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Original Article

Production of an educational video on diabetic foot care in nursing practice*

Construção de vídeo educativo sobre cuidados com o pé diabético na prática de enfermagem

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ABSTRACT

Objective: to develop educational technology for nurses in the form of an educational video on the care of foot-related conditions in people with diabetes mellitus. **Methods:** a methodological study conducted in three stages: a scoping review; and the development and validation of a storyboard, including pre-production, production, and post-production phases. The content and appearance of the storyboard were evaluated by 14 expert professionals (judges); and audiovisual production (video) was based on the validated storyboard. **Results:** the review identified 15 studies that supported the development of the technical-scientific content of the educational video. During storyboard validation, all evaluated items met the statistical criteria for satisfaction. The overall validation yielded a Content Validity Index of 0.99, Content Validity Coefficients of 0.96, and a Relative Variation of 0.98, attesting to the adequacy of the material's content and appearance. **Conclusion:** educational technology based on scientific evidence was developed and validated. The final product is a validated tool to support clinical practice in the management of feet in people with diabetes mellitus. **Contributions to practice:** the video serves as an accessible resource for nurses' continuing education, offering technical and scientific support that informs clinical decision-making and strengthens competencies in the care of foot wounds in people with diabetes mellitus.

Descriptors: Nursing; Validation Study; Instructional Film and Video; Diabetic Foot; Foot Ulcer.

RESUMO

Objetivo: desenvolver tecnologia educacional para enfermeiros em formato de vídeo educativo sobre os cuidados com as doenças relacionadas aos pés de pessoas com diabetes mellitus. **Métodos:** estudo metodológico, realizado em três etapas: revisão de escopo; construção e validação de um *storyboard*, com fases de pré-produção, produção e pós-produção. Avaliou-se a validação de conteúdo e a aparência do *storyboard* por 14 profissionais especialistas (juízes); e produção audiovisual (vídeo) baseada no *storyboard* validado. **Resultados:** a revisão identificou 15 estudos que subsidiaram a construção do conteúdo técnico-científico do vídeo educativo. Na validação do *storyboard*, todos os itens avaliados alcançaram índices estatísticos satisfatórios. A validação global obteve Índice de Validade de Conteúdo de 0,99, Coeficientes de Validade de Conteúdo de 0,96 e de Variação Relativa de 0,98, atestando a adequação do conteúdo e aparência do material. **Conclusão:** desenvolveu-se e validou-se tecnologia educacional baseada em evidências científicas. O produto final configura-se como ferramenta qualificada para apoio à prática assistencial no manejo dos pés de pessoas com diabetes mellitus. **Contribuições para a prática:** o vídeo apresenta-se como recurso acessível para capacitação contínua de enfermeiros, oferecendo subsídios técnico-científicos que qualificam a decisão clínica e fortalecem competências no cuidado de feridas dos pés de pessoas com diabetes mellitus.

Descritores: Enfermagem; Estudo de Validação; Filme e Vídeo Educativo; Pé Diabético; Úlcera do Pé.

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Introduction

Diabetes mellitus (DM) is a metabolic disorder with various causes, characterized by hyperglycemia and disturbances in carbohydrate, protein, and fat metabolism, with impaired insulin secretion and/or action. This epidemic already affects approximately 246 million people worldwide, of whom more than 12 million are Brazilian[1].

Nurses should focus their health education efforts on promoting health and preventing complications. Among patients who underwent amputation due to complications of DM, 70.8% did not receive regular outpatient follow-up, and less than 32% received health education guidance; consequently, they lacked knowledge of proper foot care and engaged in harmful self-care practices[2].

Educational alternatives for improving health have been widely explored, particularly in health education, which should recognize these alternatives as resources for promoting public health and helping individuals better understand their conditions and practice self-care[3].

Chronic wounds represent a serious, global problem that affects patients' quality of life and health. In this regard, it is important to develop technologies that enable nurses to provide high-quality, safe care to patients with wounds[4-5].

Among chronic wounds, those affecting diabetic patients stand out, as they account for a large portion of the population, representing an increasingly common global health problem. These wounds can directly impact patients' quality of life, leading to amputations and/or even death[6-7]. Morbidity following an initial wound is high, with recurrence rates of 65% over 3 to 5 years, a lifetime incidence of lower limb amputation of 20%, and a five-year mortality rate of 50% to 70%. The psychosocial consequences affect various aspects of the patient's life, particularly in those who undergo amputation[8].

The use of examples and situations drawn from professionals' daily practice is considered an essential educational principle for improving patient care. The use of real-life examples helps provide meaning and facilitates learning to improve care environments[9]. In this sense, educational initiatives in nurses' clinical practice focused on patients with wounds support better therapeutic and clinical management and, consequently, contribute to improving wound-related health indicators.

