# REALISTIC SIMULATION: METHOD OF IMPROVING KNOWLEDGE AND SELF-CONFIDENCE OF NURSING STUDENTS IN THE ADMINISTRATION OF MEDICATION

*SIMULAÇÃO REALÍSTICA: MÉTODO DE MELHORIA DE CONHECIMENTO E AUTOCONFIANÇA DE ESTUDANTES DE ENFERMAGEM NA ADMINISTRAÇÃO DE MEDICAMENTO*

*SIMULACIÓN REALISTA: MÉTODO PARA MEJORAR EL CONOCIMIENTO Y LA AUTOCONFIANZA DE ESTUDIANTES DE ENFERMERÍA EN LA ADMINISTRACIÓN DE MEDICAMENTOS*

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## ABSTRACT

**Objective:** To identify if the use of realistic simulation interferes with the acquisition, retention of knowledge and self-confidence for parenteral administration of medication in students of different age groups of the nursing undergraduate course. **Method:** Quasi experimental quantitative study developed at a public university in the Federal District. The realistic simulation was the teaching method adopted with 40 students from the sixth to the eighth semester of the nursing undergraduate course to approach the medication administration by parenteral route. Identification and knowledge data were collected through a structured questionnaire and self-confidence through the self-confidence scale, validated for the Portuguese language. The results were considered significant with $p<0.05$. **Results:** The majority (85%) of the students were female, with a mean age of 24±5 years old. The students presented a significant improvement ($p=0.001$) in the knowledge regarding the technique of parenteral drug administration from the pre-test to the post-test after using the realistic simulation. Students aged <29 years old showed improvement in the technique of medication administration in the different phases of the study, compared to those aged ≥ 29 years old. In general, the level of self-confidence after realistic simulation in the different phases of the study improved ($p=0.03$). **Conclusion:** It was identified that younger students (18 to 28 years old) have a greater tendency to acquire cognitive and practical knowledge after implementing a realistic simulation strategy. Above all, their self-confidence showed a significant increase between the phases of the study.
**Keywords:** Knowledge; Educational Measurement; Education, Nursing; Simulation.

## RESUMO

*Objetivo: identificar se o emprego de simulação realística interfere na aquisição, retenção de conhecimento e na autoconfiança para administração de medicamento por via parenteral em estudantes de diferentes faixas etárias do curso de graduação em enfermagem. Método: estudo quase-experimental, quantitativo desenvolvido em uma universidade pública do Distrito Federal. A simulação realística foi o método de ensino adotado, com 40 estudantes do sexto ao oitavo semestres do curso de graduação em Enfermagem para abordagem da administração de medicamento por via parenteral. Os dados de identificação e de conhecimento foram coletados por meio de questionário estruturado e a autoconfiança por meio da escala de autoconfiança (self confidence scale), validada para a língua portuguesa. Foram considerados significativos os resultados com p<0,05. Resultados: a maioria (85%) dos estudantes era do sexo feminino, com idade média de 24±5 anos. Os estudantes apresentaram melhora significativa (p=0,001) do conhecimento sobre a técnica de administração de medicamentos por via parenteral do pré-teste para o pós-teste após emprego da simulação realística. Os estudantes com idade <29 anos apresentaram melhora no desempenho na técnica de administração de medicamentos nas diferentes fases do estudo, comparados àqueles com idade ≥ 29 anos. De forma geral, o nível de autoconfiança após simulação realística nas diferentes fases do estudo melhorou (p=0,03). Conclusão: identificou-se que estudantes mais jovens (18 a 28 anos) têm mais tendência à aquisição de conhecimento cognitivo e prático após implementação de estratégia de simulação realística. Sobretudo, a autoconfiança deles apresentou significativo aumento entre as fases do estudo.*
*Palavras-chave: Conhecimento; Avaliação Educacional; Educação em Enfermagem; Simulação.*

