

## Best nursing practices in diabetes education for the hospitalized child: an integrative review

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### ABSTRACT

The incidence of Diabetes Mellitus type 1 (DM1) has increased in the last years, with a consequent growth of child hospitalizations due to diabetic prime decompensation, with growing need of an educational process. Thus, our objective was to identify in the literature the best nursing practices in diabetes education for hospitalized children with DM1 and their families. We conducted an integrative review with the descriptors: Diabetic Ketoacidosis, Diabetes Education, Nursing and Child, Hospitalized, and the free search in reference journals and similar articles. We selected four studies, and we identified three categories: Family Involvement and Empowerment in the Diabetes Educational Process; Performance of the Multi-professional Team; Definition and Content of the Educational Process. We concluded that the educational process should include the family, it should be conducted by a multi-professional team and based on scientific evidence. We identified few studies, showing the need for more studies in the field.

**Descriptors:** Child, Hospitalized; Health Education; Diabetes Mellitus, Type 1; Pediatric Nursing.

### INTRODUCTION

Diabetes Mellitus type 1 (DM1) is a chronic autoimmune disease caused by the partial or total destruction of the beta-pancreatic cells of the Islets of Langerhans, resulting in the progressive disability to produce the necessary insulin to the metabolism<sup>(1-2)</sup>. It has diverse predisposing genetic factors and few little known environmental factors<sup>(1,3)</sup> responsible for 5-10% of the total diabetes cases<sup>(1-2)</sup>.

Diabetes is the second most frequent chronic disease during childhood<sup>(4)</sup>, and its incidence has

increased globally in the last decades<sup>(3)</sup>, in a 3% per year, especially in the younger age groups<sup>(1,5-10)</sup>. Besides, 75% of all DM1 diagnosed cases affect individuals younger than 18 years<sup>(11-13)</sup>.

In Brazil, the DM occurs in eight of 100.000 individuals who are less than 20 years old<sup>(14)</sup>. Since the diagnosis, insulin use starts to keep the blood glucose within the normality limits during the day, avoiding the broad glycaemic variability. The treatment also includes the daily control of the capillary blood glucose, healthy diet, regular physical activity and the educational program. The treatment not only aims at the good disease control but to allow adequate growth and development to the child<sup>(2,10,15)</sup>.

It is known that the greater part of acute and chronic complications of the diabetic patient is caused by the poor metabolic control<sup>(16-17)</sup>, and its effective management is a challenge<sup>(16,18)</sup>. The literature shows the need for diabetes education<sup>(16,18)</sup>, defined as a process for developing abilities and incorporating the indispensable tools to reach the goals of the diabetes treatment. Education is considered the success key to managing the disease and essential to prevent acute complications and, to reduce them in long-term; it should be a continuous process, initiated at the diagnosis moment<sup>(2,10-11,15,19-20)</sup>.

Diabetes education for the daily treatment management is important to avoid acute and chronic diabetes complications in the child's life. It is mandatory that the health team, especially the nurse to be qualified to assist the child and her family. They should acquire knowledge and the needed abilities to manage the disease situation effectively<sup>(15,20)</sup>.

Therefore, the present study aims to identify in the literature which are the best practices in diabetes education conducted by the nurse for hospitalized the child with DM1 and her family.

## METHODS

The study is an integrative review of the literature. We followed the subsequent steps: selecting the study question, establishing criteria to select the sample, searching the literature, defining information to be extracted from studies, assessing included studies, interpreting results and presenting the review<sup>(21)</sup>.

The study guiding question was "What are the best diabetes education practices for the child with DM1 hospitalized used by nurses described in the literature?" . We used the PICO strategy, where:

- P (patient) = children/ adolescents hospitalized due to DM1;
- I (intervention) = best practices in diabetes education;
- C (comparison) = it was not used;
- O (outcomes) = better control and management of the disease situation.

Thus, it was possible to identify the descriptors for the search in the databases: *diabetic ketoacidosis*, *diabetes education*, *nursing e child*, *hospitalized*, using the boolean operators *and*, *or* and *not* in many combinations<sup>(22)</sup>.

