Elaboration and validation of a booklet on diabetes for Community Health Workers

Elaboração e validação de cartilha sobre diabetes para Agentes Comunitários de Saúde

Elaboración y validación de una cartilla sobre diabetes para los Agentes Sanitarios

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ABSTRACT

Objectives: to develop and validate a diabetes booklet for Community Health Workers. **Methods:** methodological study developed in seven steps: Bibliographic review; Development of the booklet; Calculation of readability and comprehensibility scores; Validation of the booklet by the committee of judges; Discussion between experts; Validation of the booklet by the target audience; and Final discussion between experts. Validation was performed by 10 judges via e-Surv and on a face-to-face test with 5 Community Health Workers, considering the minimum Content Validity Coefficient of 0.80. **Results:** the booklet had a mean Content Validity Coefficient of 0.97 in the validation by the committee of judges, and the images had 96.67% approval. In the face-to-face test, the Community Health Workers considered the material clear and appropriate to the function. **Conclusions:** the booklet was developed and validated on its content and relevance, and it can be used by Community Health Workers for diabetes education.

Descriptors: Validation Studies; Teaching Materials; Community Health Workers; Diabetes Mellitus; Health Promotion.

RESUMO

Objetivos: elaborar e validar uma cartilha sobre diabetes para os Agentes Comunitários de Saúde. **Métodos:** estudo metodológico desenvolvido em sete etapas: Levantamento bibliográfico; Elaboração da cartilha; Cálculo das fórmulas de legibilidade e apreensibilidade; Validação da cartilha por comitê de juízes; Discussão entre especialistas; Validação da cartilha pelo público-alvo; e Discussão final entre especialistas. A validação foi realizada por 10 juízes via e-Surv; e o teste face a face, por 5 Agentes Comunitários de Saúde, considerando o Coeficiente de Validade de Conteúdo mínimo de 0,80. **Resultados:** a cartilha teve um Coeficiente de Validade de Conteúdo médio de 0,97 na validação pelo comitê de juízes, e as imagens tiveram 96,67% de aprovação. No teste face a face, os Agentes Comunitários de Saúde consideraram o material claro e adequado à função. **Conclus**ões**:** a cartilha foi elaborada e validada quanto ao conteúdo e relevância, podendo ser utilizada pelos Agentes Comunitários de Saúde nas ações de educação em diabetes.

Descritores: Estudos de Validação; Materiais de Ensino; Agentes Comunitários de Saúde; Diabetes Mellitus; Promoção da Saúde.

RESUMEN

Objetivos: desarrollar y validar una cartilla sobre diabetes para los Agentes Sanitarios. **Métodos:** se trata de un estudio metodológico desarrollado en siete etapas: Estudio bibliográfico; Preparación de la cartilla; Cálculo de las fórmulas de legibilidad y aprehensibilidad; Validación de la cartilla por el comité de jueces; Discusión entre expertos; Validación de la cartilla por el público objetivo; y Discusión final entre los expertos. Diez jueces realizaron la validación vía e-Surv; y la prueba cara a cara, cinco Agentes Sanitarios, considerando el Coeficiente de Validez de Contenido mínimo de 0,80. **Resultados**: la cartilla tuvo un Coeficiente de Validez de Contenido promedio de 0,97 en la validación del comité de jueces, y las imágenes obtuvieron el 96,67% de aprobación. En la prueba cara a cara, los Agentes Sanitarios consideraron que el material era claro y apropiado para la función. **Conclusiones:** la cartilla se diseñó y se validó en cuanto a su contenido y a su relevancia y los Agentes Sanitarios podrán usarla en acciones de educación sobre la diabetes.

Descriptores: Estudios de Validación; Materiales para Enseñanza; Agentes Sanitarios; Diabetes Mellitus; Promoción de la Salud.

INTRODUCTION

Diabetes mellitus (DM) is one of the major public health problems in the world, currently affecting 425 million people, a number that may increase to 629 million by 2045[1]. DM is a metabolic disorder of multiple etiologies characterized by hyperglycemia and resulting mainly from defects in insulin action and/or secretion[2].

Diabetes education is the basis of treatment and can occur through educational materials, audiovisual resources, the Internet, and verbal language. Diabetes education is necessary due to the complexity of treatment, which requires continuous care[3]. Educational materials are frequently used in the services of the Unified Health System (SUS) and are made in the form of manuals, pamphlets and booklets. This type of practice can have positive results for the population, such as changing behaviors and attitudes of people coping with the disease[4].

The Family Health Strategy (FHS) consolidates the actions of the SUS and its main competences are to develop actions of health promotion and protection, disease prevention, rehabilitation, diagnosis and treatment. These actions are developed by a team composed of a doctor, a nurse, nursing technicians and Community Health Workers (CHW)[5].

