



## ORIGINALES

### **Topical therapy for chronic wounds: contributions of a distance learning unit to the knowledge of nursing students**

Terapia tópica para feridas crônicas: contribuições de um módulo de ensino à distância para o conhecimento de estudantes de enfermagem

Terapia tópica para heridas crónicas: contribuciones de un módulo de enseñanza a distancia para el conocimiento de estudiantes de enfermería

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### **ABSTRACT**

The purpose of this quasi-experimental research was to assess the performance of nursing students on a knowledge test before and after their participation in a distance learning unit on topical therapy for chronic wounds using a virtual learning environment (VLE Moodle). The study was conducted in three stages: application of a pretest, implementation of the intervention in the VLE Moodle, and application of a post-test. The participants were 37 students from the last year of a nursing undergraduate course in a public higher education institution in the state of São Paulo. There was a statistically significant increase in the mean number of correct answers obtained on the knowledge test after the intervention in all fields and items assessed in the test. The use of the VLE Moodle may represent a supporting strategy to strengthen and broaden the access of nursing undergraduates to knowledge on relevant topics for nursing care.

**Keywords:** Students nursing; Educational technology; Education nursing; therapeutics

## RESUMO

Estudo quase-experimental que objetivou avaliar o desempenho dos estudantes de enfermagem em teste de conhecimento, antes e após a participação em um módulo de ensino a distância, sobre terapia tópica para feridas crônicas usando o Ambiente Virtual de Aprendizagem (AVA-Moodle). O estudo foi desenvolvido em três etapas: aplicação do pré-teste, implementação da intervenção no AVA-Moodle e aplicação do pós-teste. Participaram 37 estudantes do último ano do Curso de Enfermagem de uma Instituição Pública de Ensino Superior do estado de São Paulo. Houve aumento estatisticamente significativo, no número médio de acertos, obtidos no teste de conhecimento após a intervenção educativa em todos os domínios e itens avaliados. A utilização do AVA-Moodle pode ser uma estratégia de apoio aos estudantes de graduação em enfermagem para potencializar e ampliar o acesso ao conhecimento sobre temas relevantes para a assistência de enfermagem.

**Palavras chave:** Estudantes de enfermagem; Tecnologia educacional; Educação em enfermagem; Terapêutica

## RESUMEN

Estudio cuasi experimental tuvo como objetivo evaluar el desempeño de estudiantes de enfermería en test de conocimiento antes y después de participar en un módulo de enseñanza a distancia sobre terapia tópica para heridas crónicas utilizando Ambiente Virtual de Aprendizaje (AVA-Moodle). Desarrollado en tres etapas: aplicación del pre-test, implementación de la intervención en AVA-Moodle y aplicación del post-test. Participaron 37 estudiantes en el último año del Curso en Enfermería de Institución Pública de Enseñanza Superior del Estado de São Paulo. Hubo aumento estadísticamente significativo del promedio de aciertos obtenidos en el test posterior a la intervención en todos los dominios e ítems evaluados. La utilización del AVA-Moodle constituye una estrategia de apoyo para estudiantes de grado en enfermería en la potenciación y ampliación del acceso al conocimiento sobre temas relevantes para la atención de enfermería.

**Palabras clave:** Estudiantes de enfermería; Tecnología educativa; Educación en enfermería; Terapéutica

## INTRODUCTION

The Brazilian national curriculum guidelines for nursing undergraduate courses, established by Resolution CNE/CES number 3, on November 7, 2011, determine that nurses must be qualified in order “to understand and intervene on problems/situations of health-disease that are more prevalent in the national epidemiological profile.”<sup>(1)</sup>

In view of the country’s situation regarding morbimortality, in which chronic health conditions become more frequent, care of people with chronic wounds is often performed by nursing professionals, whatever the context of their practice.<sup>(2)</sup>

Over the last decades, this has been a challenge due to technological progress and greater knowledge on the subject, which requires permanent updating in order to provide safe and effective care. At the international level, there are several guidelines for professionals with regard to treatment and prevention of chronic wounds in clinical practice, and interdisciplinary approaches and educational programs that aim to implement an evidence-based practice (EBP).<sup>(3-7)</sup>

