UFSM

REUFSM
REVISTA DE ENFERMAGEM DA UFSM

ISSN 2179-7692
OPEN ACCESS

Rev. Enferm. UFSM, v.14, e18, p.1-15, 2024 •
Submission: 09/29/2023 • Acceptance: 08/19/2024 • Publication: 09/13/2024

Original Article

Betinho's Dynamic Guide to Diabetes Mellitus Health Education Tipo 1

Guia da Dinâmica do Betinho para educação em saúde no *Diabetes Mellitus* Tipo 1

Guía de la Dinámica Betinho de educación para la salud en Diabetes Mellitus Tipo 1

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***** Extracted from the Course Conclusion Work "Educational Technology for the well-being of adolescents living with Type 1 Diabetes Mellitus: production and validation", presented to the Nursing Course of the Amazonas State University, in 2021.

Abstract

Objective: to build and validate a guide for applying the Betinho Dynamic to mediate health education actions with children and adolescents living with Type 1 *Diabetes Mellitus*. **Method:** methodological study carried out in three stages: literature review, construction of the guide, validation of the content in a virtual environment and at national level. Health specialists took part by means of a questionnaire. Descriptive statistical analysis and calculation of the Content Validity Index (CVI) were applied.**Results:** 14 themes emerged from the review. After construction, the first version was configured; in the validation stage it obtained a CVI of 0.83. The suggestions were used in the final version. **Conclusion:** the guide was considered adequate and could be used when applying the Betinho Dynamics, which is an interactive and playful technological resource. **Descriptors:** Diabetes Mellitus, Type 1**;** Educational Technology; Health Education; Child Health; Adolescent Health

Resumo

Objetivo: construir e validar o guia de aplicação da Dinâmica do Betinho para mediar as ações de educação em saúde com crianças e adolescentes que convivem com *Diabetes Mellitus* Tipo 1. **Método:** estudo metodológico realizado em três etapas: revisão de literatura, construção do guia, validação do conteúdo em ambiente virtual e em âmbito nacional. Participaram especialistas da área da saúde por meio de um questionário. Aplicou-se análise estatística descritiva e cálculo do Índice de Validade de Conteúdo (IVC). **Resultados:** da revisão emergiram 14 temas. Após a construção configurou-se a primeira versão; na etapa de validação obteve IVC de 0,83. As sugestões foram utilizadas na versão final. **Conclusão:** o guia foi considerado adequado e

poderá ser usado quando da aplicação da Dinâmica do Betinho, que é um recurso tecnológico interativo e lúdico.
Descritores: *Diabetes Mellitus* Tipo 1; Tecnologia Educacional; Educação em Saúde; Saúde da Criança; Saúde do Adolescente

Resumen

Objetivo: construir y validar una guía de aplicación de la Dinámica Betinho para mediar acciones de educación para la salud con niños y adolescentes que viven con Diabetes Mellitus Tipo 1. **Método:** estudio metodológico realizado en tres etapas: revisión bibliográfica, construcción de la guía, validación del contenido en ambiente virtual y a nivel nacional. Participaron especialistas sanitarios mediante cuestionario. Se analizaron estadísticas descriptivas y se calculó el Índice de Validez de Contenido (IVC). **Resultados:** de la revisión surgieron 14 temas. Tras su construcción, se configuró la primera versión; en la fase de validación obtuvo un IVC de 0,83. Las sugerencias se utilizaron en la versión final. **Conclusión:** la guía fue considerada adecuada y podría ser utilizada en la aplicación de la Dinámica Betinho, que es un recurso tecnológico interactivo y lúdico.
Descriptores: Diabetes Mellitus Tipo 1; Tecnología Educacional; Educación en Salud; Salud Infantil; Salud del Adolescente

Introduction

Diabetes Mellitus is a chronic condition, characterized by permanently elevated blood glucose levels (hyperglycemia), due to the body not being able to produce insulin effectively.[1-2]

Around 537 million people in the world live with diabetes and 1.2 million of these are children and adolescents with Type 1 Diabetes Mellitus (DM1). DM1 is caused by an autoimmune process in which the immune system attacks the beta-pancreatic cells responsible for insulin, resulting in little or no production of the hormone.[1]

