

Development of a booklet on insulin therapy for children with diabetes mellitus type 1

Construção de cartilha sobre insulinoterapia para crianças com diabetes mellitus tipo 1

Construcción de cartilla sobre insulinoterapia para niños con diabetes mellitus tipo 1

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ABSTRACT

Objective: to describe the process of developing of an educational booklet on insulin therapy for children with diabetes mellitus type 1. **Method:** methodological approach, in which the following steps were carried out: selecting of the content and type of technology to be developed (for this step, an integrative review, an analysis of the comments of blogs about Diabetes Mellitus type 1 and interviews with the children were performed), creation of images, formatting and layout composition. **Results:** the work resulted in the production of the final version of the educational booklet, which was titled *Aplicando a insulina: a aventura de Beto* [Applying insulin: Beto's adventure]. The process of developing of the booklet was based on the active participation of the children and guided by the theoretical framework of Piagetian Constructivism. **Conclusion:** the resource is a facilitator for the improvement of the knowledge and practices of self care of children with Diabetes Mellitus type 1.

Descriptors: Diabetes Mellitus Type 1; Children; Health Education; Educational Technology; Insulin.

RESUMO

Objetivo: descrever o processo de construção de uma cartilha educativa sobre insulinoterapia para crianças com diabetes mellitus tipo 1. **Método:** abordagem metodológica, na qual se seguiram as etapas: seleção do conteúdo e tipo de tecnologia a ser construída (para essa etapa, foi realizada revisão integrativa, análises dos comentários de blogs sobre Diabetes Mellitus tipo 1 e entrevista com as crianças), criação de imagens, diagramação e composição do layout. **Resultados:** o trabalho resultou na produção da versão final da cartilha educativa, que teve como título *Aplicando a insulina: a aventura de Beto*. O processo de construção da cartilha foi embasado na participação ativa das crianças e norteado pelo referencial teórico do Construtivismo Piagetiano. **Conclusão:** o recurso é facilitador para a melhoria do conhecimento e das práticas de autocuidado de crianças com Diabetes Mellitus tipo 1.

Descritores: Diabetes Mellitus Tipo 1; Crianças; Educação em Saúde; Tecnologia Educacional; Insulina.

RESUMEN

Objetivo: describir el proceso de construcción de una cartilla educativa sobre insulinoterapia para niños con diabetes mellitus tipo 1. **Método:** abordaje metodológico en el que unas etapas fueron seguidas: selección de contenido y tipo de tecnología a ser construida (para esa etapa, se realizó una revisión integrativa, análisis de comentarios de blogs sobre Diabetes Mellitus tipo 1 y entrevista con los niños), creación de imágenes, diagramación y composición de layout. **Resultados:** el trabajo resultó en la producción de una versión final de una cartilla educativa, cuyo título fue *Aplicando la insulina: la aventura de Beto*. El proceso de construcción de la cartilla se basó en la participación activa de los niños y se norteó por el referencial teórico del Constructivismo Piagetiano. **Conclusión:** el recurso es facilitador para la mejoría del conocimiento y de las prácticas de autocuidado de niños con Diabetes Mellitus tipo 1.

Descriptores: Diabetes Mellitus Tipo 1; Niños; Educación en Salud; Tecnología Educacional; Insulina.

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INTRODUCTION

Nursing has been consolidating itself as a profession and science focused on human care. Effort is put in the developing of a clinical care permeated by science, humanism, ethics, aesthetics, spirituality, health education, providing people with treatment, healing, rehabilitation, comfort and well-being.

Among the needs for care, chronic diseases stand out, with an emphasis on Diabetes Mellitus (DM). Such disease has different classifications, among which Diabetes Mellitus type 1 (DM1) stands out, present in 5% to 10% of cases, it is a chronic disease that requires lifelong treatment, daily injections of insulin, changes in lifestyle, adoption of healthy habits and dietary restrictions, especially sugars and carbohydrates, what may hinder adherence to the treatment⁽¹⁻²⁾.

