



Step-by-step insulin application: making educational videos for patients and caregivers

Aplicação de insulina passo a passo: construção de vídeos educativos para pacientes e cuidadores

Aplicación de insulina paso a paso: construcción de vídeos educativos para pacientes y cuidadores

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ABSTRACT

Objective: to describe the process of development, evaluation, and adaptation of educational videos on insulin application whose target audience was adult patients and caregivers. **Methods:** descriptive and methodological study, carried out in three phases: development, evaluation, and adaptation. The development of the videos was based on a literature review and the municipality's protocol. The evaluation was carried out by experts by applying an instrument designed by the researchers, and the level of agreement between the experts was assessed by the content validity index, which guided the material adaptation process.

Results: the videos were developed to address the main critical points related to insulin application. The items that obtained a content validity index < 0.8 were reformulated. **Conclusion and implications for practice:** two videos were made addressing insulin transport, storage, preparation and application, sharps disposal, and blood glucose monitoring. The educational videos made in the present study can be considered tools that contribute to education in diabetes mellitus and are useful for standardizing guidelines. The description of the development, evaluation, and adaptation process can encourage other professionals to develop materials that meet the needs found in their work contexts and, consequently, improve and qualify the care provided to their patients.

Keywords: Insulin; Diabetes Mellitus; Education; Patients; Educational Films and Videos.

RESUMO

Objetivo: descrever o processo de construção, avaliação e adequação de vídeos educativos sobre aplicação de insulina direcionados a pacientes adultos e cuidadores. **Método:** estudo metodológico, de caráter descritivo, realizado em três fases: construção, avaliação e adequação. A construção dos vídeos foi realizada com base em revisão de literatura e no protocolo do município. A avaliação foi realizada com *experts*, por meio de um instrumento construído pelos pesquisadores. O nível de concordância entre os *experts* foi avaliado pelo índice de validade do conteúdo, que orientou o processo de adequação do material. **Resultados:** os vídeos foram construídos contemplando os principais pontos críticos relacionados à aplicação de insulina. Os itens que obtiveram índice de validade de conteúdo < 0,8 foram reformulados. **Conclusão e Implicações para a prática:** foram produzidos dois vídeos que abordam o transporte, armazenamento, preparo e aplicação da insulina, descarte de perfurocortantes e monitorização da glicemia. Os vídeos educativos construídos podem ser considerados ferramentas facilitadoras do processo de educação em diabetes mellitus e úteis na uniformização de orientações. A descrição do processo de construção, avaliação e adequação pode encorajar outros profissionais a desenvolver materiais que respondam às necessidades de seus contextos de trabalho e assim melhorar e qualificar o cuidado às pessoas.

Palavras-chave: Insulina; Diabetes Mellitus; Educação; Pacientes; Filme e Vídeo Educativos.

RESUMEN

Objetivo: describir el proceso de construcción, evaluación y adecuación de vídeos educativos sobre la aplicación de insulina dirigidos a pacientes adultos y cuidadores. **Método:** estudio de carácter descriptivo realizado en tres fases: construcción, evaluación y adecuación. La construcción de los vídeos se realizó en base a una revisión de la literatura y en el protocolo del municipio. La evaluación se realizó con *expertos*, utilizando un instrumento construido por los investigadores, el nivel de acuerdo entre los *expertos* se evaluó mediante el índice de validez de contenido, que guió el proceso de adaptación del material. **Resultados:** los vídeos fueron construidos cubriendo los principales puntos críticos relacionados con la aplicación de insulina. Los ítems que obtuvieron un índice de validez de contenido <0.8 fueron reformulados. **Conclusión e Implicaciones para la práctica:** se realizaron dos vídeos que abordan el transporte, el almacenamiento, la preparación y la aplicación de insulina, la eliminación de objetos punzantes y el control de la glucosa en sangre. Los vídeos educativos construidos pueden considerarse herramientas que facilitan el proceso de educación en diabetes mellitus y útiles para estandarizar las pautas. La descripción del proceso de construcción, evaluación y adaptación puede alentar a otros profesionales a desarrollar materiales que respondan a las necesidades de sus contextos de trabajo y así mejorar la atención a las personas.

