

Construction and evaluation of a serial album for the prevention of foot complications in diabetics

Construção e avaliação de álbum seriado para prevenção de complicações dos pés em diabéticos

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ABSTRACT

Objective: to describe the construction process and evaluate the evidence for content and appearance validity of a serial album for the prevention of foot complications in diabetics. **Methods:** methodological study of the construction of the educational material, according to the following steps: bibliographic survey; construction of the educational technology and validation of content and appearance by experts in diabetes and technical production. The judges were chosen by convenience, five for content and two for appearance. The Content Validation Index and the Suitability Assessment of Materials were applied. **Results:** the Content Validation Index showed agreement among judges, with a result ranging from 0.76 to 1.0. According to the score obtained in the Suitability Assessment of Materials, the material was considered adequate, with a percentage of 44.5%. **Conclusion:** the serial album was considered valid for content and appearance and is suitable for clinical validation for use by health professionals in health education activities.

Descriptors: Diabetes Mellitus; Diabetic Foot; Educational Technology; Self Care; Nursing Care.

RESUMO

Objetivo: descrever o processo de construção e avaliar as evidências de validade de conteúdo e de aparência de álbum seriado para prevenção de complicações dos pés em diabéticos. **Métodos:** estudo metodológico da construção do material educativo, conforme as etapas: levantamento bibliográfico; construção da tecnologia educativa e validação do conteúdo e aparência por especialistas em diabetes e produção técnica. A escolha de juízes deu-se por conveniência, sendo cinco de conteúdo e dois de aparência. Aplicaram-se o Índice de Validação de Conteúdo e o *Suitability Assessment of Materials*. **Resultados:** o Índice de Validação de Conteúdo evidenciou concordância entre juízes, com resultado variando de 0,76 a 1,0. Pela pontuação obtida no *Suitability Assessment of Materials*, o material foi considerado adequado, com percentual de 44,5%. **Conclusão:** o álbum seriado foi considerado válido quanto ao conteúdo e aparência, estando apto à validação clínica para uso por profissionais de saúde em atividades de educação em saúde.

Descritores: Diabetes Mellitus; Pé Diabético; Tecnologia Educacional; Autocuidado; Cuidados de Enfermagem.

Introduction

The prevalence of people with diabetes mellitus has grown 62.0% in Latin America, with such people being mostly located in the Brazilian territory, with approximately 12.5 million individuals, predominantly urban and female. These data placed Brazil in the fourth position of the ten countries with the highest number of people with diabetes in the age group 20 to 79 years in 2017, preceded only by China, India, and the United States. In addition, Brazil has the highest diabetes mortality rates in South and Central America⁽¹⁾.

High blood glucose levels can cause nerve damage throughout the body, compromising autonomic, motor and sensory functions. This condition can lead to ulcerations, severe infections, amputations, and consequently death⁽²⁻³⁾. Epidemiological data show that every 30 seconds, a lower limb or part of it is amputated somewhere in the world because of diabetes. Therefore, diabetic foot is a severe chronic complication of considerable relevance to public health, leading to high costs with medical expenses, due to its implications and impacts on the quality of life of the affected person⁽¹⁾.

The nurse has an important role in the identification of the context of the person affected by this disease and, for such, it is necessary to verify the educational level and perform educational interventions that facilitate the process of knowledge appropriation in preventive care for the diabetic foot⁽³⁻⁴⁾. Within this scenario, educational technologies come as a tool to facilitate the work of health professionals regarding the communication and guidance of patients and caregivers, in addition to streamlining health education activities.

Educational activities focused on self-care have shown a change in knowledge, attitude, and practice, as evidenced by a strategy applied in a quasi-experimental study with diabetics, which showed improvement in aspects of healthy eating and hand and foot care after the intervention⁽⁴⁾.

The use of educational interventions in adult

patients with diabetes mellitus associated with multidisciplinary care has positively influenced the reduction of complications such as peripheral neuropathy and foot lesions⁽⁵⁾. The serial album is a technology that facilitates the mediation of an educational process by providing images and texts in physical material, configuring itself as low cost and easy to acquire, allowing the interaction of the user/patient and the professional/mediator. This technology is suitable for individual or group activities, does not require electricity or internet and can be applied to people with low educational level or few digital skills, since it replaces the use of some resources, such as printed leaflets or cell phone applications⁽⁶⁾.