The profession of the CHW was created in Brazil in 1991 (Law No. 10,507 of July 10, 2002, revoked in 2006)[6]. Currently, the duties of CHW are defined by the Primary Care National Policy (PNAB)[5]. Among these duties we can highlight actions for the integration between the team and the community, development of educational actions, health promotion and disease prevention[7].

The work of CHW is extremely important, as they help the healthcare team to know the real needs of the population and support the planning of effective actions to solve the problems. These professionals also inform the community about the main health problems, provide guidance regarding self-care, and encourage individuals to reflect on their health and disease conditions[8]. Thus, CHW, along with the other team members, develop care actions for people with diabetes and risk factors for the disease, and are professional with an important role in these actions[5].

Home visits are the core of the work process of CHW and represent a privileged space for establishing bonds with users and identifying vulnerabilities. However, the appreciation of this meeting by the community is directly related to the ability of the CHW to meet their demands. To achieve this, continuing education and updating of concepts of CHW are essential to the FHS service[9].

Once these professionals are properly trained, they can disseminate knowledge to the community in an effective and humane manner, especially for users with non-communicable chronic diseases[10]. The training of CHW has positive effects on health promotion and consists of a strategy for critical reflection and technical improvement of these professionals[11-12]. However, in a previous study, only 5% of the CHW interviewed reported frequently participation in continuing education activities on topics relevant to the work process, which consequently limits their potential[9].

The work of CHW is essential for monitoring people with diabetes; for this reason, it is appropriate and necessary that this professional has adequate knowledge about the disease. In this sense, CHW should have their own educational materials on various topics, which can support them on individual and collective health education activities outside health institutions.

At the moment, there is no validated booklet in literature referring to diabetes and specifically aimed for CHW, with the objective of providing knowledge about self-care and treatment of the disease in an objective way. Therefore, it is necessary to develop a material that is easy to understand and handle and that is tested and validated with this professional, to ensure that all information is properly assimilated.

The creation of a booklet for this purpose is relevant, since, by obtaining knowledge about DM, CHW can provide adequate monitoring and education in diabetes, helping individuals to have a better quality of life.

OBJECTIVES

To develop and validate a diabetes booklet for Community Health Workers.

METHODS

Ethical aspects

The research was conducted following all the guidelines described in Resolution No. 466/2012 of the National Health Council, which approves the guidelines and regulatory standards for research involving human beings[13]. It was submitted to the Research Ethics Committee (REC) of the Santa Casa BH Teaching and Research Institute, according to protocol 1,635,500. Judges' agreement to participate in the study was recorded in the e-Surv platform's start menu. The Community Health Workers signed the Informed Consent Form (TCLE).

Study setting, period and design

This is a study with a methodological approach, conducted from April 2017 to February 2018 and developed in 7 steps (Chart 1).

Chart 1 – Steps of the construction of the booklet, Belo Horizonte, Minas Gerais, Brazil, 2017

Steps	Description of the steps
1st Step: Bibliographic review	- Review on the main publications of the Ministry of Health and on the electronic databases LILACS and MEDLINE/Pubmed
2nd Step: Development of the educational material	- The content of the booklet was elaborated based on the researched literature and on a validated instrument applied to the Community Health Workers of Belo Horizonte[14]. - Illustrations and layout were created especially for the booklet by a graphic designer, who used the programs Corel Draw® X8 and Illustrator Draw® version 3.3.77.
3rd Step: Calculation of Readability and Comprehensibility Scores	- Calculation of the Flesch Reading Ease Score, Flesch Kincaid and Coleman Liau Index.
4th Step: Validation by the Committee of Judges	- Validation of the booklet by the Committee of Judges through the e-Surv Online Platform - Calculation of Content Validity Coefficient, considering a minimum value of 0.80
5th Step: Discussion between experts on the subject (nurses and physicians)	- Meetings of experts to evaluate the suggestions of the judges and make the applicable modifications to the booklet

To be continued

Chart 1 (concluded)

Steps	Description of the steps
6th Step: Validation of the booklet by the target audience	- Face-to-face testing with Community Health Workers
7th Step: Final discussion between experts	- Meetings of experts to evaluate the suggestions of the Community Health Workers and make the applicable modifications to the booklet.

Study sample

For the selection of judges for the committee, the number of 6 to 20 experts is recommended for the validation process[15]. The *Lattes* Platform of the National Council for Scientific and Technological Development (CNPq) was consulted, and the inclusion criteria were: being a professional in health or applied linguistics; having experience in family health; graduate quali-fication - specialization, master or doctorate; and experience in validating educational materials. An email invitation was sent to 14 professionals, with a link to access the PDF booklet, but only 10 professionals completed the evaluation.

The face-to-face test was conducted with a convenience sample of five Community Health Workers from the city of Piedade dos Gerais, located in the midwestern region of Minas Gerais. The city has two family health teams, with six CHWs in each team. Inclusion criteria were: accepting to participate in the research; and having at least 1 year of experience in the profession. Thus, 7 CHWs were excluded, and the 5 participants were identified by the acronym CHW, followed by cardinal numerals (from 1 to 5), in order to maintain their anonymity.

