENFERMAGEM
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THE EFFECT OF SIMULATION ON NURSING STUDENTS' KNOWLEDGE ABOUT COLOSTOMY IRRIGATION: A QUASI-EXPERIMENTAL STUDY

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ABSTRACT

Objective: to compare the effect of clinical simulation and of a lectured class on Nursing students' knowledge about the colostomy irrigation procedure.
Method: a quasi-experimental study conducted in September 2019 with Nursing students attending *Universidade Federal do Rio Grande do Norte* in Natal, Brazil. The instruments used were a questionnaire targeted at sociodemographic issues and a knowledge analysis tool at three different moments. The Control Group had a lectured class and the Intervention Group took part in the laboratory simulation. The Chi-Square and Mann-Whitney tests were used for data analysis.
Results: no statistically significant differences were observed between the groups in terms of the sociodemographic profile. In the analysis of the means of correct answers, better measures were observed in the post-test of both groups when compared to the pre-test; however, in the retention test, the students from the Intervention Group had better and statistically significant results than those from the Control Group (p-value=0.015).
Conclusion: it is noticed that both teaching strategies exerted a positive effect on the students' learning process. Although both are equally important and effective, simulation showed better performance in knowledge retention. It is expected that this research enables educators to reflect on their work and allows them to use strategies that enhance their teaching practice, in order to benefit teaching and the students' development.

DESCRIPTORS: Nursing. Education in Nursing. Patient simulation. Stoma. Therapeutic Irrigation.

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EFEITO DA SIMULAÇÃO NO CONHECIMENTO DE ESTUDANTES DE ENFERMAGEM SOBRE IRRIGAÇÃO DE COLOSTOMIA: ESTUDO QUASE EXPERIMENTAL

RESUMO

Objetivo: comparar o efeito da simulação clínica e da aula expositiva dialogada no conhecimento de estudantes de enfermagem sobre o procedimento de irrigação de colostomia.
Método: estudo quase experimental, realizado em setembro de 2019 com acadêmicos de enfermagem da Universidade Federal do Rio Grande do Norte, em Natal, Brasil. Utilizaram-se como instrumentos um questionário voltado para questões sociodemográficas e um de análise de conhecimento em três diferentes ocasiões. O grupo controle teve aula expositiva dialogada e o grupo intervenção participou da simulação em laboratório. Para análise de dados foram usados os testes Qui-Quadrado e o de Mann-Whitney.
Resultados: observou-se ausência de diferenças estatísticas significantes entre os grupos quanto ao perfil sociodemográfico. Na análise das médias de acertos, observaram-se melhores medidas no pós-teste dos dois grupos, quando comparado ao pré-teste, contudo, no teste de retenção os discentes do grupo intervenção tiveram resultados melhores que o grupo controle e estatisticamente significantes (p-valor=0,015).
Conclusão: percebeu-se que as duas estratégias de ensino produziram efeito positivo no processo de aprendizagem dos discentes. Apesar de ambas serem importantes e eficazes, a simulação apresentou melhor desempenho na retenção do conhecimento. Espera-se que a pesquisa possibilite aos educadores a reflexão de seu trabalho e oportunize a utilização de estratégias que aprimorem sua prática docente, com vistas a beneficiar o ensino e desenvolvimento dos estudantes.

DESCRITORES: Enfermagem. Educação em enfermagem. Simulação de paciente. Estomia. Irrigação Terapêutica.

EFECTO DE LA SIMULACIÓN EN LOS CONOCIMIENTOS DE ESTUDIANTES DE ENFERMERÍA SOBRE IRRIGACIÓN DE COLOSTOMÍA: ESTUDIO CUASIEXPERIMENTAL