Palabras clave: Insulina; Diabetes Mellitus; Educación; Pacientes; Película y Vídeo Educativos.

INTRODUCTION

Insulin is the medication indicated for the treatment of patients with type 1 diabetes mellitus, but also type 2 diabetes mellitus when the therapeutic goals are not achieved with the use of oral medication.¹

Insulin application technique is a critical aspect to control diabetes mellitus, and patients and caregivers' mastering it is as important as adjusting the medical prescription to patients' needs.² Health teams must have resources to train patients and caregivers to apply insulin correctly.³

The route indicated for administration of insulin by patients is the subcutaneous one, because of the gradual absorption it offers.³ Oral administration of insulin, more convenient and desirable, is still a challenge to researchers, who currently seek to develop technologies that prevent digestive enzymes from breaking down this drug.⁴

It is common for patients with diabetes mellitus to adopt behaviors that show their resistance to insulin use, given that this medication is injectable and frequently associated with pain, fear, autonomy limitation, and public recognition of the diagnosis.⁵

Studies have pointed to the existence of several problems regarding the application technique, which indicates the urgent need to put effort into training patients, for them to carry out self-application, and/or caregivers, for them to take on this responsibility along with patients.^{6,7}

Diabetes education impacts the reduction of risks of acute complications and the prevention of chronic complications.¹ Some studies have shown a decrease in glycated hemoglobin levels in patients submitted to educational interventions.^{8,9}

To put diabetes education into practice, educational materials must be incorporated in the care routine of patients with diabetes.¹⁰ These tools are one of the elements that support the interaction between professionals and patients, allowing knowledge construction in an easy and simplified way.¹¹

Visual and audiovisual resources have stood out among the materials used in educational actions carried out with patients, because they promote a greater content absorption and are simple to develop and inexpensive, which favors access to them.¹² This type of resource also offers a relief to the work overload health professionals experience for being the only information providers,¹³ which minimizes the chances of unintentional omission of aspects relevant to care.

The Brazilian Ministry of Health Decree no. 2,583 of October 10, 2007¹⁴, which addresses the medications offered to patients with diabetes mellitus by the Brazilian Unified Health System, emphasizes the need for investments in the development of educational actions, in both the individual and collective spheres, focusing on self-care.

The objective of the present study was to describe the process of development, evaluation, and adaptation of educational videos on insulin application whose target audience was adult patients and caregivers.

METHODS

This was a descriptive methodological study, carried out in three phases, regarding the development, evaluation, and adaptation of educational videos on insulin application.

The development of the videos was guided by the study by Echer, which discussed the steps of the process of developing health care didactic manuals. Although Echer's study and the present one addressed different types of materials (manuals vs. videos), the orientations offered by this author directed the execution of the present study directly. In the cited study, Echer gathered a series of pertinent and didactic orientations to develop educational materials, such as the importance of transforming technical lingo into language that is accessible to the target audience, the selection criteria of the content to be included in the material, and the assessment of the material's quality by means of evaluations carried out by experts.¹⁵

Phase 1 – Development of the educational video

A bibliographic survey about insulin application and production and validation of educational materials was performed. The Protocol of Care to People with Hypertension and Diabetes of the municipality where the study was carried out was adopted as a reference for the development of the videos.¹⁶ The scientific evidence that diverged from the protocol was discussed with the team that coordinated the Program of Attention to People with Chronic Noncommunicable Diseases.

First, the researchers made only one video addressing the information essential for executing the application procedure for both one type of insulin and two types in the same syringe. This video was designed to emphasize the clarifications of the critical points that are more prevalent in the literature and the researchers' daily practice. To do that, the researchers wrote a script that guided the making of the video.