Digital educational technologies (DETs) are increasingly used in health-related courses, as they contribute to the diversification and flexibility of activities, enabling students to access content at their convenience and from any location[10]. When integrated into clinical practice, DETs enhance learning outcomes and improve patient safety. Healthcare professionals in training can incorporate these technologies into their practice and apply the knowledge gained from these technologies to their daily work, refining nursing care interventions and strategies.

The possibility of improvement in the workplace for trained professionals is becoming increasingly likely[10]. Updating nursing professionals' knowledge is necessary for an effective care plan, with professional training as the primary pathway to improving the team's wound care performance. In this context, adopting strategies to raise awareness and educate the team is essential for implementing new practices in a collaborative and constructive manner[11].

Educational video is an audiovisual technology that serves as a valuable educational tool, as the combination of audio and visuals brings content closer to people's everyday lives, sparking interest and, consequently, enhancing learning[12].

Given this scenario, there is a clear need for educational strategies to support nurses in providing safe and qualified care to people with DM, especially in the management of foot-related conditions in people with diabetes mellitus. Thus, educational technologies serve as relevant resources to strengthen the teaching-learning process, support clinical practice, and promote evidence-based actions. Consequently, the objective of this study was to develop educational

technology for nurses in the form of an educational video on the care of foot-related conditions in people with diabetes mellitus.

Methods

Study design, time frame, and location

A three-phase methodological study: scoping review, storyboard development and validation, and video production. The study was conducted in accordance with the Guideline for Reporting Evidence-based Practice Educational Interventions and Teaching (GREET), designed for reporting evidence-based educational interventions. The scope review was conducted using the JBI methodology, with the protocol registered on the Open Science Framework platform (https://osf.io/rhu36). Data collection took place in September 2021, and the review has been published. Following the literature review, the storyboard for the educational video was developed, followed by expert evaluation of its content and appearance, and concluded with the video's production.

Population, inclusion and exclusion criteria

The storyboard format was chosen because the visual and audio elements that make up a video are best presented in this format. The target audience for the educational intervention consisted of nurses working in the care of people with diabetes at different levels of healthcare, given the applicability of the content in both outpatient and inpatient settings. The content and visual design were validated by professionals (judges) with expertise in the field of wound care. The committee was composed of individuals with experience and recognized knowledge in the field of interest.

The selection of judges was based on criteria of specialization: possessing skills and knowledge acquired through experience; having specialized knowledge that establishes the professional as an authority on the subject; having expertise in a specific field of study; passing a specific test designed to identify judges; and having a high rating assigned by an authoritative body[13]. Each judge was required to meet at least two of these requirements and at least one criterion within each requirement.

The established requirements were: specialization in dermatological nursing or stoma care, a master's degree, postdoctoral training, publications in the field of wound care, clinical experience, and teaching experience in the field. Professionals with audiovisual expertise participated based solely on their acquired experience, as their involvement enhanced the technical quality of the material without compromising the methodological rigor of content validation, which was primarily conducted by health care specialists. There is no consensus on the number of evaluators, as this depends on the available sample. This study sought to involve as many experts as possible[14].

Study Protocol

The sampling technique was a non-probability, convenience-based snowball sampling method, with incomplete questionnaire responses serving as an exclusion criterion. The professionals' résumés were reviewed on the Lattes Platform to verify selection requirements. The questionnaire was sent via *email* and/or WhatsApp as an electronic form (Google Forms) that included the Free and Informed Consent Form with the option to agree or decline to participate, along with a form to characterize the judges' profiles, including questions about professional training and experience in the field of wound care.

To evaluate the storyboard, an adaptation of the Suitability Assessment of Materials (SAM) instrument was used, comprising 16 items distributed across three dimensions: Objective (2 items), Structure and Layout (8 items), and Relevance (6 items). The Brazilian Portuguese version of the SAM was suitable for evaluating various types of educational materials, providing researchers and authors of health education materials with guidance regarding inappropria-

te variables and items. The adaptation consisted of replacing the SAM's original dichotomous/trichotomous scoring system with a five-point Likert scale (1 = strongly disagree; 2 = somewhat disagree; 3 = neither agree nor disagree; 4 = somewhat agree; 5 = strongly agree), while fully retaining the domains and items proposed in the original instrument. Each frame of the storyboard provided space for judges to record suggestions for adjustments, with a deadline for return of seven days from receipt.