From the diagnosis, the child needs to receive information in order to build knowledge about the health-disease process. The empowerment of this knowledge is an important ally for the child to achieve the independence and autonomy necessary for self-care. In addition, the child needs to be sensitive to actions needed for treatment, since depriving yourself of treats and sweets, in addition to receiving daily injections of insulin, is no simple task.

In what concerns the development of innovative technologies for nursing care in the different scenarios of the professional practice, the use of educational technologies, such as recreational resources for health education with children stands out.

Health education aims to provide emancipatory care, that is, to empower the individual for self-care, and should have as basis motivation, the context (age, education, economic level), interactivity, the significance of the theme, progressivity (explaining from what is simple to what is complex), dynamism, tutelage, reassessment, evolution and ever continuing education⁽³⁾.

After an extensive review of the national and international literature, Brazilian studies which mentioned educational technologies in printed format intended for the health education of children and adolescents with DM1 were not identified. Thus, the educational booklet *Aplicando a insulina: a aventura de Beto* [*Applying insulin: Beto's adventure*] was made, to facilitate the teaching-learning process on DM, which is accessible to the general public.

Furthermore, health care professionals, especially primary care and specialized nurses, with this resource, will be able to perform more ludic educational activities, contributing to the self-care of children with DM1. The use of educational booklets with an innovative and attractive design contributes to the improvement of knowledge and to the promotion of self-care. The proper treatment of DM1 tends to reduce the morbidity and mortality rates by the disease, the cost of hospitalization and outpatient services in the Unified Health System, in addition to promoting the improvement in the quality of life of patients.

OBJECTIVE

To describe the process of developing of an educational booklet on insulin therapy for children with diabetes mellitus type 1.

METHOD

Ethical aspects

The research project has been approved by the Research Ethics Committee of the State University of Ceará. The children participating in the interview signed the Informed Assent Form and those responsible for them, the Informed Consent Form, proving the consent for participating in the study. The ethical principles for research with human beings were followed, based on Resolution 466/12, of the National Health Committee⁽⁴⁾.

Study design, location, and period

Study with a methodological approach, in which the following steps were carried out: selecting of the content and type of technology to be developed (for this step, an integrative review, an analysis of the comments of blogs about Diabetes Mellitus type 1 and interviews with the children were performed), creation of images, formatting and layout composition.

For the identification of the blogs, the key phrase "*educação em saúde em Diabetes Mellitus tipo 1*" (health education in Diabetes Mellitus type 1) was searched for on Google, and the selection was restricted to blogs. The search occurred in October 2014.

The interviews with the children took place in a center of reference in the care for hypertension and diabetes in Fortaleza - CE. The interviews took place in November 2014.

The producing of the educational booklet was done in the months from January to May 2015.

Population or sample, inclusion and exclusion criteria

The initial search in blogs had 7,130 results. Blogs with interaction, through posts, and in Portuguese (Brazil), were included. News, scientific and commercial websites, journal articles and those which were not specific to DM were excluded, resulting in 38. Of these, 14 were excluded, for being specific to DM2. Seventeen blogs were specific to DM1, however, written by the patient him/herself in adulthood (such exclusion was due to the fact that the posts are, primarily, directed towards adult patients). Blogs written by mothers/fathers/caregivers of children with DM1 or by the patient him/herself during adolescence were selected, resulting in seven blogs.

Nineteen children participated in the interviews. The children present at the health center on the days of data collection were included. The interviews ceased when saturation of data was reached.

The target audience for the reading of the booklet consists of children 8 to 11 years old.

Study protocol

The process of developing of the booklet was guided by the theoretical framework of Piagetian Constructivism, which describes cognitive development in the following stages: sensorimotor (0 to 2 years old), preoperational (2 to 7 years old), concrete operational (8 to 11 years old) and formal operational (above 12 years old)⁽⁵⁻⁶⁾.

The characteristics of each of the stages of child development described by Piaget justify the choice for application of an educational booklet in childhood, specifically for children between eight and 11 years old. This phase is the point of reference to perceive beyond the immediate appearances. It is when the process of individual concentration and effective collaboration begins. Rather than impulsive, self-centered behaviors, the child begins to reflect on his/her actions, and develops the ability to reason about the world in a more logical manner⁽⁵⁾.

