



# From theory to simulation to teach care for burn victims: case report

*Da aula teórica ao uso da simulação para ensinar o cuidar de pessoas com queimaduras:  
relato de caso*

*Desde clases teóricas hasta el uso de la simulación para enseñar el cuidado de las víctimas de quemaduras: reporte de un caso*

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## ABSTRACT

**Aim:** To report the experience of applying different teaching strategies on undergraduate nursing students caring for burn victims. **Method:** Experience report on the topic, "Nursing care for the patient with burns", for undergraduate nursing student education. **Results:** Teaching strategies during this course involved theoretical lecture, discussion of clinical cases, use of a virtual environment, and practice in a simulated environment. The students reported satisfaction with the tools used. **Conclusion:** It is important to incorporate different active teaching strategies, such as clinical simulation practices, e-learning, classes incorporating dialogue, case studies, and others, for undergraduate nursing education on caring for the burn victim.

**Keywords:** Students; Nursing; Burns; Teaching; Simulation.

## RESUMO

**Objetivo:** Relatar a experiência da aplicação de diferentes estratégias de ensino para estudantes do Curso de Graduação em Enfermagem sobre o atendimento à vítima de queimadura. **Método:** Relato de experiência sobre a abordagem da temática "Assistência de enfermagem ao paciente com queimaduras" para o ensino de estudantes de graduação de enfermagem. **Resultados:** As estratégias de ensino durante a disciplina envolveram aula teórica dialogada, discussão de casos clínicos, uso de ambiente virtual e práticas em ambiente simulado. Os estudantes reportaram satisfação com as ferramentas utilizadas. **Conclusão:** É importante a incorporação de diferentes estratégias de ensino ativo, como práticas de simulação clínica, e-learning, aula dialogada, estudos de caso, entre outras, para o ensino na graduação em enfermagem no cuidado à vítima de queimadura.

**Palavras-chave:** Estudantes; Enfermagem; Queimaduras; Ensino; Simulação.

## RESUMEN

**Objetivo:** Relatar la experiencia de la aplicación de diferentes estrategias de enseñanza para estudiantes del curso de graduación en enfermería sobre la atención a víctima de quemadura. **Método:** Informe de experiencia derivado del enfoque temático "Atención de enfermería de la víctima de quemaduras" para estudiantes de enfermería. **Resultados:** Las estrategias de enseñanza durante el curso incluyeron conferencias teóricas, discusión de casos clínicos, uso de entornos virtuales y prácticas en ambiente simulado. Los estudiantes reportaron satisfacción con las herramientas utilizadas. **Conclusión:** Es importante la incorporación de diferentes estrategias de enseñanza activa, como prácticas de simulación clínica, e-learning, aula dialogada, estudios de caso, entre otras para la enseñanza en la graduación en enfermería en el cuidado a la víctima de quemadura.

**Palabras clave:** Estudiantes; Enfermería; Quemaduras; Enseñanza; Simulación.

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## INTRODUCTION

Burn trauma is considered one of the most devastating and critical of injuries, due to its pathophysiology, and its physical and psychosocial consequences. Given the complexity of this trauma, which has been established in the literature,<sup>1</sup> the initial care of the burn victim should follow systematic steps to identify potential life-threatening risks and minimize the damage caused by these injuries.<sup>2</sup> After initial care, hospital treatment and outpatient follow-up are essential to restore physical health and reintegrate the individual into society. The World Health Organization estimates that in the United States alone there are 180,000 deaths per year caused by burns, with a financial impact of 211 million dollars.<sup>3</sup> Burn sequelae are numerous, such as hypertrophy,<sup>4</sup> keloids,<sup>4</sup> contractures,<sup>4</sup> anxiety,<sup>4,5</sup> pruritus,<sup>4-6</sup> pain,<sup>4-6</sup> depression,<sup>4</sup> posttraumatic stress,<sup>4,5</sup> functional limitation,<sup>4</sup> inability to return to work or school activities,<sup>5</sup> and social isolation.<sup>5</sup> The availability of burn units (BU) is not uniform throughout the world, and therefore many victims are treated in non-specialized centers and/or monitored in the outpatient sector. Because the management of the burned patient depends on the health team, it is important that all professionals are prepared to deal with these victims and their relatives.