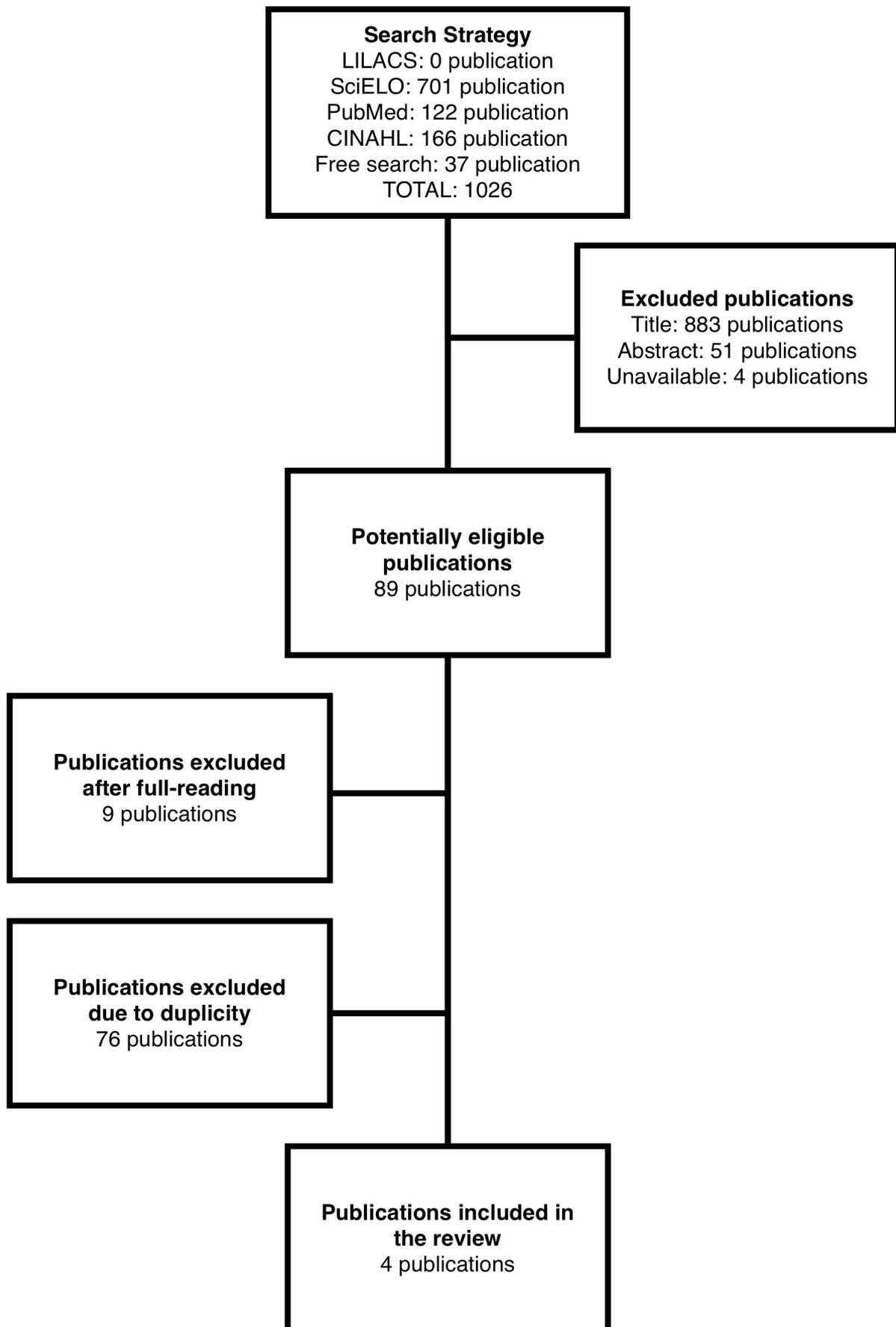
We searched the databases: *Literatura Latino-Americana e do Caribe em Ciências da Saúde* (LILACS), Scientific Electronic Library Online (SciELO), Medical Literature Analysis and Retrieval System Online (PubMed) and, Cumulative Index to Nursing and Allied Health Literature (CINAHL). We also performed a free

search in articles similar to the selected ones in the mentioned databases and international journals with specific scopus in diabetes, as *The Diabetes Educator*, *Diabetes Care* and *Diabetes* (Brazilian Diabetes Society).

