

# APPLICABILITY OF REALISTIC SIMULATION IN NURSING GRADUATION: EXPERIENCE IN INCIDENTS INVOLVING MULTIPLE VICTIMS

## APLICABILIDADE DA SIMULAÇÃO REALÍSTICA NA GRADUAÇÃO DE ENFERMAGEM: EXPERIÊNCIA EM INCIDENTES COM MÚLTIPLAS VÍTIMAS

## APLICABILIDAD DE LA SIMULACIÓN REALISTA EN EL PREGRADO EN ENFERMERÍA: EXPERIENCIA EN INCIDENTES CON MÚLTIPLES VÍCTIMAS

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**Objective:** to describe the applicability of a realistic simulation of incidents involving multiple victims in the nursing teaching-learning process. **Method:** descriptive study with quantitative approach involving a realistic simulation. The participants were 250 persons, including 30 nursing students. For data collection, a questionnaire was applied to analyze the academic experience with simulation and simulated patient. **Results:** most (80%) students had previous experience with simulation and 53.3% agreed that there is integration between medicine and nursing during the simulation. For 66.7% of the students, it allowed putting their knowledge into practice, contributing to improvement of clinical reasoning and behaviors. **Conclusion:** the use of realistic simulation in undergraduate nursing is a methodological strategy that contributes to the learning and allows students experience situations of their future professional environment.

**Descriptors:** Education, Nursing. Simulation Training. Mass Casualty Incidents. Emergency Nursing.

*Objetivo:* descrever a aplicabilidade de uma simulação realística de incidentes com múltiplas vítimas no processo de ensino-aprendizagem na enfermagem. *Método:* estudo descritivo, com abordagem quantitativa que envolveu uma simulação realística. *Participaram da simulação 250 pessoas, sendo incluídos no estudo 30 acadêmicos de*

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*enfermagem. Para a coleta de dados, aplicou-se um questionário para analisar a experiência acadêmica com simulação e paciente simulado. Resultados: a maioria (80%) dos alunos não vivenciou experiência anterior com simulação e 53,3% concordaram que houve integração entre medicina e enfermagem durante a simulação. Para 66,7% dos graduandos foi possível colocar seu conhecimento em prática, havendo contribuição para melhora do raciocínio clínico e sobre as condutas realizadas. Conclusão: a utilização da simulação realística na graduação de enfermagem é uma estratégia metodológica que contribui para o aprendizado e possibilita aos acadêmicos vivenciarem situações do seu futuro ambiente profissional.*

*Descritores: Educação em Enfermagem. Treinamento por Simulação. Incidentes com Feridos em Massa. Enfermagem em Emergência.*

*Objetivo: describir la aplicabilidad de una simulación realista de incidentes con múltiples víctimas en el proceso de enseñanza-aprendizaje en enfermería. Método: estudio descriptivo con abordaje cuantitativo, utilizándose una simulación realista. Participaron 250 personas en la simulación, siendo incluidos en el estudio, 30 estudiantes de enfermería. Para la recolección de datos, se aplicó un cuestionario para analizar la experiencia académica con la simulación y el paciente simulado. Resultados: la mayoría (80%) de los estudiantes tenía experiencia anterior con la simulación y el 53,3% estuvo de acuerdo en que hay integración entre medicina y enfermería durante la simulación. Para el 66,7% de los estudiantes, fue posible poner sus conocimientos en práctica, contribuyendo a la mejora del razonamiento clínico y comportamientos. Conclusión: el uso de la simulación realista en la graduación en enfermería es una estrategia metodológica que contribuye al aprendizaje y permite a los estudiantes experimentar situaciones de su futuro entorno profesional.*

*Descriptorios: Educación en Enfermería. Entrenamiento Simulado. Incidentes con Víctimas en Masa. Enfermería de Urgencia.*

## Introduction

According to the Ministry of Health (MOH), the Mass-Casualty Incidents (MCI) are sudden phenomena with a number equal to or greater than five victims, often exceeding the capacity of the medical resources available in the local system<sup>(1)</sup>. The MCI are becoming increasingly frequent in the reality of health services, and may cause medical and public health consequences, once the sudden increase in demand can bring vulnerability to the health system and hinder the victims' call<sup>(2)</sup>.