The first phase of developing of the booklet occurred through the selection of the content, according to the learning needs of children with Diabetes Mellitus type 1. Initially, an integrative review was performed to identify the type of technology to be produced. To this end, the analysis of the theoretical construct "educational strategies in health for children with Diabetes Mellitus type 1" was performed, answering the guiding question: what are the education strategies in health developed for the teaching and learning of children and adolescents with DM1?

Then, difficulties experienced by the children were identified, through the analysis of comments/questions posted on blogs specific to DM1 and of interviews with a group of children affected by the disease receiving care at a center of reference for the treatment of diabetes.

The dialogue of the interview was conducted through a play. At this stage of data collection, the children were given the name Child Focus Group (CFG), followed by an arabic numeral.

The analysis of the contents seized online and with children subsidized the choice for insulin therapy as content to be addressed in the booklet.

The second step for preparation of the booklet dealt with the creation of images and selection of colors and letters. Due to ethical issues, real images of children were not exposed, graphic images in drawing format having been chosen instead. Finally, the formatting of the booklet and layout composition were performed, with the aid of a graphic designer.

Analysis of results and statistics

The data were analyzed and based on relevant literature on the theme.

RESULTS

Definition of the content of the educational booklet

The first phase for the development of the booklet consisted in the analysis of the theoretical construct and content selection.

For the selection of the content of the booklet, and recognizing the Internet as an important means of communication, the selection of the virtual content on DM1 was conducted. The selection resulted in seven blogs written by mothers/fathers/caregivers of children with DM1 or by the patient him/herself in adolescence.

Such analysis enabled identifying the most frequent doubts, questions and comments. Consequently, learning needs and topics of interest to the Internet users were identified.

622 posts were identified, according to Table 1.

Table 1 – Description of the themes identified in posts of seven blogs about Diabetes Mellitus type 1, Fortaleza, Ceará, Brazil, 2014

Themes	Absolute frequency
Insulin therapy	156
Insulin pump	115
Blood glucose measurement	60
Changes in lifestyle	59
Hyper or hypoglycemia	32
Mothers of children with Diabetes Mellitus Type 1	28
Blue November	19
Time of diagnosis	18
Lack of supplies	18
Diabetes Mellitus and pregnancy	16
Diabetes Mellitus and family	16
Diabetes Mellitus and school	13
Feeding	13
Motivation	11
Health education	08

In these virtual environments, people deal with everyday matters related with Diabetes Mellitus type 1. Patients and family members exchange information and experiences of care with the disease, treatment, coping mechanisms, among others.

The analysis of the themes presented in Table 1 motivated the reflection on the impact of insulin therapy on the daily lives of children (156 posts). Reports of parents/caregivers demonstrating concern towards the suffering of the child due to the administration of insulin were identified. The reports describe the suffering at the beginning of therapy, however, with the support of family, friends and professionals, the child tends to acquire mechanisms for coping with this situation.

To finalize the selection of content, interviews were conducted in five focus groups, with the participation of 19 children. The dialogue was conducted through a play, in which the characters (nurse and child with DM1) interacted with the participants.

The play was written and staged by the author herself, alongside a graduate student in Nursing. It started with the introducing of the "actors" and "audience". After some moments of interaction, the following questions were made: What do you want to know about diabetes? What do you think is important to learn so that you can take care of yourselves? What do you think is most difficult in the treatment?

Table 2 distributes the answer from the interviews into thematic categories.

The topic of greatest interest was related with proper nutrition for children with DM1, emphasized by 11 participants.

