



Development and validation of educational technology for venous ulcer care

Construção e validação de tecnologia educativa sobre cuidados com úlcera venosa

Construcción y validación de tecnología educativa acerca de los cuidados con úlcera venosa

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ABSTRACT

Objective: To develop and validate an educational technology venous ulcers care. **Method:** Methodological study conducted in five steps: Situational diagnosis; literature review; development of texts, illustrations and layout; apparent and content validity by the Content Validity Index, assessment of Flesch Readability Index; and pilot testing. **Results:** The developed technology was a type of booklet entitled *Booklet for Venous Ulcers Care*, consisting of seven topics: Diet and food intake, walking and light exercise, resting with elevated leg, bandage care, compression therapy, family support, and keeping healthy habits. The apparent validity revealed minimal agreement of 85.7% in the clarity and comprehensibility. The total content validity index was 0.97, the Flesch Readability Index was 75%, corresponding to the reading "fairly easy". The pilot test showed that 100% of people with venous ulcers evaluated the text and the illustrations as understandable, as appropriate. **Conclusion:** The educational technology proved to be valid for the appearance and content with potential for use in clinical practice.

DESCRIPTORS

Varicose Ulcer; Health Education; Educational Technology; Nursing Care; Validation Studies.

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INTRODUCTION

Venous ulcers (VU) represent the most advanced stage of chronic venous insufficiency, being essentially caused by venous hypertension. Most cases occur with repetitive ulcerative cycles, followed by a long healing process, resulting in recurrence over decades. VU cause pain, sleep disorders, restricted mobility, dependence and social isolation, it is considered a major public health problem, affecting, mainly, productivity and quality of life of affected people⁽¹⁻³⁾.

Clinically, VU are characterized by irregular edges, presence of yellowish exudate and lipodermatosclerosis⁽⁴⁾; They may be single or multiple; of varying size, usually with slow progression, but sudden onset. Chronic venous insufficiency is responsible for about 70% of chronic leg ulcers, with general population prevalence of 1 to 2%, increasing to 2 to 3% in patients over 80 years⁽²⁻⁴⁾. The incidence of venous ulceration is similar between young male and female, although these ulcers are more common in women over 60 years⁽⁵⁾. In Brazil, researches point out a prevalence of 3.6% of active VU and/or healed wounds in more than 15 years and a higher prevalence in women⁽⁶⁻⁷⁾.

VU treatment requires a multidisciplinary therapeutic approach and involves pharmacological and educational activities, it aims to correct the underlying cause of ulceration and address the factors that exacerbate it, to promote healing and prevention of relapse⁽⁵⁾.

With regard to the educational actions, the VU treatment success includes the involvement of patients, their families and health professionals, providing essential part of treatment⁽²⁻³⁾.

The educational process in health is an instrument of socialization of knowledge, health promotion and disease prevention, particularly in the context of chronic diseases⁽⁸⁾. Among the health professionals involved in the use of educational actions, nurses are constantly challenged to seek for options that offer them support to work with people, groups and communities, and educational technologies as strong allies in this process. However, for these professionals to use these instruments effectively, they must be developed and validated⁽⁸⁾.

The use of printed educational technologies such as manuals, brochures, folders, small books, flipchart and booklets is a viable alternative for information and sensitization of the population, and may open new paths for health promotion through people's participation in a shared construction of knowledge, and allows the patient and his/her family a later reading, reinforcing verbal directions, serving as a guide in cases of doubt and aiding the decision-making daily⁽⁹⁻¹⁰⁾.

In this sense, the aim of the study was to develop and validate an educational technology for VU care.

METHOD

This is a methodological research carried out in five steps: Situational diagnosis; literature reviews; preparation of illustrations, layout, design and texts; apparent and content validation and calculation of Flesch Readability Index (FI); and pilot testing.

The first step was based on the care indicated by 51 people with VU diagnosis monitored by a vascular surgery clinic from August to November 2011 selected by convenience. Interviews were conducted with the assistance of a script that contained questions regarding ulcer features: recurrence, disease length of time, hospitalizations and location. In addition to the following question: What precautions do you think are important to treat your ulcer? Participation was voluntary, by signing the Informed Consent Form.

Identifying these topics formed the basis for the second step carried out from October to December 2011. The first search of the literature was performed in the databases SciELO and Medline/PubMed using the Descriptors of Health Science/Medical Subject Headings (DeCS/MeSH): "venous ulcers", "nutrition", "physical activity", "rest", "smoking", "alcoholism", "ideal body weight", "bandage", "compression therapy" and "medical chaperones". We used the controlled descriptor "venous ulcers" linked through the Boolean operator AND to the aforementioned descriptors. Studies published between 2006 and 2011 were included.

