Construction and validation of a website about pressure injuries

Construção e validação de um website sobre lesão por pressão

Elaboración y validación de un sitio web sobre úlceras por presión

Rodrigo Magri Bernardes[1] https://orcid.org/0000-0001-6232-704X
Maria Helena Larcher Caliri[1] https://orcid.org/0000-0001-7662-5072

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Corresponding author
Rodrigo Magri Bernardes
Email: rodrigomb05@gmail.com

Abstract

Objective: Describe the construction and validation of a website for pressure injury prevention and management, for use as an online educational resource and supplementary teaching strategy for nursing students.

Methods: Descriptive, methodological, technology production study. The website was built in the following stages: analysis, design and development, implementation and evaluation. The content was based on international and national recommendations and a literature review. The assessment of content, information quality and technical quality was performed by two groups of judges, comprised of seven nursing professors and three informatics professionals.

Results: The address of the website used for the study was: *www.recursoeducacional.com.br*. The content was composed of five modules with 66 topics, 37 figures and 36 photos, addressing essential pressure injury issues: patient safety and occurrence, prevention and treatment interventions, pressure injury management and care of more vulnerable patients. All the content topics were deemed important by the nursing judges: 66.67% were accepted without any changes to the text and presentation and others were revised. All the content topics obtained Content Validity Index scores >0.8, with a mean of 0.99. Therefore, the website was considered validated. The quality of the information and technical quality of the website were appraised as excellent by the two groups of judges.

Conclusion: The website was validated and may be used as an educational resource to help teach nursing students about pressure injuries.

Resumo

Objetivo: Descrever a construção e validação de um *website* para prevenção e manejo da lesão por pressão, a ser utilizado como recurso educacional em cursos *on-line* como estratégia complementar de ensino para graduandos de enfermagem.

Métodos: Estudo descritivo, metodológico, de produção tecnológica. O *website* foi construído seguindo as fases de análise, *design* e desenvolvimento, implementação e avaliação. O conteúdo foi baseado em recomendações internacionais e nacionais e na revisão da literatura. As avaliações de conteúdo, de qualidade das informações e qualidade técnica foram feitas por dois grupos de juízes, sendo sete enfermeiros docentes e três profissionais da informática.

Resultados: Para o estudo, o endereço do *website* utilizado foi *www.recursoeducacional.com.br*. O conteúdo é composto de cinco módulos com 66 tópicos, 37 figuras e 36 fotos, abordando temas essenciais sobre lesão por pressão: segurança do paciente e ocorrência, intervenções para prevenção e tratamento, manejo da lesão e cuidados com pacientes mais vulneráveis. Todos os tópicos do conteúdo foram considerados importantes

[1]Escola de Enfermagem de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, SP, Brazil.
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pelos juízes enfermeiros, 66,67% foram aceitos sem mudanças na redação e apresentação e os outros foram revisados. Todos os tópicos dos conteúdos obtiveram Índice de Validade de Conteúdo >0,8, com média de 0,99, portanto o *website* foi considerado validado. A qualidade das informações e a qualidade técnica do *website* foram consideradas excelentes pelos dois grupos de juízes.

Conclusão: O *website* foi validado e poderá ser utilizado como recurso educacional para auxiliar o ensino sobre lesão por pressão a graduandos de enfermagem.

Resumen

Objetivo: Describir la elaboración y validación de un sitio web para prevención y manejo de úlceras por presión, que será utilizado como recurso educativo en cursos en línea como estrategia complementaria de enseñanza para estudiantes universitarios de enfermería.

Métodos: Estudio descriptivo, metodológico, de producción tecnológica. El sitio web fue elaborado de acuerdo con las siguientes fases: análisis, diseño y desarrollo, implementación y evaluación. El contenido se basó en recomendaciones internacionales y nacionales y en la revisión de la literatura. Las evaluaciones de contenido, de calidad de la información y de calidad técnica fueron realizadas por dos grupos de jueces, formados por siete enfermeros docentes y tres profesionales de la informática.