Table 2 – Description of the thematic categories that emerged from the interviews in focus groups with children with Diabetes Mellitus type 1, Fortaleza, Ceará, Brazil, 2015

Question	Thematic category	Absolute frequency
What do you want to know about diabetes?	Proper nutrition	11
	Insulin therapy	7
	Why do I have diabetes?	1
What do you think is important to learn so that you can take care of yourselves?	Self-administration of insulin	10
	What can I eat	6
	Glycemic monitoring	3
What do you think is most difficult in the treatment?	Daily injections of insulin	10
	Not eating what I like	5
	Hypo or Hyperglycemia	4

Although feeding was a topic of greater interest, the main learning need was considered to be insulin therapy, due to its predominance in subsequent questions. The participants stressed the importance of knowing how to administer insulin by themselves. In addition, they stressed the daily insulin injections as the main difficulty in the treatment.

The participation of the target audience in the choice of the theme enabled the development of an educational booklet that helps with difficulties in the treatment and with learning needs. Such an approach tends to contribute to the effectiveness of health education.

The choice of pedagogical design is another fundamental requirement in the educational process. The intention of the booklet is to provide the user with the possibility of building of knowledge through dialogued and reflective reading.

Elaboration of the text

After the definition of the theme of the booklet, the selection of the content to be addressed was done for the subsequent elaboration of the text. Initially, an intense search for national and international papers published in databases of the Virtual Health Library and for books and publications of the Ministry of Health was conducted.

After reading the material, the important content on insulin therapy for children with DM1 was selected. The selected material was filed in order to obtain reliable information. In addition, similar themes, originated from several bibliographies, were condensed into a single topic, making it the most complete possible.

The information described in the booklet were organized into a logical sequence of thought, in order to portray briefly what is Diabetes Mellitus type 1 and what are the procedures required for implementing insulin therapy. Among the procedures, self-administration, storage and transportation of insulin stand out. The contents of the booklet have the following theoretical references: Diretrizes da Sociedade Brasileira de Diabetes⁽¹⁾, Guideline for Diabetes in Childhood and Adolescence⁽²⁾, National Standards for Diabetes Self- Management Education⁽³⁾.

The booklet was initiated with the cover, which features the image of the character in his daily environment and the title *Aplicando a insulina: a aventura de Beto*. Then, the index card, presentation and table of contents were made.

In the presentation, the content of the booklet and the target audience are presented. This topic is concluded with an invitation to reading and to the acquisition of new knowledge, in a didactic and ludic way.

The booklet was finalized with a page titled "Insulin Treatment Plan" and two blank pages for notes. The treatment plan is designed to present information about the child, who to find in case of emergency, as well as the type and dose of insulin administered.

The booklet is divided into nine topics:

"Hi, my name is Beto": the introduction of the character named Beto, who is nine years old and has Diabetes Mellitus type 1. This presentation aims to encourage reading, with scenes and everyday situations with which the child may relate to.

"How I discovered I had diabetes": narration of the day the character received the diagnosis. It describes the classic signs and symptoms of the disease and how the character feels about the news.

"What is diabetes": the focus of the booklet is insulin therapy, however, it was necessary to briefly explain the pathophysiology of diabetes. To facilitate learning, the scientific content was addressed through ludic resources. For instance, insulin is represented by a submarine that carries glucose from the blood to the cells.

"Treatment with insulin": definition of insulin and its mechanism of action. To conclude this content, the booklet features puzzles, in which the reader has to form an object to find out the answer. This strategy encourages challenges and provides the building of knowledge. It is also an exercise to solidify and test the acquired knowledge.

"Types of insulin": there was a need to introduce the most common types of insulin: regular, NPH and the analogs of ultra-rapid and long action.

"Administration of insulin": this topic discusses the need for daily administration of insulin and shows the reader the necessary materials (syringe, insulin pen and infusion pump) and places for administration.

"Appropriate procedures for administration of insulin": displays the procedures for the preparation and administration of insulin. It is a list of actions, therefore, it is not recommended to present the text in listing form. Thus, it was decided to add mini folders, with the actions being presented gradually, as the pages are opened.

Still on this theme, the contents were displayed on topics related with trivia. "Did you know" discusses the mixture of two kinds of insulin in a single syringe and the rotation of places for administration. It is common, in clinical practice, the preparation of two types of insulin in a single syringe, reducing the number of injections.