Study protocol

Bibliographic review

Initially, the main publications of the Ministry of Health on Community Health Workers and diabetes were searched; then, the electronic databases LILACS and MEDLINE/Pubmed were searched. The Health Sciences Descriptors (DeCS) used were: Validation Studies; Teaching Materials; Community Health Work-ers; Diabetes Mellitus and Health Promotion.

Development of the booklet

The content of the booklet was elaborated based on the re-searched literature and on instrument validated study "*Avaliação do conhecimento dos Agentes Comunitários de Saúde no acom-panhamento às pessoas com diabetes aplicada aos ACSs de Belo Horizonte*"[15]. This instrument was applied to 102 CHW of the City of Belo Horizonte-MG, in order to verify their knowledge about diabetes. It consists of questions about the disease, which were used as the basis for the preparation of the booklet.

The illustrations and layout were created especially for the booklet by a graphic designer, using the Corel Draw® X8 and Ilustrator Draw® version 3.3.77.

Calculation of readability and comprehensibility scores

For the calculation of the readability and comprehensibility scores of the booklet, the Flesch Reading Ease Score, Flesch Kincaid and Coleman Liau Index were determined according to the educational level of the target audience[16].

The Flesch Reading Ease Score (FRES) was calculated using the average number of syllables per word and average sentence length according to the formula: FRES = 206.835 − (1.015 × ASL) − (84,6 × ASW), in which ASL is the average sentence length and ASW the average number of syllables per word. The output of the formula is a number ranging from 0 to 100. The value of 0 indicates low readability, while 100 indicates that the text has high readability[17].

The Flesch Kincaid Readability Score (FK) converts readability into years of education. The result estimates the number of years of education required to properly understand the text. The result of the formula has values between 0 and 35. Values close to zero indicate low level of education, while values between 30 and 35 indicate high level of education (FK = ([0.39 × ASL] + 11.8 × ASW]) − 15.59)[18].

The Coleman Liau Readability Index (CL) formula calculates level of education based on average sentence lengths and average number of characters per word (CL = (5.89 × ACW) − 0.3 × (1/ASL) − 15.8)[19].

The term "readability" refers to text size, font, color, paragraph spacing and alignment, and elements of text formatting. Compre-hensibility refers to ease of reading, comprehension, speed of reading and comprehension of a text, factors related to the form of writing and the vocabulary used. Readability and comprehensibility can be evaluated using metric techniques and public opinion, respectively. The formulas used can predict the difficulty in reading texts with certain linguistic characteristics[16].

For evaluation and determination of readability and compre-hensibility scores, the number of words and phrases in the text was determined by the online counter Word Counter, available at: http://pt.wordcounter360.com/; the number of syllables was determined by the Word Calc counter, available at: http://www.wordcalc.com/; and the average number of characters per word, without spaces, was provided by the Microsoft Word counting tool. The average sentence length (ASL) and the average number of syllables per word (ASW) were calculated manually by dividing the number of words by the number of sentences and the number of syllables by the number of words, respectively[16].

Validation of the booklet by the committee of judges

After the development of the educational material, an e-mail was sent to each selected judge, with the request to participate as an evaluator and guidelines on the booklet evaluation process via the e-Surv online platform. Participants who did not answer the question-naire in seven days received a new e-mail, reinforcing the invitation.

The judges rated each page of the booklet for clarity and relevance, with a score of 1 to 4 stars, in which: 1 star – need for complete refor-mulation; 2 stars – need for partial reformulation with many changes; 3 stars – need for partial reformulation with optional changes to enhance text style; and 4 stars – no reformulation required. When the text was rated 1 or 2 stars, or if they had suggestions for improvement (3 stars), they were asked to leave comments. The images were evaluated as appropriate or not to the text and received a positive or negative evaluation. When participants evaluated the image negatively, they were asked to make suggestions.

After the evaluation of the educational material by the experts, a meeting of experts (one endocrinologist and three nurses, who are

teachers and researchers in the area of diabetes at a teaching and research institute of a large hospital in Belo Horizonte; and a family health physician of a FHS in the city of Piedade dos Gerais-MG) was held to evaluate the suggestions and make the applicable modifications[20-21]. Thus, the booklet was modified and reorganized to be validated by the CHW.

Validation of the booklet by the target audience

An individual meeting was held with the five CHW of the Family Health Strategy of the city of Piedade dos Gerais-MG. In the meeting, the booklet was handed to the CHW and they were asked to read the educational material and evaluate if the language and the images were clear and easy to understand and, if applicable, make suggestion for changes in any words, phrases, or images to facilitate understanding. They evaluated the booklet in its print and online versions. An instrument with six questions, based on the Suitability Assessment of Material[22] was elaborated to evaluate the booklet. The questions addressed the opinion of the CHW on the cover, title, subtitle, content, writing and illustrations. The CHW analyzed the suitability and relevance of each item. The entire process was recorded with an audio device so that the evaluation was later transcribed in full.