Resultados: La dirección del sitio web utilizada en el estudio fue *www.recursoeducacional.com.br*. El contenido se compone de cinco módulos con 66 temas, 37 figuras y 36 fotos, que abordan asuntos esenciales sobre úlceras por presión: seguridad del paciente y episodios, intervenciones para prevención y tratamiento, manejo de la úlcera y cuidados con pacientes más vulnerables. Todos los temas del contenido fueron considerados importantes por los jueces enfermeros, el 66,67 % se aceptó sin cambios de redacción ni presentación y el resto fue revisado. Todos los temas del contenido obtuvieron un Índice de Validez de Contenido >0,8, con promedio de 0,99, por lo tanto el sitio web fue considerado válido. Tanto la calidad de la información, como la calidad técnica del sitio web fueron consideradas excelentes por los dos grupos de jueces.

Conclusión: El sitio web se consideró válido y podrá ser utilizado como recurso educativo para complementar la enseñanza sobre úlceras por presión a estudiantes universitarios de enfermería.

Introduction

Despite the scientific and technological advances in health care, and consequent benefits, patient safety risks have also arisen.[1] Patient safety is an attribute of care quality, and incidents associated with care, particularly adverse events, generate high levels of morbidity and mortality.[2] Pressure injuries, in different care contexts, are considered an adverse event, i.e., an incident that causes harm to patients[1,2] and, in most cases, could have been avoided.

Insufficient knowledge on the part of nursing professionals and students concerning pressure injury prevention and management is a problem that has been identified in national and international studies.[3-8] Although the literature points out that students and professionals have knowledge about recommended practices, erroneous and outdated procedures have also been cited, indicating the need for education, to incorporate new knowledge, technologies and therapies.[9,10]

Scientific evidence-based practices should start during nursing training and be a key factor for enabling and implementing pressure injury prevention and management. In light of quality and patient safety improvement programs in health services, the responsibility of nursing is now more all-inclusive. Its greatest contribution is the ability to coordinate and integrate multiple aspects of quality within nursing care and between the care provided by other professionals.[11]

It is believed that the effectiveness of educational programs that focus on transmitting knowledge about pressure injury prevention and treatment is directly related to care quality.[11] In addition, scientific evidence-based knowledge should guide teaching nursing students to develop competencies in the realm of practice.[5,12]

In various countries, associations for specialists, researchers and professors stress the need to improve the inclusion of topics regarding patient safety and prevention of adverse events, such as pressure injuries, in the curricula of undergraduate nursing courses.[11,12]

The challenge of strengthening the topic of patient safety in nursing education, in undergraduate and graduate courses, as well as technical courses, is big.[13] Nursing students, future professionals and leaders in health care must be prepared, during their undergraduate years, to carry out safe practices.[1]

Undergraduate curricula in health should encompass the latest discoveries and new knowledge. The acquisition of skills and attitudes should occur before students enter into healthcare services.[1] The training of professionals in the area of pressure injury prevention and treatment should be in accordance with current evidence-based rec-

ommendations and made available to students, in order to foster safe care practices.[14] Professional training should involve adequate preparation and knowledge of professors who need to guide teaching practices, with an emphasis on patient safety and employing effective teaching strategies, such as distance education.[5]

Nowadays, most undergraduate students have Internet access. Educational resources in digital formats, such as websites, are important tools in the teaching-learning process, since they help build and enhance knowledge in real time, in relation to lived situations and at opportune times, chosen by the individuals.

The objective of this article was to describe the construction and validation process of a website for pressure injury prevention and management, to be used as an online educational resource as a supplementary teaching strategy for nursing students.

Methods

This was a descriptive, methodological, technology production study, carried out in stages, using the Analyze, Design, Develop, Implement and Evaluate model.[12]

The Analysis stage considered data from the literature pointing out the need for students to be prepared during their professional training to engage in safe practices. Therefore, the instructional objectives of the website were based on proposals from the National Pressure Ulcer Advisory Panel (NPUAP) regarding the competencies of nurses for pressure injury evaluation and prevention[15] and from the resolution of Federal Nursing Council No. 567/2018, which regulates nursing care for patients with wounds.[16]

The Design and Development stage examined the conceptual aspect – that is, how the content is presented to the target audience – navigation and interface and establishing the layout of the screens. The content was built according to recommendations from the NPUAP guideline, the European Pressure Ulcer Advisory Panel (EPUAP) and the Pan Pacific Pressure Injury Alliance (PPPIA),[14] and was supplemented by the literature review in the Cochrane Database of Systematic Reviews (CDSR).