RESUMEN

Objetivo: comparar el efecto de la simulación clínica y de una clase expositiva en los conocimientos de estudiantes de Enfermería sobre el procedimiento de irrigación de colostomía.
Método: estudio cuasiexperimental realizado en septiembre de 2019 con estudiantes de Enfermería de la *Universidade Federal do Rio Grande do Norte* en Natal, Brasil. Como instrumentos se utilizaron un cuestionario dirigido a cuestiones sociodemográficas y una herramienta de análisis del conocimiento, en tres ocasiones diferentes. Al Grupo Control se le ofreció la clase expositiva y el Grupo Intervención participó de la simulación en laboratorio. Para el análisis de los datos se emplearon las pruebas de Chi-Cuadrado y de Mann-Whitney.
Resultados: no se observaron diferencias estadísticas significativas entre los grupos en relación con el perfil sociodemográfico. En el análisis de los valores medios de respuestas correctas se observaron mejores medidas en el *post-test* de ambos grupos, en comparación con el *pre-test*; sin embargo, en el test de retención, los estudiantes del Grupo Intervención obtuvieron mejores resultados que los del Grupo Controle, además de ser estadísticamente significativos (valor p =0,015).
Conclusión: se percibió que ambas estrategias de enseñanza produjeron un efecto positivo en el proceso de aprendizaje de los estudiantes. Aunque ambas son importantes y eficaces, la simulación presentó mejor desempeño en la retención de conocimientos. Se espera que este trabajo de investigación permita que los educadores reflexiones acerca de su trabajo y haga posible la utilización de estrategias que mejoren su práctica docente, a fin de beneficiar la educación y el desarrollo de los estudiantes.

DESCRIPTORES: Enfermería. Educación en Enfermería. Simulación de pacientes. Estoma. Irrigación Terapéutica.

INTRODUCTION

Teaching strategies are defined as knowledge facilitating methods for the students to achieve their technical-professional goals. In Nursing teaching, the development of practical activities that provide students with safe and good quality learning as future professionals has been increasing[1,2].

Lectured classes are still one of the main methods used in teaching activities. However, the National Curriculum Guidelines for the Nursing Undergraduate Course (DCNs/ENF), according to resolution No. 573 of January 31st, 2018, requires students that participate actively in the learning process and develop competencies and skills so that they become social transformation agents[3]. Therefore, other teaching methods that favor this profile can be used, with emphasis on clinical simulation. This method stimulates learning and clinical reasoning by means of repetitive training, without posing any risk to patient safety. In a controlled environment, simulation ensures the students' active role in their own teaching-learning process[1,4].

Simulation even allows for a reflection about the knowledge acquired with clinical judgment for correct decision-making, enables an increase in self-confidence, reductions in anxiety and nervousness, improvements in communication, relational skills enhancement, and emotion control during health care, in addition to assisting in the development of base competencies to perform the Nursing work[4].

Several themes can be worked on from simulation, including colostomy irrigation, which is a procedure calculated and planned for the management of intestinal activity from the introduction of liquid via the stoma, for flushing the large intestine in order to allow effluent control for a given period of time[5]. To such end, it is fundamental that the students have the necessary knowledge and skills to adequately perform the technique and educate the patients[1,2].

Thus, to ease the students' practice, the Nursing curriculum should have methodologies that benefit Nursing professionals' training with autonomy, confidence and critical sense, so that they are trained for the practice, meeting the population's health needs[6].

In this perspective, we know that a lectured class is of major importance when teaching students; however, the active methodology stimulates sharing knowledge and enhancing education, for example, clinical simulation[7–9]. Therefore, a number of authors have shown promising results from clinical simulation as a teaching strategy[9–11]; however, it is still necessary to develop other studies that compare the effects of this method to traditional teaching, based on a lectured class[11]. In addition to that, it is imperative to analyze these strategies in the teaching of specific procedures, such as colostomy irrigation.

Consequently, the effects of the lectured teaching method were investigated in comparison to the clinical simulation strategy on the Nursing students' knowledge about the colostomy irrigation procedure. In order to verify and contrast both methods, the objective of the current study is to compare the effect of clinical simulation and of a lectured class on Nursing students' knowledge about the colostomy irrigation procedure.

METHOD

A quasi-experimental and randomized study consisting of pre-test, post-test and retention technique, developed in September 2019 with Nursing students from a Northeastern Brazilian university, in order to analyze and compare two teaching methods: lectured class and clinical simulation. The methodological design was developed based on CONSORT.