Three content validity metrics were calculated: Content Validity Index (CVI), Content Validity Coefficient (CVC), and Content Validity Ratio(CVR). The CVI was calculated as the ratio of the number of judges who assigned scores of 4 or 5 to the total number of judges [CVI = n(4 or 5)/n], adopting a cutoff point of ≥ 0.80. The CVC was calculated as the sum of the scores divided by the product of the number of judges and the maximum score on the scale [CVC = Σ scores/(n × 5)], with a cutoff point of ≥ 0.80. The CVR was used to express the relative agreement among judges, calculated as the proportion of "strongly agree" (5) responses relative to the total valid responses (4 and 5) [CV = n(5)/n(4 or 5)], differing from the Content Validity Ratio, and adopting a cutoff point of ≥ 0.80.

The overall indices (CVI, CVC, and overall CVR) were calculated using "n" as the total number of responses to the 16 items. The storyboard was considered validated when all indices, both item-by-item and overall, met the established cutoff points.

In addition to the content validity indices (CVI, CVC, and CVR), a descriptive statistical analysis of the judges' evaluations was conducted, including the frequency distribution of responses on the Likert scale, identification of the most frequent response for each item, and calculation of the coefficient of variation, with the aim of assessing the dispersion of evaluations among the experts. These analyses were used to complement the interpretation of the obtained validity indices.

After the storyboard was validated by the expert judges, the recorded suggestions were analyzed qualitatively and considered for incorporation into the material when they showed a minimum level of agreement among the evaluators, were supported by technical and scientific rationale, and were feasible to implement. Next, the video production phase began, with the aim of training nurses in the systematic clinical assessment, prevention, and management of foot-related conditions in people with diabetes mellitus, thereby strengthening evidence-based clinical decision-making.

The production was carried out by a communications company and supervised by the researcher, using vector-based animations and audio narration, in accordance with the 12 principles of the Cognitive Theory of Multimedia Learning[15]. The audio consisted of light, informative narration, alternating between male and female voices, accompanied by background music ("Patience") at a constant volume. The recording was performed by a specialized company and edited in Adobe Audition CS6. The vectorized images were created in Adobe Illustrator, laid out in CorelDRAW, and animated in Adobe After Effects CS6. The final video was produced in the MPG format, with a resolution of 1920×1080 pixels and a duration of six minutes and five seconds. The intervention was designed for use in continuing health education and self-learning contexts, allowing asynchronous access to the content and offering flexibility for professionals.

Analysis of Results and Statistics

The data were organized in a Microsoft Excel 2020 spreadsheet and analyzed using SPSS version 22.0. Descriptive analysis was based on absolute and relative frequency distributions and descriptive statistics (minimum, maximum, mean, median, standard deviation, coefficient of variation – CV). Variability was considered low if CV < 0.20; moderate if 0.20 ≤ CV < 0.40; and high if CV ≥ 0.40. The frequency distribution followed Sturges' formula: nc = 1 + 3.32 log n, and range h = Range nc, where n is the sample size and Range = Xmaximum − Xminimum.

Ethical considerations

In preparing this manuscript, the authors used the artificial intelligence tool Claude, developed by Anthropic, to assist with grammatical review and text organization. All content was subsequently reviewed and revised by the authors, who assume full responsibility for the final version of the publication.

To comply with Resolution 466/12 of the National Health Council, the Informed Consent Form was presented to the participant or their legal guardian, and the evaluation began contingent upon this consent. It should be noted that no financial incentives were offered to the participants. The study was approved by the Research Ethics Committee of the School of Medicine at Antônio Pedro University Hospital of the Fluminense Federal University, under Certificate of Ethical Review 38352920.2.0000.5243, No. 4,563,245/2021.

Results

The scoping review identified 15 studies published between 2016 and 2021, originating from 13 countries, that addressed the prevention and treatment of foot-related wounds in people with diabetes mellitus. The interventions were categorized into two main areas: prevention (four studies) and treatment (11 studies).

In axis 1, preventive strategies included health education, periodic assessment protocols, and regular nurse follow-up, the latter proving to be a significant protective factor against mortality. The studies emphasized the importance of diabetes self-management, daily foot inspection, glycemic control, and appropriate footwear. Regarding axis 2, therapeutic approaches ranged from traditional techniques to advanced technologies, notably: (a) debridement in its various forms (autolytic, surgical, mechanical, and conservative); (b) larval therapy; (c) negative pressure therapy; (d) omega-3-rich fish skin graft; (e) specialized topical products (sodium alginate hydrogel, beta-glucan). The review also highlighted the importance of assessing neurological, vascular, and skin integrity, including tests of protective, vibratory, thermal, and pain sensitivity.

These findings directly guided the development of the script and storyboard for the educational video, organizing the content into sequential thematic sections: (1) pathophysiology of foot-related conditions in people with diabetes mellitus. And peripheral neuropathy; (2) systematic clinical assessment; (3) debridement techniques; (4) available dressings and technologies; (5) preventive strategies and health education. Each scene in the storyboard was grounded in at least one of the studies included in the review, ensuring that the material was based on up-to-date scientific evidence.