In order to meet the needs of new professionals, many higher education institutions have been implementing changes, with the use of active teaching-learning methods, which include the Internet as a tool to access information and share educational resources, on site or remotely. Information technology (IT) has the potential to facilitate the learning process, as it provides students and professors with greater access to

sources of knowledge, with no geographical limits.<sup>(8)</sup>

The beginning of distance education (DE) dates back to the end of the 18th century in the United States and in the mid-20th century in Canada. Great demand occurred mainly as a consequence of its low cost and the long distance to urban areas to attend regular courses. Since then, DE has been developed, with the help of strategies, tools, and technology, in such a way as to offer interaction between the student and the source of knowledge.<sup>(8)</sup>

There are currently several platforms available for DE. In Brazil, the virtual learning environment (VLE) Moodle (acronym of Modular Object-Oriented Dynamic Learning Environment) has been widely used. This VLE is an open-source software to support learning and it is executed over the Internet or a local network, mainly in an e-learning context.<sup>(9)</sup>

The Moodle provides scholars with the possibility of creating and conducting courses remotely, by means of activities or resources organized from an education plan. The advantages of using this platform are in the availability of the course material over the web, which makes access easier for consultation, maintenance, and updating; the convenience of accessing different information about courses, gathered in the same environment; and interacting with other students and scholars via forums and chats, among others.<sup>(9)</sup>

The literature highlights the deployment of the scientific community to conduct studies on the use of DE; these have obtained positive results with regard to the greater flexibility of the teaching-learning process, in addition to improving the capacity to meet the demand, which has been constantly growing.<sup>(10-12)</sup>

One of the goals of nursing undergraduate courses is to teach students the best and safest practices, which enable professionals to develop care that achieves health promotion and prevention or the treatment of a disease or an unfavorable health condition, without doing harm.<sup>(12-13)</sup> Considering this goal, the American Institute of Medicine (IOM) presented in the 2003 report "Health Professions Education: a Bridge to Quality" the competencies all health professionals must have, emphasizing care focused on the patient: working in interdisciplinary teams, having an EBP, applying the principles of quality improvement, and using IT resources. The IOM also highlighted the importance of including contents that encompass these fields in the academic curricula of health care professionals.<sup>(13)</sup>

Given the importance of knowledge about chronic wounds for safe, good-quality nursing care in all contexts and the need to develop students' competencies on the subject throughout the undergraduate course, the purpose of this study was to assess the results of implementing a DE unit to teach topical therapy for chronic wounds on the performance of nursing students.

## **MATERIAL AND METHOD**

This was a quasi-experimental study that conducted evaluations before and after an educational intervention in the same group of subjects, with a quantitative analysis. The study was conducted in a public institution of higher education in the countryside of the state of São Paulo, after the approval of the Research Ethics Committee (Protocol 0996/2009), and it was funded by the São Paulo Research Foundation

(FAPESP, Project number 00041/2010). Data collection was done from May to August 2012.

All fourth-year students of the nursing undergraduate course were invited to participate, and those who accepted and signed a Free and Informed Consent Form were part of the sample.

The study was conducted in three stages: a knowledge pretest, the application of the educational intervention, and a knowledge post-test.

The dependent variable of the study was the participants' knowledge score before and after the intervention, whereas the educational intervention was the independent variable.

In the first stage, the researcher had previous contact with students. For those who agreed to participate, the data collection instrument was applied (pretest), through on-site learning, in a classroom.

The instrument was created by the researcher, and it included questions related to sociodemographic and educational aspects, as well as questions related to knowledge of the systematic assessment of patients with neuropathic ulcers (NUs), pressure ulcers (PUs), and venous ulcers (VUs); the questions addressed knowledge of the etiology, pathophysiology, and assessment of the skin, and risk factors. The recommendations of the guidelines of the Wound, Ostomy and Continence Nurses Society<sup>(4-6)</sup> and the National Pressure Ulcer Advisory Panel<sup>(6)</sup> were used. The instrument was submitted for content and appearance validation by judges and specialized nurses, and the necessary changes were made to make it suitable.

The educational intervention with the DE unit (the second stage) was made available to participants in May, June, July, and August 2012 through the Moodle.

To implement the unit through the Moodle, the systematic approach recommended by Seixas and Mendes<sup>(8)</sup> was adopted, which refers to a request to create the course on the VLE Moodle USP, the creation of the course, the registration and entry of professors and tutors into the VLE, the entry of contents, student registration, the beginning and development of the course, and evaluations.

The educational model was offered as an extension course titled *Topical therapy for chronic wounds: nursing care*, with the support of the Culture and Extension Department of the University of São Paulo, with a course load of 30 hours and two physical meetings. The students registered in the Moodle in order to get a password and access to the course, and they were entitled to a certificate, provided that they attended 85% of classes and obtained a minimum score of 5.0.