To take part in the research, the students had to be enrolled in the "Comprehensive Care to Adult's Health I" academic discipline (as it addresses the issue of Nursing care for bowel surgeries) of the Nursing course where the research took place, be present at the intervention moments and be at least 18 years old. The students excluded were those that did not finish all the research stages.

The population consisted of 40 students; however, the final sample gathered 31 students, as nine were excluded: four for not taking part in all the research stages, and five for not attending the locus on the intervention day. At the end of the process, 15 students took part in the simulation and comprised the Intervention Group, whereas 16 students attended the lectured class and were included in the Control Group.

The randomization technique was processed by means the *Excel*® "random" command, performed by the researcher herself from the academic subject's attendance list.

As for the study protocol, the students did not have the colostomy irrigation topic in their curriculum matrix; thus, it was from the research that they had their first contact with the theme.

One week before and on the very day of the intervention, all the students were handed in scientific materials to read about the bowel irrigation procedure. After the randomization procedure, one class was divided into Control Group (CG) and Intervention Group (IG). All the students answered a questionnaire containing sociodemographic data, as well as a knowledge analysis instrument on three different occasions: before starting the teaching strategy (pre-test), immediately after applying the educational methods (post-test), and 30 days after the intervention (retention).

The questionnaire for profile outlining included questions about gender, age, number of children, marital status, monthly income, training in the Nursing field, employment contract, and work in the health area.

The knowledge assessment instrument was elaborated through a literature review comprised by five articles, with the following guiding question: "Which technical aspects are used in the colostomy irrigation procedure?", as well as from reference books in the area. Validation of the instrument by means of content validation was carried out by nine specialists and the questions were validated as for Usefulness/Pertinence, Consistency, Clarity, Objectivity, Simplicity, Feasibility, Update, Vocabulary and Precision. After two evaluation rounds, accepting the judges' suggestions, the mean Content Validity Index (CVI) of all the instrument items was equal to or greater than 0.96.

The instrument had 10 multiple-choice questions, each one with four options where only one was correct. The score analysis was carried out by adding up the correct answers and comparing them to the number of correct answers in the pre-, post- and retention tests, in order to verify the efficacy of the teaching methods and compare them between the groups.

As its teaching method, the CG had the lectured class prepared by the researcher from scientific articles and Gray Literature about Stomatherapy, which consisted of a slide presentation and a video about the bowel irrigation procedure, in addition to an irrigation kit available for handling after the researcher showed the technique. The class lasted approximately two hours.

The students from the IG took part in the educational intervention in a laboratory assembled and equipped like a Nursing office where the simulated procedure would take place, and the scenario presented was previously validated by specialists with experience in the simulation area. The scenario validation form contained 20 items, namely: Learner's previous knowledge, Learning objectives, Available materials, Preparation of the scenario (topic, expected interventions, expected results, fidelity level, checklist, description of the script for the actors, case structure and description of the script for the student), material resources, characterization of the actors, physical space, human resources, development of the scenario, scenario estimated time, debriefing, and debriefing estimated time.

To carry out the simulation, a trained collaborator used a belly simulator for the colostomy bowel irrigation, in order to allow characteristics closer to reality. The irrigation kit was provided, in addition to all the materials and inputs required to perform the procedure.

With the scenario mounted, the students were asked to volunteer to take part in the simulation. They were guided by the researcher, in isolation, so that they played the nurse's role in the colostomy irrigation simulated guidance and performance. A case was read, containing diverse information about a person with a stoma that attended the Nursing office to learn and to be trained by the nurse about how to perform colostomy irrigation. The scene lasted approximately 20 minutes.

After the scene, a debriefing session was conducted, comprised by the following stages: Meeting: where the students described what happened and their feelings before the scene; Positive reinforcement: reflection about positive points during performance; Analysis: critical observation of aspects to be improved and ways to enhance the practice; Summary: solving doubts and manifestation of key points[12]. This phase lasted 30 minutes.

The Content Validity Index (CVI) was used for the content validation analysis of the instrument, considering CVI values equal to or greater than 0.80 as valid.

After collection, the data were tabulated and processed in the Statistical Package for the Social Sciences (SPSS), version 20.0, for the descriptive and inferential analysis. The chi-square test was used for sociodemographic data and to verify the number of correct answers given by the participants; the Mann-Whitney test was employed in the comparison between the groups in the pre-, post- and retention tests. p-values<0.05 were considered significant.