The educational intervention was developed by nursing researchers, with support from professionals specializing in audiovisual production. The storyboard was validated by 14 expert judges, predominantly female (92.9%), with a median age of 37.5 years (range: 26.9 to 66.1 years). The group was intentionally composed of complementary expertise profiles to ensure an integrated evaluation of content and form.

Of the total, 11 judges (78.6%) had clinical experience in wound care (mean duration of clinical experience: 10.2 years), and were primarily responsible for evaluating the technical-scientific content, including accuracy of information, suitability for the target audience, logical sequence, and clinical relevance, while 5 judges (35.7%) had experience in audiovisual production (mean duration: 7.5 years; range: 6 to 12 years), focusing on the analysis of structural, layout, and visual aspects, such as the appropriateness of language for the video format, font legibility and size, visual organization of scenes, and aesthetic aspects of the illustrations. It should be noted that two judges (14.3%) possessed expertise in both areas (clinical and audiovisual), enabling an integrated, multidimensional analysis of the material. Table 1 presents the complete profile of the judges.

Table 1 – Frequency distribution of the variables characterizing the group of experts (n=14). Niterói, RJ, Brazil, 2023

Variable	n (%)
Gender	
Female	13 (92.9)
Male	1 (7.1)
Age (years)	
26 ⊢ 34	5 (35.7)
34 ⊢ 42	6 (42.8)
42 ⊢ 50	2 (21.4)
50 ⊢ 58	0 (0.0)
58 ⊢ 66	1 (7.1)
Education	
Nursing	12 (85.7)
Biology	1 (7.1)
Other	1 (7.1)
Length of nursing training (years)*	
3 ⊢ 6	1 (8.3)
6 ⊢ 9	1 (8.3)
9 ⊢ 12	3 (25.0)
12 ⊢ 15	1 (8.3)
15 ⊢ 18	6 (50.0)
Time working in the audiovisual field (years)	
0	9 (64.3)
6	2 (14.3)
10	1 (7.1)
12	2 (14.3)
Higher degree	
Undergraduate programs	1 (7.1)
Graduate programs	3 (21.4)
Master's programs	7 (50.0)
Doctoral programs	2 (14.3)
Postdoctoral programs	1 (7.1)
Do you have experience in wound care?	
Yes	11 (78.6)
Do you have teaching experience in the wound care field?	
Yes	10 (71.4)
Have you published works in the field of wound care?	
Yes	11 (78.6)

*Excluding those without a bachelor's degree in nursing

Table 2 presents the main descriptive statistics for the continuous variables in the judges' profiles. The participants' ages ranged from 26.9 to 66.1 years, with a median of 37.5 years, a mean of 37.9, and a standard deviation of 9.5 (CV = 0.25). The duration of nursing education ranged from 3.5 to 18.0 years, with a median of 13.5 years, a mean of 12.4, and a standard deviation of 4.6 (CV = 0.37). The length of experience in the audiovisual field ranged from 0.0 to 12.0 years, with a median of 0.0 years, a mean of 3.3, and a standard deviation of 4.9 (CV = 1.48).

Table 2 – Key statistics on the age, duration of nursing education, and length of experience in the audiovisual field of the study participants. Niterói, RJ, Brazil, 2023

Measures	Age (years)	Length of nursing training (years)	Years of experience in the audiovisual field
Minimum	26.9	3.5	0.0
Maximum	66.1	18.0	12.0
Median	37.5	13.5	0.0
Mean	37.9	12.4	3.3
Standard Deviation	9.5	4.6	4.9
Coefficient of Variation	0.25	0.37	1.48

Table 3 presents the frequency distribution of the judges' evaluations and the corresponding validity indices. For all items, the most frequent response was "strongly agree," ranging from 64.3% (language appropriate to the material) to 100% (stimulates interest in the topic). All items achieved CVI ≥ 0.93, CVC ≥ 0.91, and CVR ≥ 0.86, and were individually validated according to the established cutoff points (CVI and CVC ≥ 0.80; CVR ≥ 0.80). In addition, the instrument was validated overall, with CVI = 0.99, CVC = 0.96, and CVR = 0.98, confirming the storyboard's validation across all adopted metrics.

The values obtained for the validity indices (CVI = 0.93; CVC = 0.91; CVR = 0.86) indicate a high degree of agreement among the raters regarding the appropriateness of the material's content. However, since they do not represent absolute agreement, these results suggest opportunities for specific improvements, particularly in the logical sequence of information and the refinement of the storyboard's visual elements. In this regard, it is recommended that pilot tests be conducted with the final target audience, consisting of nursing assistants, to assess understanding of the material and inform further adjustments that could optimize its application in professional practice.