## RESUMEN

*Objetivo:* identificar si la simulación realista interfiere en la adquisición, retención del conocimiento y en la autoconfianza para administrar medicamentos por vía parenteral en estudiantes de diferentes edades del curso de grado en enfermería. *Método:* estudio cuasi experimental cuantitativo realizado en una universidad pública del Distrito Federal. La simulación realista fue el método de enseñanza adoptado con 40 estudiantes del sexto al octavo semestre del mencionado curso para enfocar la administración de medicamentos por vía parenteral. Los datos de identificación y de conocimiento fueron recogidos por medio de un cuestionario estructurado y los de autoconfianza a través de la escala de autoconfianza (self confidence), validada para el idioma portugués. Se consideraron significativos los resultados con p <0,05. *Resultados:* la mayoría (85%) de los estudiantes era del sexo femenino, con edad media 24±5 años. Los estudiantes mejoraron significativamente (p = 0,001) el conocimiento sobre la técnica de administración de medicamentos por vía parenteral del pre-test al post-test después de la simulación realista. Los estudiantes con edad <29 años mejoraron el desempeño en la técnica de administración de medicamentos en las diferentes fases del estudio, comparados con aquéllos con edad ≥ 29 años. En general, el nivel de autoconfianza mejoró después de la simulación realista en las diferentes fases del estudio (p = 0,03). *Conclusión:* los estudiantes más jóvenes (18 a 28 años) demostraron mayor tendencia a la adquisición de conocimiento cognitivo y práctico después de la implementación de la simulación realista. La autoconfianza, principalmente, aumentó considerablemente entre las fases del estudio.
*Palabras clave:* Conocimiento; Evaluación Educacional; Educación en Enfermería; Simulación.

## INTRODUCTION

Higher education in Brazil, even in expansion, faces challenges regarding its search for better quality. Educating nursing students in the 21st century denotes some innovations. The current trend of many curricular education programs is directed to the active methods, based on the need to reach both self-confidence and the personal satisfaction of the learner. In this context, the simulation, *per se*, stands out as an active methodology and educational tool, increasingly prevalent in the teaching and learning process of the Nursing course.[1,2]

Learning plays an important role in the life of the human being. Nowadays, educators define it as an element of permanent behavioral change and derived from experiences. The learning style is unique and varies according to the student's individual perception and their cognitive, emotional and physiological structure. Above all, it is commonly affected by the personality, career, educational resources and duties.[3] Undergraduate students may benefit from the teaching method through simulation as a reflective holistic learning opportunity, which combines theory and clinical practice.[4]

The use of the simulation is promising to the development of clinical judgment, regardless of age, length of professional experience and gender of the individual. An emerging trend in nursing education is characterized by using simulated learning experiences as a means of optimizing skills and abilities.[5] As the use of the simulation method in nursing increases, the self-confidence of the student grows.[6]

The simulation favors not only the development of competences related to clinical, but also technical and technological processes of the professional practice; in addition, it also stimulates the development of the capacity for analysis, synthesis and decision making. Realistic simulations, by mimicking real performance, can contribute to increasing self-confidence and reducing the level of anxiety and fear of students in different age groups.[7,8]

There are few studies that specifically address the age range as a variable that can influence the learner's performance and self-confidence during the simulated scenario.

In this context, the objective of this study was to identify if the use of realistic simulation interferes in the acquisition, retention of knowledge and self-confidence for the parenteral medication administration in students of different age groups of the undergraduate nursing course.

## METHODOLOGY

A quasi-experimental, quantitative study developed at a public university in the Federal District during the period from March to October 2016.

Students of the sixth to the eighth semester of the Nursing undergraduate course who attended the Semiotechnic subject were included in the study. However, those with certification of completion in any course in the health area, absence in any of the stages of development of the study or who declined to participate in the study were excluded.

The population initially consisted of 80 students; however, 30 were excluded due to refusal or accumulation of ongoing training in the health area. In the knowledge retention phase, three months after the initial phase, 10 students were excluded due to absence in one of the stages of the study. The final sample, therefore, consisted of 40 students.

To implement the data collection of the study, six phases were followed:

**Phase I:** sensitization of students through the distribution of a folder and dissemination of the study on the homepage of the institution of higher education (IHE). Registration of the students who expressed interest and signed the free and informed consent term, in addition to the sound and image authorization.

**Phase II:** application of the student's satisfaction scale (Cronbach's alpha of 0.86) and self-confidence in learning (Cronbach's alpha of 0.77), validated in the Portuguese language. It is a scale

developed to measure the satisfaction and self-confidence acquired from high fidelity simulation, a 5-point Likert type, composed of 13 items, subdivided into two dimensions (satisfaction/5 items and self-confidence in learning/8 items). In this study, only the self-confidence dimension in learning was applied. In addition, the knowledge evaluation test (pre-test) was applied on the technique of parenteral medication administration.[8,9]

**Phase III:** workshop on parenteral medication administration by the responsible researcher. This strategy was applied to level the theoretical and practical bases on medication administration, providing similar conditions of cognitive, affective and psychomotor performance. The workshop was implemented by the researcher in the auditorium of a IHE during the morning period, lasting two hours. It was subdivided into two sections, a theory established from the dialogic exposition about the technique of parenteral administration of medications and another practice, in which the student experienced the practical experience of medication administration through the use of static simulators. At this stage, the responsible researcher took over the role of facilitator.