The inclusion criteria to select the publications were primary studies published in the last ten years, from January 2007 to January 2017, due to the small number of publication in a smaller period; in English, Spanish or Portuguese and, studies conducted with children of zero to 18 incomplete years admitted in a hospital. We excluded book chapters, doctoral dissertations, master thesis, case reports, and studies related to outpatient diabetes education and/or primary health care.

We surveyed November/2016 to January/2017, obtaining 122 studies in the PubMed database, 701 in SciELO, 11 in CINAHL and none in LILACS, besides 37 studies found through free search, totalizing 1,026 publications. We excluded 883 studies by title, 51 excluded by abstract, nice duplicated publications and, four articles excluded by lack of access. In this step, we elected 80 publications, and we fully read them. After this analysis, we excluded 76 studies, being 33 excluded because they addressed diabetes education outside the hospital environment, 28 for not addressing diabetes education, eight for being bibliographic reviews and two for addressing adult population. Therefore, we selected four studies for analysis.

We descriptively conducted the final synthesis, referring to the objectives, results, and conclusions obtained in each one of the studies. The selection process is represented in the Flow Chart 1.



**Flow Chart 1:** Search strategy to select the included articles for review analysis

## RESULTS

Between the four studies selected for analysis, two had a qualitative approach, one was quantitative (pre- and post-intervention study) and, one retrospective study. Only one study was conducted in Brazil, in Fortaleza-CE, one was conducted in Sweden and the others in the USA.

We present the results and conclusions of the studies included in this review in the Chart 1.

**Chart 1:** Results and conclusions of included studies about education in hospital diabetes for children and their families.

Title/country of origin and year of publication	Objectives	Results	Conclusions
Pediatric Type 1 Diabetes: Reducing Admission Rates for Diabetes ketoacidosis <sup>(23)</sup> / (USA, 2016)	To verify if admissions by diabetes ketoacidosis (DKA), rates of readmissions in less than 30 days and hospitalization time could be reduced through 4 different interventions, including a new diabetes education program.	Statistically significant reduction in the three variables of interest.	Admissions by DKA can be reduced if specific aspects of diabetes management are attended, for example, education for patients and families.
Percepções de enfermeiras acerca da prática educativa no cuidado hospitalar a crianças com diabetes <sup>(24)</sup> / (Brazil, 2014)	Description of nurses' perceptions about diabetes education for children admitted in a hospital unit.	Highlight to the nurse performance as an educator; the need for a multi-disciplinary team; involvement of the family; education importance in the hospital scope, stimulation of the child's autonomy.	Appreciation of educational strategies, intensification of autonomy and self-care, family involvement. Need of continuous follow-up by a multidisciplinary team.
Long-Term Glycemic Control as a Result of Initial Education for Children With New Onset Type 1 Diabetes – Does the Setting Matter? <sup>(25)</sup> / (USA, 2013)	To analyze the initial diabetes education delivered in an academic medical center (AMC) compared to education delivered in non-academic centers, about the long-term glycemic control.	There was no significant difference in the long-term glycemic control between the two compared groups.	The long-term glycemic control is independent of a diabetes education conducted in a specialized center, and the most important are: constant re-education, focus on the child's developmental stages and new educational paradigms.
A multi-disciplinary education process related to the discharging of children from hospital when the child has been diagnosed with type 1 diabetes – a qualitative study <sup>(26)</sup> / (Sweden, 2010)	Understanding of the work process of the health team specialized in diabetes in the education of a child recently diagnosed with DM1.	The goal of the diabetes education program is for the patient to reach a self-care status, and the family should be part of the caring process.	The recommended education in diabetes program specially developed for each family, using clinical practices recommended by guidelines, incentivizing the family to be part of the child's self-care.

Analysis of objectives, results, and conclusions of the four studies listed above allowed us to identify three categories: Family Involvement and Empowerment in the Diabetes Educational Process; Performance of the Multi-professional Team; Definition and Content of the Educational Process.