It was decided to format the content in sequential modules, with the same topic structure as the guideline[14] containing texts and images. The content was then developed in a digital format (website) through the help of a computer professional contracted for this purpose. For data storage and management, the MySQL® system was used.

The Implementation and Evaluation stage involved the validation process, by two groups of judges, for content and quality of the information. The first group was composed of nurses, with expertise on the subject, who met the following criteria: PhD or master's degree in nursing, professor at a public university, with experience in teaching nursing basics or medical-surgical nursing, had published a scientific article related to pressure injuries and/or taught an undergraduate course on the topic. The second group of judges, in turn, was comprised of informatics professionals, with experience in website development.

An invitation to participate in the study was sent by email to the two groups of judges, along with the research objectives, followed by the modules to be evaluated (in PDF) or the link to access the website and data collection instruments. In the instruments used for collecting data related to validation of the content and evaluation of the technical quality of the modules, room was provided for the opinions of the judges and a description of the modifications they suggested.

First, the nursing judges assessed the importance of the content of the information in the modules and made recommendations for it to be maintained, excluded or adjusted. Content that obtained an agreement percentage of ≥80% among the judges, regarding its importance, was not changed. Those that failed to achieve the established agreement percentage were revised according to the suggestions made by the experts.[17,18]

The content of the modules was also evaluated by the nursing judges in terms of clarity, pertinence and applicability. Clarity involved assessing whether the content was understandable. Pertinence was

in relation to whether the content was relevant and achieved the purpose of the topic and the objectives proposed for undergraduate teaching. As for applicability, it was assessed whether the content was appropriate and useful for the proposed objectives.[19] The Content Validity Index (CVI) was used for validation, which was considered adequate if there was an agreement ≥80%.[17,18,20]

To evaluate the quality of the information presented in the modules, an adapted version of the Health-Related Website Evaluation Form (HRWEF/Emory) was used,[21] which classifies information as excellent, adequate or poor. This questionnaire had 36 questions distributed into eight topics. The nursing judges evaluated 21 questions distributed into five topics: content (its purpose and discussion of the subject matter), accuracy (if the content presented reliable information), authorship (if the authors provided information about their professional training and contact information), audience (if the target audience was stated) and references and photos (whether the references and photos were appropriate).

The informatics judges evaluated the technical quality of the educational resource in the form of a website, using an instrument with questions about accessibility, navigability and presentation of information (colors, screen space, font and figures).[22] In the evaluation, the judges assigned scores: (1) characteristic fully met, (zero) characteristic partially met and (-1) characteristic not met. For scores of zero and -1, the judges were requested to provide comments and reasons. An agreement percentage was also used for these evaluations and aspects with agreement <80% were revised.[17,18]

The evaluation by the informatics judges of the technical quality of the information contained in the modules was done through an analysis of the website, using another part of the HRWEF questionnaire, with 12 questions.[21] These questions were distributed into eight topics: authorship (if the educational and contact information of the authors was accessible), updates (if the website provided recent information and if updates were explicitly made available), navigation (if there was good navigability, if it was slow to open, if it had a search tool), external links (if the external links of the website were appropriate for the material evaluated) and structure (how the information was made available, if it permitted access by people with disabilities). For each question, the judges had the following response options: "I agree" (2 points), "I disagree" (1 point) and "does not apply" (zero). The results classified the website as excellent, adequate or poor, based on the distribution of the percentages proposed by the authors of the study.[21]

The data from the evaluations of the two groups of judges was input on a Microsoft Office Excel® spreadsheet (double entry) and, after correction of typing errors, the descriptive analysis was performed.

The study was approved by the Research Ethics Committee under No. 2592894.