Within the multiprofessional team, nurses play an important role in assessment and establishment of priorities for care of the burn patient. Due to the specialization required, it is imperative that nurses have scientific knowledge and mastery of the physiological and functional changes of burn injuries. They must preventively identify the damaged tissue and potential systemic complications, to determine the best treatment plan for these patients. Nursing interventions are aimed at reducing the risk of complications and/or sequelae, and at contributing to healing and rehabilitation of the individual.<sup>7</sup> From this perspective, the academic training of students must focus on the development of clinical reasoning, and on the skills needed to treat the burn victim, including content that emphasizes primary care.<sup>8</sup>

However, studies in the literature show that nursing students present unsatisfactory knowledge and inadequate education regarding the initial treatment of burn patients.<sup>8,9</sup> Curriculum analysis of the nursing course in a metropolitan area of Brazil showed mainly need for adapt and structuring of theoretical and practical content of teaching in this area.<sup>10</sup>

To fill these gaps, nursing education should focus on the development of practical and interpersonal skills aimed at better decision-making and problem solving in all health and disease situations.<sup>11</sup> Several teaching methods are used to improve care for the burn patient, so that the student experiences scenarios closest to reality.<sup>12,13</sup> However, after searching databases we did not find many Brazilian studies that present new strategies for nursing teaching in this area.

For effective learning, it is considered that the learning styles of individuals must be dynamic and determined by their

preferred methods of receiving and processing information.<sup>15</sup> The educational process should be meaningful for the student and both student and professor are subjects in this process.<sup>15</sup>

In this way, the integration of innovative methodologies and different methods within courses can favor student learning. Different strategies which consider those learning styles, and the need for nurses to gain knowledge and develop skills to care for burn patients, must be used to stimulate the acquisition of knowledge. Within pedagogical approaches can be used case studies, problem solving, small workshops, laboratories, reflection by pairs, simulation, lectures and article readings. For diverse students, answering questions, encouraging brainstorming and discussions, and providing visual material, such as videos and professional journals are used.<sup>14,15</sup>

Thus, the objective of the study was to report the experience of using different teaching strategies on the care of the burn victim with undergraduate nursing students.

## CASE REPORT

This is an experience report on the topic, "Nursing care for the patient with burns", in an undergraduate course at a public university in Campinas, São Paulo, Brazil. Three professors in an elective course developed these activities; nine students in their last semester attended during the second term of 2016, on Fridays, from 2:00 - 5:00 p.m.

The objective was to develop clinical reasoning and decision making in nursing students for the assessment and treatment of burn victims. The teaching strategies used were theoretical dialogue, discussion of clinical cases, use of a virtual environment (Moodle), and practice in a simulated environment. The course was offered weekly for a period of four weeks.

In the first class, the objectives of the course were presented, along with the virtual Moodle environment and its tools: chat, forum, and quiz. This environment was also used as a repository of references on each topic.

An expert with postdoctoral research on patients with burns presented the theoretical class in the second week. The topics discussed were: epidemiology, definition and classification, pathophysiology, initial treatment, skin treatment, and rehabilitation. The class occurred over a three hour period and used slides to supplement the didactic content. At the end of the class, a clinical case was discussed as a summative assessment method. In the end, questions and a clinical case activity were posted in Moodle. The student was presented with a description of the clinical history and the photo of the wound. For this activity, students applied the diagnosis and planning steps of the nursing process. Within 72 hours, the students received feedback from the professor.

In the fourth week, the students experienced a clinical simulation scenario conducted by one professor and a nurse specialized in simulation. The scenario was built on the

model proposed by the National League for Nursing (NLN)/Jeffries Simulation Theory,<sup>16</sup> which includes the definition of the simulation objectives, fidelity, problem solving, student support and debriefing, as presented in Chart 1.

In order to achieve the goal of providing initial care for the burn patient, we developed a clinical case, with signs and symptoms that would be provided to the students during the activity, using the simulator, as presented in Chart 2.