### Family involvement and empowerment in the diabetes educational process

Families revealed that the child's DM1 diagnosis is a devastating situation and initially, it is very difficult to deal. The health team should help the family to focus on the educational process, trying to substitute the anxiety and stress by assuming an active role in the care for the child<sup>(26)</sup>. The family involvement in the child's education is fundamental, since admission until hospital discharge, as it is from the family that the child will receive help for self-care<sup>(24)</sup>. The child's glycemic control is directly related to the family dynamic, and it can be affected by behavioral problems<sup>(25)</sup> and also by the socioeconomic variable<sup>(24)</sup>. It is noted that the child appreciates the support from the family in her treatment<sup>(24)</sup>.

The diabetes education process should encourage parents and the child to participate in self-care actively<sup>(26)</sup>. The team should share the childcare with the family<sup>(24)</sup>, establishing a successful partnership in the triad professionals-child-family, since the child's diagnosis<sup>(25)</sup>, helping the family to incorporate changes effectively into the lifestyle<sup>(24)</sup>.

The child should be stimulated to apply the insulin herself and to conduct capillary glycemia, assuming the protagonist care role according to her development and capability<sup>(24)</sup>. The team should promote a proud feeling in the child related to her self-care, making the educational process fun and interesting<sup>(26)</sup>.

The process of providing knowledge and abilities to the child and family, to promote diabetes self-care, to make decisions, to resolve problems and to collaborate with the health team is a fundamental part of the empowering process for the patient<sup>(25)</sup>.

### Performance of the multi-professional team

The nursing is closer to the child and family since hospital admission, and it is the major responsible for diabetes care continuation, especially the nurse, who can identify the needs and preferences of the family and the participation in the care for the child<sup>(24,26)</sup>. The nurse's performance is noted as an educator in the hospital admission of the diabetic child<sup>(24)</sup>. But the nursing acknowledges the need for a multi-professional team with a teaching strategy and treatment adherence, and it is indispensable for continuous care, not only at the admission moment<sup>(24)</sup>.

The care provided to the child by the team members should be integrated, occurring the intersection of knowledge and propitiating quality and effectiveness of the educational process to the child, providing support and information to each other<sup>(24,26)</sup>. The child's needs should be a priority according to her reality and vision of the world, and not only focusing on the therapeutic requirements<sup>(24)</sup>.

The team should be kept updated in regards to the DM1 management<sup>(23)</sup>, and it is desirable for the hospital to have a structured and standardized DM1 education program<sup>(23)</sup>.

Creating bonds between the team and family is very important for diabetes management, being a higher involvement of the team resulting in a better long-term glycemic control<sup>(25)</sup>.

## Definition and content of the educational process

The concept of DM1 education is defined as a process to provide knowledge and essential abilities for self-care to the child and her family, for management of crises and lifestyle changes<sup>(26)</sup>. The approach should be integral with actions stimulating the participation of the child and her family<sup>(24)</sup>.

The process started since hospital admission should be seen as a strategy to support the child and based on dialogue, with the intention to increase knowledge about the disease and to stimulate the desire for self-care by the child and her family<sup>(24,26)</sup>. It is important to remember that this process should continue after hospital admission, and not only restricted to the diagnosis; on the contrary, it should be maintained throughout the child's life, requiring frequent contact between the triad team-child-family<sup>(25)</sup>.

The initial focus, at the diagnosis moment, is to teach "survival tools" to the child and her family, which will allow them to learn enough to have a safe discharge<sup>(25)</sup>. Therefore, it should be taught to the family members: correct administration of insulin, monitoring the capillary glycemia, eating adjustments and, care with hypoglycemia<sup>(24,26)</sup>.

The hospital admission is used to provide understanding and abilities needed to the child and family, without the expectation of the child and her family to obtain total understanding about DM1<sup>(26)</sup>. It is important to remember that the diabetes diagnosis experience causes suffering for the child and the family, that can be exacerbated with the hospital admittance, creating doubts and overload, and it can impair the comprehension of given orientations and, the acquisition of needed abilities<sup>(24)</sup>. Besides, it is fundamental that the concepts about infant development to be integrated to care, drawing a new adequate educational plan for each child<sup>(24)</sup>. Below, Chart 2 resumes topics that the child's hospital education should address, according to the developmental phase, based on two literature reviews<sup>(16,27)</sup>.