Table 3 – Analysis of expert evaluations (n=14). Niterói, RJ, Brazil, 2023

Item evaluated/Response	n (%)	CVI	CVC	CVR
Does this encourage reflection?		1.00	0.96	1.00
I partially agree	3 (21.4)			
I totally agree	11 (78.6)			
Does it encourage behavioral change?		1.00	0.96	1.00
I partially agree;	3 (21.4)			
I completely agree	11 (78.6)			
Does this cover the topic?		1.00	0.99	1.00
I partially agree;	1 (7.1)			
I completely agree	13 (92.9)			
Suitable for teaching?		1.00	0.96	1.00
I partially agree;	3 (21.4)			
I completely agree	11 (78.6)			
Does this answer your questions/doubts?		1.00	0.94	1.00
I partially agree;	4 (28.6)			
I completely agree	10 (71.4)			
Is the language appropriate for the audience?		1.00	0.96	1.00
I partially agree	3 (21.4)			
I totally agree	11 (78.6)			
Is the language appropriate for the material?		1.00	0.93	1.00
I partially agree	5 (35.7)			
I totally agree	9 (64.3)			
Is this information correct?		0.93	0.96	0.86
I neither disagree nor agree	1 (7.1)			
I partially agree	1 (7.1)			
I totally agree	12 (85.7)			
Objective information?		1.00	0.99	1.00
I partially agree	1 (7.1)			
I totally agree	13 (92.9)			
A logical sequence of ideas?		0.93	0.91	0.86
I partially disagree	1 (7.1)			
I partially agree	3 (21.4)			
I totally agree	10 (71.4)			
Current topic?		0.93	0.97	0.86
I partially agree	1 (7.1)			
I totally agree	13 (92.9)			
Font size and type		0.93	0.96	0.86
I partially agree	1 (7.1)			
I totally agree	13 (92.9)			
Does it encourage learning?		1.00	0.96	1.00
I partially agree	3 (21.4)			
I totally agree	11 (78.6)			
Does this contribute to our understanding?		1.00	0.97	1.00
I partially agree	2 (14.3)			
I totally agree	12 (85.7)			
Does this topic interest you?		1.00	1.00	1.00
I totally agree	14 (100)			
Overall assessment		0.99	0.96	0.98
I partially disagree	1 (0.5)			
I neither disagree nor agree	1 (0.5)			
I partially agree	34 (16.2)			
I totally agree	174 (82.9)			

CVI: Content Validity Index; CVC: Content Validity Coefficient; CVR: Coefficient of Relative Variation

In addition to the quantitative analysis, the judges' suggestions were analyzed qualitatively and grouped into categories related to content, layout, and narrative sequence. Those that were technically and scientifically sound and considered relevant to the quality of the material were incorporated into the storyboard. Of the 14 expert judges, 12 provided substantive suggestions, totaling 124 contributions, which mainly involved layout adjustments (enlarging fonts and spacing), content adjustments (adapting language and rephrasing sentences), image adjustments, and reordering scenes for better didactic progression. Thus, the following stand out: an adequate number of judges, exceeding the number recommended in methodological studies, as well as the qualified profile of the evaluators; high overall agreement; and structured and systematic validation, thereby lending methodological strength to the study. Among these, 35% of the suggestions were fully incorporated, and 65% were partially adjusted, following discussion among the researchers.

After the storyboard was approved by the experts, the post-production phase began, which included vectorizing the illustrations, animating the scenes, and finalizing the video. The final product is six minutes and five seconds long and was structured into 46 scenes organized sequentially around the following themes: introduction and epidemiology of diabetes mellitus; pathophysiology and clinical evaluation of foot-related conditions in people with diabetes mellitus; neurological evaluation; treatment and management of wounds; and prevention strategies and general guidelines. Figure 1 illustrates the image creation process, from the vector sketch to the final composition.