Thus, the importance of the construction of a photo book, a soft-hard educational technology, for the development of autonomy regarding health care based on the reflection on one's own actions and choices about the health problem and the better understanding of the subject addressed is ratified⁽⁷⁾. The construction and validation of a serial album for diabetic foot prevention are relevant because it is a major public health problem, with high rates of complications and public spending^(3,8).

Moreover, the use of educational strategies has been presented as a tool to raise awareness and stimulate the active participation of the person with diabetes, becoming co-responsible for the promotion of their health, prevention of grievances and recovery of diseases^(3,8). Thus, this study aimed to describe the construction process and evaluate the evidence for content and appearance validity of a serial album for the prevention of foot complications in diabetics.

Methods

The present methodological study deals with the development of a serial album to be used as an educational strategy during nursing consultations with patients with diabetes mellitus and companions in waiting rooms, with the purpose of educating about self-care with the feet, in order to prevent complications related to them and treat existing ones.

This research was developed according to the following steps: 1) Bibliographic survey; 2) Construction of the educational technology; and 3) Validation of the content and appearance by experts in diabetes and technical production, based on similar research⁽⁹⁻¹⁰⁾, which also sought to follow the same steps in the construction and validation of their health educational technologies.

As for the first stage, a broad search was conducted in the scientific literature on the subject, selecting the main international and national guidelines on care for people with diabetes and the diabetic foot, without temporal restriction, to reach all materials related to the subject. The selected materials went through reflective reading and group discussion, composed of nine members, being seven undergraduate nursing students who contributed to different phases of the methodological pathway and two university professors who guided the process. The group was created with the purpose of producing the serial album, including all the stages of the methodological study described here.

An integrative review was conducted based on the guiding question: "What are the productions about technologies for health promotion and prevention of diabetic foot?" in order to verify the characteristics of the productions and their contents, as well as identify elements used in their construction. The search occurred in the databases Database on Nursing, Cumulative Index to Nursing and Allied Health Literature, Latin American and Caribbean Literature on Health Sciences, SCOPUS and in the PUBMED meta search in June 2016, using the following descriptors: educational technology, diabetic foot and nursing care, with the Boolean operator AND. Data were extracted using an instrument containing the following information: authors; year of publication; database; journal; country; type of study and main findings. The final sample was composed of six articles, divided into the following categories: 1. issues addressed in educational activities on diabetic foot (four articles) and 2. technology used and its methodologies (two articles). The findings on the main subjects led the authors to gather up-

dated data obtained from manuals, official documents such as guidelines, protocols and consensus for the construction of the serial album, which were pointed out, in short, in the references of the review articles and in national and international documents^(1,3).

In the second step, the structures of the illustrations were defined in order to address specific elements in each section, and guide sheets were prepared to guide nurses during the use of the educational material. Then, a design specialist was consulted to make the educational material according to the previously established guidelines, so that the album would be attractive and easy to understand for the target audience. The program used for the illustrations was Adobe Illustrator® and the diagramming and configuration of the album were made in Adobe Indesign®.

Regarding to the third step, validation of content and appearance of the educational material, this was performed through the appreciation of a committee composed of seven judges, two professionals with expertise in visual communication (validation of technical production) and five nurses (content validation), through the application of two validated instruments, a path performed in similar studies⁽¹⁰⁻¹¹⁾. The search for the judges was conducted by convenience through the network of contacts of the authors and contact with them occurred by email in December 2017 and January 2018. However, for the stipulated period, we obtained a return rate of 82.0% (n=14) and an acceptance rate of 29.4% (n=5). These had notorious knowledge in diabetes, since the selection of content judges had considered as inclusion criteria: time working in the area of diabetes over five years, experience in diabetes and diabetic foot, and four of the five content judges had worked with validation of educational material. Five visual communication professionals were also invited, and they returned, two of them having accepted the invitation. The selection of the technical judges considered previous experience in validation of educational materials and their availability, given the difficulty of availability and participation of professionals in a timely manner. Thus, the judges were considered qualified to analyze the con-

tent, presentation, clarity, and understanding of the serial album by means of the instrument provided, conferring it validity⁽¹²⁾.