Results

After analyzing the recommendations for clinical practice from the last guideline of the NPUAP, EPUAP and PPPIA, it was decided to build the website in modules, with the same topic structure as the guideline, to facilitate updating it. Each of the five modules was finalized with national and international references, along with inclusion of new evidence in relation to the subject matter, identified in the literature review in the CDSR database. The content of the website submitted for the judges' evaluation had 66 items, 37 figures and 36 photos. The website was hosted at the following address for the study: *www.recursoeducacional.com.br*.

The themes of the modules and structure of the content of each one is presented in Chart 1.

The first group of judges was composed of seven female nurses, within an age range of 37 to 53 years, with a median age of 39 years and a mean age of 42.57 years (standard deviation – SD 6.04). Number of years of education ranged from 14 to 31 years, with a median of 16.5 years and a mean of 20 years (SD 6.72). Six (85.71%) judges had a PhD and one (14.29%) had a master's degree. All were connected to public universities and had clin-

Chart 1. Distribution of the themes of the modules and structure of the content of the website

Modules	Content
1. Introduction – patient safety and occurrence of pressure injuries	Presentation of the educational resource Patient safety and training of health professionals Definition and etiology of pressure injuries International pressure injury classification system Prevalence and incidence of pressure injuries
2. Pressure injury prevention	Risk factors and evaluation of pressure injury risk Skin and tissue assessment Recommendations for an institutional skin assessment policy Skin care Pressure injury prevention therapies
3. Interventions for pressure injury prevention and treatment	Nutritional status screening and assessment Food intake Repositioning and mobilization Repositioning to prevent and treat pressure injuries on the heels General recommendations for support surfaces Pressure injuries related to the use of medical devices
4. Pressure injury management	Pressure injury identification and categorization Evaluation of patients with pressure injuries Evaluation of pressure injuries and healing Evaluation and management of pressure injury-related pain Preparation of the bed of the wound for healing Evaluation and treatment of infections and biofilms Biophysical agents in pressure injury treatment
5. Additional care recommendations for patients more susceptible to pressure injuries	Obese patients Patients in a critical condition Older people Surgery theater patients Palliative care patients Pediatric patients Spinal cord injury patients

ical and academic experience as professors in the area of nursing basics and medical-surgical nursing; one professor (14.29%) also worked as a nurse in a public hospital. Only one (14.29%) had not published a scientific article related to pressure injuries but worked in the area of patient safety and taught a class on the subject of pressure injuries in an undergraduate course.

The nursing judges evaluated the 66 content topics of the five modules and none were excluded. Of these, 44 (66.67%) were accepted without any changes and the agreement percentage among the judges was from 85.71% to 100% (median: 100%; mean: 94.13%; SD 6.13). For the other 22 (33.33%) topics with an agreement percentage <80%, modifications were suggested. Of these, there were 26 (41.27%) suggestions to cite the figures in the body of the text; 22 (34.92%) to modify the text to improve comprehension; 10 (15.87%) to supplement the content with information on how to apply electrical stimulation to prevent pressure injuries and provide specific angling for repositioning patients; four (6.35%) to improve the definition of the photo images; and one (1.59%) to correct the terminology of the international classification of pressure injuries, replacing the term "category/stage" with "stage". Three (42.86%) nurses suggested adding the following themes to the content: neonatal care, a pressure injury risk assessment scale for intensive care patients and description of the characteristics of the bed of the wound during the evaluation. All the suggestions of the nursing judges were heeded in the revision of the modules before the creation of the final version of the website.

Figure 1 presents the CVI means of each module of the website, in relation to the criteria of pertinence, clarity and applicability, according to the evaluation of the nurses.

All the content topics obtained a CVI >0.8, i.e., more than 80% agreement, and the overall mean

