



Venous ulcer and compression therapy for nurses: development of online course*

Úlcera venosa e terapia compressiva para enfermeiros: desenvolvimento de curso online

Úlcera venosa y terapia compresiva para enfermeros: desarrollo de un curso online

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ABSTRACT

Objective: To describe the development of an online course about venous ulcer, with a focus on compression therapy, for the educating of nurses. **Methods:** The development of an online course followed the phases of analysis, design, development, implementation and evaluation, based on contextualized instructional *design*. **Results:** The course was divided into ten modules structured in the *Moodle* virtual learning environment. It was characterized by a constructivist approach, aimed at increasing student participation, to provide principal references, reviews and consensus, and to utilize multimedia objects and interactive educational resources. **Conclusion:** The course provides professional nursing education in compression therapy in an innovative, flexible, interactive manner in various care settings.

Keywords: Nursing informatics; Varicose ulcers; Education, distance; Education, nursing; Professional training

RESUMO

Objetivo: Descrever a elaboração de um curso on-line sobre úlcera venosa, com enfoque em terapia compressiva, para capacitação de enfermeiros. **Métodos:** O desenvolvimento do curso on-line seguiu as fases de análise, design, desenvolvimento, implementação e avaliação, baseadas no *design* instrucional contextualizado. **Resultados:** O curso dividiu-se em dez módulos estruturados no ambiente virtual de aprendizagem *Moodle*. Caracterizou-se por uma proposta construtivista, visando ampliar a participação do aluno, disponibilizar as principais referências, revisões e consensos, bem como utilizar objetos multimídia e recursos didáticos interativos. **Conclusão:** O curso possibilita a capacitação profissional do enfermeiro em terapia compressiva de maneira inovadora, flexível, interativa em diversos ambientes de cuidado.

Descritores: Informática em enfermagem; Úlcera varicosa; Educação a distância; Educação em enfermagem; Capacitação profissional

RESUMEN

Objetivo: Describir la elaboración de un curso online sobre úlcera venosa, con enfoque en terapia compresiva, para la capacitación de enfermeros. **Métodos:** El curso online se desarrolló siguiendo las fases de análisis, diseño, desarrollo, implementación y evaluación, basadas en el *diseño* instruccional contextualizado. **Resultados:** El curso se dividió en diez módulos estructurados en el ambiente virtual de aprendizaje Moodle. Se caracterizó por una propuesta constructivista, pretendiendo ampliar la participación del alumno, poner a disposición las principales referencias, revisiones y consensos, así como utilizar objetos multimedia y recursos didáticos interactivos. **Conclusión:** El curso permite la capacitación profesional del enfermero en terapia compresiva de manera innovadora, flexible, interactiva en diversos ambientes de cuidado.

Descriptorios: Informática aplicada a la enfermería; Úlcera varicosa; Educación a distancia; Educación en enfermería; Capacitación profesional

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INTRODUCTION

Chronic venous insufficiency (CVI) is defined as the abnormal functioning of the venous system caused by valvular incompetence associated or not with venous flow obstruction. Chronic venous insufficiency can affect the superficial or the deep venous systems or both and can result from congenital or acquired disorders. Some of the risk factors for CVI include age, gender, family history, obesity, pregnancy, static orthostatism, and sedentarism. Its clinical manifestation is characterized by edema, varicose veins, corona phlebectatica or ankle flare, lipodermatosclerosis, white atrophy, hyperpigmentation or ochre dermatitis, cellulitis or erysipelas, eczema or stasis dermatitis, and ulcers, which are the maximal expression of this disease ^(1,2).

Associated with a wide scope of causes, leg ulcers are considered a public health problem in Brazil as well as in the rest of the world. Studies conducted in different countries point to an overall prevalence of 0.18% to 5.69%; the incidence is higher among individuals 65 years of age and older. Inasmuch as the worldwide elderly population is estimated to reach 1,900 million people in 2050, these data are a source of concern. Data from the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística – IBGE) from 2000 indicate that in the future, the elderly will represent one out of five people worldwide ⁽³⁻⁵⁾.