Respecting the ethical guidelines of research studies with human beings, all the students read and signed the Free and Informed Consent Form (FICF) in two copies. The study was only initiated after consideration and approval by the Research Ethics Committee

RESULTS

The study participants were 31 Nursing students: 15 in the IG and 16 in the CG, all allocated by randomization. The figure 1 below shows the structure according to the CONSORT flowchart.

Regarding the profile of all 31 students, no statistically significant differences were observed between the control and intervention groups. There was predominance of female individuals, with a mean age of 29.94 years old, single, no children, with incomes above three minimum wages, and no experience or training in the health field. Table 1 shows all the information in detail.

Given all the information obtained, similarities between the groups were verified in the pre- and post-test. As a consequence of better mean values in the post-test of both groups when compared to the pre-test, it is inferred that both educational interventions were efficient in the students' learning process. Table 2 presents the results obtained in the pre-test, the post-test and the intragroup retention test.

However, from the appreciation of the retention test, it was identified that the IG participants, which took part in the simulation, had higher means than the CG and with statistically significant results, taking into consideration that the simulation strategy can produce longer-lasting knowledge. Table 3 presents the measures found.

The items that had more incorrect answers in the pre-test addressed the type of stoma in which irrigation could be performed (Question 3); the temperature, mean time in continuous speed, and adequate volume for infusing the liquid in the stoma (Questions 6, 7 and 8 respectively); and incorrect guidelines provided by the health professional (Question 9). Table 4 shows the questions with the most incorrect answers in the pre-test and their analysis in the post-test and retention test, comparing the numbers between the groups.