After the evaluations of the CHW, meetings of experts were held to evaluate the suggestions and make the applicable modifications to the booklet. The final version of the booklet was defined based on the suggestions made by the judges and by the CHW, trying to adapt it to the target audience as much as possible.

Analysis of results and statistics

The level of agreement between the judges was calculated using the Content Validity Coefficient (CVC) proposed by Hernandez-Nieto[23], which is used to quantify and interpret the evaluation of items and scales by a group of experts in the subject that the instrument measures. Data from the e-Surv validation were entered into Microsoft Office Excel 7.0 software for the calculation of the CVCs.

After obtaining the judges' evaluations, CVC calculations were performed to evaluate the clarity and relevance of each page. The coefficient for each item (CVCi) is calculated by dividing the average of the judges' evaluation scores (Σxj) by the maximum score of the last category of the Likert scale (Vmax) for a given item x. The total CVC of the scale (CVCt) is given by subtracting the judges CVC (CVCj) for the whole scale by the Standard Error (Pej) of the judges' polarization. CVCj is the division of the total average of the scores (attributed to all scale items) by the maximum value of the Likert scale. Pej is calculated by the ratio between 1 and the absolute number of judges (Nj), raised to the absolute number of judges[23].

RESULTS

Development of the booklet

Initially, the booklet was developed based on the doubts of the CHW about diabetes and the bibliographic survey. After reading 98 pre-selected studies, 19 articles were read and the most relevant information for the knowledge of CHW about diabetes were selected. The subtitles of the booklet were "Community Health Worker (CHW); Functions of the CHW with people with diabetes; What is diabetes? What are the main types of diabetes? What are the risk factors for

diabetes? What tests are done to see if the person has diabetes? What is a capillary blood glucose test? What is hyperglycemia? What can a person feel when glucose is high?; What is hypoglycemia? What are the symptoms?; How to explain about the storage of insulins?; How to explain about the transportation of insulin?; How to explain about the disposal of materials used?; What are the benefits of physical activity? How to explain about the frequency of consultations for people with diabetes?; How to explain about vaccines for people with diabetes? What are the major parts of the body that may be affected by diabetes? How to prevent the complications of diabetes? How to explain about foot care?; Important to know!". The booklet with 28 front and back pages was printed on coated paper measuring 15×21 cm. Its title is "The Community Health Agent and Diabetes". The final version of the educational material is available at https://www.diabetes.org.br/profissionais/images/o-agente-comunitario-de-saude-e-o-diabetes-2-1.pdf.

Characterization of the judges

Regarding the characteristics of the judges, there were 4 (40%) nurses, 2 (20%) endocrinologists, 2 (20%) nutritionists and 2 (20%) linguists. Among the judges, 8 (80%) were female. Regarding academic qualification, 1 (10%) had a *lato sensu* graduate degree; 5 (50%) had *stricto sensu* graduate studies in progress and 4 (40%) had a *stricto sensu* graduate degree. Regarding the area of their work, 3 (30%) worked in outpatient care; 3 (30%) in Primary Health Care; 3 (30%), in scientific research; and 1 (10%) in an interdisciplinary clinic. Most judges (80%) had already participated in the evaluation of educational materials or measurement instruments (data not shown).

Validation of the booklet by the committee of judges

The validation of the booklet by the judges obtained a general CVC of 0.94 for clarity and 0.99 for relevance, totaling a mean CVC of 0.97, which indicates a high level of agreement between the judges (Table 1).

Chart 2 describes the judges' suggestions regarding the substitution or addition of words and images.

Table 1 – Content validity coefficient calculated after evaluation by the Judges Committee, Belo Horizonte, Minas Gerais, Brazil, 2017

Item	Theme	CVCi – Clarity	CVCi - Relevance	Pej
Cover	----	1.00	1.00	0.00000000010
Page 6	Importance of the CHW	0.98	1.00	0.00000000010
Page 7	Function of the CHW	0.93	0.95	0.00000000010
Page 8	What is diabetes?	1.00	1.00	0.00000000010
Page 9	Risk factors for diabetes	0.90	1.00	0.00000000010
Page 10	Tests for diabetes	0.90	1.00	0.00000000010
Page 11	What is the capillary blood glucose test?	0.93	1.00	0.00000000010
Page 12	What is hyperglycemia?	0.90	1.00	0.00000000010
Page 13	What is hypoglycemia?	0.98	1.00	0.00000000010
Page 14	Insulin storage	0.83	0.95	0.00000000010
Page 15	Disposal of materials	0.93	0.95	0.00000000010
Page 16	Benefits of physical activity	0.98	1.00	0.00000000010