The number of judges met the recommendation of experts who suggest a minimum number of five and a maximum of ten people, as found in similar designs⁽¹³⁾. It is noteworthy that the five content validation judges and the two technical validation judges answered the questionnaires for calculation of the Suitability Assessment of Materials (SAM) and the Content Validity Index (CVI) in full, and although the two groups of judges answered the same instruments, the reading was done according to the speciality of each one, which valued the different suggestions made by the judges.

The Suitability Assessment of Materials evaluates, in a global way, through six domains containing 22 items the following aspects: 1. content; 2. literacy demand/appropriate language for the population; 3. graphic illustrations, lists, tables and graphs; 4. layout and typography; 5. stimulation for learning and motivation; and 6. Cultural appropriateness. The SAM score ranges from 0 to 100% appropriateness. If the material reaches 0 to 39% it is considered inadequate; from 40 to 69%, adequate; and if it reaches 70 to 100% of the scores it will be considered superior educational material⁽¹⁴⁾.

The Content Validity Index (CVI) was used to analyze the album script sheets. This is a percentage index calculation that uses a Likert-type scale with scores ranging from one to four to assess the degree of agreement among judges about the adequacy of the material. To calculate the CVI, the following criteria were considered for texts and figures on each page: 1) Clarity of language; 1) Practical relevance; and 3) Theoretical relevance. For each criterion, the degree of agreement was 1 for "very little", 2 for "little", 3 for "medium", and 4 for "a lot". The calculation was based on the sum of the relative frequencies of answers three (average) and four (a lot) over the total number of answers for each part of the album, adopting the parameter of excellence of the Content Validity Index equal to or greater than 0.80⁽¹⁵⁾. The judges also had a

space to make considerations about the content and clarity of the material below each question. The suggestions made by the judges were evaluated as to their relevance and, after approval by the authors, included in the final version of the serial album. The items that scored below 0.80 in the CVI calculation were removed from the album.

After returning from the judges, the data were organized in Excel[®] software. For the SAM, scores were assigned to each category, with 2 points for the item evaluated as "superior", 1 point for the item evaluated as "adequate" and no points for the item evaluated as "inadequate". With this, the calculation was performed based on the sum of the scores, subsequently divided by the total scores and multiplied by one hundred.

The construction data were presented descriptively and the information about the validation was allocated in a table. It is noteworthy that the study was approved with opinion number 1,739,998/2016 by the Research Ethics Committee of the Assis Chateaubriand Maternity School, being in accordance with the recommendations of the Guidelines and Regulatory Standards for Research Involving Human Beings and Resolution 466/12, of the National Health Council/Ministry of Health.

Results

The serial album was entitled *De olho na prevenção do pé diabético* (Eye on diabetic foot prevention) and, after illustration and layout, had, in its final version, 26 pages, including cover, fact sheet, script sheets (eleven pages), illustrations (eleven pages), references, and back cover with information from collaborators. The formatting size was 42 cm long and 30 cm high. All pages had illustrations on the front page (the page shown to the target audience), all in color, and on the back page, a page that serves as a guide for the professional.

The themes addressed in the album went through the concept of diabetes mellitus, symptoms, and the interference of diet in the course of the disease, as well as health care. Later, the technology men-

tions and describes the complications of diabetes such as hypoglycemia, diabetic foot, and other macro and microvascular complications. The most emphasized topic of the album was the foot at risk and its complications, aiming to guide the patient regarding warning signs, necessary care such as hygiene, and the use of appropriate footwear. The album was structured in eleven general topics, seeking to include the family and companions in the promotion of care, while it sought to support the actions of health education offered by the professionals who used this technology.

The appearance and content validation of the album was performed through the analysis of expert judges. Of the five content validation judges, all had more than five years of training in nursing, with the shortest training time being six years and the longest, 13 years. Only one of the content validation judges was pursuing a doctoral degree, while all the others held a doctoral degree. Three judges worked exclusively in teaching, one of the judges worked in teaching and assistance, and one worked exclusively in assistance. Regarding the experience of the judges with the subject "diabetic foot", the time ranged from 5 to 11 years. All judges had published on the subject and only one of the judges had no experience with validation of educational material. As for the two technical judges, both had a degree in social communication

with a qualification in advertising and publicity, both were under 30 years old, and their training time ranged from two to six years.