The manikin used was the SimMan(Laerdal®) high fidelity. This was a female manikin, which allowed for monitoring of vital signs, and showed wounds to the left upper and lower limbs. The scenario was simulated as an emergency room setting.

The *moulage* technique was used to characterize the wounds and apply paste and makeup to the simulator. Students were expected to perform a history, physical assessment and wound examination, determine the treatment, and guide the patient regarding the necessary care.

Two participants were members of each team: a nurse technician and a registered nurse. A script with the time of each scene, the cues, expected actions, and the "voice of the patient", was developed for this purpose, and is presented in Chart 3. The estimated time to resolve the high complexity situation was 15 to 20 minutes.

The necessary material and human resources were identified by the researchers, along with the equipment necessary for the simulation. A computer technician was available for support; one of the nurses was the "voice of the patient". The professor provided initial guidance (pre-briefing and briefing) to the students to help them understand the clinical situation, and she assessed the clinical scenario.

After the simulation, one professor conducted the debriefing to assess responses to questions related to self-assessment, feelings, knowledge acquired, and satisfaction with participating in this scenario. Finally, the students were determined that the scenario adequately reproduced a real care situation,

**Chart 1.** Elements of the simulation scenario, according to the NLN/JSF model

Objectives	<p><b>General objective</b> To perform initial care for burn patients</p> <p><b>Specific objectives</b></p> <ul style="list-style-type: none"> <li>A - To investigate the context of the burn</li> <li>B - To prepare and administer the medication prescribed for pain</li> <li>C - To identify the characteristics of the WOUND</li> <li>D - To select the ideal type of coverage</li> <li>E - To perform therapeutic communication</li> </ul>
Fidelity	<p>High fidelity simulation with a high degree of emotional involvement.</p> <p>SimMan 3G manikin with: voice, thoracic expansion, labial cyanosis, opportunity for pulmonary, cardiac and abdominal auscultation, verification of blood pressure, among other skills.</p>
Problem solving	<p>Moderate complexity case, with relevant information for intermediate students to perform initial care and provide an adequate response, for example:</p> <ul style="list-style-type: none"> <li>• To associate burn history with the need to investigate the situation and make ABCDE (Airway maintenance with cervical spine protection; Breathing and ventilation, Circulation with hemorrhage control, Disability/neurologic assessment, Exposure and environmental control).</li> <li>• To associate the pain symptoms with the type of tissue exposure and the patient's anxiety, and make the decision to administer medication for pain control.</li> <li>• To associate the exposure of superficial, second-degree, deep, and third degree burns with the need for treatment with silver sulfadiazine until patient is stabilized for surgery to debride and graft deeper areas.</li> </ul>
Cues	<ul style="list-style-type: none"> <li>• Presence of pain, in which the patient constantly complains and requests assistance; the participant demonstrates initiative to verify the patient's chart to identify the prescription of an analgesic</li> <li>• Presence of closed dressings on the thigh and arm.</li> <li>• Skin hot to the touch, T = 99.86°F (axillary).</li> <li>• Allergy to dipyrone</li> </ul>
Debriefing	<p><b>Emotional stage:</b> How did you feel about caring for this patient?</p> <p><b>Descriptive stage:</b> Could you describe the clinical picture of the patient?</p> <p><b>Evaluation stage:</b> What were the positive actions you performed?</p> <p><b>Analytical stage:</b> What would you do differently, if you had another opportunity?</p> <p><b>Concluding stage:</b> What did you learn from this experience for your future clinical practice?</p>

**Chart 2. Patient case history.**

**Information provided to the participant**

Wendy, 21 years old, was admitted to the burn area of a Burn Treatment Center.

**Patient information to be collected by the participant**

Wendy, 21 years old, was admitted to the burn area of a Burn Treatment Center. She reports that in her home, when preparing a barbecue with her family, she lit the barbecue grill with liquid alcohol, causing an explosion that eventually hit her. She was taken by her friends to the nearest specialty hospital, where she was diagnosed with burns to the upper and lower left limbs, with a predominance of deep second and third degree burns. Burns occurred in an open environment with a direct flame. Patient presents pain intensity of 10. She drank two cans of beer. She reports that she wrapped her body with some sheets she had in the house.