Venous ulcers (VUs) begin spontaneously or are associated with trauma on the medial face of the leg (close to the medial malleolus); their size and depth are variable, and relapse is frequent ^(6,7). In addition to the local and systemic alterations they cause, VUs affect patients' lifestyles as a result of chronic pain, discomfort, depression, loss of self-esteem, social isolation, inability to work, hospitalization, and frequent visits to outpatient clinics. One study found 90% prevalence of pain among patients with venous ulcers ⁽⁸⁾. The social and economic impact of venous ulcers is thus immense for patients, healthcare systems, and society at large. In the United States, the average cost per patient might be higher than USD 40,000, and the total annual cost is estimated as more than one million dollars ^(6,9).

Treatment of patients with venous ulcers aims at improving their symptoms, reducing pain and edema, treating lipodermatosclerosis, healing the ulcers, and preventing relapse. Treatment plans must include measures to increase venous flow, such as compression therapy, which increases the transport of oxygen to the skin and subcutaneous tissue and reduces edema and inflammation. Compression therapy can be performed by means of compression stockings or elastic or inelastic compression bandage systems ⁽¹⁰⁾. It consists of applying pressure to the lower legs as a means of

facilitating the venous return, and represents one of the most basic and important features in the treatment of venous ulcers. Compression reduces the volume of blood in the superficial venous system and transiently restores valvular competence, thus preventing reflux through incompetent perforator veins. In addition, compression increases contraction of the calf muscles; thus, the deep veins are emptied provided the arterial flow is unaltered ⁽¹¹⁾.

Compression is a powerful therapy that promotes the healing of venous ulcers, prevents their relapse, and improves patients' quality of life when appropriately used. However, it can delay healing, cause pain and lesions, and even lead to amputation of the affected limb when used inappropriately ⁽¹²⁾. To guarantee the efficacy and safety of this technique and to identify arterial affections that might contraindicate compression therapy use, it is essential to perform previous assessment of patients by means of the nursing process and through diagnostic and complementary exams, such as measurement of the ankle-brachial index (ABI) and Doppler. Therefore, the healthcare professionals who prescribe and apply compression therapy and perform related follow-up must exhibit sound technical and scientific knowledge ^(13,14).

The choice of compression therapy as the subject of an online course is justified by the fact that venous ulcers are an important health concern; they interfere significantly with the lifestyles of patients due to the time they require to heal and the high frequency of relapse. However, nurses commonly encounter difficulties in regard to the indication, application and handling of the different compression systems used in everyday clinical practice, and these difficulties have a negative impact on the quality and efficacy of the assistance provided to patients.

Because compression therapy is commonly performed at different types of healthcare facilities, including primary care centers, the use of new technologies, particularly technologies associated with collaborative and flexible distance learning, is considered important in teaching and training nurses in its use.

Information and Communication Technologies

Information and communication technologies (ICT) are tools to facilitate the communication, processing and transmission of information by way of electronic media. This notion includes the use of radio, television, fixed and mobile telephone lines, computers, and the web ⁽¹⁵⁾.

ICT must be assessed as tools for process optimization, e.g., in healthcare, continuing education and research development. The use of ICT in nursing supplies tools to improve healthcare by electronically linking assessments, interventions, and results to support decision-making ⁽¹⁶⁾.

In the field of education, the incorporation of ICT provides wider access to information by integrating multiple media, languages, and resources; this integration facilitates the development of interactive educational processes combining theory, practice, and research. Therefore, ICT might be incorporated into educational processes as a structural element of novel pedagogical approaches that, in turn, gives rise to qualitative modifications in such processes⁽¹⁷⁾.

The integration of ICT into teaching might be accomplished by the use of virtual learning environments (VLE), which could be represented by internet-available computer systems and software that serve to support ITC-based activities. Such environments allow the integration of a variety of communications media and resources and also facilitate making information available in an organized manner to meet the intended educational goals. They further contribute to the management of the students' participation in the educational process because the paths, threads, productions, and interactions can be recorded⁽¹⁷⁾.

In the training of nursing professionals who assist patients with venous ulcers, ICT must be incorporated into professional teaching and practice. The aim of the present study was to describe the process of development of an online course on venous ulcers that focused on compression therapy aimed at the training of nurses.

METHODS

The development of online courses might be considered applied research on technological production, the goal of which is to create new products or to increase the efficiency of existing products⁽¹⁸⁾. The elaboration of the present online course was based on Contextual Instructional Design (CID), which comprises the principles, methods, and most appropriate specifications for the development of learning virtual environments while taking into account several types of learning. This method allows the development of interactive multimedia VLE that favor communication among the participants in the teaching and learning process, as well as the production of knowledge by the students themselves in an autonomous, flexible, and dynamic manner⁽¹⁹⁾.