The supply of the didactic educational material, which is cultural and adequate to the developmental phase of the child is an important tool for diabetes care, counting with the use of technologies, books, flyers, and websites. These resources promote the increase of verbal expression and favor the involvement and understanding of the child about care with the disease<sup>(23-24)</sup>.

The family should be invited to ask questions to the health team during the educational process, and the nurse should revise and reinforce the understanding. The nurse should also test if the child and the family acquired knowledge. It is expected for the family to acquire abilities to promote care to the child, with the management of the insulin pen and/or syringe, the perception of the insulin effect and monitoring of the capillary glycemia levels, within others<sup>(26)</sup>.

Despite the ADA<sup>(20)</sup> and ISPAD<sup>(2)</sup> recommendations that a team should conduct diabetes education focused on pediatric diabetes, Cabrera et al.<sup>(25)</sup> indicates no evidence supporting that the initial diabetes education should be conducted in a specialized center; considering no significant differences found in the levels of glycated hemoglobin (HbA1c) in the pediatric group educated in a unit specialized in diabetes versus the pediatric group educated in a non-specialized unit<sup>(25)</sup>.

**Chart 2:** Essential topics to address in the education to the hospitalized child diagnosed with diabetes and how much can the child assume self-control.

Developmental phase	Characteristics related to the DM1 diagnosis	Specific subjects to be addressed	Empowering the child and self-control
TODDLER AND PRE-SCHOOL	High dependence on the parents and/or caregivers; incapable of detecting, assessing or verbalizing diabetes signals and symptoms; they can present atypical clinical manifestations.	Hypoglycemia signals and their potential risks; Balanced nutrition; Adjusts in the insulin therapy and eating during infection periods; Situations where the child rejects therapy; Feelings of guilt; Child's social interaction; Social support.	Parents should have total control of insulin administration, monitoring of glycemic levels and eating until the child is three years old. Between three and seven years, the children can start to perform little diabetes self-care tasks.
SCHOLAR	They can present moderate cases of depression and anxiety related to the diagnosis.	Balanced nutrition and dealing with sweets; Adapting the insulin therapy for physical exercise; Social integration at school and in leisure activities; Child's safety when not under parental supervision;	Children can progressively assume daily tasks like the insulin application and monitor the capillary glycemia but under the supervision of instructed adults. The child can be instructed about the physiopathology of the disease simply.
	An increasing need for independence.	Support and responsibility for the child without excesses; Diabetes as an instrument of power; Importance of the glycemic self-monitoring; Child's typical behavior or emotional issues.	
ADOLESCENTS	A phase comprehending diverse physical, psychic and social changes. The adolescent makes his own decisions; the autonomy is very important for the good control fo the disease.	To divide the responsibilities and diabetes management within the family; To promote independence and autonomy; Puberty influences in the metabolic control; To deal with mood swings of the age; Excess of physical exercise and night outings; Trips without the parents; Alcohol and drugs; Motivational support; Sexuality; Eating disorders; Self-monitoring.	Should be responsible for his treatment, assuming the protagonist role. But it does not mean that care and responsibility for the disease will be only of the adolescent. The parents should be present, sharing the tasks and helping the adolescent to promote autonomy.

## DISCUSSION

Based on the results and conclusions of the study, we identified important categories related to the education of the child diagnosed with diabetes. The three identified themes are not excluding; once all these aspects are tangled in the establishment of the educational process.

The diabetes education is a very clear concept, emphasizing care strategy as the integral approach of the child and family<sup>(24)</sup>. It is perceived as a continuous process that facilitates the access to knowledge and promotes the development of abilities for self-care and, it aims at the quality of life improvement<sup>(15-16)</sup>.