**Chart 3. Simulation scenario activities, according to the NLN/JSF model<sup>16</sup>**

Time	Monitor	Expected actions by the nurse (Participant)	Patient voice
0-8 min	HR = 105 bpm BP = 140/80 mmHg RR = 24 breaths per minute Temp = 98.6°F Sat = 94%	- Presentation - Patient identification - Handwashing - Conduct patient history and assessment (ABCDE) and monitor the patient - Seek out information (burn context, allergy to any medicine ...?) - Physical examination - Search for prescription - Administer pain scale.	"Nurse, I have too much pain!" "My body is burning!" "Help me! Do something for me." "My pain is level 10." "I burned myself at the time of the barbecue, when I used alcohol to start the fire." "I am allergic to dipyrone."
08-12 min	HR = 115 bpm BP = 146/88 mmHg RR = 26 breaths per minute Temp = 98.6°F Sat = 92%	- Give pain medication - Assess the wound. - Select the treatment	"What have you done for me?" "What will happen to me?" "I washed with water and ran here." "What will you use on my body? It is burning a lot." "I can smell the burn."
12-15 min	HR = 108 bpm BP = 142/84 mmHg RR = 22 breaths per minute Temp = 98.6°F Sat = 90%	- Calm the patient - Reassess the pain - Explain the reason for the pain to the patient.	"I still feel pain." "What now?" "I am feeling better." "My pain is now a level 4." "Can I go home now?"

mainly because of the use of the *moulage* technique to create the wounds, and the interaction with the mannequin by the participants. All these elements helped the students to achieve the proposed simulation objectives, and to develop their clinical reasoning to implement appropriate treatment during their care. At the end of the debriefing, students reported satisfaction with the set of strategies used.

**DISCUSSION**

In this study, we used theoretical dialogue, discussion of clinical cases, a virtual environment, and practice in a simulated environment to improve care for burn victims. The use of these teaching strategies was thought to attend the different learning styles of the students, and to stimulate participation and interest.

Teaching of students and health professionals involved in the care of these patients should provide basic knowledge of assessment and management of acute burns. In addition, the medium- and long-term management of patients with severe burns using a health team approach may also cover other important topics, such as nutritional, psychological, and special rehabilitation aspects. Therefore, the use of different methods may help to better integrate content into the curricula.<sup>17</sup>

For the students interacting with this scenario, skills, ability, safety, good communication and the ability to work with the team are required, in addition to theoretical knowledge. Thus, when focusing on adult learning, it is necessary to develop the cognitive, affective, and psychomotor areas (technical and non-technical skills).

The *Nurse Educator Core Competencies* (2016)<sup>18</sup> state that to develop the cognitive (knowledge), affective (attitudes and behaviors) and psychomotor (skills) area, it is necessary to use educational approaches that reflect contemporary educational theory and practice, including: problem-based learning, case-based learning, discussion and group work, seminar presentation, experiential learning (data collection, physical examination, role play, simulations), workshops, projects, and active participatory classes.<sup>18</sup> In this context, in order to structure the present course, we applied different teaching strategies to stimulate the students' learning and clinical reasoning for the care of patients with burns and we offered theoretical content through the expository class for later incorporation, through discussion of the clinical case in the virtual environment, and participation in the simulation scenario. This enables students to recognize the association between theory and practice, reflect on the acquired learning, and translate it into a future clinical reality.

Examples found for teaching about burns are the use of problem-based learning at the patient's bedside, with a focus on teaching topics, such as: skin physiology, metabolism, volume replacement, and wound healing, as well as clinical practice experience.<sup>17</sup> However, care must be taken with regard to two aspects: exposure and patient safety. Thinking about these aspects and to maintain a safe, controlled environment when improving technical and non-technical skills, and interpersonal teamwork skills, simulation has been used in many contexts within health courses, such as: surgeries, invasive procedures, and physical examination.<sup>19,20</sup>

In order to provide tools for a safe approach to a theme, our scenario presented objectives that favored the clinical reasoning, since it stimulated the clinical evaluation of the patient and aspects of the wound, and the choice of correct treatment by students. The simulation also promoted good communication between the student, the individual receiving care (high fidelity manikin), and the other members of the team.