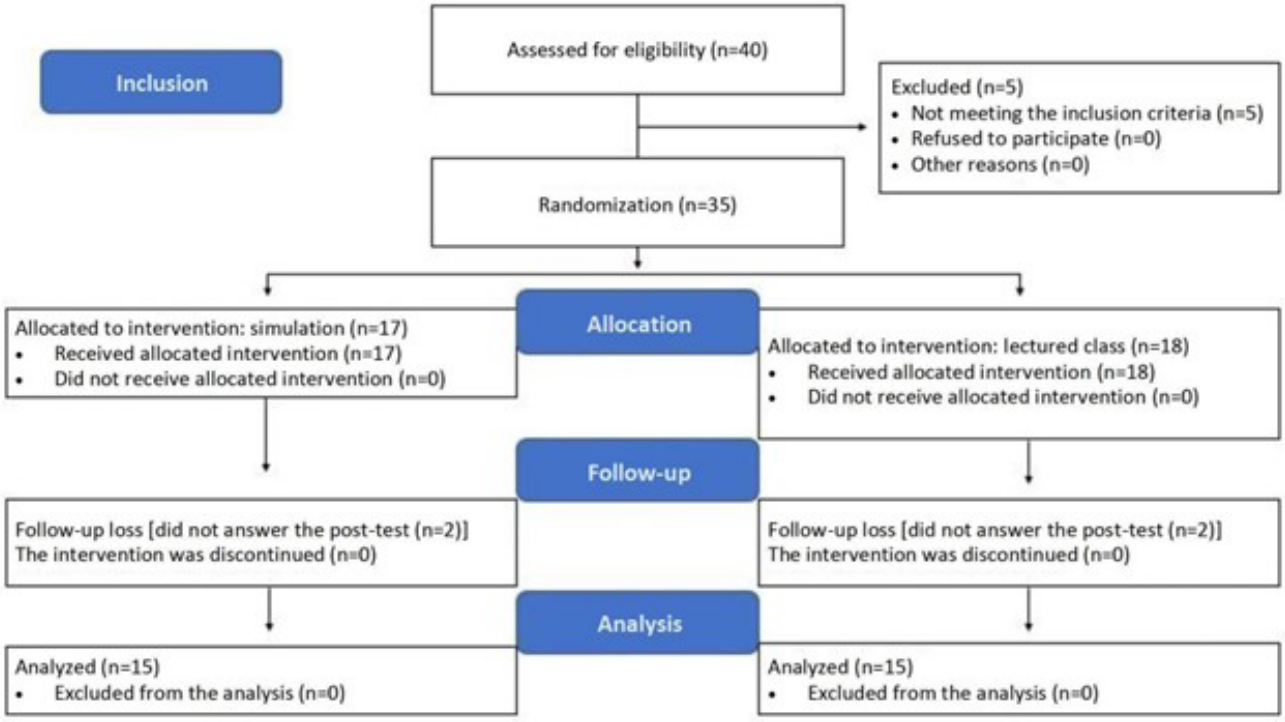

Figure 1 – Flowchart based on the CONSORT 2010 model. Natal/RN, 2020. (n=31)

Table 1 – Characterization of the students by group. Natal/RN, Brazil, 2020. (n=31)

Variables	Control Group	Intervention Group	p-value
	n (%)	n (%)	
Gender			
Female	13 (41.9)	14 (45.2)	0.600*
Male	3 (9.7)	1 (3.2)	
Marital status			
Single	7 (22.6)	7 (22.6)	0.809†
Stable union	6 (19.4)	6 (19.4)	
Married	2 (6.4)	2 (6.4)	
Divorced	1 (3.2)	0 (0.0)	
Number of children			
One	0 (0.0)	1 (3.2)	0.135†
Two	3 (9.7)	0 (0.0)	
No children	13 (41.9)	14 (45.2)	
Monthly income‡			
Up to 1 wage	1 (3.2)	4 (12.9)	0.195†
2-3 wages	7 (22.6)	3 (9.7)	
More than 3 wages	5 (16.1)	7 (22.6)	
No income	3 (9.7)	1 (3.2)	
Training in the Nursing area			
No	16 (51.6)	12 (38.7)	0.101*
Nursing Technician	0 (0.0)	3 (9.7)	

Table 1 – Cont.

Variables	Control Group	Intervention Group	p-value
	n (%)	n (%)	
Having worked in the Health area			
No	15 (48.4)	12 (38.7)	0.333*
Yes	1 (3.2)	3 (9.7)	
Currently working			
No	15 (48.4)	12 (38.7)	0.333*
Yes	1 (3.2)	3 (9.7)	
Total	16 (51.6)	15 (48.4)	

*Fisher's t test; †Pearson's correlation test; ‡Minimum wage: R$ 1,039.00

Table 2 – Measures referring to the participants' knowledge in the pre-, post- and intragroup retention tests. Natal/RN, Brazil, 2020. (n=31)

Group	Stage	Mean	Median	Standard Deviation	Standard Error	p-value*
Control Group	Pre-test	6.00	5.50	2.309	0.577	
	Post-test	9.19	10.00	1.167	0.292	<0.001
	Retention test	7.63	7.50	1.784	0.446	
Intervention Group	Pre-test	5.80	6.00	1.897	0.490	
	Post-test	9.27	9.00	0.799	0.206	<0.001
	Retention test	9.00	10.00	1.464	0.378	

*Friedman's test

Table 3 – Measures referring to the participants' knowledge in the pre-, post- and retention tests. Natal/RN, Brazil, 2020. (n=31)

Stages	Groups	Mean	Median	Standard Deviation	Standard Error	p-value*
Pre-test	Control	6.00	5.50	2.309	0.577	1.000
	Intervention	5.80	6.00	1.897	0.490	
Post-test	Control	9.19	10.00	1.167	0.292	0.846
	Intervention	9.27	9.00	0.799	0.206	
Retention test	Control	7.63	7.50	1.784	0.446	0.015
	Intervention	9.00	10.00	1.464	0.378	

*Mann-Whitney's test

Table 4 – Absolute and relative frequencies of the number of incorrect answers by question in the groups' pre-, post- and retention tests. Natal/RN, Brazil, 2020. (n=31)