The second search was conducted in the same aforementioned databases in the same period of the first, in order to identify which types of printing technologies were most used and recommended for use with patients suffering from disease or clinical condition that required active participation in their treatment. The descriptors "teaching materials", "health education", "technology assessment, biomedical" and "educational and promotional materials" were used. The controlled descriptor "chronic disease" was associated to the Boolean operator to the above descriptors.

In the third step, conducted from January to March 2012, the selected content and graphics were developed and submitted to the editing and layout process, according to criteria related to the content, structure/organization, language, layout and design, cultural sensitivity and appropriateness to the elderly population⁽¹¹⁾.

In the fourth step, there was the apparent and content validation process by experts, which was held from April to October 2012. It was noted that, in this study, an expert was considered a person who presented wide capacity acquired by a high degree of knowledge, skills and experience in a specific area of knowledge, even presenting the particularity of being identified and recognized by others⁽¹²⁻¹³⁾.

Professionals were considered experts if they presented at least two of the following criteria: development of prevention and/or health promotion aimed at people with VU for at least 10 years; have published scientific papers on VU and/or on development and validation of educational materials; being an expert in stomatherapy and/or member of the Brazilian Society of Stomatherapy; having a master's degree or PhD with scientific production in the VU area or production of educational technology; being a member of the Brazilian Society of Angiology and Vascular Surgery.

For identification of experts, professional life was investigated using *Lattes*^(a) Curriculum to verify the adequacy of the expert to the criteria established in the study and

^(a) This is a Brazilian national *Curriculum vitae* for researches, recognized by the government.

snowball sampling was used. Thus, we identified 11 experts and seven agreed to participate. It is noteworthy that the odd number of experts was essential to avoid ties in the opinions during the validation process⁽¹⁴⁾.

During apparent and content validation, the responses were analyzed following three aspects: clarity and understanding of texts and illustrations; relevance; and degree of relevance of the booklet content. When judged necessary, the experts suggested changes, which were considered in the final version.

With regard to the content validity, the Content Validity Index (CVI) was used, so that an agreement rate from 80% was considered valid parameter. The CVI was calculated for three mathematical equations: S-CVI/Ave (average content validation indexes for all scores of the scale), S-CVI/UA (ratio scale items that reaches score 3 – really important – and 4 – very important – by all experts) and the I-CVI (content validity of individual items)⁽¹⁴⁻¹⁵⁾.

Regarding content validity, they questioned the relevance (yes or no) and the degree of relevance. The items considered irrelevant and unimportant had zero score, and really important and very important items had score 1⁽¹⁴⁾.

Still in the fourth step, we calculated the FI, which assesses the degree of readability of text on a percentage scale from zero to one hundred. All texts were selected and evaluated by the text analysis software of the Microsoft Office Word. The higher the score of the FI, the greater the text readability and rated lower the required level of education. A text considered default by FI is the one with percentages between 60 and 70%. In this study, we established an FI above 70% as acceptable for the booklet, which allowed rank reading as fairly easy/easy/very easy. In case of lower index, the text would be rewritten⁽¹⁶⁾.

The fifth step consisted of the pilot test with the presentation of the booklet to 23 people with VU treated at a specialized clinic in vascular surgery, selected for convenience in February 2013. At the end of each page, it was asked if the person understood what was written and if the illustrations were adequate.

Tabulating and calculating the average of the CVI, we used the Statistical Package for Social Sciences version 20.0, in which the presentation of the results was made through descriptive statistics.

This study was approved by the Research Ethics Committee of the *Universidade Federal do Ceará* with the protocol 065 07.10. All participants, including 51 from step 1, 7 from step 4, 23 from step 5, signed a Consent Form and confidentiality of all information collected was guaranteed, and the anonymity of the participants ensured, according to the Resolution 196/96 of the standards of the National Health Council of the Ministry of Health for research with human beings, adapting to the Resolution 466/12 when necessary, since the data were collected in the period of the first resolution.

RESULTS

The booklet, called Educational guideline for venous ulcers care, in its final version, consisted of cover and 14

pages, with standard size format 21cm high by 15cm wide. Each page had four illustrations at the top, totaling 25 illustrations (Figure 1).

The answers obtained in the first step of the study were registered and organized into themes: diet and food intake, keeping healthy habits, walks and light exercises, rest associated with limb elevation, bandage care and use of compression therapy.