DM1 can develop at any age, but is more common among children, adolescents and young adults. People living with DM1 need daily insulin injections, continuous blood glucose monitoring and ongoing educational support, the aim of which is to live healthily and delay or prevent diabetes-related complications.[1] However, access to insulin, self-care tools and diabetes education, the use of a healthy diet, physical activity and continuous glucose monitoring are still precarious aspects in many countries.[1-3] In this context, it is important to provide health professionals with technological support so that they can facilitate care and educational processes that sensitize the target audience to reframe behaviors and thoughts to enable more effective health care.[3]

Health technologies, and especially soft and soft-hard technologies, can add to the treatment marked by hard technologies, i.e. the greater association between the

person living with diabetes and health professionals.[4] Among health technologies, Educational Technologies (ET) stand out, as they can create possibilities that go beyond the specific requirements of the target audience, allowing the exchange of knowledge.[5]

In a study on the barriers and facilitators of self-management of DM1, the importance of the professional's presence was noted, from the environment and informational support to insulin and carbohydrate dosage adjustments, which enable changes that alter behavior and attitudes towards the disease.6 In a study with children using playful strategies, interaction with health professionals was strengthened.[7] TEs are pedagogical devices for use by health professionals that enable the construction of senses and meanings to transform the way the target audience lives with DM1, whether in a hospital environment or not. Diabetes education requires differentiated follow-up strategies as children, adolescents and young adults require specific approaches.[8]

The motivation for the study in question arose in the context of the Laboratory of Technologies for Work and Education (LATTED-UEA), in which one of the authors (creator) presented the TE called Betinho Dynamics (DB). This dynamic uses a felt doll called “Betinho”, whose “body” contains felt miniatures of the human organs affected by the disease, with the starting point being the demonstration of clinical issues related to DM1, which constitutes a playful pedagogical resource for mediating educational actions applied by health professionals in any context of care for people with DM1.

The dynamic aims to: create and strengthen the bond between health professionals and children, adolescents with DM1 and their families; stimulate, through play, the understanding and adherence of children and/or adolescents and their families to the clinical condition of DM1 and the care needed to promote quality of life for children and adolescents. Although the author applied the dynamic in her professional activities, it was found that there was no guide that would allow other health professionals working in DM1 education to apply the dynamic. As a result, a technology working group decided to create the application guide, which is justified by the need to disseminate DB among professionals. With this in mind, the aim was to develop and validate a guide for applying the Betinho Dynamic to mediate health education activities with children and adolescents living with Type 1 Diabetes Mellitus.

Method

This is a methodological study, carried out in three stages: literature review, construction of the application guide and content validation. Methodological studies aim to build instruments and devices that can be used by researchers and other people, that are reliable and related to complex phenomena and/or people's health.[9] Validation seeks to have devices and tools evaluated by experienced and competent people in the field, so that the product brings excellent content to the target population, who can also be part of this process.[9-10]

The first stage, carried out between April and May 2020, was an integrative literature review.[11] The review question was: what guidance is needed for children and/or adolescents living with Type 1 Diabetes Mellitus? We considered full texts, available online, in Portuguese or English, which converged with the review theme. Publications in the form of letters, reviews and editorials were disregarded. For the searches, the following databases were consulted: Medical Literature Analysis and Retrieval System Online (PubMed®/Medline), Scopus, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Latin American and Caribbean Health Sciences Literature (LILACS).

We used the controlled descriptor "Type 1 Diabetes Mellitus" associated with the Boolean operator AND "Health Education" AND "Quality of life". In addition, the Guidelines of the Brazilian Diabetes Society and the Atlas of the International Diabetes Federation were included as references. After selection, the studies evaluated constituted a synthesis of this process, organized into generating themes.

In the second stage, which took place in May 2020, the first version of the application guide was created, based on the DB, in which one of the authors watched, recorded and filmed the dynamics being carried out with the children at a camp coordinated by the creator of the dynamics (one of the authors). To this end, the guide was prepared using Microsoft PowerPoint software and the illustrations were captured on the Freepik graphic resources website using LATTED-UEA's computer resources. The selection of content was based on the generating themes resulting from stage 1. The editing and layout process was carried out by one of the authors with expertise in editing and layout of teaching resources. The color palette adopted prioritized olive green, turquoise blue, magenta and golden yellow.

In the third stage, which took place between June and August 2020, the content was validated with specialists[9] in a virtual environment and nationwide, covering the North, Southeast, Midwest and South regions. For selection, the professional had to meet at least two of the following inclusion criteria: clinical and care experience with the target audience for at least three years; have published work in journals and/or events on the subject; have published work in journals and/or events on the construction and validation of ET; be a specialist (lato-sensu and/or stricto sensu) in the subject of ET.9 The aim was to reach between six and 20 specialists.[10] The sample was intentional and the "snowball" technique was used.