The higher frequency of MCI has traffic accidents as cause. Between 2016 and 2017, there were more than 55 thousand traffic accidents in Ceará, with more than four thousand deaths and 26,955 wounded persons. In the city of Fortaleza, in 2017, there were 12,907 traffic accidents, with 251 fatal victims and approximately 12 thousand injured persons<sup>(3)</sup>.

The call in a Mass-Casualty Incident is dynamic, complex and multidimensional, requiring the appropriate incident management, planning and systematic organization of urgency services, available resources and qualification

of professionals. The correct management and distribution of victims are essential to ensure adequate supply and prevent overloading of health services<sup>(4)</sup>.

The qualification and training of health professionals are essential to provide a quality service in those situations<sup>(5)</sup>. Since MCI are a sudden event and not included in the syllabus of nursing graduation, there is need to prepare and train students to acquire and improve important skills and abilities in professional performance.

In this context, realistic simulation is a new strategy of teaching-learning process that builds situations similar to reality, offering the experience of professional routine situations, training of skills, communication, clinical reasoning, analysis and decision-making, teaching teamwork and improving self-confidence<sup>(6)</sup>.

The use of simulation in the nursing teaching-learning process is based on the problem solving of daily life; the usual approximation of reality allows making education meaningful. By the experiences acquired in situations experienced, the objective is to combine the inductive process

of knowledge, with scarce generalizations, with the deductive process, mediated by systematized concepts in global explanatory systems, organized in a socially developed and authentically recognized logic<sup>(7)</sup>.

The simulation is a type of active methodology in which the student plays a central and active role in the teaching-learning process, in a self-directed way, in order to develop critical and reflective thinking, and be able to solve problem situations. Active learning allows integration between theory and practice, facilitating the nursing teaching-learning process<sup>(8)</sup>.

This experience is recent at the University of Fortaleza. In 2016, there was an (pilot) experience in partnership with the Militarized Firemen of the State of Ceará and Pre-hospital Care Services in Fortaleza and Ceará. However, the impact of the teaching-learning process for students was not thorough enough, and concerned in the search for data that showed a significant learning in academic formation of future professionals about this theme little explored.

The current work context of the nursing professional is dynamic and constantly demands specific knowledge, skills and experience to provide the best assistance. In this aspect, the MCI is a sudden event unlikely to allow professionals' *in loco* training of professionals. In this way, the use of realistic simulation of mass-casualty incidents in the nursing teaching-learning process is a necessary and important strategy to provide the experience and knowledge construction, acquisition and improvement of technical and attitudinal skills, besides promoting the reduction of fears in emergency and chaos situations.

Observing the benefits of simulation in the teaching of nursing graduates, the realistic simulation is expected to be widely used to facilitate the teaching-learning process. Furthermore, this study intends to encourage the inclusion of the MCI theme in higher education institutions, so that future health professionals are properly trained to act in this scenario and provide quality assistance to victims.

Thus, the objective of this research was to describe the applicability of a realistic simulation

in mass-casualty incidents in the nursing teaching-learning process.

## Method

Descriptive study with a quantitative approach, performed through a realistic simulation of a mass-casualty incident, which occurred at the University of Fortaleza, in 2017.

The scenario involved a collision between a car, a bus and a kombi, totaling 56 victims. The participants were 250 persons, professors and students from the Medical and Nursing Courses of the University of Fortaleza (UNIFOR) and other Institutions, professionals from the Mobile Emergency Care Service (SAMU), the Integrated Coordination of Air Operations (CIOPAER) and the Fire Department.

For the construction of the simulation, there was the planning with the selection of the main situations of trauma and the script of simulated patients with signs and symptoms for each scenario. The students were trained during 30 days prior to the simulation, and had theoretical-practical lessons in the classroom, with realistic simulation in trauma, addressing the pre-hospital care to patients with trauma. Moreover, one day before the event, the students participated in a symposium on MCI, which gathered various expertise in the area, adding an exchange and sharing of knowledge to support the educational activities.