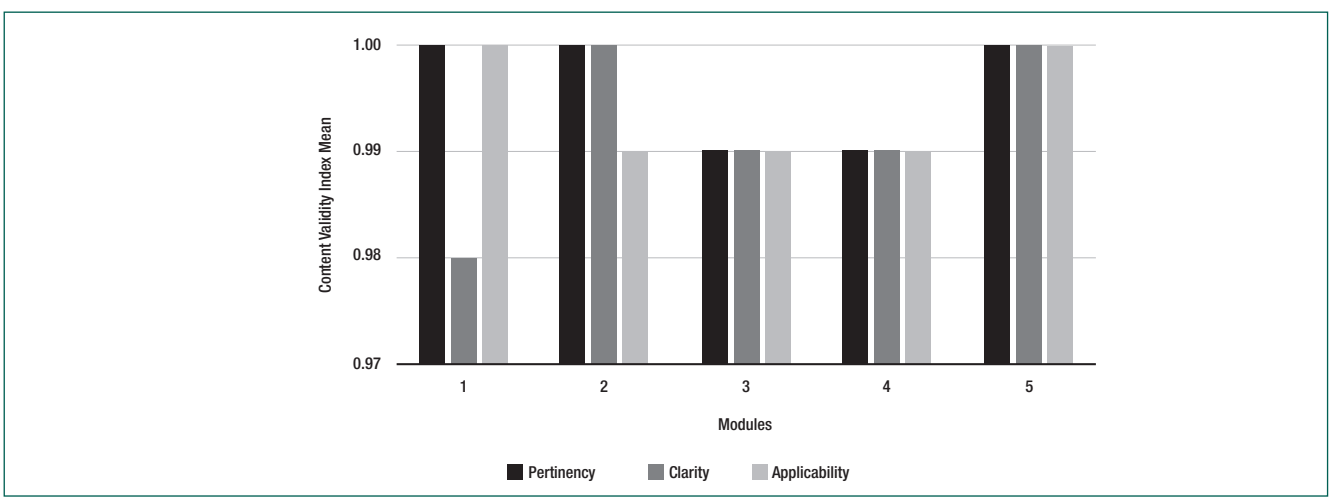

Figure 1. Content Validity Index means for the modules of the website, according to the criteria of pertinence, clarity and applicability.

for this index was 0.99. The results demonstrate that the modules of the website were considered validated in relation to appearance and content.

As for the agreement percentage means in the information quality evaluation by the nursing judges, agreement was 95.2% for "content", 92.8% for "accuracy". 76.2% for "authorship", 100% for "audience" and 100% for "references and photos". The "authorship" characteristic obtained a mean agreement of <80% since the website content sent to the nursing judges had an error when opening the link to the Lattes Curriculum of the authors, in addition to not containing their email addresses. These pending issues were corrected in the final version. In the "accuracy" characteristic, which examined agreement percentage among the nursing judges, one of the questions was not answered, since none of them knew the meaning of the term *HONcode*. The information quality evaluation ranged from 95% to 100%, with a median of 97.5% and a mean of 97.48 (SD 1.89). These results classified the information quality of the content of the website as excellent.

The second group of judges was formed by three informatics professionals. All were male, between 32 and 41 years of age, with a median of 41 years and a mean of 38 years (SD 4.24). Number of years of education ranged from 11 to 16 years, with a median of 15 years and a mean of 14 years (SD 2.16). In relation to degrees, all of them were specialists. Two (66.67%) worked in private companies and one (33.33%) in a public company.

With respect to response time and interface quality of the website, the three informatics professionals considered that all the characteristics were fully met, with the exception of navigability and screen space, with an agreement percentage <80%. The suggestions for improving these characteristics referred to access by mobile devices and were taken into account in the reformulation of the website.

In the evaluation of the technical quality of the website, agreement was 100% for "authorship", 66.7% for "updates", 83.3% for "navigability", 33.3% for "external links", and 100% for "structure". The "updates" and "external links" characteristics received an agreement percentage <80% due to lack of identification of the publication date of the website and some links that did not work. These aspects were corrected in the final version of the website. The evaluation of the website's technical quality ranged from 85% to 100%, with a median of 60% and a mean of 91.67 (SD 7.64). These results classified the website as excellent.

Discussion

A limitation of the present study was not assessing the semantic validity of the content with nursing students, the target audience of the website. Further studies will be carried out.