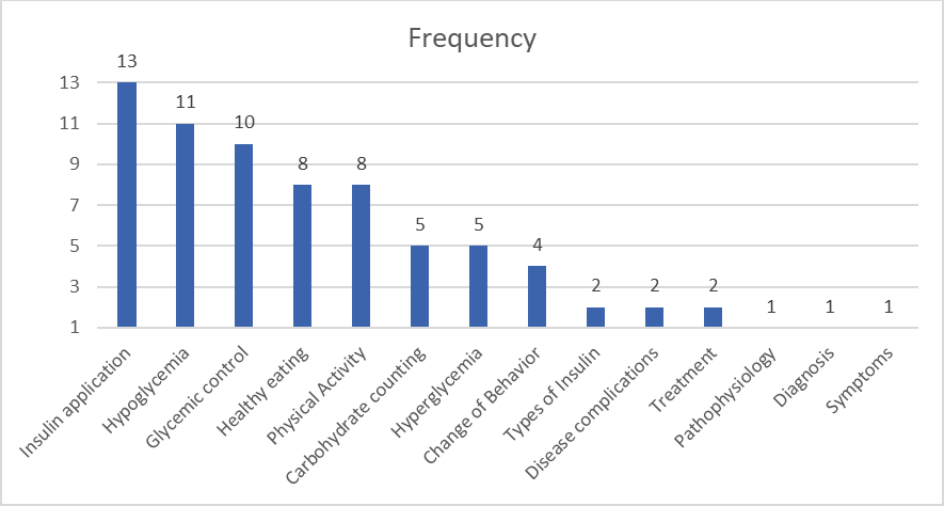
For data collection, contact was made via e-mail, by sending an invitation letter. After accepting, each participant received a link containing the Informed Consent Form (ICF), the first version of the guide and the instrument. The instrument used for validation contains three domains made up of items: objectives (5 items), structure and presentation (12 items), relevance (5 items). Organized on a Likert-type scale with a structured measurement of 1 to 4 points, with 1 (Totally adequate), 2 (Adequate), 3 (Partially adequate), 4 (Inadequate).[10,12]

To analyze the data, descriptive statistics were used to calculate the Content Validation Index (CVI). The CVI is calculated by adding the scores for the point structure of 1 and 2 and dividing the value by the total number of marks. The CVI was calculated item by item, by blocks, in order to reach the overall CVI. Validation considered agreement and a minimum overall CVI of 0.70.9 As this value was reached in the first round, there was no need to carry out a new round among the experts. The items that did not reach the minimum CVI were considered in the revision and structuring of the final version.

The study was approved by the Research Ethics Committee of the Centro Universitário Luterano de Manaus, in Manaus, Amazonas. Opinion No. 2.719.952 of June 18, 2018, meeting all the ethical standards required by Resolution No. 466/2012. The rights of the participants were preserved and the steps taken complied with the established standards. The participants were informed of the research objectives and agreed to sign the ICF.

Results

In the literature review stage, 13 sources were obtained, with 14 generating themes, distributed according to the frequency of citations in the sources (Graph 1).



Graph 1 – Generating themes according to frequency of citation of selected sources. Manaus (AM), Brazil, 2020

The generating themes made it possible to systematize, in general, and include in the application guide the necessary guidelines for children and adolescents with DM1, the purpose of which is to provide support for the professional, who during the educational activity can highlight these guidelines, as well as use them as a checklist (what is important to stress and not forget).

In the construction stage, the guide was organized into three chapters: the first presents the authors, the objectives of the application guide and the objectives of DB; the second presents the application of DB based on four steps: getting to know, interacting, explaining and reviewing; the third contains the clinical rationale based on the generating themes. Thus, the guide equips health professionals to practice DB, as it describes, step by step, how to use both the doll and the internal organs; and it enables the dissemination of DB, which can be reproduced in different contexts where diabetes education actions are carried out.

In the validation stage, 18 participants responded to the invitation and filled in the instrument, 13 (72.2%) nurses, two (11.1%) doctors, two (11.1%) psychologists and one (5.5%) dental surgeon. They were aged between 32 and 55, with a median age of 42. Eight (44.4%) had a master's degree, six (33.3%) a doctorate and four (22.2%) were specialists.