Variables	Pre-test		Post-test		Retention test	
	n	%	n	%	n	%
Question 3						
Control Group	8	25.8	0	0.0	5	16.1
Intervention Group	8	25.8	0	0.0	2	6.4
Question 6						
Control Group	9	29.0	2	6.4	7	22.6
Intervention Group	12	38.7	0	0.0	2	6.4
Question 7						
Control Group	10	32.2	3	9.7	8	25.8
Intervention Group	7	22.6	1	3.2	3	9.7
Question 8						
Control Group	11	35.5	1	3.2	5	16.1
Intervention Group	11	35.5	0	0.0	3	9.7
Question 9						
Control Group	10	32.5	3	9.7	3	9.7
Intervention Group	7	22.6	2	6.4	2	6.4

DISCUSSION

The profile of the Nursing students included in this study presents predominance of females with a mean age of 29.94 years old, in accordance with a study carried out in Belgium with 665 Nursing students, where most of them belonged to the female gender (89.77%), with a mean age of 26.97 ± 8.86 years old[13].

As for the strategies implemented in the study, the beneficial effect of both of them on the students' knowledge training is verified, evidencing their importance in teaching.

These results corroborate a study carried out with 60 undergraduate Nursing students that compared the effects of simulation-based teaching (Intervention Group) to traditional teaching associated with practical classes in a laboratory (Comparison Group) regarding the enteral tubing, patient safety and biosafety contents. It was found that both groups obtained improvements in the cognitive assessment; the participants from the traditional teaching group presented means of 5.3 and 7.3 in the pre- and post-test, respectively, and the Intervention Group mean rose from 4.7 to 7.7[9].

These findings suggest that different teaching methods can be effective for the students, if carried out properly. Educational programs prepared by educators in a clear way and with well-defined methods can be effective in the students' cognitive development and self-confidence when faced with complex topics that demand specific knowledge and skills[8–9,11].

In the lectured class, the students' participation is fundamental and the professor is considered a knowledge facilitator; thus, this methodology establishes that the teacher presents the content in order to guide reflective thinking capable of questioning, analyzing and debating about the knowledge object[14].

Likewise, simulation-based education is anchored in the students' active participation; however, it involves a replication closer to real clinical practice experiences. This type of teaching is based on various learning theories that have Constructivism as their main framework, where students are stimulated to develop their knowledge[15].

Clinical simulation has obtained several positive results in research studies by improving the students' learning, skills, self-confidence and critical thinking[10,16,17], and has presented not only a complementary teaching technique but an essential component of the Nursing training curriculum[15]. A study carried out in a Nursing school from China with 147 third-year students verified that simulation teaching helps cultivate the students' enthusiasm and initiative and promotes their self-teaching ability[18].

In Chinese Nursing schools, simulation is practiced in various ways, such as human patient simulators, computer-assisted simulation, standardized patients, and partial simulation (back, arms, pelvis, etc.). There are schools that have devices for different clinical scenarios, with high-fidelity simulation, which presented vital signs and responses to medications and other treatments[18].

A systematic review study verified that high-fidelity simulation provided an improvement in Nursing students' knowledge ($p<0.0001$), professional skills ($p=0.0001$), critical thinking ability ($p<0.00001$), clinical judgment ability ($p=0.006$) and communication ability ($p=0.001$)[19].

For the simulation to achieve these benefits, it is necessary to implement good practices related to systemization of the planning and performance of the activities. The following is pointed out to such end: the importance of outlining simulations based on appointments with specialists in these practices; definition of verifiable objectives; alignment of modalities and objectives; elaboration of scenarios and cases; use of various fidelity levels; and student-centered planning, focusing in a facilitating environment aligned with the objectives, the participants' level and the desired results. In addition to that, there is the use of pilot tests before implementing the final simulation[20].

However, several barriers hinder the proper implementation of clinical simulation as a teaching methodology. The following stand out in this context: structural deficits related to the sufficient number of educators; limited material resources and physical environments to meet the necessary demands; fragmentation of actions; lack of time; and insufficient knowledge about the strategies and performance of the activities[20].

Given the above, the importance of institutional interest to provide means and human resources for managing and carrying out the activities is noted, in addition to the educators' training, in order to implement good practices in clinical simulation. Implementing this teaching strategy and achieving favorable results depend on the joint participation of educators, students and institutional managers[20].