The end of the course was followed by the third stage of the study, in which students responded to the post-test questionnaire.

The assessment was performed on site, before and after the educational intervention, and in the virtual environment throughout the course.

The on-site assessment corresponded to the diagnostic evaluation and the summative evaluation, with the application of an instrument to assess students' knowledge before and after the application of the instructional unit (intervention).

Data collected were analyzed by comparing the students' performances in the pre- and post-tests. For this analysis, data were transcribed twice to a Microsoft Excel<sup>®</sup> spreadsheet and then analyzed using the Statistical Package for Social Science (SPSS) version 18.0.

For the exploratory analysis of quantitative variables, measures of central tendency and variability were used, and for qualitative variables, simple frequency tables were used.

The performance of students who participated in the educational unit was measured by the number of hits in the pre- and post-tests. The results were converted into average percentages of hits, in order to compare topics with different numbers of questions. The paired Student's statistical t test was used to compare the averages of hits in the pre- and post-tests for each topic. The differences that resulted in  $p < 0.05$  were considered to be significant.

## **RESULTS AND DISCUSSION**

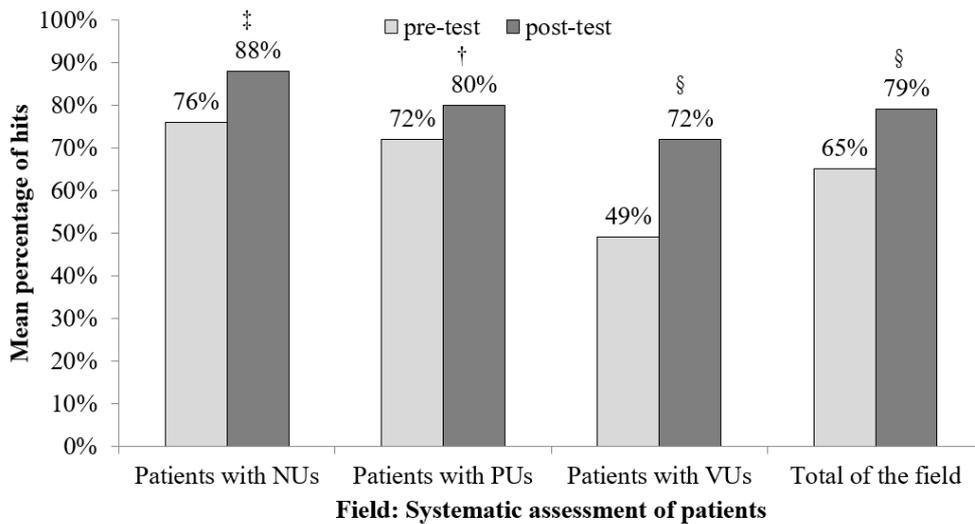
The 80 students from the fourth year of the nursing undergraduate course were invited to participate. The 68 students who agreed to participate in the course did the pretest and accessed the unit. Of these 68 students, 37 did the post-test. For this analysis, only the 37 students who did both the pre- and post-tests were considered.

Thirty-five of the students (95%) were women. The average age of participants was 23.16 years old (SD = 1.69 years), the minimum age being 21 years old and the maximum 28 years old.

Regarding their performance on the knowledge test with regard to the systemic assessment of patients (etiology and pathophysiology of wounds, evaluation of the skin and risk factors), the participants had an increase in the number of hits, from 65% in the pretest to 79% in the post-test. As to the questions of topical therapy for chronic wounds (evaluation of the wound and decision regarding topical therapy), the average percentage of total hits was 52% in the pretest and 68% in the post-test.

In the figures below, the average percentages of hits in the pre- and post-tests are presented for items from systemic assessment of patients and topical therapy for chronic wounds.