The inclusion of the family in the care, one of the great highlights of the study, is corroborated by the large institutions related to diabetes research, as ADA<sup>(20)</sup>, SBD<sup>(15)</sup> and ISPAD<sup>(2)</sup>. All guidelines present the family as a vital component of the excellent diabetes management during childhood and adolescence<sup>(20)</sup>.

The nursing team should be attentive to provide a comprehensive education to the family and child<sup>(27)</sup>, paying attention to potential learning limiting factors. For example, social conflicts, psychiatric conditions, parental overload, economic issues, lack of information and, some spiritual beliefs<sup>(27-28)</sup>, besides the

hospitalization; that is an additional stress factor to the family<sup>(28-29)</sup>.

Nursing should constantly evaluate the family which they are providing care<sup>(29-32)</sup>, as the positive and optimistic communication in the family relates to better glycemic levels and the child's treatment adherence<sup>(32)</sup>. Thus, resulting in better quality of life, while family conflicts, high levels of hostility and criticism, feelings of lack of parental help by the child lead to opposite results<sup>(32)</sup>.

The nurse should transfer to the family and the child the desire to learn about the disease<sup>(27)</sup> and to have realistic goals to reach self-control<sup>(27)</sup>, focusing in reaching independence and autonomy according to each age group<sup>(15-16)</sup>. Active participation directly connects to a better long-term glycemic control<sup>(16,28)</sup>.

Another common point raised through the analysis is not only the participation of the nurse in diabetes education but a multi-disciplinary team<sup>(2,15,20)</sup>. The participation of a multidisciplinary team that shares the same philosophy and goals have beneficial metabolic and psychological effects for the children during the educational process.

We highlight the need for a constantly updated team about diabetes management and, the hospital institution to have a structured diabetes education program guided by the guidelines proposed by the specialists' societies<sup>(11,16,27)</sup>.

There are many sources in the literature indicating that the treatment to the child diagnosed with diabetes should be done by a team specialized in this disease<sup>(11,16,27)</sup>, or with at least one specialist member in this subject<sup>(31)</sup>, something that Cabrera et al. <sup>(25)</sup> contests. His study showed that the education of a child recently diagnosed with diabetes conducted in a specialized or center for diabetes or not does not interfere with the long-term glycemic control. But the author himself recognizes a limitation in the study as the only analyzed variable was the HbA1c<sup>(25)</sup> level. Best results in diabetes education for children have more impact on the psychosocial variable than in the glycemic control<sup>(2,15)</sup>.

This analysis found evidence that education in diabetes should start as soon as the child enters the hospital, it should continue after the hospital discharge, due to the importance to adapt the therapy according to the needs of the child and family, turning it into a continuous process<sup>(2,15,20,27,33)</sup>.

There is no world's standard model of education to the child recently diagnosed with diabetes, and the educational methods can vary even when guided by consolidated guidelines<sup>(16,28)</sup>. It is not a problem, considering the need of to adapt education to the child's context and to individualize information to each family, to adapt to their culture and, to be incorporated in the hospital clinical care routine<sup>(2,15-16,18,20,27)</sup>.

The educational process for the child in the hospital should be based in goals<sup>(19)</sup>, with specific objectives, trying to focus in one therapeutic goal at a time, instead of focusing in the diabetes treatment as a whole, given its high complexity<sup>(17)</sup>. Besides, the care should not be restricted only to the technical part, it should incorporate the emotional, social and psychological needs of the child and her family<sup>(18)</sup>, in addition to the external support network that inspires trust in the child<sup>(29)</sup>, which helps the treatment adherence.

The use of technologies as cell phones, games, text messages, social networks, within others, are attractive educational tools to children and adolescents, which seem promising in interventions, besides

creative initiatives with dolls and puppets<sup>(15-16)</sup>.

The education to parents should promote trust and competence, and include training for the acquisition of needed skills<sup>(27)</sup>. The use of innovative techniques as vignettes and simulations with patients, which give support to the educational process without adding too much formality and which allow parental interaction in the process, are extremely beneficial<sup>(28)</sup>. The educational material provided to parents should have appropriate language and of easy comprehension<sup>(2)</sup>.