"Storing and transporting insulin": the school was elected as the backdrop for explaining the administration, transportation and storage of insulin. Such a scenario was chosen for being part of the daily life of the child, to where he/she goes daily, taking insulin with him/her.

“What to do with used syringes and needles”: teaches about a temporary way of disposal of used syringes and needles until they are taken to a health institution.

“Insulin treatment plan”: it is important that every child with DM1 has information about the treatment and how to proceed in case of emergency.

Another strategy present in the booklet was the developing of stories that feature important content in a casual manner. In “The mysterious case of diabetes,” the asymptomatic beginning of the disease and how its diagnosis happens are emphasized. In “Securing my future”, the character Beto talks about the changes in lifestyle needed to avoid complications associated with diabetes.

Producing of the images, selection of letters and colors

The producing of the images, letters and colors had the aid of a graphic designer. As the hired professional drew the images, they were sent to the researcher who would approve them or make corrections so the illustrations could be better understood.

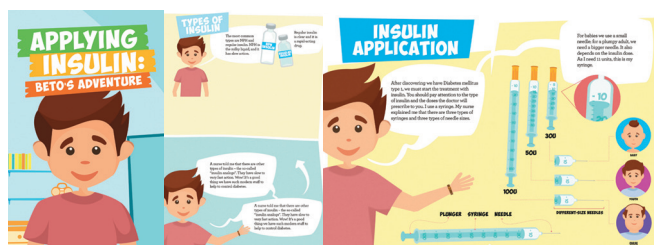
No specific recommendations for the preparation of written material for children were identified. Thus, the recommendations for adults were used, with adaptations related with language and the layout, making the material more attractive.

The booklet was designed so as to provide a dialogue/interaction between reader and character through a story. This format allows the use of short and objective sentences, what aids in its understanding.

Games, puzzles, crosswords and collages

Still from the perspective of knowledge building and for the purpose of providing an active and interactive reading, the booklet features games, puzzles and collages. Such recreational strategies optimize the teaching-learning process, making it enjoyable and challenging, in addition to providing feedback on the content explained.

The figures below illustrate the contents addressed in the booklet.



Source: Moura; Moura; Guedes, 2016.

Figure 1 – Images from the booklet *Aplicando a insulina: a aventura de Beto*.

Recommendations from some authors were followed in the preparation of this educational material⁽⁹⁻¹²⁾: use of serif fonts in extensive texts, because they tend to guide one’s gaze through the text, aiding the eyes of the reader to “slide” through the story. Thus, fonts Amasis MT, size 12, and Obelix Pro, size 20, were

chosen for the titles, with spacing between lines of 1.5 cm. Bold and upper case letters were used in titles only. Words in upper case, italic, or underlined letters were avoided in the text.

In what concerns language, short sentences were prioritized, with words that are part of the everyday life of the reader, in active voice; jargons and technical terms were avoided. In addition, positive actions were highlighted, informing the reader what to or not to do.

Regarding the illustrations, they were used to represent the content presented, instilling it with meaning and making learning easier. Drawings with simple lines were used, created in Adobe Illustrator. Caricatures were not used. The harmony of colors and homogeneity of figures were preserved in the creation of the layout. Vivid colors were used, with backgrounds in yellow, blue, green or orange. The program used for editing was Adobe Indesigner.

The booklet was printed in 80kg coated paper, for the cover, and 60kg coated paper, for the text.

After the writing was done, the booklet was evaluated regarding readability by applying the readability test of Flesch-Kincaid (ILFK)⁽¹³⁾. 52.8 ILFK was obtained, being classified as easy to read.

The ability of reading does not guarantee the ability of understanding. The readability test performed involved the decoding of words and ability of pronunciation. The listening comprehension test, in turn, concerns the meaning of the words, critical thinking and experience with the theme, culminating with the ability to perform commands.

To this end, the text on pages 24 to 29 was read out loud in a paused manner. Then, the child was orally questioned on the themes presented in the text.