To be continued

Table 1 (concluded)

Item	Theme	CVC_i – Clarity	CVC_i - Relevance	Pej
Page 17	Frequency of appointments	0.95	0.95	0.00000000010
Page 18	Vaccines for people with diabetes	0.98	1.00	0.00000000010
Page 19	Body parts affected by diabetes	0.98	1.00	0.00000000010
Page 20	How to prevent diabetes complications	0.95	1.00	0.00000000010
Page 21	Foot care	1.00	1,00	0.00000000010
Page 22	Important to know!	0.93	1.00	0.00000000010
Total CVC		0.94	0.99	---

Note: CVC_i - coefficient for each item; Pej - Standard Error of judges' polarization.

Chart 2 – Summary of suggestions made by the Judges Committee, Belo Horizonte, Minas Gerais, Brazil, 2017

Item	Judges suggestions	Suggestions accepted Yes	Suggestions accepted No
Cover	- Add images that correspond to diabetes on the cover.	X	
	- Remove the image of people and add images that "resemble" diabetes.	X	
Page 6	- Replace the word "treatment" with "follow up".	X	
Page 7	- Perform an active search for patients who did not attend appointments.		X
	- The pictures look great, but what about replacing "SUS" with "PSF" in the text of the last picture?		X
Page 8	- Replace the word "or" with "and/or".	X	
Page 9	- Add "baby weighing more than 4 pounds at birth".	X	
	- Remove "prediabetes".		X
Page 12	- Remove the image from the phrase "What is hyperglycemia?".	X	
	- Replace "easily tired" with "fatigue".	X	
	-Reformulate the phrases regarding hyperglycemia values for age groups.	X	
Page 14	- Replace the phrase: "temperature between 15ºC and 30ºC or between 2ºC and 8ºC in the fridge" with the phrase: "temperature up to 30ºC or in the fridge".	X	
	- Replace "closed insulin" with "unused insulin".	X	
	- Add that, when transporting, ice should not be in direct contact with insulin.	X	
	- Add that insulin should not be placed in the freezer.	X	
Page 16	- Replace the image of children playing with people jogging.	X	
Page 17	- Replace "diabetes foot examination" with "foot examination".	X	
Page 22	- Replace the image of the person lying on the couch with an image of a person sitting watching television.	X	

Note: SUS - Unified Health System; PSF - Family Health Strategy.

Characterization of the target audience

Regarding the social profile of the 5 CHW who participated in the face-to-face test: 1 (20%) CHW has a degree in pedagogy and

4 years in the profession; 1 (20%) CHW is a law student and has 4 years in the profession; 1 (20%) CHW has completed high school and has 14 years in the profession; 1 (20%) CHW has completed high school and has 8 years in the profession; and 1 (20%) CHW has completed high school and has 1 year in the profession. All of them are female (data not shown).

Validation of the booklet by the target audience

Chart 3 presents the opinions of the CHWs regarding the booklet.

Chart 3 – Opinions of the Community Health Workers on the booklet, Belo Horizonte, Minas Gerais, Brazil, 2017

Item	Opinion	Modification
Page 13 What is hypoglycemia? It is glucose lower than 70 mg/dL.	"But is it under 70 for everyone?" (CHW4) "For adults and children, for everyone is it 70?" (CHW2)	What is hypoglycemia? It is glucose lower than 70 mg/dL for all ages.
General evaluation of the booklet	"We can understand it when we read." (CHW2) "I liked it a lot." (CHW5) "It is very good." (CHW1) "It is clear." (CHW5) "When can you release the booklet for us?" (CHW3) "Can you send it to us today?" (CHW4)	No modification
Which version is better: online or print?	"For everyday life I think the print version is better." (CHW2) "Yeah, if we had a tablet, it would be easier." (CHW1) "If the phone is good, you can also look at the PDF." (CHW5) "It would be a good option for them to buy the tablet so we can see the booklet, right." (CHW3)	No modification

Note: CHW - Community Health Workers; mg - milligrams; dL - deciliter; PDF - Portable Document Format.

DISCUSSION

The choice of the study theme considered the scope of the actions of the Community Health Workers and their necessity of adequate knowledge about diabetes in order to provide qualified care to users of health services. The CHW develop activities of disease prevention and health surveillance through home visits and health education. These professionals provide guidance to the community and informs the health team about the situation of families, especially those at risk, assuming the role of an articulator[8].

The different dimensions of the work of CHW require adequate instrumentation to qualify the professional and strengthen the bond with the community. Training through continuing education activities is necessary, so that they can competently and effectively perform their duties with the family and community health team[8]. Therefore, we decided to develop a booklet for CHW addressing the most relevant items related to diabetes, as it is a disease with high prevalence and which needs to be understood by the professionals and by the community[1-2,4].