Validation of appearance and content by the nursing judges – nursing professors with experience and scientific productions in the topic addressed – indicated that the resource was considered adequate and may be used as a strategy to supplement traditional teaching or as support material for other methodological approaches. The development of teaching strategies aimed at better qualification and training of future professionals, with a focus on patient safety and care quality, is a need in the current nursing education context.[23]

Educational content validation strategies, in the field of health, are indispensable for attributing adequate reliability and validity. The participation of experts in the validation process is essential for avoiding inaccurate results that lead to wrong conclusions.[24]

The nursing judges, as well as the informatics professionals, considered the information quality of the website to be excellent. Despite this favorable evaluation, it should be noted that the nursing judges were not familiar with the term *HONcode*, which is considered the gold standard in terms of health website information certification.[25] The Health On the Net Foundation (HON), an organization headquartered in Switzerland, established a code of conduct with a definition of ethical aspects for websites that provide information on health, and awards certification for those in compliance.[21,25]

The upsurge in fake news and controversies related to health are a challenge for health consumers

and educators, in addition to representing a research opportunity for the scientific community in the area of health informatics. Greater concern about the quality of online health information could help prevent inadequate information reaching the target audience.[26]

The need to develop competencies during nursing undergraduate courses coincides with the regulations of the Federal Nursing Council, which state that professionals should participate in ongoing education programs and be involved in risk evaluation, wound prevention and management activities.[16]

The teaching method used in nursing education on wounds is essential for improving the quality of the care provided to people in risk or who develop pressure injuries.[3] Since pressure injuries are a quality indicator directly related to nursing, nursing education programs should include development of important competencies for pressure injury prevention and care, as set forth by the NPUAP.[3,14,27]

Implementing strategies to provide education on the topic could improve knowledge and the quality of care provided by students to patients.[7,28] Authors have found an association between high levels of education/training on the subject and better knowledge scores. They also stress the importance of implementing systematic and comprehensible approaches in order to enhance the knowledge of students about pressure injury prevention and management.[8]

Researchers carried out a study in the United States to prepare a list to verify the competency skills of students in relation to pressure injuries, as well as educational strategies based on adult learning principles, to support knowledge acquisition. They emphasize the need to enhance competencies through successful education strategies to incorporate evidence-based practices.[3]

In the United Kingdom, it was suggested in a study that lack of knowledge and education of health services professionals is a key factor for the occurrence of pressure injuries in institutions, since there is no basic curriculum during their training.[29] To address the problem, health services leaders developed a national program called *Stop the Pressure*, which proposes a basic curriculum for educating nurses and other health professionals about pressure injury prevention. This program recommends conducting studies that support the structuring of curricular content aimed at providing education on the subject.[27]

A multicenter study, conducted in Australia, assessed evidence-based knowledge and attitudes of nursing students in relation to pressure injury prevention. The students lacked knowledge about preventive strategies for reducing the number and duration of pressure/shearing injuries, positioning and devices used to alleviate pressure. Educational level and knowledge about pressure injury prevention had statistically significant differences. They also manifested low confidence in their ability to use pressure injury prevention strategies. Statistically significant differences were found among the attitude and educational level variables. The authors claimed that implementing strategies to improve knowledge on the topic can enhance the quality of care given.[28]

The Internet has texts, images and animations, among other objects that can be used for training students, even though not many of these resources are open source or in Portuguese. Digital technologies provide options for updating and training professionals, since they allow for flexibility in study time schedules, as well as access to and use of organized educational resources and innovations in pedagogical practices.[5,30]

The content validation and information quality evaluation confirmed the reliability and quality of the website's content. These evaluations are necessary because there is plenty of ungrounded information on the Internet and, in the area of health, the quality of this information can generate problems, which institutions and researchers have sought to resolve. Information on the Internet can be low quality, insufficient, outdated and of dubious origin, in addition to having a poor scientific foundation.[25]

Conclusion

The website, built based on national and international references on nursing competencies for

pressure injury prevention and management, was validated in terms of its appearance and content by the nursing judges. The quality of the information was considered excellent. The website was also evaluated by professional informatics judges who deemed its technical quality to be excellent. Therefore, the website can be used as an educational resource to help teach nursing students about pressure injuries.

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Collaborations

Bernardes RM and Caliri MHL contributed to the study design, data analysis and interpretation, writing of the article, relevant critical analysis of the intellectual content and approval of the final version for publication.

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