The simulation was developed in three stages. In the first stage, the automobile collision occurred; in the second, the accident victims were rescued and screened using the Simple Triage and Rapid Treatment (START); and in the third step, the victims were met *in loco*, and then transferred. After the simulation, there was the debriefing, which is a meeting of clarifications and guidelines, which involves the reflection and discussion on the experience acquired in the simulation, in order to consolidate the theoretical and practical knowledge for future real situations.

The study included all nursing students from the eighth term, regularly enrolled in compulsory

module of urgency and emergency in nursing (60 students). Nevertheless, only 42 students participated in the simulation. Of them, 12 were excluded, because they did not fully responded the data collection questionnaire. In this way, the participants were 30 students selected by convenience sampling.

The data collection occurred during the months of November and December 2017, using a data collection instrument applied in-person and online (Google Drive). It contained variables related to sociodemographic aspects, such as age and sex, and variables related to the teaching-learning process with simulation, which included: function in the simulation; medicine-nursing integration; acquisition of cognitive and attitudinal abilities; contribution to academic training; level of preparation; importance and efficiency of simulation in teaching.

Data analysis occurred through the program Statistical Package for Social Sciences (SPSS), version 20.0, in a descriptive manner, with a sample of absolute and relative values.

The research was approved by the Research Ethics Committee (REC) of the University of Fortaleza under Opinion n. 2.505.271. It is the result of a project entitled "Educational technologies in the teaching-learning process: simulations developed in the emergency area". All ethical and legal precepts of Resolution n. 466/12 of the National Health Council were followed<sup>(9)</sup>.

## Results

The realistic simulation involved 250 participants. Among the Nursing graduate

students, 30 were selected to compose the study, being 76.7% female and 23.3% male. In relation to age, most students (63.3%) were between 20 and 24 years. Regarding the current term in the graduation, the great majority (60.0%) was in the eighth term.

Within the simulated realistic process, 56.7% of the nursing students acted as victims, 33.3% as nurses and 10.0% in the screening. In relation to the previous experience in this process, 80% of the participants had never experienced it.

It is important to emphasize the participation of medicine, acting in conjunction with the nursing in the simulation of MCI. In this aspect, integrating medicine and nursing, most interviewees (86.7%) reported having never participated in simulated integrated call. For 100% of the participants, the MCI training during graduation is important.

Among nursing students, 53.3% agreed completely with the medicine-nursing integration during the realistic simulation (RS). The participation, as a means of contributing to the academic knowledge through simulation, showed that 90% agreed completely. Still assessing the participation as a means of contribution to the academic knowledge, this contribution occurs through the elaboration and interpretation of clinical reasoning for 46.7% of the students; for 30.0%, there was contribution to expected behaviors and their consequences.

In relation to the possibility of putting into practice the theoretical knowledge during the simulation, it was possible for 66.7% of the students, and, for 100% of them, the simulation is a teaching tool that makes learning more meaningful and effective (Table 1).

**Table 1** – Distribution of participants in the simulated Mass-Casualty Incident, according to function, experience and contribution to the academic training of Nursing Graduation. Fortaleza, Ceará, Brazil – 2017 (N= 30) (continued)

Variables	n	%
<b>Function in the simulation</b>		
Victim	17	56.7
Nurse	10	33.3
Screening	3	10.0

**Table 1** – Distribution of participants in the simulated Mass-Casualty Incident, according to function, experience and contribution to the academic training of Nursing Graduation. Fortaleza, Ceará, Brazil – 2017 (N= 30) (conclusion)