In the second step, the first search revealed 31 scientific studies. They were also used a thesis and dissertation theses available via the portal of Coordenação de Aperfeiçoamento de Pessoal de Nível Superior and five textbooks.

The second search found 26 scientific studies. It was evident that most printed educational technologies produced for this audience was on the booklet type. Therefore, we opted for the production of this type of educational technology.

After reading the selected material in association with the responses obtained in the first step of the study by the VU elderly patients, the content used for educational booklet was divided into seven topics: Diet and Food intake, Walking and light exercise, Rest with elevated leg, Bandage care, Compression therapy, Family support and Keeping healthy habits, which led to sections of the booklet.

As for the content used for the construction of the educational technology, in each section three to four ideas were presented, which included only necessary information for the reader to understand and follow each message; these were written in the form of dialogues, through the active voice, short sentences and words with simple definitions, and familiar analogies to the public, in order to facilitate understanding of the information.

The ideas were highlighted by illustrations and motivational steps on healthy lifestyle habits and information to promote patient care, following a logical sequence. Thus, initially, the main character of the booklet presented by telling her health care routine, emphasizing the measures favoring the healing of the VU. Throughout the booklet, some care actions for improving health status were shown, so that at the end, she demonstrates a successfully performed care, leading to VU healing.

In the presented illustrations, ethnic aspects of the target audience were taken into account, considering that this is a disease that affects mostly women and elderly, the main character portrayed with these characteristics.

The illustrations were placed as close to the texts to which they referred, and used drawings appropriate to the reader, avoiding illustrate material aimed at adults/elderly with children and juvenile reasons. To this end, we used high-definition graphics, designed by professional expert in graphic design.

Regarding the writing style and design, we used the fonts Times New Roman and Comic Sans MS, size 14 for text and 16 for titles. The use of bold was used only for the titles or highlights. We prioritized images rather than texts, since not all readers were able to read and perform the interpretation only in words. The key words or ideas were placed at the beginning of the sentence or the proposition, and the most important information was put at the beginning and end of the document.



Figure 1 – Cover and pages of the booklet for venous ulcers care⁵ – Fortaleza, Ceará, Brazil, 2015.

Some figures were presented totally colored when highlighted in its entirety, and others were drawn in black and white with just a few colored elements that deserved greater emphasis. The entire development process as the proof of reading, illustration and layout of the booklet was done by a graphic design. The booklet is now in the process of obtaining the authorship registry.

After the process of developing the educational booklet, we proceeded to the apparent and content validation, which was performed by seven experts, three nurses, two vascular surgeons, a physical educator and a nutritionist. The average age was 40 years; six completed specialization courses; one, had a master's degree; one, a PhD; and one had post-doctoral studies.

Regarding professional experience, six reported an average of 10 years of experience with VU; four had experience in health education, an average of 9 years. In addition, six have experience in the development and/or validation of educational materials. Five had publications about VU and/or educational technology. Two were members of the Brazilian Society of Angiology and Vascular Surgery.

Regarding the apparent validation concerning the clarity and understanding of the texts and illustrations, it can be seen on every page of the booklet, that most experts judged the text as clear and comprehensible, and the illustrations as self-explanatory (Figure 2).