CID comprises five phases: analysis, design, development, implementation, and assessment⁽¹⁹⁾. During the *analysis* phase, the learning needs are identified and the target audience is defined; also, the educational aims are defined, the resources selected, and the limitations identified. During the *design* phase, the composition of the team is established. *Development* includes the planning of the contents and media to be used and the production of educational materials and learning virtual

objects. The *implementation* phase comprises the training and adaptation of students to the selected platform, whereas *assessment* includes the follow-up of students, correction of possible errors, and maintenance of the developed environment.

In regard to the human resources needed for the description of the layout of virtual objects and the development of the contents and methods to assess learning, the team included three registered nurses who are postgraduate students in stomal therapy and two researchers from the Group of Studies on Learning and Telenursing Practices (Grupo de Estudos de Práticas de Ensino e Teleenfermagem – GEPETE) under the supervision of two professors from the School of Nursing of the University of São Paulo (Escola de Enfermagem da Universidade de São Paulo – EEUSP), one of whom is a specialist in stomal therapy and the other a specialist in health information technology. A graphic designer from the Discipline of Telemedicine of the Faculty of Medicine of USP participated in the creation of the learning object, 'Virtual Man'.

Virtual Man is a dynamic and focused communication method represented in three dimensions. Because it facilitates the understanding of particular subjects, it allows for a dynamic supply of information on anatomy, physiological processes and molecular mechanisms⁽²¹⁾.

The use of CID associated with ICT results in a configuration of five levels of patterns for the development of distance learning programs; these are informational, supplementary, essential, collaborative, and immersive patterns⁽¹⁹⁾. The informational and supplementary patterns comprise educational programs focusing on the transmission of contents and information. The essential pattern stresses the activities developed during the course, including interactive graphical representations and evaluation exercises presented at the end of modules. The educational emphasis of the collaborative and immersive patterns falls on communication, socialization, and the collective construction of knowledge by means of resources such as wiki, forums, and chats⁽¹⁹⁾.

RESULTS

The development of the online course on venous ulcers and compression therapy was the result of a partnership that included the Enterostomal Therapy Nursing Education Program – ETNEP of the School of Nursing of University of São Paulo – EEUSP, the Center of Studies in Telenursing of EEUSP (Centro de Estudos em Telenfermagem – CETENF), the GEPETE, and the Research Group of Ostomy Wound and Continence Care – WOCN (Grupo de Pesquisa em Enfermagem em Estomaterapia: estomias, feridas

e incontinências). The latter two organizations are accredited by the National Council of Scientific and Technological Development (Conselho Nacional de Desenvolvimento Científico e Técnico – CNPq).

The elaboration of the course followed the phases described below.

Analysis

The selection of the subject – venous ulcers with focus on compression therapy – was justified in the first section of this article. Due to its social and economic impact, the target-audience corresponded to nurses needing training and continuing education on the selected subject. In this phase, the acquaintance of nurses with the ICT resources used was important in characterizing the target audience.

The virtual learning environment selected to develop the present educational project was *Moodle – Modular Object-Oriented Dynamic Learning Environment*. This is a free web application for creating effective online courses that is used by educational institutions as a support tool in both distance and traditional learning⁽²⁰⁾.

The method used to develop the online course was characterized by constructivism; the established objects were intended to increase the participation of students during the course and to make the primary national and international literature references, such as Cochrane reviews, consensuses and case studies, available. The methodology used also aimed at using multimedia objects and interactive didactic resources such as videos, illustrations, hypertexts, photographs, case studies, and problem-situations.

Design and development

During the process of course development, the images, links and animations needed to facilitate understanding of the materials were surveyed. To establish the content description, meetings were conducted with specialists; in these meetings, the contents, links, animations, photographs, and videos related to the educational aims of the learning environment were detailed. The illustrative videos were developed by these researchers; they included demonstrations of techniques and other procedures related to the course subject based on national and international recommendations and consensuses. These videos were made at the laboratory of procedures of EEUSP.

During the development phase, the design elaborated in the previous phase was applied in practice. The commercially available software *Articulate Rapid e-Learning Studio*® was used to illustrate and make more dynamic the contents selected and elaborated for the course.

Implementation

This phase comprised the configuration of the educational technological tools and resources of the Moodle virtual learning environment to enable web access to the course once the students performed the required registration.