This script had two columns, the first related to the video's audio and the second to the video's images. Each audio was associated with a corresponding image. The audio component was made up of soundtrack and narration, and the image component was composed of video, pictures, drawings, and animation. After the choice of the audio and image components, timed reviews of the video's audio were carried out to produce an educational material that had duration and speed adequate to the needs of its target audience, with no detriment to content approach, its understanding, and attention maintenance. Image capture and audio recording were carried out at a studio by a professional trained in the sound and image area, who also edited the material.

The content addressed in the initial video was arranged according to defined steps to facilitate the material organization and its understanding by the target audience.

Phase 2 – Evaluation of the educational video

After the development process, the initial video was submitted to evaluation by a group of experts in diabetes mellitus and chronic noncommunicable diseases. Selection of the experts

was carried out based on convenience, after analysis of some professionals' Lattes curriculum vitae.

The evaluation of the video was carried out in a single three-hour meeting, during which the proposal was explained, the produced material was presented, a multiprofessional discussion was conducted, and the evaluation instruments were filled out. The video was shown by using multimedia equipment and sound boxes. The experts discussed the produced material from a multiprofessional perspective. All the steps of the video were addressed and the suggestions were registered by the researchers that attended the meeting.

The evaluation instrument used in the present study was formulated by the authors and had 28 items addressing the video's content and face. This tool was designed to show statements and Likert-type answer possibilities, with the following agreement levels: 4 = adequate; 3 = adequate, but liable to reviewing; 2 = must be reformulated; and 1 = inadequate. The items that received the score 1 or 2 were submitted to adjustments, and the items that obtained the score 3 or 4 were kept. The content validity index (CVI) was used to assess agreement between the experts. This parameter is calculated according to the following formula: total number of answers 3 or 4 divided by total number of answers. The CVI considered satisfactory was ≥ 0.8 .^{17,18} The experts also filled out a socio/academic/professional characterization instrument.

Phase 3 – Post-evaluation adaptation of the educational video

The items of the initial video that obtained a CVI < 0.8 in the evaluation carried out in phase 2 were reformulated. The experts' considerations related to aspects that were not covered in the evaluation instrument were also taken into account.

The evaluation resulted in the production of two videos, one addressing the process of preparing only one type of insulin, and another explaining the preparation of two types of insulin in the same syringe. To do that, the original script was modified to originate two scripts, and a new image capture and audio recording process was carried out. This step was executed with the support of a professional from the audiovisual production area.

The present study proposal was approved by the Research Ethics Committee at the Ribeirão Preto College of Nursing at the University of São Paulo, as per consolidated report no. 2,144,495. The principles addressed in the Brazilian National Health Council Resolution 466/2012, which covers ethical aspects of human research, were observed. The participants signed free and informed consent forms.

RESULTS

Phase 1 – Development of the educational video

In the first phase of the study, a single video entitled "Insulin application: a step-by-step guide" was made. It was developed to focus on providing guidance oriented toward patients and/or caregivers that use syringes to apply insulin, because the administration of this drug by using other devices, such as pen

and continuous infusion pump, is still incipient in the municipality where the study was carried out.

This video had a duration of 8 minutes and 34 seconds and was split into 13 steps to facilitate content organization: 1- How to transport insulin; 2- Where to store insulin; 3- Insulin expiry date after the flask is opened; 4- Materials necessary to carry out insulin application; 5- Body areas where insulin can be applied; 6- How to organize insulin application; 7- How to prepare insulin for application; 8- How to prepare two types of insulin in the same syringe; 9- How to carry out insulin application; 10- Syringe reuse; 11- Syringe disposal; 12- Glycemia monitoring; and 13- Signs and symptoms of hypoglycemia. Although the authors acknowledged the existence of other critical issues, the steps mentioned above were kept for the development of the material.