In order to increase the fidelity of the simulation, *moulage*, a makeup technique to simulate an injury, was used in the burn scenarios. Study results on this subject describe it as an important teaching technique and one that, when prepared by professional makeup artists, ensures greater injury fidelity.<sup>13</sup> However, in the absence of these professionals, there are courses and manuals that support others in applying the makeup. We produced wounds with characteristics very close to real wounds, which supported the fidelity of the simulation and contributed to the involvement of students during the care.

Other strategies presented were the use of electronic learning (e-learning).<sup>12</sup> The "Basic Burns Management" e-learning tutorial contained 33 pages, covering topics such as local and general burn response, burn assessment, first aid, primary and secondary research, and referral guidelines. The satisfaction of medical students with this program was evaluated as good or very good.<sup>12</sup>

Roger Schank, in 1993, stated that good educational software should be active and should not be limited to just seeing something (passive attitude).<sup>21</sup> In our study, the Moodle tool served as a reference repository and space for feedback on the students' activities; that is, it was of reduced use, given the many tools available. This occurred, at first, because we believed that e-learning should be complemented by face-to-face sessions (Blended Learning or b-Learning),<sup>22</sup> in order to increase the gains and reduce the losses of both strategies. Additionally, the use of more interactive software would require time for preparation, which was not yet possible. Therefore, development and validation studies, or perhaps, translation and adaptation of virtual environments such as Basic Burns Management, are necessary.

Other strategies, such as case studies, are also widely used in the health field and in the education. Those related to research are considered formal, while others are informal, such as clinical cases used in professional practice and teaching.<sup>23</sup> This method allows the student to understand and observe a real situation by assisting in problem-solving, decision-making, and in improving the planning of nursing care for the patient and his/her family.<sup>23,24</sup> In this study, the clinical cases were very important to the integration of the knowledge of the basic sciences, the dialogue classes, and the materials made available in Moodle, as well as to assist in clinical reasoning, as the students had to develop a plan of care for the patient.

Authors suggest the importance of case studies in knowledge integration, and the applicability of soft skills in the classroom and in a virtual environment.<sup>25</sup> Clinical case discussion in the approach to the burn patient should contemplate the multidisciplinary team, even in undergraduate years, so that everyone can know his/her role from the perspective of collaborative care.<sup>26,27</sup>

The use of the theoretical class as a teaching tool for this theme was presented in a previous study. They used a structured teaching program with PowerPoint class through videoconference and noticed increased knowledge and confidence in the care provided to victims of burns.<sup>28</sup> However, we acknowledge the need for future studies to assess the impact of the program on the quality of the clinical care that is offered.

Knowing that the care for the burn victim requires knowledge, skills, and a positive attitude from the nursing student and future nursing professional, and taking into account different learning styles, we reinforce the use of different strategies to teach this subject.

## CONCLUSIONS

In this study we developed activities with different strategies to teach students about care for the burn victim, and we noted student satisfaction with the tools used.

In view of the changes in access to health care, technological advances, and the increasing complexity of burn victim care, as well as the different profiles of student learning, it is imperative to

incorporate different active teaching strategies, such as clinical simulation practices, e-learning/b-learning, dialogue, and case studies. These strategies should include undergraduate nurses and multiprofessional health team members, especially when we think of critical patient care requirements, such as with burn patients.

Notably with regard to clinical simulation, the integration of this technique into teaching contributes to patient safety, by ensuring greater accuracy in wound evaluation and treatment for burn victims. However, there remains a lack of longitudinal studies showing the effectiveness of this strategy in long term, that is, that evidence the results of differentiated care by a professional who, during education, had experience with simulation.

Future studies need to be developed on the current topic, including studies that aim to evaluate the effect of different educational strategies on knowledge.

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