Regarding the clinical simulation aimed at teaching stoma care, the results of a study that investigated the effect of the simulation-based intervention for nurses about irrigation skills for patients with urinary bypass found significant improvements in knowledge ($p=0.005$) and confidence ($p=0.009$) after the intervention[21]. Nevertheless, it is noted that this is a little-explored topic in educational intervention studies, even if it is part of Nursing students' curriculum matrix.

In relation to the retention test, it was observed that the IG participants, who participated in the clinical simulation, obtained better results than their CG counterparts, showing that the knowledge acquired by the students in the simulation was longer-lasting.

In a study that assessed the students' retention level after using simulation-based education, it was verified that 55% did not reach the minimum passing standard in three or more of the skills tested,

that 45% obtained retention levels in all seven skills tested, and that 4% did not reach the minimum in five or more skills. It was also observed that there is a correlation between the number of times that the students stated having practiced the skills and competencies acquired, in which practices they performed repeatedly resulted in better performance. Furthermore, in addition to the practical skills, simulation activities should consider affective, psychomotor and cognitive components[22].

Simulation-based curricula with emphasis on deliberate practice and debriefing have proved to be promising in the students' knowledge retention, especially when these programs establish simulated teaching reinforcement in the skill decline period, which can occur months after the first intervention. A study that assessed retention of simulation-based training knowledge, with reinforcement after 4 months of the first simulated intervention, presented improved overall skill retention after 8 months, when compared to the Control Group (n=12) (mean: 0.57 ± 0.05 vs 0.52 ± 0.06; p=0.037)[23].

Knowledge integration and its prolonged duration by means of the simulation can be explained by the set and interrelationship between experiences, interactions, reflections and decision-making, addressed by various learning theorists. The exact mechanisms by which simulation and those attributes contribute to knowledge acquisition, as well as its effects, still need to be studied mainly in relation to the interfaces between the educational theories and the processes inherent to simulation[23].

Thus, simulation offers different opportunities to the students in professional training and provides safe learning so that they develop the necessary competencies and skills. With that, training curricula have been integrated and become an important way of teaching based on scientific evidence[15].

Professor play an important role in this learning facilitating process, with better use of the teaching techniques, mainly simulation, according to theoretical basis and different experiences to achieve the educational objective proposed[15].

It can be understood that both ways of teaching have students as the center of the educational process and that both favor learning. Using such techniques in combination seems to favor knowledge acquisition, as well as students' satisfaction and self-confidence. In addition to that, simulation use provides an opportunity for the students to undergo practical experiences that intensify learning[24].

Therefore, the findings suggest that both of the interventions tested exert a positive effect on students' knowledge about the stoma irrigation practice, and that simulation provided improvements in knowledge retention. However, more studies are required to assess the ideal educational interventions for improving skills and retention, based on the teaching strategies, frequency and period required to attain these competencies.

The following are highlighted as study limitations: the difficulty finding scientific literature about colostomy bowel irrigation, as well as studies that compare two different intervention methods; In addition, only one student had the opportunity to perform the simulation, although all the other participants from the group observed the procedure.

Given the positive results for simulation teaching, the importance of disseminating this teaching practice is noted, in order to provide knowledge and experience exchanges, with new interventions through simulation; sharing results and difficulties, as well as producing research. The creation of scientific groups on the theme allows teachers to provide guidelines, encourage publication of results and stimulate critical analysis among the participants.

It is expected that this research will enable scientific communication, encourage disclosure of findings and conclusions obtained referring to the theme on scientific communication means, and stimulate educators to reflect on their work, so that they use strategies that enhance their teaching practice, aiming to benefit the students' education and development.

CONCLUSION

By the end of the research, it was noticed that both teaching strategies produced positive effects on the students' learning process, in view of the similar means in the groups' post-test in the intragroup analyses. Nevertheless, in the late post-test analysis (30 days after the intervention) a decline in CG knowledge retention was observed, thus inferring that the IG retained more information due to the simulation technique experienced.

Consequently, the current study contributed to the scientific community by producing and evidencing the advantages of the simulation strategies, when compared to the lectured class. Although both of them are important and efficient, simulation presents better performance in terms of knowledge retention.

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NOTES

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CONFLICT OF INTEREST

There is no conflict of interest.

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