**Phase IV:** immediately after the previous phase, each individual student, in order to experience the parenteral medication administration technique, was conducted to the realistic simulated scenario. The other students were confined in a classroom under the responsibility of a professor collaborating with the study. The realistic scenario mimicked an environment of a hospitalization unit, close to the real one, with the use of high fidelity simulators (which emit sound, voice, and allow cardiac and pulmonary auscultation). During the scenario moment, the main researcher observed the performance of the student and simultaneously recorded the performance of cognitive, psychomotor and affective skills in a check-list previously validated by three judges (undergraduate nursing professors). This stage lasted for 15 minutes. At the end of the scenario moment, the student was given a 10-minute feedback related to their performance. This phase was performed during the six hour period.

**Phase V:** Phase II was repeated for the assessment of cognitive, psychomotor and affective competences.

**Phase VI:** three months later, the knowledge retention assessment was carried out, through the re-application of the knowledge test on parenteral medication administration and the self-confidence scale validated for the Portuguese language.[8,9]

The descriptive analysis was performed by means of summary-measures (mean and median) and dispersion measurements (standard deviation, quartile 1 and quartile 3). The comparison between students in the group was performed using the Wilcoxon's signed Rank Sum test. Significant results were considered with $p<0.05$.

## RESULTS

The 40 students included in the study were enrolled in Nursing. Their average age was $24\pm5$ years old. Of the total number of students, the majority (85%) were female and more than half (55%) attended the seventh period of the course.

Overall, students showed a significant improvement ($p=0.001$) in knowledge about the parenteral medication administration technique from the pre-test to the post-test. From the pre-test to the knowledge retention phase, carried out three months after the initial/pre-test phase, students sustained a significant improvement in knowledge ($p=0.001$) (Figure 1).
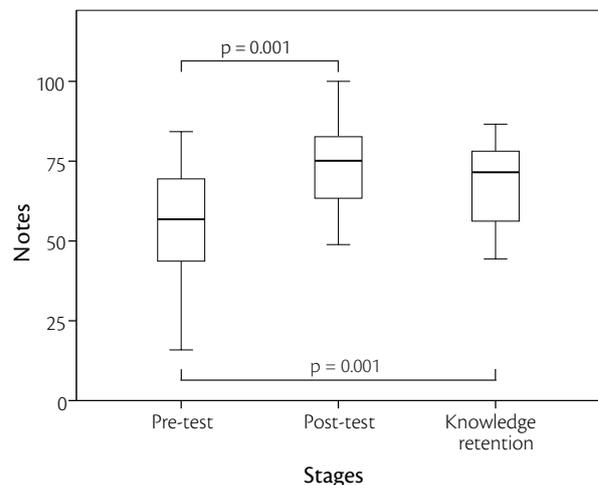


Note: Wilcoxon's signed Rank Sum test.

Figure 1 - Students' knowledge in the different phases, pre, post-tests and knowledge retention through the simulation method. Brasília/DF, 2016.

Table 1 shows that students aged <29 years old showed improved performance for the technical implementation of medication administration in the different phases of the study, compared to those aged ≥ 29 years old. However, this difference was not significant ($p>0.05$).

Table 1 - Comparison of students of different age's performance (n=40) during the parenteral medication administration technique between the different phases of the study (pre, post-tests and knowledge retention test). Brasília/DF, 2016

| Phases | Age | | p value |
| --- | --- | --- | --- |
| | < 29 (n=28)) | ≥ 29 (n=12) | |
| Pre-test | 57.4 (45.7 – 69.7) | 46.8 (41.9 – 55.9) | 0.1 |
| Post-test | 75.2 (63.8 – 81.9) | 66.7 (61.2 – 83.5) | 0.9 |
| Knowledge retention test | 73.3 (61.5 – 78.1) | 56.4 (52.1 – 64.7) | 0.07 |

Note: Mann-Whitney's Test.

The students were more confident to administer parenteral medication from the pre-test phase to the post-test ($p=0.02$). In general, the level of self-confidence showed an increasing improvement between the different phases of the study ($p=0.03$) (Figure 2).