Variables	n	%
<b>Any previous similar experience?</b>		
Yes	6	20.0
No	24	80.0
<b>Any previous simulation involving medical-nursing integrated care?</b>		
Yes	4	13.3
No	26	86.7
<b>Do you think the training of situations like Mass-Casualty Incidents in graduation is important?</b>		
I totally agree	30	100
<b>Was there any medical-nursing interaction during the simulation?</b>		
I don't agree (disagree) totally	1	3.3
I don't agree (disagree) partially	2	6.7
I partially agree	11	36.7
I totally agree	16	53.3
<b>Has the participation in this simulation contributed to your academic knowledge?</b>		
Indifferent	1	3.3
I partially agree	2	6.7
I totally agree	27	90.0
<b>In case you have answered the previous item, in which aspect?</b>		
In the elaboration and interpretation of my clinical reasoning	14	46.7
In the perspective of the polytraumatized patient	7	23.3
In the expected behaviors and their consequences, if accomplished	9	30.0
<b>Was it possible to put into practice the theoretical knowledge?</b>		
I don't agree (disagree) partially	2	6.7
Indifferent	3	10.0
I partially agree	5	16.7
I totally agree	20	66.7
<b>I find the simulation a teaching tool that makes learning more meaningful/efficient</b>		
I totally agree	30	100

Source: Created by the authors.

In Table 2, below, which refers to the participants in the quality of nurses, 50% stated that, before the simulation, were prepared to respond to a MCI situation. After the simulation, this preparation increased to 90% of students who acted as nurses. The majority (70%) had not trained similar calls. In relation to cognitive abilities, the simulation contributed to improving the attention for 90% of students.

Concerning psychomotor skills, simulation contributed to decision-making for most

participants (70%). In relation to attitudinal skills, for 60% of students who acted as nurses, their participation in the realistic simulation contributed to establishing closed-loop communication. Nonetheless, another important aspect in emergencies, which is leadership, was mentioned by only 20% of the students. During the academic training, 100% of the participants would like the development of more moments integrating the practice between medicine and nursing.

**Table 2** – Distribution of students acting as nurses in the educational simulation of Mass-Casualty Incidents. Nursing Graduation. Fortaleza, Ceará, Brazil – 2017 (N= 10)

<b>Variables</b>	<b>n</b>	<b>%</b>
<b>As a nurse, I was prepared to answer a situation like the simulated MCI?</b>		
I don't agree (disagree) partially	1	10
I partially agree	4	40
I totally agree	5	50
<b>After the simulation, did your perception change?</b>		
Yes	9	90
No	1	10
<b>If positive, what has contributed to this change?</b>		
Couldn't manage to answer your demand	1	10
There was emotional interference	1	10
I've never trained previous similar calls	7	70
Improved service and reasoning	1	10
<b>Among the cognitive skills, in which aspect do you think the participation in a MCI contributed to your education?</b>		
Motor	1	10
Attention	9	90
<b>Among the attitudinal skills, in which aspect do you think the participation in a MCI contributed to your education?</b>		
Network	2	20
Leadership	2	20
Closed-loop communication	6	60
<b>Would you like more moments of medical-nursing practical integration in your education?</b>		
Yes	10	100
<b>If positive in the previous question, what environment would you like that integration to occur?</b>		
Objective Structured Clinical Examination	4	40
Multidisciplinary academic leagues	2	20
Curricular subjects	4	40

Source: Created by the authors.

MCI = Mass-Casualty Incident.

Table 3 shows that 14 students acting as victims (82.4%) agreed that the simulation had contributed to the academic training. This contribution occurs in relation to the elaboration, interpretation of the clinical reasoning and the perspective of the polytraumatized patient (41.2%). All participants (100%) that acted

as victims had not exercised this function in previous simulation.

As regards the preparation to act as polytraumatized victim, 58.8% were prepared. After the simulated performance, 100% of the students-victims significantly changed their conceptions about the realistic simulation.

**Table 3** – Distribution of students acting as victims in the educational simulation of Mass-Casualty Incidents. Nursing Graduation. Fortaleza, Ceará, Brazil – 2018 (N= 17) (continued)

<b>Variables</b>	<b>n</b>	<b>%</b>
<b>I think this simulation had contributed to my academic training</b>		
I partially agree	3	17.6
I totally agree	14	82.4
<b>In case you have answered the previous item, in which aspect?</b>		
In the elaboration and interpretation of my clinical reasoning	7	41.2
In the perspective of the polytraumatized patient	7	41.2
In the expected behaviors and their consequences, if accomplished	3	17.6

**Table 3** – Distribution of students acting as victims in the educational simulation of Mass-Casualty Incidents. Nursing Graduation. Fortaleza, Ceará, Brazil – 2018 (N= 17) (conclusion)