In the first “Objectives” domain assessed by the experts, there were 40 marks for Totally Adequate (TA) (44.4%), 43 (47.8%) for Adequate (A), seven for Partially Adequate (PA) (7.8%) and zero Inadequate (I). A total of 83 marks were considered for AT and A, which together amounted to 93.1%, representing a CVI of 0.92 for this domain (Table 1).

Table 1 – Experts' responses to the "Objectives" domain. Manaus (AM), Brazil, 2020 (n=18)

Item	Values				
Objectives	**Fully Adequate 1**	**Adequate 2**	**Partially Adequate 3**	**Inadequate 4**	**Content Validation Index**
1.1 Is the information/content consistent with the day-to-day needs of the TE* target audience?	9	7	2	-	0,8
1.2 Is the information/content important for the quality of the work of the TE target audience?	9	9	-	-	1
1.3 Does TE invite and/or instigate changes in behavior and attitude?	8	10	-	-	1
1.4 Can TE circulate in the scientific milieu of the area?	7	8	3	-	0,8
1.5 Does TE meet the objectives of the institutions in which TE's target audience works?	7	9	2	-	0,8
Score	40	43	7	-	90
Percentage	44,4	47,8	7,8	-	100
Total CVI			0, 92		

* TE: Educational Technology

In the "Structure and Presentation" domain, 83 marks were made for TA (38.4%), 82 for A (38.0%), 48 for PA (22.2%) and three for I (1.4%). We considered 165 marks for TA and A, which amounted to 70.8% of the answers, equivalent to a CVI for the domain of 0.72 (Table 2).

Table 2 – Experts' responses to the “Structure and presentation” domain. Manaus (AM), Brazil, 2020 (n=18)

Item	Validation				
Structure and presentation	**Fully Adequate 1**	**Adequate 2**	**Partially Adequate 3**	**Inadequate 4**	**Content Validation Index**
2.1 Is TE* suitable for use by the target audience?	10	6	2	-	0,8
2.2 Are the messages presented clearly and objectively?	6	5	7	-	0,6
2.3 Is the information presented scientifically correct?	6	9	3	-	0,8
2.4 Is the material appropriate to the socio-cultural level of the target audience?	7	9	2	-	0,8
2.5 Is there a logical sequence to the proposed content?	5	10	3	-	0,8
2.6 Is the information well structured in terms of agreement and spelling?	2	6	8	2	0,5
2.7 Does the writing style match the level of knowledge of the target audience?	3	9	5	1	0,7
2.8 Is the information on the cover, back cover, table of contents and/or presentation consistent?	12	4	2	-	0,8
2.9 Are the headings and topics the right length?	8	9	1	-	0,9
2.10 Are the illustrations expressive and sufficient?	6	3	9	-	0,5
2.11 Is the material (PDF quality/proportions of illustrations/quality of images) appropriate?	7	5	6	-	0,6
2.12 Is the number of pages adequate?	11	7	-	-	1
Score	83	82	48	3	216
Percentage (%)	38,4	38	22,2	1,4	100
Total CVI			0,72		

*TE: Educational Technology

The “Relevance” domain had 48 marks for TA (53.3%), 35 for A (38.8%), seven for PA (7.7%) and zero for I. We considered 83 marks for TA and A, which together amounted to 92.2%, representing a CVI of 0.91 for the “Relevance” domain (Table 3).

Table 3 – Experts' responses regarding the “Relevance” domain. Manaus (AM), Brazil, 2020 (n=18)

Item	**Validation**				
Relevance	**Fully Adequate** 1	**Adequate** 2	**Partially Adequate** 3	**Inadequate** 4	**Content Validation Index**
3.1 Do the themes portray key aspects that should be reinforced?	11	7	-	-	1
3.2 Does the material allow for the transfer and generalization of learning in different contexts?	9	9	-	-	1
3.3 Does TE* propose the construction of knowledge?	13	4	1	-	0,9
3.4 Does the material cover the subjects necessary for the TE target audience to know and do?	9	8	1	-	0,9
3.5 Is it suitable for use by any professional?	6	7	5	-	0,7
Score	48	35	7	-	90
Percentage (%)	53,3	38,9	7,8	-	100
Total CVI			0,91		

*TE: Educational Technology

When considering the three domains, 331 marks were obtained for TA and A, representing an overall CVI of 0.83.