Assessment

In this stage, the course content was formally introduced at the end of the EEUSP ETNEP and assessed by an expert panel composed by two professors holding PhDs, one of whom is a WOCN and the other in distance learning processes. Before the oral presentation, these two professors accessed the full course content in the Moodle platform to assess and validate its content and format, respectively. After the presentation, all the suggestions made for improvement of the course and maintenance of the course environment were implemented by these authors.

The course is available at the Moodle platform at URL <http://www.moodle.redealuno.usp.br>, and students will be able to access it once their supervisors have provided electronic authorization and they have registered with a user name and password. Upon registering and logging in, the students will have access to the initial page of the course (Figure 1), where they will find instructions for participating in all the suggested activities and accessing the course contents.

The content of the course is divided into 10 modules (Figure 2): Module I – Anatomy and physiology of the venous system; Module II – Physiopathology and diagnosis of chronic venous insufficiency; Module III – Venous ulcers; Module IV – Assessment of patients with venous ulcers; Module V – Prevention and treatment of venous ulcers; Module VI – Introduction to compression therapy; Module VII – Bandages; Module VIII – Elastic stockings; Module IX- Intermittent pneumatic compression; Module X – Case-study.

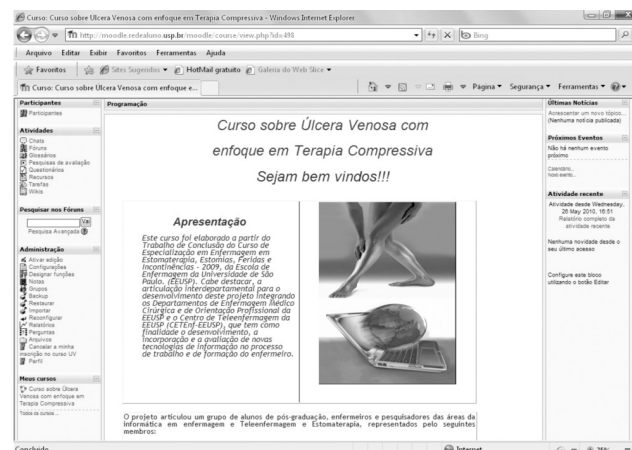


Figure 1. Initial page and instructions on the course.

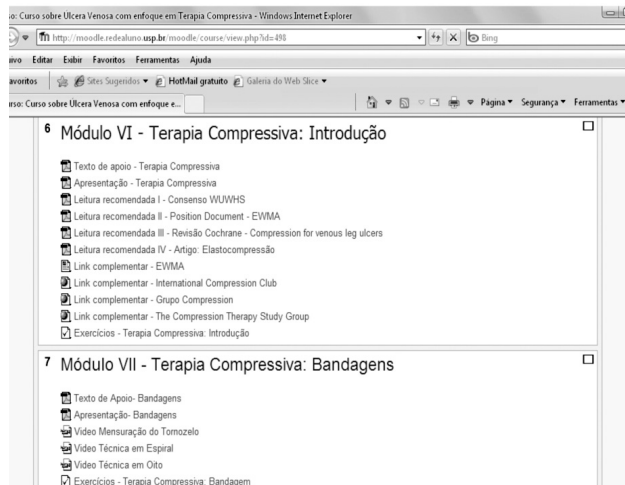


Figure 2. Structure of a module.

In each module, the students will find activities to be performed; access to the contents of the next module will only be enabled after the student has completed the mandatory activities of the current module. Each module contains supporting text written by the authors and based on the primary and most up-to-date references in the literature on the corresponding subject, a slide presentation of its contents (Figure 3) including figures, illustrations and photographs to better illustrate the supporting text, and recommended literature, including the full text of national and international articles, the main consensuses, and Cochrane reviews. Some modules also include videos made by these authors (Figure 4) demonstrating procedures such as measurement of the ABI and the application of the different compression techniques, in addition to links to other relevant sources available on the web.

At the end of each module, the students are required to perform the indicated assessment activity; this may include multiple-choice questions, true-false questions, the writing of a collective text (wiki) or a glossary, or the discussion of a case study. The performance of the students on the assessments will be discussed on an individual basis with their supervisors.

The method used in the development of the course is characterized by a collaborative pattern and a constructivist perspective aimed at increasing the participation of students throughout the course. Interactions between students and supervisors and among the students will occur by means of participation in forums and chats.

Specific tools were used by the students to assess the course, which contributed to its improvement.