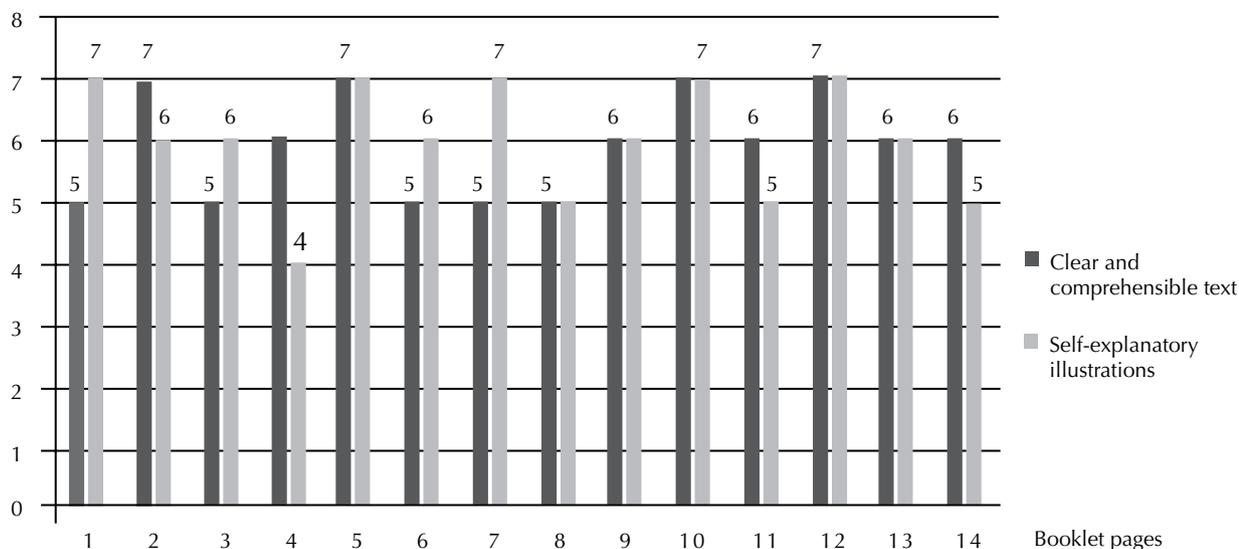


Figure 2 – Expert assessment for text clarity and comprehensible illustrations for the booklet venous ulcer care – Fortaleza, Ceará, Brazil, 2015.

Regarding the relevance of the text and illustrations of each page of the booklet, the experts responded that 12 of the 14 pages were relevant, with the exception of pages 3 (Focusing on topic malnutrition) and 8 (Indicating the resting time) which a judge referred to as relevant “in part”, suggesting some modifications.

In the analysis of the degree of relevance, by applying the three equations (SVI-Ave, SCVI /UA, I-CVI), showed a total CVI of 0.97. Table 1 shows the CV index by topics and pages.

The aimed CVI should be higher than 0.80, characterized by a high level of agreement among the experts, being considered the booklet validated in its content.

It is noteworthy that the answers, comments and suggestions of the experts were analyzed, verifying the consensus according to the degree of agreement of the content and structure/organization, language, layout and design, cultural sensitivity and appropriateness, not being suggested inclusion nor illustrations exclusion, only some adjustments related to: grammar changes, zoom in the text of the figure and removing repetitions, use of only one term for healing, inclusion of the phrase *reduce the consumption of sugar and salt* in the recommendations, differentiation of leg elevation angles during the day and at night, placing the explanation of the compression therapy, such as the use of compression socks.

Table 1 – Distribution of content validity of individual items (I-CVI) total and per page of the educational booklet for venous ulcer care – Fortaleza, Ceará, Brazil, 2015.

Topics	Page	I-CVI
	1	0.857
Diet and food intake	2	1
	3	0.857
Walking and light exercises	4	1
	5	1
Resting with elevated feet	6	1
	7	1
Bandage care	8	0.857
	9	1
Compressive Therapy	10	1
	11	1
Family Support	12	1
Keeping healthy habits	13	1
	14	1
Total		0.97

For readability, the FI of the booklet (75%) was higher than established, and the text of the booklet classified as fairly easy to read.

Out of the 23 participants in the pilot test, 12 (52.2%) were 60 years or older, 12 (52.2%) were men, 14 (60.9%) had not completed primary education, 14 (60.9%) were married or held a stable union, 11 (47.8%) were retired, 17 (73.9%) lived with one to three minimum wages and 23 (100%) lived with a partner or family.

Regarding the pilot test, all 23 participants rated the text as understandable, and illustrations as appropriate. No suggestions, opinions or doubts were highlighted.

DISCUSSION

It is a known fact that the educational technologies are necessary and relevant, as they are capable of providing information to improve knowledge and motivation of the patient, especially with chronic disease, making them able to understand how their own actions influence their health standard^(8,17).

The educational booklet came from the needs of people with VU and was built following the scientific criteria, and therefore, a potential strategy to gather knowledge able to support safer practices in the health area⁽¹⁸⁾.

In this study, previous diagnosis of knowledge demands of people with VU on treatment; the use of a reference for its layout and language; validation by experts with different backgrounds and experience with VU; and the participation of the audience in the final assessment allowed an easy material to understand VU treatment.

Researches indicate that knowledge and user questions need to be considered in the development of educational technologies; additionally to the close relationship between the quality of educational materials, the use of principles and defined ways of development⁽¹⁹⁾.

The apparent validity was considered adequate by experts with minor corrections in two of the 14 pages. The content assessed showed a high score of the CVI, with excellent level of agreement among experts, suggesting that the booklet is representative of the content to be approached about VU care. The use of apparent and content validity by experts has been made by researchers in

the evaluation of technologies. Similar CVI scores were found in other studies of educational technologies^(17,20).