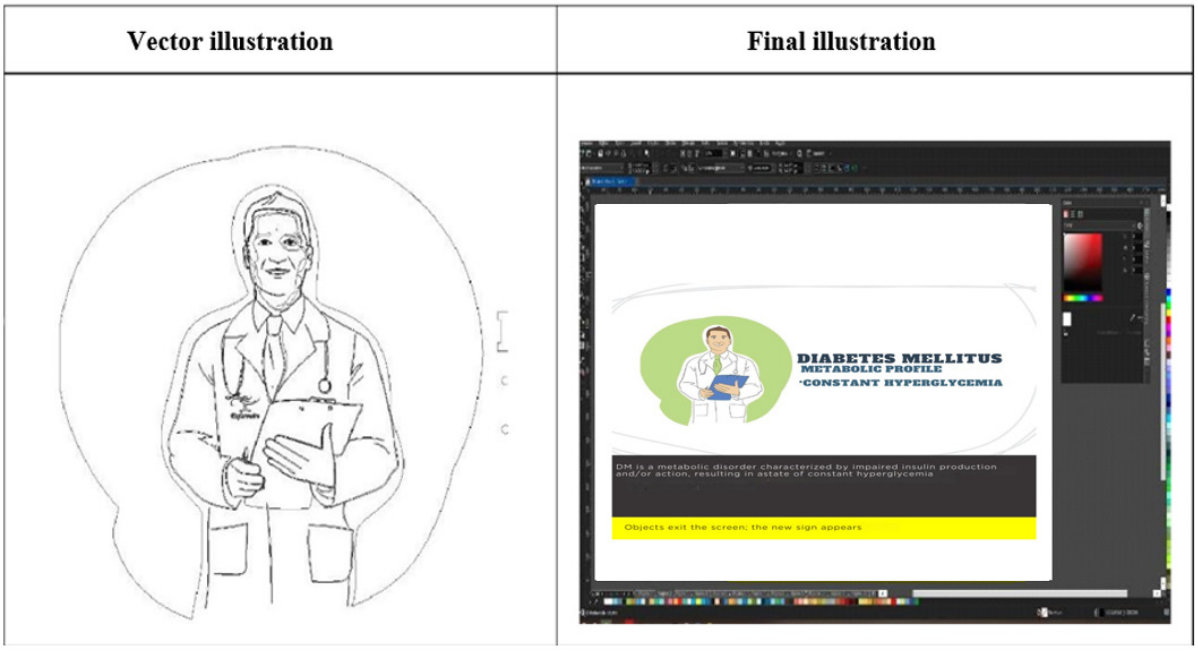

Figure 1 – Process of creating storyboard images. Niterói, RJ, Brazil, 2022

The video featured audio narration alternating between male and female voices, animated illustrations, and instrumental background music ("Patience") played at a constant volume (the music was chosen for its gentle rhythm, which did not interfere with comprehension of the narration). The supporting text was presented in the GeoSlab font, in 82pt and 57pt sizes, in accordance with adjustments suggested by the expert judges. The material was made available in MPG format, with a resolution of 1920×1080 pixels, and is freely accessible on the YouTube video platform, with multilingual automatic captions generated by the platform, as well as in the eduCAPES repository, as described in the Data Availability section.

Discussion

This study is theoretically significant in that it expands the body of scientific literature on the development and validation of educational technologies in health; socially significant in that it promotes the dissemination of expert knowledge among professionals; and practically significant in that it provides a structured audiovisual resource that can support continuing education in health and improve the quality of care provided to people with diabetes.

With the development of new technologies, professional training has incorporated various mechanisms to ensure high-quality engagement and effectively stimulate learning. Consequently, educational videos have been strategically developed, as they engage both audio and visual senses, thereby enhancing attention, memory, and learning through their focus on different sensory modalities. Consequently, the audiovisual resources discussed is frequently used as a teaching-learning tool, for content dissemination, knowledge distribution, and addressing questions. Finally, the advantages of this mechanism are evident, including easy access to the strategy and broad institutional reach[16].

Given the strategic importance of educational technology in video format, new content based on scientific evidence must be developed. Thus, a product with proven scientific reliability must undergo validation. This process builds trust in the product and legitimizes its use as a teaching-learning tool by

integrating visual, cognitive, and auditory stimuli, thereby enhancing understanding and knowledge retention among healthcare professionals in a didactic manner[9-10]. Once validated, the material aims to directly influence clinical practice, transforming the reality of care delivered by professionals with access to the developed technology.

A trained healthcare professional creates a network to disseminate information and, using the latest technological tools, can share the resulting product with other professionals to view and use. This tool is easy to share and has a high likelihood of disseminating scientific evidence, making its use advantageous for various aspects of healthcare. Trained professional benefits the patient, the administrator, the facility, and various spheres of healthcare, thereby promoting quality healthcare[17].

In the present study, the predominance of nurse practitioners working in clinical care and teaching can be considered a positive factor for validating the content of the educational video. These professionals have direct experience in caring for people with diabetes and managing complications related to diabetic feet, as well as experience in health education processes, which contributes to a critical and informed assessment of the relevance, clarity, and significance of the information presented in the material.

The participation of nurses with clinical experience allows the content to be analyzed from the perspective of its practical applicability in healthcare, while the presence of faculty members facilitates an evaluation focused on pedagogical aspects and the communication of scientific knowledge. Thus, the combination of these professional experiences may have contributed to the high levels of agreement observed in the content validation.