Phase 2 – Evaluation of the educational video

In the group of ten (100%) experts who evaluated the material, there were three (30%) endocrinologists, three (30%) nurses, one (10%) pharmacist, one (10%) dentist, one (10%) psychologist, and one (10%) general practitioner, all of them showing experience in providing care to patients with diabetes mellitus regarding insulin use.

Regarding the professional activity of the experts, one (10%) was the coordinator of the Chronic Noncommunicable Diseases Program in the municipality where the study was carried out, one (10%) was the manager at a specialties outpatient clinic, one (10%) worked as a professor, and seven (70%) provided care to patients directly. The presence of experts with experience in the management field allowed the discussion of the produced material taking into account financial, management, and bureaucratic aspects related to care. Complementing this point of view, the presence of experts who dealt with care more directly allowed the discussion of problems and difficulties experienced in their work routine.

Regarding the potential to achieve the educational goals that aim to solve problems identified when care is provided and in the literature, the experts evaluated 15 items addressing the video's characteristics, among which 14 (93.3%) obtained a CVI ≥ 0.8 . The item related to the video's capacity to favor the understanding of the technique to mix two types of insulin got a CVI of 0.7. Reformulation of this item was suggested by three (30%) experts, as shown in Table 1.

Regarding the video's technical and organizational aspects, ten (100%) evaluated items reached a CVI ≥ 0.8 . However, as shown in Table 2, the sound quality was considered inadequate by one (10%) expert.

Phase 3 – Post-evaluation adaptation of the educational video

After analysis of the experts' evaluation and CVI results, the necessary adaptations were carried out.

The item that evaluated the video's capacity to favor the understanding of the technique to mix the two types of insulin obtained a CVI = 0.7, and three (30%) experts suggested that

Table 1 – Evaluation of the educational video “Insulin application: a step-by-step guide”. Ribeirão Preto – SP, Brazil, 2018. (n = 10).

Evaluated items	Adequate	Adequate, but liable to reviewing	Must be reformulated	Inadequate	CVI
Favors the understanding of the correct transportation of insulin	08 (80.0%)	02 (20.0%)	-	-	1.0
Favors the understanding of the ideal storage conditions	06 (60.0%)	04 (40.0%)	-	-	1.0
Favors the control of the insulin flask expiry date after it is opened	07 (70.0%)	02 (20.0%)	01 (10.0%)	-	0.9
Favors the understanding of the need to take the insulin flask out of the refrigerator 15 to 30 minutes before application	07 (70.0%)	02 (20.0%)	01 (10.0%)	-	0.9
Favors the understanding of the neutral protamine Hagedorn insulin homogenization technique	07 (70.0%)	03 (30.0%)	-	-	1.0
Favors the understanding of the need to disinfect the rubber in the insulin flask with cotton balls and alcohol	07 (70.0%)	02 (20.0%)	01 (10.0%)	-	0.9
Favors the understanding of syringe graduation marks	03 (30.0%)	06 (60.0%)	01 (10.0%)	-	0.9
Favors the understanding of the need to inject air in the insulin flask before aspiration	06 (60.0%)	03 (30.0%)	01 (10.0%)	-	0.9
Favors the understanding of the technique to mix neutral protamine Hagedorn insulin and regular insulin	04 (40.0%)	03 (30.0%)	03 (30.0%)	-	0.7
Favors the identification of insulin application areas	07 (70.0%)	03 (30.0%)	-	-	1.0
Favors the understanding of the organization of the application area rotation	06 (60.0%)	03 (30.0%)	01 (10.0%)	-	0.9
Favors the understanding of the need to keep the needle in the subcutaneous tissue for 5 seconds after application	07 (70.0%)	03 (30.0%)	-	-	1.0
Favors the understanding of proper disposal of sharps	08 (80.0%)	02 (20.0%)	-	-	1.0
Favors the understanding of glycemia monitoring	06 (60.0%)	04 (40.0%)	-	-	1.0
Favors the recognition of hypoglycemia signs and symptoms	07 (70.0%)	02 (20.0%)	1 (10.0%)	-	0.9

this part of the video should be reformulated. Consequently, the researchers opted to produce two videos to facilitate the audience’s understanding: one explaining the process of preparing only one type of insulin and another addressing the process of preparing a mix of two types of insulin in the same syringe. The first video had a duration of 8 minutes and 9 seconds, and the second video had a duration of 8 minutes and 55 seconds.