Based on the theoretical framework, it is believed that the CHW can offer important guidelines to patients with diabetes, contributing to a higher quality of life. According to Paulo Freire, it is necessary to brings individuals closer through dialogue,

encouraging them to make decisions to improve their lives, requesting the participation of professionals to interfere in this process. Freire defends the emancipation of individuals as a necessary and important instrument for the transformation of society, making individuals agents of their own recovery and placing them in a conscious critical posture in face of their problems[24].

The creation of booklets, manuals and pamphlets facilitates the work of health professionals when guiding patients and families in the process of treatment, recovery and self-care. Educational material can facilitate their work and standardize the guidelines. In addition, it is a way to help individuals better understand the health-disease process and walk the path of recovery[4,25].

Printed educational material is widely used to convey health care messages and facilitate the teaching-learning process. However, there are some limitations in its use, resulting from reading difficulties due to the inadequacy of the material, the profile of the readers and especially their level of education[19].

In order to facilitate reading and understanding of this booklet, all sentences were analyzed in the three formulas of readability and comprehensibility. The sentences were adapted based on the minimum level of education required to be a CHW, which is complete elementary education[7].

Illustrations are important for understanding a text, and its main functions are: attracting the reader; arousing and maintaining interest in reading; complementing and reinforcing information[19]. In this study, this relevance could be observed, since some suggestions of the judges were related to the images and the adequacy of the illustrations with the text. The booklet has 18 images; therefore, 180 evaluations from judges were made, of which 174 were positive, that is, the illustrations were in agreement with the content and were easy to understand; six images had a negative evaluation, and modifications were suggested. The layout and design made the booklet more attractive and easy to read[26].

For the validation of the booklet, it was necessary to obtain the evaluation from judges and from the target audience. The overall CVC of the educational material indicated a high level of agreement, corroborating other methodological studies of development of educational technologies[27-28]. After the evaluations, meetings of experts were held to verify if the suggestions were pertinent, if they were in accordance with the literature and if, when inserted in the readability and comprehensibility formulas, they would be in accordance with the level of education and understanding of CHW.

The selection of a committee formed by judges with expertise in the area, and preferably from various areas, is essential for a broad discussion of the educational material and inclusion of updated and pertinent information regarding health recommendations. This methodology can be observed in other publications on the development and validation of booklets[27,29-30]. In this study, we decided to form a committee of judges from different areas to reinforce the multidisciplinary construction of the booklet, valuing different opinions and points of view. Professionals in the same team often have different conducts regarding health care, so it is an opportunity to standardize and formalize patient care conducts, with the participation of all[4,31].

On the cover of the booklet, the judges suggested no changes to the title. However, some suggested changing the cover image, which was an image of a CHW and a group of people of different age groups. The image was replaced with a picture of a CHW and images of pills, syringes, candies and insulin.

Page 7 received the suggestion of replacing the phrase "Search for patients who did not attend appointments" with the phrase "Perform an active search for patients who did not attend appointments". The suggestion was not accepted because, according to the readability formulas, this sentence was classified as above the level of understanding of the CHW[16-19]. Still on page 7, they suggested replacing the word SUS with PSF.

Page 9 presents the risk factors for diabetes, and the judges suggested to remove "prediabetes". However, this is a risk factor for the disease, so this suggestion was not accepted[2].

Judges commented on the storage and transportation of insulins. Previous studies have shown lack of knowledge and failures of most patients regarding insulin preservation[32-33]. The Brazilian Society of Diabetes emphasizes the importance of diabetes education for drug treatment, especially for the management of insulin therapy. Combined with a healthy lifestyle, proper use of medication reduces blood glucose levels and the risk of complications. The multidisciplinary team is responsible for disseminating these guidelines to users[2]. In this sense, the efficacy of storage guidelines and other relevant issues, such as dose adjustment and skin antisepsis, is emphasized[34], and CHW are potential multipliers of this knowledge in the community.

The CHW evaluated the textual content and images of the booklet in a face-to-face test. They suggested adding on page 13 the value of hypoglycemia for each age group and considered that all images were clear and in line with the text.

Overall, the CHW rated the booklet positively and found the printed version more useful than the online version, as many of them had no digital resources to access it. Validating educational material with the target audience makes it possible to realize what is really missing, what was not understood and how it was understood[4].

In the literature, there are several studies related to the preparation of booklets, most of which have patients with diabetes as the target audience[30-31]. To the best of our knowledge, this is the first study to do this type of work directed to CHW, aiming to help these professionals to effectively disseminate diabetes knowledge to users. It is expected that this instrument will be used in the daily life of these professionals and provide adequate support for their educational actions in the community.

Limitations of the study

A limitation of this study was the validation with CHW of a single city. Therefore, it would be interesting to validate it with workers from several cities in order to obtain a greater number of suggestions, as the booklet is intended to be disseminated in the Family Health Strategies and made available to CHW.