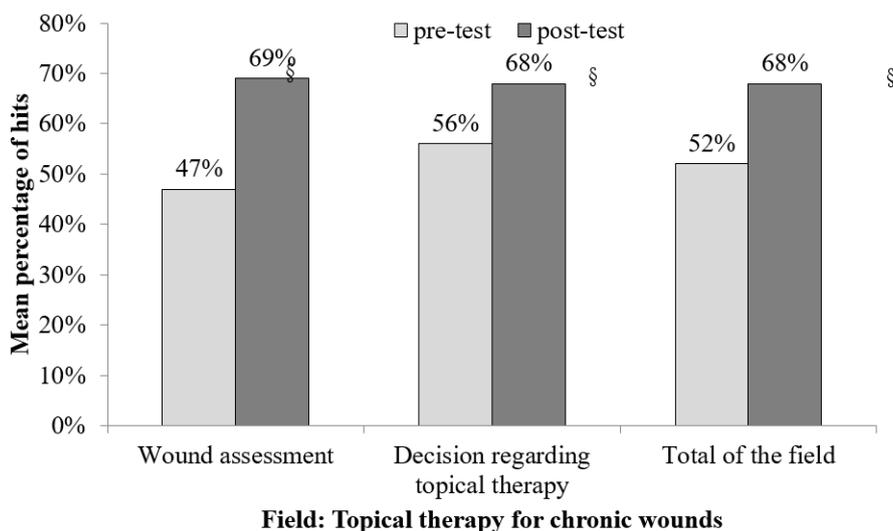
**Figure 1.** Average percentage of hits in the pre- and post-tests with regard to the systematic assessment of patients with different types of chronic wounds. (Ribeirão Preto, 2012)



Note: p-value > 0.05 (not significant)      p-value < 0.05      p-value < 0.01 p-value < 0.001

We must note that in the pretest, students performed better regarding the systematic assessment of patients with NUs and PUs, with more than 70% hits for both kinds of subjects, whereas their performance was poorer in the systematic assessment of patients with VUs, for which they answered 50% of questions correctly.

**Figure 2.** Average percentage of hits in the pre- and post-tests with regard to the evaluation of the wound and the decision regarding topical therapy for chronic wounds. (Ribeirão Preto, 2012)



Note: p-value > 0.05 (not significant)      p-value < 0.05      p-value < 0.01 p-value < 0.001

It was observed that in the section on topical therapy for chronic wounds, in which the essential elements for making a clinical decision on the choice of therapy were

assessed, students' performance on the evaluation of wounds was below 50% in the pretest. However, in the post-test, there was a statistically significant increase in the average number of hits.

The students' sociodemographic profile confirms the results found by other studies, which highlighted the prevalence of women among nursing students and the 20-25 age group.<sup>(14-17)</sup> The predominance of women among nursing students and professionals can be observed in different parts of Brazil and the world.

Students aged 20-28 years old are experiencing the digital technology boom that began in the last decade of the 20th century and thus have greater ease learning new technological resources.<sup>(14)</sup>

In 2000, a study was conducted among students in a nursing undergraduate course in a public institution of higher education in São Paulo in order to assess their knowledge of IT resources and their skills. The authors found that 85.63% of students used the university's computers, 59.19% reported that they could surf the Internet (37.35% reported that they could not and 2.29% did not answer). Out of these students, most of them used the Internet to write and check emails, and also to conduct bibliographic research, which was a new way of accessing information for that generation of students. The integration of IT and new technologies as tools to create new standards of learning, research, and professional practice was already seen at that time as a new challenge.<sup>(15)</sup>

In 2010, a new study was conducted in the aforementioned institution in order to assess the digital fluency, knowledge, skills, and interest of students in the use of VLE in a nursing graduate course. Out of the 51 students who participated in the study, all of them (100%) stated that they had computer knowledge, of which 26 (49%) reported that they had an intermediate level; 47 (92%) reported the use of MSN and 32 (62.7%) the use of Skype, 41 (82%) accessed online chats, 33 (64.7%) used discussion boards, and 22 (43%) accessed blogs. The frequent use of VLE Moodle was reported by 33 students (64.7%), and 26 (51%) mentioned the use of VLE online courses. The majority (45, or 88.2%) reported interest in the use of VLE. Students were considered digitally fluent by the authors and had knowledge of, skills in, and significant interest in the use of VLE in their academic training.<sup>(16)</sup>

Regarding the level of knowledge of nursing students about the subject proposed in this study (chronic wounds), the scientific literature has pointed out that they get to the last course period with insufficient knowledge to help patients with chronic wounds.<sup>(18-19)</sup> The results of this study confirm those found by the authors, which saw knowledge gaps of students about the evaluation of wounds, especially the identification of signs and symptoms of infection, as well as the indication of topical therapy.