Despite the positive evaluation of the initial video regarding technical and organizational aspects, the researchers opted to carry out a new image capture and audio recording to fully meet the suggestions. The new image capture was performed in a home environment to improve contextualization and demonstrate some relevant points that were addressed in the initial video by using drawings only, for instance the storage of insulin flasks in the refrigerator. Additionally, the new image capture allowed to improve aspects related to selection of background colors and objects, which increased image sharpness. The audio,

considered inadequate by one (10%) expert, was recorded again in another studio.

Text-related adaptations were also carried out to improve the understanding of the procedure. The changes included the description of the appearance of the two types of insulin and the use of more common descriptive terms, including cloudy insulin and clear insulin; the addition of captions as a method to reinforce the information provided in the audio; and the inclusion of information about the parts that make up an insulin application syringe, given that the word “plunger” was said several times in the video during the explanation about how to carry out some procedures because the researchers could not find a synonym compatible with the lay language of the target audience.

Figure 1 shows frames of different scenes that make up the produced videos, which are available for access and download at: https://www.youtube.com/watch?v=O_6kV6M--pQ&t=37s <https://www.youtube.com/watch?v=Fnp8AB7dwXc&t=76s>

Table 2 – Evaluation of the technical and organizational aspects of the video “Insulin application: a step-by-step guide”. Ribeirão Preto – SP, Brazil, 2018. (n = 10).

Evaluated items	Adequate	Adequate, but liable to reviewing	Must be reformulated	Inadequate	CVI
Duration	07 (70.0%)	03 (30.0%)	-	-	1.0
Sound quality	07 (70.0%)	02 (20.0%)	-	01 (10.0%)	0.9
Images	06 (60.0%)	03 (30.0%)	01 (10.0%)	-	0.9
Language	07 (70.0%)	02 (20.0%)	01 (10.0%)	-	0.9
Clarity and objectivity	05 (50.0%)	04 (40.0%)	01 (10.0%)	-	0.9
Content organization	09 (90.0%)	01 (10.0%)	-	-	1.0
Agreement and orthography	06 (60.0%)	04 (40.0%)	-	-	1.0
The information shown is correct	08 (80.0%)	02 (20.0%)	-	-	1.0
Coherence between content and everyday needs of the target audience	07 (70.0%)	03 (30.0%)	-	-	1.0
Meets the objectives of institutions that provide care to patients who use insulin and their caregivers	08 (80.0%)	02 (20.0%)	-	-	1.0



Figure 1. Frames of the videos “Insulin application: a step-by-step guide”. Ribeirão Preto, SP, Brazil, 2018. Source: Researchers’ files.

DISCUSSION

The focus of care to patients with diabetes who use insulin usually is dose adjustment based on the results of laboratory tests.¹⁹

Access to educational materials is difficult, which may discourage health teams to use these resources to train patients and caregivers.¹¹ Most of the available educational materials are published by corporations such as medical specialty societies and big companies. Considering the remarkable inequality between Brazilian regions, the recommendations included in these materials are often unfeasible, which precludes their use.