Contributions to the area

It is believed that the use of the booklet by the CHW will help disseminating knowledge about diabetes and lead to greater adherence of patients to disease follow-up. As CHW are in direct contact with the patient, it will provide better follow-up to people with diabetes by increasing their knowledge about the disease.

CONCLUSIONS

The booklet was validated on content and appearance. The evaluation process included experts in designing and validating educational materials as well as Community Health Workers.

It is worth noting that the support of government agencies is necessary for the reproduction, dissemination and wide distribution of this material in health services, in different media, in print and on-line versions and for its inclusion as new teaching material in health education activities on diabetes for Community Health Workers.

REFERENCES

1. International Diabetes Federation IDF. IDF Diabetes Atlas. 8. Ed. Brussels: IDF; 2017. [cited 2017 Nov 29]. Available from: http://www.diabetesatlas.org.

2. Sociedade Brasileira de Diabetes. Diretrizes SBD: 2017-2018 [Internet]. São Paulo: Editora Clannad; 2017[cited 2017 Nov 29]. Available from: https://www.diabetes.org.br/profissionais/images/2017/diretrizes/diretrizes-sbd-2017-2018.pdf.

3. Freitas F, Rezende Filho LA. Análise semiótica de imagens para educação em diabetes. Encontro Nacional de Pesquisa em Educação em Ciências [Internet]. Florianópolis, 2009[cited 2017 Nov 29]. Available from: http://posgrad.fae.ufmg.br/posgrad/viienpec/pdfs/1146.pdf

4. Echer IC. Elaboração de manuais de orientação para o cuidado em saúde. Rev Latino-Am Enfermagem [Internet]. 2005[cited 2017 Nov 29];13(5):754-7. Available from: https://www.revistas.usp.br/rlae/article/viewFile/2146/2237

5. Ministério Da Saúde (BR). Portaria nº 2.436, de 21 de setembro de 2017. Aprova a Política Nacional de Atenção Básica, estabelecendo a revisão de diretrizes para a organização da Atenção Básica, no âmbito do Sistema Único de Saúde (SUS) [Internet]. Brasília: Ministério Da Saúde; 2017[cited 2019 Nov 29]. Available from: http://bvsms.saude.gov.br/bvs/saudelegis/gm/2017/prt2436_22_09_2017.html

6. Barros DF, Barbieri AR, Ivo ML, Silva MG. O contexto da formação dos agentes comunitários de saúde no Brasil. Texto Contexto Enfermagem [Internet]. 2010[cited 2017 Nov 29];19(1):78-84. Available from: http://www.scielo.br/pdf/tce/v19n1/v19n1a09.pdf

7. Costa SM, Araújo FF, Martins LV, Nobre LL, Araújo FM, Rodrigues CA, et al. Agente Comunitário de Saúde: elemento nuclear das ações em saúde. Ciênc Saúde Coletiva [Internet]. 2013[cited 2017 Nov 29];18(7):2147-56. Available from: http://www.scielo.br/pdf/csc/v18n7/30.pdf

8. Ministério da saúde (BR). Guia prático do agente comunitário de saúde. Brasília: Ministério da saúde; 2009.

9. Garcia ACP, Lima RCD, Galavote HS, Coelho APS, Vieira, ECL, Silva, RC, et al. Agente Comunitário de Saúde no Espírito Santo: do perfil às atividades desenvolvidas. Trab Educ Saúde [Internet]. 2017[cited 2017 Nov 29];15(1):283-300. Available from: https://dx.doi.org/10.1590/1981-7746-sol00039

10. Leite MT, Dal Pai S, Quintana JM, Costa MC. Doenças crônicas não transmissíveis em idosos: saberes e ações de agentes comunitários de saúde. Rev Pesqui: Cuid Fundam [Internet]. 2015[cited 2017 Nov 29];7(2):2263-76. Available from: https://pesquisa.bvsalud.org/portal/resource/pt/bde-26819

11. Coutinho, SKSF, Minghini, BV, Brito, GV, Rocha, RB, Miranda, JS, Magalhaes, AT. Rede cegonha: uma experiência em educação permanente com agentes comunitários de saúde. SANARE Rev Pol Púb [Internet]. 2017[cited 2017 Nov 29];16(1):74-9. Available from: https://sanare.emnuvens.com.br/sanare/article/view/1097

12. Da Luz LA, Vilasbôas ALQ, Junior EPP, Ruiz DC. Efeitos da qualificação sobre as práticas dos agentes comunitários de saúde em um estado brasileiro. Lecturas: Educ Física Deportes [Internet]. 2018 [cited 2017 Nov 29];23(240):47-55. Available from: https://efdeportes.com/index.php/EFDeportes/article/view/316/174

13. Ministério da Saúde (BR). Resolução nº 466, de 12 de dezembro de 2012. Trata de pesquisas em seres humanos e atualiza a resolução 196. 12 dez 2012.