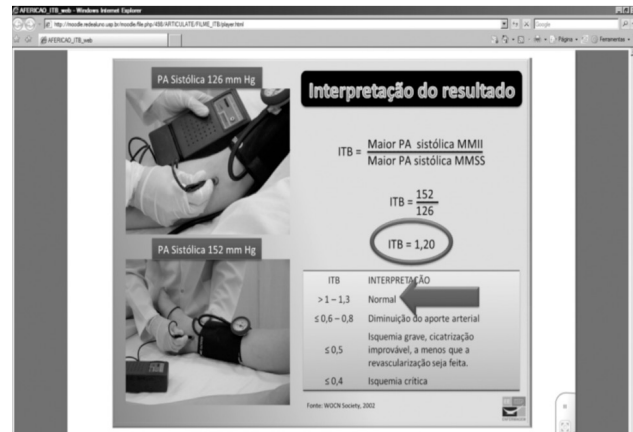


Figure 3. Presentation of contents with slides

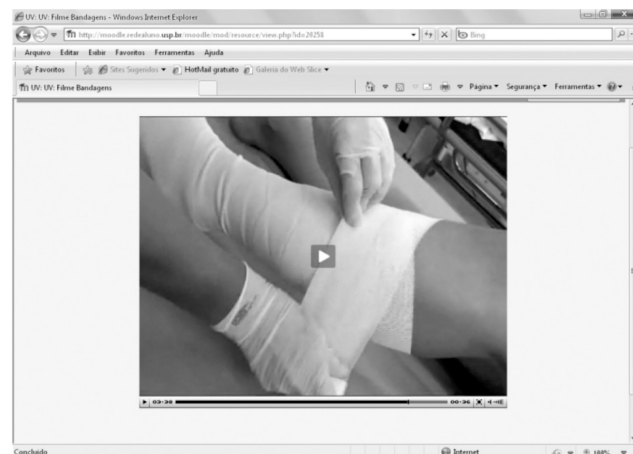


Figure 4. Videos demonstrating procedures

DISCUSSION

The main technique currently in use for the prevention, control and treatment of venous ulcers is compression therapy⁽¹³⁾. However, in actual clinical practice, nurses frequently encounter difficulties in the indication, application, and handling of the several types of compression devices that are in use⁽²²⁾.

ICT-mediated educational methods contribute to the sharing of information and promote collaboration among geographically distant groups.

Professors act as mediators and guides; their role is to monitor the development of the students, point to novel paths, and induce the students to critically reflect on the expression of their thoughts and to understand the mistakes they may have made⁽¹⁷⁾.

The implementation of ICT in the educational setting requires a novel pedagogic approach, particularly with regard to the relationship between teachers and students. It also requires techniques of learning evaluation because it represents a shift of values within the educational setting that demands that students become the protagonists

of their process of learning and give up the passive role in which they are cast in traditional educational models.

From this perspective and to promote the development of attitudes and the critical thought of students, the teaching and learning process must include strategies such as teacher-student, student-student and groups of students-teacher interactions, simulation of problem situations, individuality, flexibility, and the coexistence of students exhibiting different learning rhythms⁽²³⁾.

The participation of students in the online course on venous ulcers and compression therapy is expected to unfold in a flexible and collaborative manner in regard to the discussions of case studies, elaboration of a glossary and collective texts (wiki). It is also expected to develop in a real-time interactive manner with the supervisors and other students by means of chats, as well as by posting doubts, answers and comments in the discussion forums. The students will also receive period feedback from their supervisors in regard to their performance of the indicated activities.