The album was built based on an illustrative figure that should be shown and explained to the target audience (called Figure - F in this study), and a chart with content directed to the nursing staff (called - R).

The results of the calculation of the Content Validity Index showed a proportion of agreement in the judges' evaluation, with a variation of 0.76 to 1.0. The index of content validity of the figures was 0.92 for clarity of language, 0.97 for practical relevance, and 0.96 for theoretical relevance, with an overall CVI of 0.95. The script sheets, on the other hand, had a Content Validity Index of 0.83 for clarity of language, 0.85 for practical relevance, and 0.86 for theoretical relevance, with an overall CVI of 0.84. When calculating the Content Validity Index of the album, a score of 0.90 was reached.

In order to improve the final version of the album, the judges' suggestions were analyzed according to the pertinent literature and corrections were made. Some suggestions made by the judges were analyzed and accepted. Only one script-form scored a CVI below 0.80, and it was removed from the album. The main changes suggested and made to the album are shown in Table 1.

Table 1 – Suggestion of judges regarding clarity of language, practical relevance and theoretical relevance. Fortaleza, CE, Brazil, 2018

Reference	Modifications performed
1F (Cover) CVI=0.95	Change in title of the "Eye on the diabetic foot" series album to "Eye on diabetic foot prevention"
2F - CVI=1.0	Inclusion of the caption "pancreas" below the image
3F - CVI=0.95	Changed illustrative image
2R- CVI=0.80	Changed the textual content for accuracy of definitions
5F- CVI=0.95	Insertion of caption in each image
4R- CVI=0.95	Alteration in the sequence of the text to better differentiate the complications
6F- CVI=0.95	Insertion of a caption below each image
7F - CVI=1.0	Change in the sequence of this image, becoming the sequence picture 3
7R- CVI=1.0	Replacing the term "diabetics" with "people with diabetes"
9F - CVI=1.0	The title "Take care of your health" was added, and physical exercise was added to the picture. In addition, the sequence of the image becomes 4
8R- CVI=0.85	Added table with blood glucose parameters established by the Brazilian Diabetes Society
10F - CVI=1.0	Added title in the "Watch your feet" picture, and made changes to the illustrative image
9R - CVI=0.85	Textual changes for explanatory purposes
11F - CVI=1.0	Insertion of a caption below each image
12F - CVI=1.0	Added "Diabetic Foot" as a title, as suggested by judges
11R- CVI=0.76	Removal of the script sheet from the album as suggested by the judges

CVI: Content Validity Index; F: Figure; R: Script sheet

The assessment of the suitability of the material produced was performed with the judges by applying the Suitability Assessment of Materials (SAM). The overall opinion of the serial album, based on the sum of the average scores among the items, showed that the material was considered “adequate”, with a percentage of 44.5%. The album score ranged from 23.8% to 80.9%. The item with the highest score was “learning mediated by advanced signs” with 80.9%. The item “active voice style is used” scored the lowest with 23.8% in the sum of the percentages of the scores.

The first domain, “Content” obtained the highest score with 60.6%, containing four sub-items: the objective is evident; the content addresses behaviors; the proposal is limited and summary or review. On the other hand, domain four, “Layout and Typography”, which analyzes factors of layout, typography, and the use of subheadings, obtained the lowest score, with 26.8%.

Domain two “Demands Literacy/Language appropriate to the population” had a score of 38.0% and has the following sub-items: it is based on the reading level; active voice style is used; vocabulary uses common words; context comes first; and learning is mediated by advanced signs. Domain three, “Graphic illustrations, lists, tables, graphs” with five sub-items: cover, type of illustrations, relevance of illustrations as well as lists, tables, graphs and shapes and the subtitles scored 43.7%.

Domain five “Stimulation for learning and motivation” and domain six “Cultural appropriateness” scored 39.6% and 42.8% respectively. Domain five assesses whether interaction is included in the texts and/or pictures, in addition to desired behavior patterns and self-efficacy motivation. Regarding domain six, it has two sub-items: Cultural play, cultural imagery, and examples. The domains whose scores were below 40.0% underwent changes such as title change, use of common words, and inclusion of desired behavioral situations.