14. Cordeiro EM. Validação de instrumento de avaliação do conhecimento dos agentes comunitários de saúde no acompanhamento às pessoas com diabetes (Diabetes-ACS). (Dissertação). Belo Horizonte: Instituto de Ensino em Pesquisa da Santa Casa BH; 2017.

15. Pasquali. Psicometria: teoria dos testes na psicologia e na educação. Petrópolis: Vozes; 2004.

16. Lyra DA, Amaral CLF. Apreensibilidade e legibilidade de artigos científicos de um periódico nacional. Tekhne Logos [Internet]. 2012[cited 2017 Nov 29];3(3). Available from:http://www.fatecbt.edu.br/seer/index.php/tl/article/viewFile/146/132.pdf

17. Flesch R. How to write plain English. New York, NY: Harper and Row, 1979.

18. Kincaid JP, Fishburne RP, Rogers RL, Chissom BS. Derivation of new readability formulas (Automated Readability Index, Fog Count and Flesch Reading Ease Formula) for Navy enlisted personnel. Research Branch Report. p. 8-75, 1975.

19. Coleman M, Liau TL. A computer readability formula designed for machine scoring. J App Psychol. 1975; 60(2): 283-284.

20. Rubio DM, Berg-Weger M, Tebb SS, Lee S, Rauch S. Objectifying content validity: conducting a content validity study in social work research. Soc Work Res. 2003; 27(2):94-105.

21. Tilden VP, Nelson CA, May BA. Use of qualitative methods to enhance content validity. Nurs Res. 1990;39(3):172-5.

22. Doak CC, Doak LG, Root JH. Teaching Patients with Low Literacy Skills. 2nd ed Philadelphia: JB Lippincott; 1996.

23. Hernández-Nieto, RA. Contributions to Statistical Analysis. Mérida: Universidad de Los Andes; 2002.

24. Freire P. Educação como prática da liberdade. 22ª ed. Rio de Janeiro: Paz e Terra; 1996.

25. Demir F, Ozsaker E, Ilce AO. The quality and suitability of written educational materials for patients. J Clin Nurs. 2008;17(2):259-65. doi: 10.1111/j.1365-2702.2007.02044.x

26. Moreira MF, Nóbrega MML, Silva MIT. Comunicação escrita: contribuição para elaboração de material educativo em saúde. Rev Bras Enferm. 2003;56(2):184-8. doi: 10.1590/S0034-71672003000200015

27. Oliveira SC, Lopes MVO, Fernandes AFC. Development and validation of an educational booklet for healthy eating during pregnancy. Rev Latino-Am Enfermagem [Internet]. 2014[cited 2017 Nov 29];22(4):611-20. Available from: http://www.scielo.br/pdf/rlae/v22n4/pt_0104-1169-rlae-22-04-00611.pdf.

28. Sousa CS, Turrini RNT. Validação de constructo de tecnologia educativa para pacientes mediante aplicação da técnica Delphi. Acta Paul Enferm. 2012;25(6):990-6. doi: 10.1590/S0103-21002012000600026

29. Neto NMG, Caetano JA, Barros LM, Silva TM, Vasconcelos EMR. Primeiros socorros na escola: construção e validação de cartilha educativa para professores. Acta Paulista de Enfermagem. 2017;30(1):87-93. doi: 10.1590/1982-0194201700013

30. Galdino YLS, Moreira TMM, Marques ADB, Silva FAA. Validação de cartilha sobre autocuidado com pés de pessoas com Diabetes Mellitus. Rev Bras Enferm. 2019;72(3):780-7. doi:10.1590/0034-7167-2017-0900

31. Gonçalves MS, Celedônio RF, Targino MB, Albuquerque TO, Flauzino PA, Bezerra AN, et al. Construção e validação de cartilha educativa para promoção da alimentação saudável entre pacientes diabéticos. Rev Bras Promoç Saúde. 2019;32:7781. doi:10.5020/18061230.2019.7781

32. Oliveira, ABAS; Silva LF; Mello SDP; Ferreira MS; Silva, JCS. Conhecimento de portadores de diabetes mellitus acerca da conservação da insulina. Rev Saúde. 2019;45(2):1-10. doi: 10.5902/2236583437342

33. Koch M, Pereira Marin M, Trindade OA, Dal Piva R. Avaliação sobre o armazenamento da insulina em uma amostragem de usuários. Rev Uningá [Internet]. 2019[cited 2019 Nov 29];56(1):17-25. Available from: http://revista.uninga.br/index.php/uninga/article/view/2050

34. Becker TAC, Teixeira CRS, Zanetti ML. Intervenção de enfermagem na aplicação de insulina: acompanhamento por telefone. Acta Paul Enferm. 2012;25(spe1):67-73. doi: 10.1590/S0103-21002012000800011