Variables	n	%
<b>Have you ever participated in any simulation as a victim?</b>		
No	17	100
<b>Do you think you were prepared to act as polytraumatized victim?</b>		
I don't agree (disagree) partially	1	5.9
Indifferent	1	5.9
I partially agree	5	29.4
I totally agree	10	58.8
<b>Did your perception about your preparation change after acting in the simulation?</b>		
Yes	17	100
<b>In case of positive answer in the previous question, what has contributed?</b>		
I found more complex to associate commands during the simulation	9	52.9
I had doubts to simulate some aspects	3	17.6
I found the medical/nursing call confuse	4	23.5
Deepening regarding shock signs	1	5.9

Source: Created by the authors.

## Discussion

The results found in this study reveal the importance of deploying active and innovative methodologies in the learning area, since most students that participated in the simulation had never experienced a situation that brought the reality of situations of disasters and mass-casualty incidents. The teaching in nursing graduation based on simulation has consolidated as a pedagogical approach, encouraging students to practice their clinical skills and improve the decision-making process promoted by experiences<sup>(10)</sup>. The future health professionals, when inserted in the work environment, must present a set of skills, critical and reflective thinking to make correct and problem-solving decisions<sup>(11)</sup>.

The realistic simulation is implemented during the graduation as active methodology that favors the teaching-learning process, providing students with reality-like scenarios, allows them to put into practice the theoretical knowledge and acquire, in this way, more autonomy. It provides with agility and development of critical thinking skills, as well as contributes to experiences of different simulated cases and the establishment of the correlation between theory and practice<sup>(12-13)</sup>.

The simulation-based learning builds a teaching environment focused on patient safety and reducing human errors, allowing the integration between theory and practice, considered an ideal strategy to develop and practice individual skills. The simulation-based learning has been essential in the training of professionals capable of acting effectively in complex health care environments. This fact results from the complex simulation scenarios that allow planning with establishment of goals, methods and specific objectives for the teaching outcomes<sup>(14)</sup>.

The simulation allows practicing the self-knowledge in stressful situations, putting into practice the empathy and communication skills, emphasizing teamwork with several health professionals in disastrous situations<sup>(15)</sup>. One of the characteristics of simulation is to provide the interaction between the various professionals in the health area<sup>(16)</sup>. Such interaction is necessary, because those students are assumed to put into practice their actions to work in a team in the future workplace<sup>(17)</sup>. The use of an innovative method for nursing and medical students, as proposed by this study, brought a new perspective on the dynamics of integration between the areas that work in partnership, because the academy do not explore actions aimed to unite and familiarize

the care practices. Thus, the medicine-nursing integration observed in this study is a positive result of the simulation and is in agreement with the literature.

The consensus among the students in the study that the realistic simulation is a teaching tool that makes learning more meaningful and efficient demonstrates its effectiveness, bringing satisfactory results, as well as contributing to the acquisition and improvement of knowledge. Since it is a controlled scenario with several clinical cases and simulated patients, the integration between theoretical and practical knowledge becomes easier and more effective, thus contributing to better results in the nursing teaching, especially in MCI cases.

With the simulation, students experience the preparation for clinical practice, culminating in the improvement of confidence in practice, constituting a moment of opportunity to practice skills and take over in advance the role of nurses. In this aspect, the simulation will help students develop the knowledge, communication, organization, critical thinking and clinical reasoning to solve difficult problems and situations within the work context, providing the opportunity to discuss scenarios and decisions made<sup>(16)</sup>. In fact, as observed in this study, the decision was the psychomotor skill that most improved after the simulation.

The simulated scenarios provide with psychomotor, cognitive and affective experiences, contributing to the effective use of the knowledge of the classroom in clinical environments. Those experiences reinforce the students' hits in the procedures and improve aspects that were not satisfactory<sup>(18)</sup>. Although in academic training the difficulty to address realistic simulations in a general way is notorious, especially in MCI, it is noticeable a positive look to the interpretation of clinical reasoning and of other aspects of learn to be and learn to do, in the perspective of how the nurse acts in this reality.