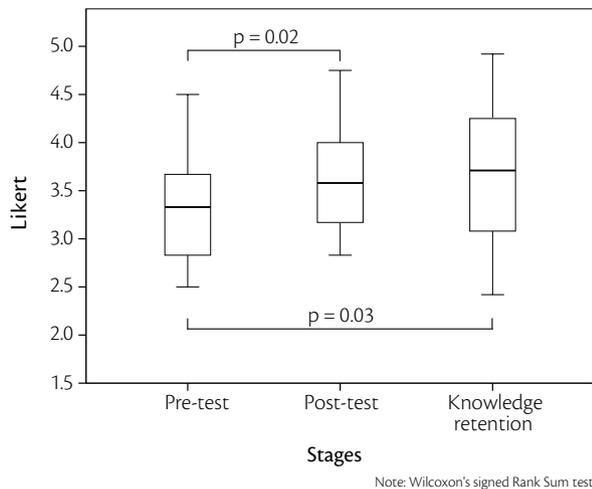Note: Wilcoxon's signed Rank Sum test.

Figure 2 - Self-confidence described by the students (n=40) in the different phases of the study (pre, post-tests and knowledge retention test). Brasília/DF, 2016.

Students under the age of 29 were significantly more self-confident than those aged ≥29 years old in the knowledge retention assessment phase (p=0.04) (Table 2).

Table 2 - Comparison between the self-confidence level of students of different ages in the different phases of the study (pre, post-tests and knowledge retention phase). Brasília/DF, 2016

| Phases | Age | | p value |
|---|---|---|---|
| | < 29 (n=26) | ≥ 29 (n=7) | |
| Pre-test | 3.3 (3.0 – 3.8) | 2.9 (2.7 – 3.5) | 0,2 |
| Post-test | 3.6 (3.3 – 4.2) | 3.2 (3.1 – 3.5) | 0,1 |
| Knowledge retention test | 4.0 (3.3 – 4.3) | 3.1 (2.9 – 3.2) | 0,04 |

Note: Mann-Whitney's Test.

## DISCUSSION

The increasing use of technology in health care and the high expectations of patients have encouraged the development and use of new learning tools in health education. The need to reproduce experiences to learners through educational technologies that minimize possible restrictions on learning has stimulated the use of simulation as a teaching methodology. The results of this research were positive regarding the use of simulation as a teaching method that supports the significant learning, favoring students' interaction and acquisition of skills, using previous their knowledge and past experiences and management of new or unknown situations.[10,11]

The teaching of skills in the nursing area is constantly improving because of the complexity of the care process, and it should be based on evidence and integrate the theoretical knowledge through the practice.[12] Scientific evidence, as well as our study, showed that after the simulated strategy there was a significant improvement in students' knowledge compared to that pre-sim-

ulation. Surely, simulation models function as dynamic decision support programs and tools that integrate different forms of evidence and subsidize the knowledge consolidation.[13,14]

In addition, a study like this shows that students, after experiencing realistic simulation, present improvement of self-confidence.[15] As an example, in this study, younger students (18 to 28 years old) reported not only better performance in tests related to the assessment of cognitive and psychomotor knowledge, but also more self-confidence in relation to students aged 29 years old or over. Scientific evidence showed that the confidence levels of Nursing students are higher in those who are younger, who have the potential for growth through the acquisition of more experience.[4,7] Another study pointed out that students aged between 20 and 27 years old have higher scores of performance in the areas of care, performance of techniques and information technology.[16] On the other hand, a study developed at a University in England showed that younger students (aged <20 years old) were identified as at risk in terms of academic performance, while in those aged > 34 years old, a better overall performance was predicted.[17]

It is important to highlight that regardless of age, learners who have the opportunity to combine different styles of educational approaches to learning in their training process accumulate conditions that favor a meaningful learning.[18]

The limitation identified refers to the small sample size due to the limited adherence of undergraduate Nursing students.

## CONCLUSION

The study, in general, showed that after the implementation of the realistic simulation as a teaching strategy, a significant improvement of knowledge was observed, as well as the retention of knowledge and self-confidence among undergraduate students of the Nursing course.

It has been identified that younger students (18 to 28 years old) are more likely to acquire cognitive and practical knowledge after the implementation of the realistic simulation strategy. In addition, the self-confidence of students had a significant increase between the study phases.

## ACKNOWLEDGMENT

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