In addition, the committee included experts in the audiovisual field who were responsible for evaluating technical aspects of the video's visual language, such as image quality, color accuracy, scene clarity, and the aesthetic organization of the material for the target audience. Although fewer, these professionals played a complementary role in the validation process, helping to ensure that the educational resource demonstrated not only scientific rigor but also communicative and visual appropriateness.

Thus, the diverse profile of the judges—with a predominance of health experts and the participation of audiovisual professionals—facilitates a comprehensive evaluation of the educational material, addressing both the scientific consistency of the content and the technical aspects necessary for the effectiveness of educational technologies aimed at promoting self-care in health.

A description of the validation process is essential for understanding the target audience and the literature regarding the video's suitability. Validation occurs through expert analysis, ensuring the quality of the product, the information presented, and the relevance of the material to the target audience in an appropriate and qualitative manner. The video is validated through expert review, ensuring the quality of the product and the information presented, and assessing the study's relevance to the target audience in a rigorous, qualitative manner. Although the lack of specific expertise in the audiovisual field may be considered a partial limitation, this aspect does not compromise the validity of the clinical content, since the reviewers possess technical and scientific knowledge in the health field.

The transparency and appropriateness of language identified by the experts are aligned with the principles of health education, such as accessibility, clarity, and practical applicability, especially in foot care for people with diabetes mellitus, a condition associated with neuropathy and peripheral arterial disease, where education is essential for preventing injuries and complications.

The creation and validation of educational materials are interconnected and complex processes, requiring methodological rigor and pedagogical approaches, given the high risk of injuries, infections, and amputations in diabetic feet. In this context, health education stands out as a pillar of prevention, promoting self-care and early identification of changes. The

use of educational technologies expands the reach of these initiatives and standardizes information.

The high validity indices obtained can be understood in light of three interconnected factors: the rigorous grounding of the content in a scoping review conducted according to the JBI methodology, which conferred technical and scientific robustness to the material and aligns with the literature on educational technologies based on the synthesis of scientific evidence[16-18]; the strategic composition of the panel of judges, including clinical specialists (78.6%) and audiovisual professionals (35.7%), which enabled a comprehensive evaluation of both the scientific rigor and the aesthetic quality of the material, reflecting the integration of multiple perspectives of expertise[19]; and the iterative development process, with successive refinements of the storyboard prior to formal validation, which allowed the submission of material at an advanced stage of maturity, reducing significant disagreements and fostering high consensus among evaluators, as described in studies on the development of educational technologies based on iterative design[20].

A qualitative analysis of the judges' suggestions revealed that aspects were valued differently depending on their areas of expertise. Clinical experts tend to emphasize the logical sequence of the content, with progression from pathophysiological concepts to practical application; the objectivity of the information, appropriate for the typical attention span of educational videos; and clinical relevance aligned with international guidelines, such as those of the *International Working Group on the Diabetic Foot* (IWGDF). Audiovisual specialists, on the other hand, highlighted formal aspects, such as the visual clarity of vectorized illustrations, the alternation of voices in the narration to avoid monotony, and design elements that enhance accessibility. This dual approach reflects the growing recognition in the literature that effective educational technologies must combine scientific rigor with aesthetic quality, since technically correct but poorly presented content tends to compromise engagement and, consequently, educational effectiveness[18,21].

The process of incorporating suggestions also merits special mention. Adjustments related to font enlargement and spacing adjustments, suggested primarily by experts in the audiovisual field, reflect instructional design principles that enhance readability and reduce extrinsic cognitive load, as advocated by the Cognitive Theory of Multimedia Learning[15], which was adopted in the video's production. Terminological reformulations and language adjustments, proposed by clinical experts, aimed to make the discourse more colloquial without compromising technical rigor, balancing accessibility and scientific precision. This integration of clinical and communicational expertise constitutes a methodological distinction that enhances the quality of the final product, as evidenced by studies on effective communication and integrated competencies in nursing education[22].

As for the educational technology developed in the form of educational videos, these can be produced in various formats and durations, among other forms that allow for adaptation to the most recommended approach for stimulating learning. There is a hypothesis that a video longer than 15 minutes may become tedious and distract viewers. Thus, the videos that stand out are those under 10 minutes. Furthermore, videos with an aesthetic like that of cartoons also stand out[18].

The study can also be interpreted from a pedagogical innovation perspective, as educational videos promote multimodal learning and contribute to professional development. Furthermore, materials validated by experts have the potential for application in various healthcare and educational settings, such as primary care, outpatient clinics, hospitals, and educational environments, reducing variability in clinical practice and strengthening evidence-based practice, thereby contributing to patient safety[10-16].