An overall percentage of 90.3% correct answers was obtained, as shown in Table 3. This percentage is considered “easy” and can be thus understood completely and independently⁽¹⁴⁾.

Table 3 – Description of the percentage of correct answers of the listening comprehension test of the booklet *Aplicando a insulina: a aventura de Beto*, Fortaleza, Ceará, Brazil, 2015

Question	% of correct answers
1) What types of insulin does the text talk about?	80.0
2) According to the text that we have just read, what materials can be used to administer insulin?	68.0
3) Are there different sizes of needle?	100.0
4) Why?	100.0
5) Name the places for administration of insulin.	96.0
6) Is it needed to change the places for administration of insulin?	100.0
7) Explain how changing the places for administration of insulin is done.	88.0
Average percentage of correct answers	90.3

The percentage of correct answers corresponds to the total of correct answers. Some participants answered with different words, however synonymous, from the text read. These were also deemed to be correct, since the intention was to test the understanding of the listening and not the memorization of the reading. Those which were wrong, incomplete or were not answered correspond to the percentage of errors.

DISCUSSION

For the development of educational materials, it is necessary to adopt a participatory, communicative and collective approach. The American standardization of education for the self-management of diabetes highlights the importance of the educational process based on the educational needs of the population, which includes the medical history of the individual, age, culture, beliefs, prior knowledge, level of education, family support, and financial status⁽⁸⁾.

Despite the advancement of electronic media, the development of a written material was performed, in this case, the booklet. Such a choice is justified because no such production was identified in Brazilian literature, in addition to the ease of access to the public in the various socioeconomic levels.

A study that reported the experience on the development of educational booklets for promoting self-care in individuals with diabetes points out that the written material was chosen by the audience, who opted for the production of a booklet illustrated with figures, which could be taken to one's home and that would be more accessible to people at all levels of education⁽⁹⁾.

The use of the educational material written by health professionals as a tool for reinforcement of the verbalized guidelines is recommended. The teaching material can have a positive impact on the education of patients and can also help them with their doubts, when they are not interacting with the health care professional⁽¹⁰⁾.

The participation of the target audience in the choice of the theme enabled the development of an educational booklet that helps with difficulties in the treatment and with learning needs. Such an approach tends to contribute to the effectiveness of health education.

Studies confirm that the recipient's participation in the preparation of educational materials is extremely important to achieve the proposed objective⁽⁹⁻¹²⁾. This way, teacher and learner, mediated by the environment and reality, seek together the content to be studied. The use of these approaches have favored the active participation of the subjects, from the questioning of reality, to the search for answers and choice of the type of material to be developed⁽¹⁴⁾.

The choice of pedagogical design is another fundamental requirement in the educational process. The intent of the booklet is to provide the user with the possibility of building knowledge through dialogued and reflective reading; only when there is a change in factors of perception and information processing, there is, consequently, significant learning and the possibility of changes in attitudes⁽¹⁴⁻¹⁵⁾.

In the concrete operational phase (which is the phase of the target audience of this booklet), the child is able to perform

correlations between what he/she is experiencing through reading and his/her reality. The child is no longer so self-centered and can put themselves abstractly in another's shoes, experiencing an increase in empathy with the feelings and attitudes of others^(5,16).

Storytelling (strategy used in this booklet) is a pedagogical resource which may facilitate significantly the teaching-learning process. The stories stimulate imagination, teach, develop cognitive skills, dynamize the process of reading and writing, in addition to providing an interactive activity that optimizes learning. Amid the pleasure, wonder and fun that narratives create, various types of learning happen⁽¹⁷⁾.

For the development of the booklet, recommendations from some authors were followed⁽¹⁰⁻¹¹⁾.

The illustrations must be appropriate to the theme, in order to facilitate the understanding and memorizing of the text, clarifying and reinforcing the information. Images influence the decision of the reader to read the information or not. They should draw the attention of the target audience and portray clearly the content in question. Drawings with simple lines promote realism, without including unwanted details⁽¹⁰⁾.