In the context of improved skills, in a study conducted with nursing professionals using simulation, there was an improvement of performance in the group with simulation,

increasing their skills from 46.6 to 53%, in addition to significant improvement of the nurse' self-confidence<sup>(19)</sup>.

The simulated MCI is an advantageous scenario for the active and meaningful teaching, because it allows the student to be the protagonist in the construction of his/her knowledge. The simulation allows the participation, interaction and discussion among participants about the activity, becoming an innovative and improved tool<sup>(20)</sup>.

Among the students who acted as nurses, there stands out the increased preparation to provide assistance in a MCI situation, since most of them had no previous training. In this way, the contribution to nurses' training is noticeable. The simulation of multiprofessional care in MCI is an experience that demonstrates the need for early training, and should be included still in graduation, in order to ensure excellence in the teaching process, care service and improvement of professional skills<sup>(21)</sup>.

The simulation performed with nursing students allows approaching the profession' reality, reflecting on the performance and the feelings raised in the simulated activity, as well as enhances the opportunity to review the mistakes that can be avoided in similar situations in the future professional activity, thus contributing to patient safety<sup>(22)</sup>.

In nursing education, the simulation closely associates the technical skills and motivation of students in learning to recognize the clinical situation and intervention in critically ill patients and in the face of unexpected situations, teaching students to control the feelings of panic and stress levels in real situations<sup>(23)</sup>. The safe environment provided by the simulation builds stressful situations, as in the case of a mass-casualty incident, requiring student to think quickly and intervene appropriately<sup>(24)</sup>.

While active methodology, the simulation acts in the student-centered teaching, in which he/she becomes an active subject in the learning process, culminating in a more efficient education, with better results, teaching new skills, based on critical and reflective thinking,



with self-evaluation and cooperation to work in a team<sup>(25)</sup>.

In a mass-casualty incident, the nurse must be prepared to make quick decisions, list priorities and perform a comprehensive approach with the patient. The nurse's professional practice requires organization, critical look and commitment during the care with the victims. In this way, the realistic simulation contributes to building more capable nurses, with a reflexive thinking focused on their professional assistance.

Evidently, the simulation covers a large framework of solutions to various problems related to the nursing teaching-learning process, with the potential to treat problems related to the development of competence of the professionals responsible for the health care provision.

Furthermore, in this reality, some limitations included the financial expenses with the production of realistic makeup and the difficulty to gather the participants to organize and plan this event of great magnitude, which reinforces the need for a committee to operationalize more simulations that incorporate the pre-hospital services and more institutions involved in the management of this type of situation. Moreover, involving university students so that they have access and can collaborate in future events with knowledge and wisdom in decision-making and with social responsibility.

## Conclusion

The results showed that the use of realistic simulation in nursing graduation is a methodological strategy that contributes to the learning, providing students with the opportunity to experience situations of their future professional environment, in addition to potentiating the critical thinking in decision making with problem solving of simulated cases, thus enabling students to a future real situation.

The simulation is an active methodology that allows for the construction of new ways to operate the health training in graduate courses. In this way, it contributes to improving decision-making and construction of critical thinking of

the student, even influencing the integration between physicians and nurses, which results in more qualified professionals, with better professional performance and harmonious teamwork.

## Collaborations

1 – conception, design, analysis and interpretation of data: Renan Pereira da Silva, Vitória Soares dos Santos, Jennyffer de Souza Moraes, Ítalo Rigoberto Cavalcante Andrade, Rita Neuma Dantas Cavalcante de Abreu and Julyana Gomes Freitas;

2 – writing of the article and relevant critical review of the intellectual content: Renan Pereira da Silva, Vitória Soares dos Santos, Jennyffer de Souza Moraes, Ítalo Rigoberto Cavalcante Andrade, Rita Neuma Dantas Cavalcante de Abreu and Julyana Gomes Freitas;

3 – final approval of the version to be published: Renan Pereira da Silva, Vitória Soares dos Santos, Jennyffer de Souza Moraes, Ítalo Rigoberto Cavalcante Andrade, Rita Neuma Dantas Cavalcante de Abreu and Julyana Gomes Freitas.

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