REFERENCES

- Maffei FH, Lastódia S, Yoshida WB, Rollo HA. Doenças vasculares periféricas. Rio de Janeiro: Medsi; 2002.
- Vasquez R. Venous insufficiency syndrome of the lower limbs. *Bol Hosp San Juan de Dios*.1983; 30(4):213-6.
- Kantor J, Margolis DJ. Epidemiology. In: Morison MJ, Moffat CJ, Franks PJ. Leg ulcers: a problem-based learning approach. Missouri: Mosby; 2007. p. 65-77.
- Instituto Brasileiro de Geografia e Estatística. Perfil dos idosos responsáveis pelos domicílios [Internet]. 2002 [citado 2002 jul 25]. Disponível em: <http://www.ibge.gov.br/home/presidencia/noticias/25072002pidoso.shtml>
- Maffei FH, Magaldi C, Pinho SZ, Lastoria S, Pinho W, Yoshida WB, et al. . Varicose veins and chronic venous insufficiency in Brazil: prevalence among 1755 inhabitants of a country town. *Int J Epidemiol*.1986; 15(2):210-7.
- Wound Ostomy and Continence Nurses Society. Guideline for management of wounds in patients with lower-extremity venous disease [Internet]. Glenview (IL): WOCN; 2005 [citado 2012 Feb 10] (WOCN Clinical Practice Guideline Series, 4. Available from: http://blogs.curtin.edu.au/wound-node-project/files/2011/02/Wounds_20_patients_with_Venous_Disease.pdf
- Valencia IC, Falabella A, Kirsner RS, Eaglstein WH. Chronic venous insufficiency and venous leg ulceration. *J Am Acad Dermatol*. 2001; 44(3):401-21; quiz 422-4.
- Park SH, Ferreira KASL, Santos VLCC. Understanding pain and quality of life for patients with chronic venous ulcers. *Wounds*. 2008; 20(11): 309-11.
- de Araújo T, Valencia I, Federman DG, Kirsner RS. Managing the patient with venous ulcers. *Ann Intern Med*. 2003; 138(4): 326-34.
- European Wound Management Association (EWMA). Understanding compression therapy. Position document. London: Medical Education Partnership; 2003.
- Doughty DB, Holbrook R. Lower-extremity ulcers of vascular etiology. In: Bryant RA, Nix DP. Acute and chronic wounds: current management concepts. St. Louis: Mosby; 2007. p.258-306.
- World Union of Wound Healing Societies (WUWHS). Principles of best practice: compression in venous leg ulcers. A consensus document. London: Medical Education Partnership; 2008.
- O'Meara S, Cullum NA, Nelson EA. Compression for venous leg ulcers. *Cochrane Database Syst Rev*. 2009; (1):CD000265.
- Partsch H, editor. Evidence based compression-therapy an initiative of the International Union of Phlebology (IUP). *Vasa*. 2004; 34 (Suppl 63): 3-15.
- Dal Sasso GT, Silveira DT, Barbosa SF, Évora YD, Marin HF. Tecnologias da informação e da comunicação em enfermagem e telenfermagem. In: Prado C, Peres HH, Leite MM. Tecnologia da informação e da comunicação em enfermagem. São Paulo: Atheneu; 2011. p.113-25.
- Barreto RG. [Technologies in teacher education: the discourse of the Ministry of Education (MEC)]. *Educ Pesqui*. 2003; 29(2): 271-86. Portuguese.
- de Almeida ME. [Distance learning on the internet: approaches and contributions from digital learning environments]. *Educ Pesqui*. 2003; 29(2): 327-40. Portuguese.
- Santos JA, Parra Filho D. Metodologia científica. São Paulo: Futura; 1998.
- Filatro A. Design instrucional contextualizado: educação e tecnologia. São Paulo: SENAC; 2004.
- Nakamura R. Moodle: como criar um curso usando uma plataforma de ensino a distância. São Paulo: Farol do Forte; 2009. 160 p.
- Chao LW. Teleeducação em saúde. In: Prado C, Peres HH, Leite MM. Tecnologia da informação e da comunicação em enfermagem. São Paulo: Atheneu; 2011. p.113-25.
- Nunes JP. Avaliação da assistência à saúde aos portadores de úlceras venosas de membros inferiores atendidos no programa saúde da família do município de Natal/RN [dissertação]. Natal: Universidade Federal do Rio Grande do Norte, Centro de Ciências da Saúde; 2006.
- Peres HH, Leite MM. Informática no ensino de enfermagem. In: Kalinowski C, coordenadora. Programa de atualização em enfermagem: saúde do adulto: (PROENF). Porto Alegre: Artmed Panamericana; 2006.
- da Costa JB, Peres HH, Rogenski NM, Baptista CM. An educational proposal to teach a pressure ulcer management course online to students and nursing professionals. *Acta Paul Enferm*. 2009; 22(5): 607-11.

CONCLUSION

Currently, due to the present rate of technological advances and the requirement for permanent updating in the health fields, the teaching of nursing cannot neglect new technologies in seeking to provide new avenues for professional training. The course described here, which was configured with a collaborative pattern, represents a further tool available to nurses and will help them develop skills for the assistance of patients with venous ulcers, and more particularly for compression therapy, in an innovative, flexible, interactive and collaborative manner.

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