Some contents, such as the preparation and administration of insulin, are represented through texts and images that gradually appear and are delineated. This strategy encourages discoveries, challenges and the building of knowledge.

Collages representing the places of administration of insulin were also done in order to bring the content closer to the concrete reality and facilitate the learning of the exact locations of administration.

To situate learning means bringing it closer to the concrete life of the student as a starting point for changes that go beyond what is taught. Another excellent way of situating learning is also to guide it on strategies focused on problematizations and on the use of active methodologies⁽¹⁸⁾.

Given this, combining the ludic and the cognitive aspects is an important strategy for the teaching and learning of abstract and complex concepts, favoring internal motivation, reasoning, argumentation, the building of mental representations, affectivity, self-learning and socialization⁽¹⁹⁻²⁰⁾.

These are the grounds for the learning pyramid that is based on the type of instructional material and level of involvement of the apprentice. Learning through reading (written material only) retains, on average, 10% of the information; 20% of audition; 30% vision. In the produced booklet, speech and/or writing was combined with the use of text, images, games, in addition to spoken reading. This modality has an average rate of 70% of retention of information⁽¹⁴⁾.

The ability to perform self-care depends in part on the ability to read and understand information. In this context, written information has been used as a complementary strategy for health education.

This ability to read and understand may be hindered if there is discrepancy between the level of education of the reader and the difficulty of the information⁽¹⁴⁾.

The Flesch formula used in this study is based on the sum of two basic language elements: the average size of the selected sample sentences in the text and the average size of the

words measured in syllables for each sample of 100 words. The required reading level is calculated through the combination of these two variables⁽¹⁴⁾.

In addition to reading, the ability of understanding stands out, which will contribute to decision making. FKRT, like other tests to evaluate readability, is target of criticism due to its purely quantitative aspect, not considering individual characteristics, such as interest and familiarity with the topic⁽¹⁴⁾. In addition, children with the same age and education may have different reading capabilities.

The readability index estimated in this study received a classification of easy reading. As limitation to this study, it is recognized that, for the age of the public in question, the ideal would be the classification of the content as very easy, however, the specificity of the topic of the booklet motivated the writing of some polysyllable words and technical terms. These terms were repeated several times, which may raise the quantitative evaluation of the index. However, it is believed that it did not increase the level of difficulty of reading, since these words are part of the everyday life of children with DM1 and knowing them is a *sine qua non* strategy for the promotion of self-care. Among these words, the following stand out: insulin, diabetes, treatment, blood glucose, monitoring, and feeding.

Study limitations

As limitation to the study it is emphasized that the booklet was evaluated regarding readability and understanding from listening, being deemed appropriate to the target audience. However, there was difficulty in performing the validation with the children. They were questioned about aspects related with the content and appearance of the booklet. The responses were very positive, but answers that evoked changes in the material produced were not obtained.

Contributions to the field of nursing, public health or public policy

The production of this booklet characterizes an improvement in health education activities with children with DM1, since it is a technology that may enhance the teaching-learning process. The intention is not to replace the work of the professional, but rather to provide a resource that assists/supplements their job.

It is recommended, therefore, to disclose it to the academic community and among nurses, at the three levels of care. Everyday educational activities that contribute to the empowerment of knowledge and self-care of children and adolescents with Diabetes Mellitus type 1 are necessary.

From this perspective, the use of educational technologies emerges as a therapeutic resource. The empowerment of individuals concerning the health-disease process contributes to self-care and to the improvement in the quality of life. Therefore, the contribution of the booklet as a resource to be used in the activities of health education is emphasized.

CONCLUSION

The development of the booklet is a proposal for promoting empowerment and the health of children with Diabetes Mellitus type 1. This kind of technology works as a support to professionals, children and families, so that they may overcome doubts and difficulties, acting positively on the health-disease process.

This resource aims to contribute to the improvement of the knowledge and self-care practices of children. Therefore, other studies should be conducted to verify the effectiveness of the booklet as a technology for promoting knowledge, the adherence to the treatment and the promotion of the self-care of children with Diabetes Mellitus type 1.

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