The experts suggested changes to the TS which were taken into account when structuring the final version (Figure 1): inclusion - benefits of ET for children and adolescents and for professionals, precautions regarding the application of insulin, types of food that can be consumed by children and adolescents with type 1 DM, tests

such as urea, creatine and proteinuria, diabetic ketoacidosis; alterations - to the order in which organs are presented, taking into account the cephalocaudal description, size and type of fonts in the summary; reinforcement - checking glycated hemoglobin, glycemic control for treatment, insulin application, time of use, and what causes non-use; revision - occasional spelling mistakes.

The final version (Figure 1), after a general spelling check, was finalized by the Editora da Universidade do Estado do Amazonas team and registered (ISBN 978-85-7883-591-0); it is available in the institutional repository (http://repositorioinstitucional.uea.edu.br//handle/riuea/4708).

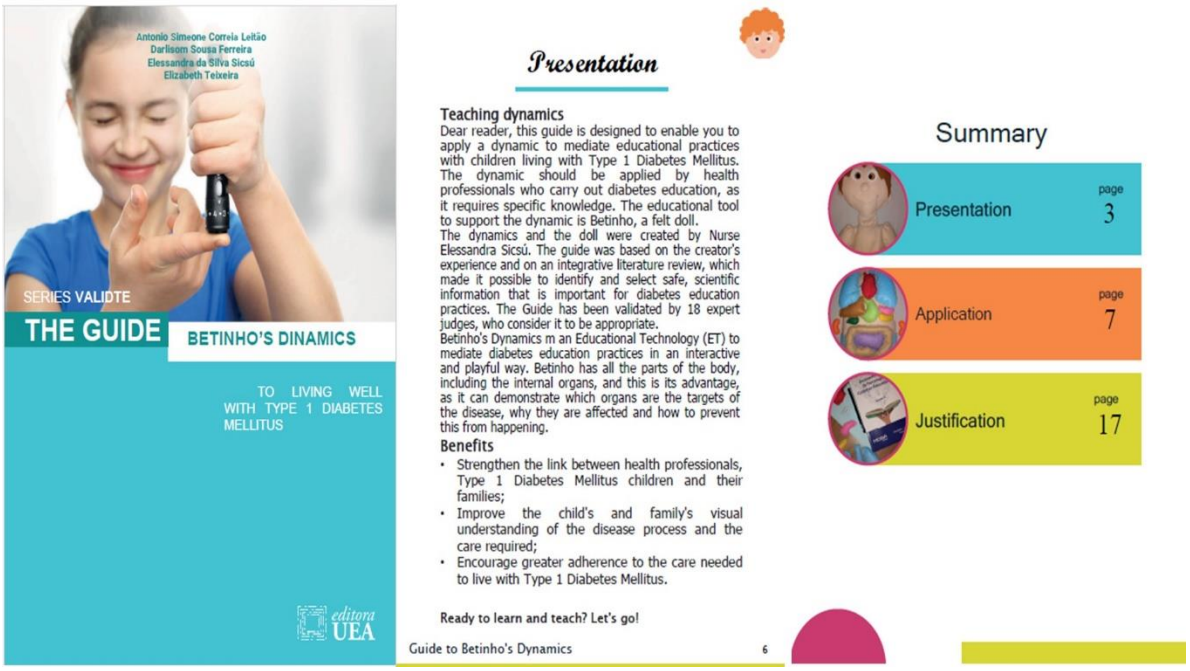


Figure 1 – Pages from the DB guide - Final Version. Manaus (AM), Brazil, 2020

Discussion

Although the treatment of DM1 is based on the triad of insulin, diet and physical activity, other issues are relevant, such as psychological and social issues, which place education as an important part of the disease control process.2 In this sense, guidelines on these issues were included in the guide, as well as tips on how to approach the target audience to facilitate socialization and interaction, highlighting the contribution of health professionals in relation to the issues mentioned. In this way, the possibility of people appropriating knowledge, developing skills and a critical sense, collaborating

spontaneously to promote health, well-being and self-confidence,[13] is made possible by the process of health education, which promotes individual and family responsibility in the management of the promotion and treatment of DM1.[14]

In order to provide quality care and teach appropriate actions for self-care, children and adolescents must have access to reliable sources of information and, as a result, secure knowledge about DM1.[13] It should be noted, however, that knowledge alone does not guarantee the changes in behavior required when living with chronic conditions that demand daily interventions, which are sometimes uncomfortable, and in order to collaborate in this area, it is worth highlighting the use of health technologies, as they are health promotion tools applied to reduce health problems.[15]