The production of the material must contain reliable information available in literature; however, a prominent problem is the *lack* of knowledge regarding available databases and new technologies. This is often a challenge even for the tech-native generation. Thus, the difficulty in finding information is also linked to the challenge of finding quality educational videos online. Therefore, implementing a dissemina-

tion strategy for the training tool aimed at promoting the video to disseminate the evidence-based information contained in the final product, is essential for the product's success[23].

The sophistication of videos enabled by technological advancements has significantly impacted healthcare and human development, enhancing communication and information storage. The storyboard is an interactive video presentation that can elicit a stronger learning response, based on hypotheses in the literature about short-duration videos, such as cartoons. Thus, as this remains a hypothesis, further studies are needed to verify the higher-quality learning produced by this type of tool.

Storyboards contribute to the development of the narrative structure and provide elements that encourage interpretations of both individual scenes and their sequences, playing a key role in visualizing the physical elements to be created through the drawings. In addition to assessing expressiveness and dramatic intensity, they also offer a means of exploration through which various possibilities can be tested[24].

Technological tools designed to create smart solutions are used in nursing to assist with daily administrative, educational, and direct patient care tasks. Thus, there is a growing need to disseminate reliable, high-quality nursing research to promote high-quality healthcare for the population. Finally, a review of the literature reveals the need to produce or increase the dissemination of short educational videos aimed at training professionals. This type of material conveys appropriate content in a timeframe conducive to learning. It also addresses, within the presented theme, the care of foot-related conditions in people with diabetes mellitus.

Diseases related to the feet of people with diabetes mellitus. An epidemiological scenario that has shown gradual growth over the years. The goal must be to promote patient health through professionals trained using the materials produced. It is worth noting that there is a noticeable lack of material on this topic in the literature[25-26].

Guidance on self-care and nursing care focused on continuing health education are preventive measures aimed at promoting health, with the goal of reducing the rate of worsening foot complications in people with diabetes mellitus, as well as decreasing the number of amputations in patients with DM and lowering the mortality rate. Furthermore, early and appropriate recognition is another mechanism that supports high-quality care to prevent future complications. Finally, healthcare professionals trained through initiatives aimed at enhancing their skills have the potential to prevent the onset and progression of foot-related diseases in people with diabetes mellitus[27].

In summary, it is important to emphasize the need for nursing professionals to develop and evaluate educational initiatives, as these functions lead to an expansion of their role as educators. Furthermore, the qualified and trained nurse understands the need for a set of functions (to intervene, develop, and evaluate) to establish these as pillars for the qualitative promotion of health in society. Thus, patients with DM should be able to rely on a nurse with the appropriate vision and a willingness to learn different approaches to develop educational initiatives aimed at the population[16-18].

The video is available for free and open access on the YouTube platform[28] and in the eduCAPES educational records repository[29].

Study limitations

A key limitation of this study is the need for clinical validation of the educational video with the target audience. Furthermore, it should be noted that this research focused on validating the content and design of the educational intervention and did not include an assessment of learning outcomes or behavioral changes. In this regard, future studies could include validation with nurses through usability and acceptability assessments, as well as investigate the video's effectiveness in knowledge acquisition, learning retention, and its impact on professional practice in the care of foot-related conditions in people with diabetes mellitus.

Contributions to practice

The detailed description of the process for developing, validating, and making the educational video available enables the intervention to be replicated in other educational contexts and adapted to different healthcare settings. The video serves as a potential vehicle for communication and education focused on professional practice. As an accessible tool, the audiovisual material can support ongoing training for nurses in managing foot-related conditions in people with diabetes mellitus, providing technical and scientific support to inform clinical decision-making. Furthermore, it directly contributes to improving the quality of care by fostering the development of wound care competencies, in line with the guidelines of the Unified Health System and the National Policy on Continuing Health Education.

Conclusion

The educational video on foot care for people with diabetes mellitus was developed based on scientific evidence, validated by experts, and made available in digital format, demonstrating high content validity across all metrics. The incorporation of the judges' suggestions improved the material, resulting in the development of a validated educational technology that is appropriate and consistent with the proposed objective. Upon completion, the video was made available digitally for nurse training. The final product is a validated tool to support clinical practice in managing foot-related conditions in people with diabetes mellitus.

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Authors' contributions

Conception and design or analysis and interpretation of data; Drafting the manuscript or providing critical review of the intellectual content: **Fontes TLA, Pires BMFB**, Oliveira BGRB. Final approval of the version to be published; Agreement to be responsible for all aspects of the manuscript related to accuracy: **Fontes TLA, Pires BMFB, Oliveira BGRB, Rodrigues QM, Morais JQ, Oliveira MF, Amorim LA.**

Data availability

The data supporting the findings of this study may be requested directly from the corresponding author.

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