Readability was a satisfactory percentage and mainly consistent with the assessment of people with VU in the pilot test, which, in its entirety reviewed the language of the booklet as comprehensive. The degree of readability of an educational material is important, to avoid learning limitations as a result of low educational level⁽²¹⁾.

Regarding language, this can facilitate or hinder the message sent. It should be given special attention to this aspect. The textual preparation should be appropriate to the educational and cultural level of the individual so that he/she can benefit from the developed educational technology. In this sense, the participation of experts and representatives of the target audience can raise the credibility and acceptance of educational technologies⁽²¹⁾.

CONCLUSION

This study made it possible to present a process based on the development and validation of the educational material on the relationship between the needs of people with venous ulcers and scientific knowledge on the subject.

The methodology used proved to be able to support the development of an attractive and comprehensive educational technology, which can facilitate the development of other educational technologies, both in this topic or in any other, involving the need for care.

The booklet is relevant because it is a new educational technology for health education activities in order to motivate patients and families in maintaining good practices in the care of venous ulcers and it can be used by nurses, doctors, nutritionists and other professionals involved in the care of people with venous ulcers.

We point out that there were some difficulties for the choice of experts in the implementation of this study, a task that was a hard work, given the specificity of the topic. It is noteworthy that although this study indicates potentially positive outcomes for the use of the booklet, more researches are essential to carefully assess the application processes, as well as long-term follow-up studies with patients and their families.

RESUMO

Objetivo: Construir e validar uma tecnologia educativa para cuidados com úlcera venosa. **Método:** Estudo metodológico realizado em cinco fases: diagnóstico situacional; revisão da literatura; desenvolvimento de textos, ilustrações e diagramação; validade de aparência e de conteúdo pelo Índice de Validade de Conteúdo, avaliação do Índice de Legibilidade de Flesch; e teste piloto. **Resultados:** A tecnologia desenvolvida foi do tipo cartilha intitulada *Cartilha para cuidados com úlcera venosa*, constituída de sete tópicos: Alimentação, Caminhadas e exercícios leves, Repouso com a perna elevada, Cuidados com o curativo, Terapia compressiva, Apoio familiar, e Manter hábitos saudáveis. A validade aparente revelou concordância mínima de 85,7% na clareza e compreensibilidade. O Índice de Validade de Conteúdo total foi de 0,97, o Índice de legibilidade de Flesch foi de 75%, o que correspondeu à leitura "razoavelmente fácil". O teste piloto revelou que 100% das pessoas com úlcera venosa avaliaram o texto como compreensivo e as ilustrações, como adequadas. **Conclusão:** A tecnologia educativa mostrou-se válida quanto à aparência e ao conteúdo, com potencial de utilização na prática clínica.

DESCRIPTORIOS

Úlcera Varicosa; Educação em Saúde; Tecnologia Educacional; Cuidados de Enfermagem; Estudos de Validação.

RESUMEN

Objetivo: Construir y validar una tecnología educativa para cuidados con úlcera venosa. **Método:** Estudio metodológico llevado a cabo en cinco fases: diagnóstico situacional; revisión de la literatura; desarrollo de textos, ilustraciones y diagramación; validez de apariencia y de contenido por el Índice de Validez de Contenido, evaluación del Índice de Legibilidad de Flesch; y prueba piloto. **Resultados:** La

tecnología desarrollada fue del tipo libreta titulada *Cartilha para cuidados com úlcera venosa* (Libreta para cuidados con úlcera venosa), constituida de siete tópicos: Alimentación, Caminatas y ejercicios ligeros, Reposo con la pierna elevada, Cuidados con el apósito, Terapia compresiva, Apoyo familiar y Mantener hábitos sanos. La validez aparente desveló concordancia mínima del 85,7% en la claridad y comprensibilidad. El Índice de Validez de Contenido total fue de 0,97, el Índice de legibilidad de Flesch fue del 75%, lo que correspondió a la lectura “razonablemente fácil”. La prueba piloto desveló que el 100% de las personas con úlcera venosa evaluaron el texto como comprensivo y las ilustraciones como adecuadas. **Conclusión:** La tecnología educativa se mostró válida en cuanto a la apariencia y el contenido, con potencial de utilización en la práctica clínica.

DESCRIPTORES

Úlcera Varicosa; Educación en Salud; Tecnología Educacional; Atención de Enfermería; Estudios de Validación.

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