When technologies are associated with playful strategies, they have proven to be effective in teaching and in glycemic self-control, for example. It should be emphasized that in addition to being playful, the technologies must provide attributes that show improvement in reaching targets with the aim of stimulating children and adolescents.15 Health professionals are important in the health education process, especially nurses, as their visits to health units provide an opportunity to implement these strategies.[16]

Specificity implies the adoption of special care, whether pediatric or hebiatric, considering age, capacity for self-care, school life and physiological vulnerabilities, issues that are redoubled when considering only children, the indirect target audience of the guide.[2] Therefore, carrying out health education with children with DM1, regardless of the level of health care, is provoked to elaborate TE in order to facilitate their work process, reinforcing it with playful resources.[14] Therefore, health professionals need differentiated guidance and TE so that teaching support and the exchange of knowledge and know-how with the target audience is effective.

This type of support should be encouraged, as it allows children, adolescents and their guardians to be taken into account in the preparation of activities, acquire knowledge and develop coping attitudes to overcome the challenges and difficulties experienced, taking a self-care stance and mastering subjects such as insulin application, hypoglycemia and diet plans.[17] The acquisition of knowledge is relevant, since the knowledge that children and adolescents have about DM1 is decisive in the conduct adopted.[12] Such knowledge is

clinically important because the knowledge acquired enables appropriate care and/or self-care. A British study evaluated the level of glycated hemoglobin-Hb1Ac in young people who received a course on insulin, carbohydrates, ketones and physical activity for diabetes control, and showed statistically relevant results in the reduction of Hb1Ac levels among those who received the guidance, in addition to reporting greater knowledge, involvement and positive self-care behavior for DM1.[18]

The concern of parents and/or guardians about the suffering caused mainly by insulin therapy is a frequent topic on blogs and virtual spaces for sharing knowledge about diabetes. Including the family in the DB application process can be positive, since they are a source of support for the child or adolescent at the time of care and when they feel valued, they actively participate in the care process.[8]

The professional's support, however, is not restricted to social issues, but must take into account the various stages of growth and development of children and adolescents, considering their individuality and the environment in which they live, since DM1 makes it difficult to live and lead a healthy life. The dynamics and all the knowledge contained in the guide can be worked on with children and adolescents, but listening should also be done, as it can provide more direct and effective strategies, capturing the difficulties of living with diabetes of the child or adolescent themselves, and not of third parties.[19] The importance of fostering community empowerment is emphasized, involving children, adolescents and their families with the environments in which they live and interact, such as the school, which makes the professional who works in the community an intermediary.[20]

Validation with experts broadened the knowledge covered in the TS to be applied by health professionals, since the final version was organized taking into account the considerations and suggestions of the experts who took part in the study. The suggestions helped to ensure that children and guardians take into account aspects such as age, puberty, late diagnosis, family history of diabetes and low educational level, which are risk factors for DM1.[21]

Calculating the CVI confers reliability on the technology, as it is validated by experts in the area for which the TE was built. Although the number of experts and items can vary, the TE must obtain a minimum index of 0.70 to be considered valid.[22]

The DB guide obtained an index within the proportion of agreement considered adequate, with a total CVI of 0.83.

One limitation of the study is that it did not validate the results with health professionals. However, the results are in line with the literature and make a contribution to the educational work process, since ET can stimulate change, encourage autonomy and adherence and strengthen the bond between health professionals, children and adolescents with DM1 and their families.

Conclusion

The guide to the application of BD to mediate health education actions with children and adolescents living with DM1 is presented as a valid ST to promote care management and self-care for the target audience for which the health education actions will be carried out. This guide can be used as a playful and interactive resource for health professionals in different contexts, since they are responsible for monitoring this public in health services. As a potential tool, the guide has systematized the guidelines, seeking to provide tips for managing the disease, based on scientific evidence.

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Associate Editor: Nara Marilene Oliveira Girardon-Perlini

How to cite this article

Leitão ASC, Teixeira E, Sicsu ES, Pena FPS, Nemer CRB. Betinho's Dynamic Guide to Diabetes Mellitus Health Education Tipo 1. Rev. Enferm. UFSM. 2024 [Access at: Year Month Day]; vol.14, e18:1-15. DOI: https://doi.org/10.5902/2179769285243