Reuse of syringes, for instance, is a prevailing practice in Brazil. Although the Brazilian Diabetes Society contraindicates this practice, because of the risk of infection and lipohypertrophy associated with it, the Brazilian Ministry of Health recommends that syringes be used by the same patient at home seven times at most, taking some criteria into account.^{3,20} In the municipality where the present study was carried out, it is recommended that a syringe be used by patients four times at most in the case of patients who do not mix different types of insulin and two types at most in the case of patients who do.¹⁶

Comparing the education material's orientations with scientific evidence and the municipality's protocol without leading to losses in the results patients could obtain may have been the greatest difficulty during the execution of the present study. This difficulty was emphasized by all the experts during the evaluation of the material. The matters addressed by the experts were relevant and taken into account by the authors, which contributed considerably to increasing the quality of the final product. The experts considered the content of the produced material compatible with the needs of the target audience. Organizing the video in steps resulted in a logical sequence to address the proposed content.

Properly designed educational films and videos are supporting tools in the teaching-learning process.²¹ The coverage potential of educational videos can be explained by the simplicity of the resources necessary for their promotion and access.

In the present study, the language used in both the video and ... was considered adequate. The use of a language accessible to the target audience is indispensable, because lack of understanding of the content prevents health professionals from achieving their goals with educational materials.^{15,22}

Addressing some procedures, such as the mix of different types of insulin, proved to be a challenge because of the complexity of these processes, even after testing simplification strategies to favor understanding. A study showed that only 34 (48.6%) out of 70 (100.0%) patients carried out this procedure properly.²³ Experts' suggestions related to layout, texts, images, and colors were incorporated into the videos, and the implementation of these ideas was grounded in the literature.^{22,24}

In the period of development of the present study, the researchers tried to establish agreements with the local health system management team to guarantee that the produced material was made available as an official material on the municipality's website. The existence of educational materials by itself has no

impact on care results. The materials must be used by health teams when dealing with patients and their caregivers.¹⁰

It must be stressed that the people to whom educational actions are intended must be involved in the establishment of learning necessities, planning, and evaluation.^{25,26} This was a limitation of the present study, given that the validation of the material was not carried out with patients and caregivers yet.

Another limitation was that the produced material was evaluated only by health professionals. Evaluation of the videos by professionals from different fields, such as languages, communication, and sound and image could impart more quality to the material.¹⁵ Additionally, part of the evaluation was performed by using an instrument designed by the authors of the study themselves, that is, a nonvalidated tool.

Despite these limitations, it is important to point out that the development, evaluation, and adaptation of the produced material were supported by professional practice and reflected the authors' aspiration to bridge the gap between research and practice, valuing the complementarity potential that exists in this initiative.

CONCLUSION AND IMPLICATIONS FOR PRACTICE

Regarding the development aspect, a video entitled "Insulin application: a step-by-step guide", with duration of 8 minutes and 34 seconds, split into 13 steps, and covering the main critical issues related to the subject, was produced. A script was written containing the image and audio description to make the video.

Regarding the evaluation aspect, the material was submitted to the appreciation of ten experts from the management, care, and teaching areas during a single face-to-face meeting. These experts discussed the produced material, and the resulting suggestions were registered by the group of researchers. Additionally, an instrument designed by the authors containing statements and Likert-type answers was applied in the evaluation.

Regarding the adaptation aspect, the process was performed based on the comments that emerged during the evaluation by the experts and those included in the evaluation instrument. In this phase, the authors opted to make two videos, one about the process of applying insulin when only one type of insulin was prescribed and another about the procedure to apply the drug when two types of insulin were prescribed. To do that, the script drafted in phase 1 was modified to originate two scripts. These two new materials were the starting point to carry out a new image capture and audio recording, which resulted in the production of two videos.

The produced educational videos can be considered a tool that facilitates diabetes mellitus education and a useful resource in guidance standardization. Describing the process of development, evaluation, and adaptation of the videos can encourage other professionals to design materials that meet their needs in their work contexts and consequently improve and qualify care to patients.

AUTHOR'S CONTRIBUTIONS

Study design. Data collection and analysis, and interpretation of results. Manuscript writing and critical review. Approval of the final version of the manuscript. Responsibility for all the aspects of the content and integrity of the published paper. Janaina Pereira da Silva. Gerson Alves Pereira Júnior.

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