The treatment of chronic wounds is complex and dynamic, and new technologies that favor the healing process are constantly being developed. This requires that nurses have a certain knowledge of the topic, based on the best scientific evidence, so as to have professional autonomy in the care of people with chronic wounds. To this end, it is essential that nursing students complete the undergraduate course and become capable of assessing patients and their wounds, and also to prescribe topical therapy and identify other factors related to the practice of qualified care.<sup>(18)</sup>

In view of the above and of the importance of the topic, it is necessary that strategies

for teaching about the care of people with chronic wounds in nursing undergraduate courses be reworked, in order to ensure more effective learning. Students must be encouraged to actively seek out updated scientific knowledge in the field.<sup>(18-19)</sup>

In Brazil, nursing is currently benefiting from DE and its resources, among which is VLE,<sup>8,10</sup> which has become a common tool among the various technologies available. VLEs can be understood as computer systems aimed at supporting activities mediated by information and communication technologies. These environments allow for the integration of countless media, languages, and resources, as well as the management of databases, the broadening of intercommunication, and the socialization of experiences in the building of collaborative learning.<sup>(8,20)</sup>

Comparative studies about the result of learning using traditional and innovative methodologies have proved that the effectiveness of the latter is greater and therefore should be further developed. There are in the literature several publications about the use of DE in different fields.<sup>(11,12,21,22)</sup>

In the present study, the knowledge of nursing students about the topic improved after the educational intervention (participation in the course “Topical therapy for chronic wounds” through the Moodle), especially regarding wound evaluations. It is worthy of note that the first stage of wound management is the evaluation, which precedes the choice of treatment and must be carefully performed.

In a study conducted among nursing students in a federal university in Minas Gerais to assess VLEs in the teaching of nursing, 42 students did exercises related to the course contents of identification and classification of the nursing diagnosis, in both VLEs and printed versions. There was a significant association between the variables “owns a computer” and “prefers to do the exercises on the web platform” ( $p = 0.0044$ ) and “owns a computer” and “access to the Internet” ( $p = 0.000001$ ). Most students stated that they preferred to do the exercises in the VLE due to its convenience, promptness, and practicality (61.9%).<sup>(17)</sup>

In another study conducted at a university in the state of Rio Grande do Sul, nursing students assessed the digital objects used for vital signs in a VLE. The activities proposed were as follows: knowledge of the VLE TelEduc and familiarization with it; use of the six digital educational objects (armpit temperature, heart rate, respiratory rate, blood pressure, pain assessment, and quizzes) produced with FlashMX software; resolution of case studies in groups, with presentation to other colleagues; and technique performance in a teaching lab. At the end of the unit, students responded to a questionnaire in order to assess the activities in the VLE that addressed the use of technology, the educational practices, student support, and the results. Most students (90%) approved of the use of technology and were able to relate the specific concepts about vital signs and general concepts to each other in order to solve case studies presented in the VLE.<sup>(22)</sup>

The use of DE as a strategy to promote and update knowledge of chronic wounds has been indicated as an effective measure, for both nurses and nursing students. An experimental study conducted in Belgium with nurses who worked in hospitals, long-stay institutions, or home care, and with students in their last year of the basic undergraduate course tried to identify participants’ difficulties with PU classification and the effectiveness of an online education program as a teaching method. The authors found an improvement in the knowledge test about PU classification after their

participation in the educational intervention. This was observed in both the control group, which participated in a conventional educational intervention, and the experimental group, which took an online course.<sup>(23)</sup>

The number of organizations and institutions that are using electronic media and developing computer skills has been increasing. The access to the Internet for searching information is a global reality.

In teaching institutions, the use of information and communication technologies has been an integral part of the program and it is important not only to provide a dynamic, creative, and innovative learning but also to go beyond geographical limits.

## CONCLUSIONS

This study showed that students who participated in an online educational intervention had a statistically significant increase in the average percentage of hits, when comparing pre- and post-tests. It was seen that the use of the VLE Moodle in the undergraduate course can be a supporting strategy to maximize and increase access to relevant topics from an epidemiological point of view.

With regard to the evaluation of wounds, a better result was observed for questions regarding NUs and PUs, as was the need to focus on aspects inherent to the etiology and pathophysiology of VUs.

Generally speaking, there are gaps in the knowledge of students regarding the evaluation of chronic wounds and alternatives for topical therapy. It should be emphasized that nursing care of wounded people requires a safe practice based on updated knowledge. To do so, the acquisition of skills must take place throughout undergraduate education, since patients with chronic wounds can be found in all contexts of health care.

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