Discussion

A limitation of this study is that the sample size of the judges was reduced due to the collection time, which may have affected the calculation of the CVI and SAM, in addition to the fact that the profile of the judges included more teaching experience than clinical practice.

The use of health technologies is important when aiming at health promotion, disease prevention and treatment since their implementation can occur in these three moments when working with the health of the population in general. The nurse, as an integral part of health care, can develop educational technologies, their validation process, and their application⁽¹⁶⁾.

When developing an educational instrument, it is important to evaluate if it has a methodology that achieves its objective in a clear and reliable way⁽¹⁷⁾. In the present study, the overall CVI of the album was 0.90 and the CVI of the figures (0.95) and chart-forms (0.84) was higher than recommended⁽¹⁴⁾. In the individual evaluation, one chart had a CVI lower than 0.80, and it was removed without prejudice to the album validation by the judges’ analysis. In other methodological studies, there was similarity during construction and validation of educational materials, aiming to improve technologies to be employed in the process of health education and favoring methodological rigor, undergoing adjustments after analysis and review^(6,8,17).

The Suitability Assessment of Materials is an important tool in the evaluation of educational technologies, since it makes possible a more detailed inspection of the educational material in order to identify items of the material that may cause confusion at the time of its implementation by health professionals⁽¹¹⁾. Although three domains were considered inadequate, the overall assessment of the album by SAM was considered adequate (44.5%). The results point to a need for evaluation of the domains mentioned, specifically regarding the adequacy of language, layout and typo-

graphy (elements used, colors, font type and size) and stimulation for learning and motivation, especially through interaction.

Considering that promoting foot care in diabetic patients contributes to reducing the appearance of ulcers and the occurrence of amputations, evidence shows that these interventions carried out through educational actions should reinforce the importance of glycemic control, for which, in addition to pharmacological methods, essential actions should be included, such as daily foot inspection and clarification of questions about nail trimming, foot moisture, and the use of appropriate footwear⁽¹⁸⁻¹⁹⁾.

In a randomized clinical trial conducted in India using educational interventions to increase the level of knowledge and self-care practices of diabetics, there was statistical significance in the comparison between the two groups at the third month, with the group that received educational interventions doing better⁽²⁰⁾.

The development and validation of educational material have the potential to contribute to a nursing care that seeks to overcome the purely medicalizing and hospital-centric practices. In Primary Health Care, where people with diabetes are usually diagnosed and followed-up, the educational activities are part of the health promotion and complication prevention process, making the consultation moment also a propitious moment for learning, when, by acquiring information, the user becomes co-responsible to produce his/her health. The correct use of health technologies, whether by means of pamphlets, manuals, or booklets and folders, is important in promoting the health of patients, by enabling the construction of their knowledge and being able to transform their attitudes and practices.

Attentive to the adequacy of the elements for improvement, this study showed that the material is suitable for use with patients, thus enabling the implementation of educational interventions based on structured knowledge and information to be made available to the clientele. Thus, the use of this serial

album is recommended in strategies for educational activities, facilitating the learning process and making the patient become a fundamental part in his health process and a multiplier of knowledge regarding the prevention and care of the diabetic foot.

It is noteworthy that the clinical validation of the material presented is of paramount importance to ensure greater reliability and credibility to its application. Thus, after its validation with the target audience, the material is suitable to be used as a tool for health education in the clinical practice of nurses who care for diabetic patients.

Conclusion

The process of elaboration and validation of the serial album was carried out following the stages of bibliographic survey, construction of the technology, and validation by judges of content and appearance. The album obtained an overall Content Validity Index of 0.90, indicating that this material is suitable for use in educational activities. For the suitability of the material by means of the Suitability Assessment of Materials, the result of 44.5% categorized the album as suitable. Thus, it is believed that with the validated content, the proposed technology can be used, aiming at the learning process about prevention and care of the diabetic foot in order to minimize the effects of this complication that often affects diabetic people.

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Collaborations

Souza IC, Costa JS, Alencar MMSC, Monteiro PGA, Aquino OS, and Castro RCMB contributed to the conception and design, data analysis and interpretation, writing of the article, relevant critical review of the intellectual content, and final approval of the version to be published.

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