## CONCLUSION

Nursing has noted participation within the multidisciplinary team in the educational process of the child with DM1 and her family. Thus, the nurse should value the partnership with the family in the educational process during the child's entire hospitalization, considering the family involvement, since the admission until the child's discharge. The nurse should follow through the whole development until the adult phase, which is essential for good diabetes management and contributes to the adequate glycemic control.

The diabetes education during hospitalization should be part of the integral care to the patient, offered during the clinical practice, respecting individualities and family's culture, being evidence-based and according to the development phase and the child's maturity.

It is important to highlight that the diagnostic moment is a stressful phase for parents and the child, added the hospitalization itself. At this moment, the education should be focused on "survival tools", promoting a safe hospital discharge for the child and assuring care continuity.

There were limitations in this study since there are few existing primary studies addressing diabetes education for hospitalized children. Considering the growing incidence of DM1, future studies about educational interventions are needed to assure the better care for children diagnosed with DM1.

The contribution of this review consists in providing the nurse with guidelines for the educational practice to the hospitalized child with DM1, aiming to standardize conducts, guarantee an updated educational process and that offers safety and quality of life to the child and her family.

## REFERENCES

1. Yogi-Morren D, Lansang MC. Management of Patients with Type 1 Diabetes in the Hospital. *Curr Diab Rep* [Internet]. 2014 [cited 2017 dec 31];14(2):458. Available from: <http://doi.org/10.1007/s11892-013-0458-9>.
2. International Society for Pediatric and Adolescent Diabetes. ISPAD Clinical Practice Consensus Guidelines 2014 [Internet]. Berlin: ISPAD; 2014 [cited 2017 dec 31]. Available from: <https://www.ispad.org/?page=ISPADClinicalPract>.
3. Negrato CA, Dias JPL, Teixeira MF, Dias A, Salgado MH, Lauris JR, et al. Temporal trends in incidence of Type 1 diabetes between 1986 and 2006 in Brazil. *J Endocrinol Invest* [Internet]. 2010 [cited 2017 dec 31];33(6):373-7. Available from: <http://doi.org/10.1007/BF03346606>.
4. Haller MJ, Atkinson MA, Schatz D. Type 1 Diabetes Mellitus: Etiology, Presentation, and Management. *Pediatr Clin North Am* [Internet]. 2005 [cited 2017 dec 31];52(6):1553-78. Available from: <http://doi.org/10.1016/j.pcl.2005.07.006>.

5. Banion C, Valentine V. Type 1 diabetes throughout the life span. In: Mensing C, editor. The art and science of diabetes self-management education: a desk reference for healthcare professionals. Chicago: American Association of Diabetes Educators; 2006. p. 187-213.
6. Dabelea D, Mayer-Davis EJ, Saydah S, Imperatore G, Linder B, Divers J, et al. Prevalence of Type 1 and Type 2 Diabetes Among Children and Adolescents From 2001 to 2009. JAMA [Internet]. 2014 [cited 2017 dec 31];311(17):1778-86. Available from: <http://doi.org/10.1001/jama.2014.3201>.
7. Onkamo P, Väänänen S, Karvonen M, Tuomilehto J. Worldwide increase in incidence of Type I diabetes - the analysis of the data on published incidence trends. Diabetologia [Internet]. 1999 [cited 2017 dec 31];42(12):1395-403. Available from: <http://doi.org/10.1007/s001250051309>.
8. Patterson CC, Dahlquist GG, Gyürüs E, Green A, Soltész G. Incidence trends for childhood type 1 diabetes in Europe during 1989–2003 and predicted new cases 2005–20: a multicentre prospective registration study. Lancet [Internet]. 2009 [cited 2017 dec 31];373(9680):2027-33. Available from: [http://doi.org/10.1016/S0140-6736\(09\)60568-7](http://doi.org/10.1016/S0140-6736(09)60568-7).
9. Gyurus EK, Patterson C, Soltesz G. Twenty-one years of prospective incidence of childhood type 1 diabetes in Hungary - the rising trend continues (or peaks and highlands?). Pediatr Diabetes [Internet]. 2012 [cited 2017 dec 31];13(1):21-5. Available from: <http://doi.org/10.1111/j.1399-5448.2011.00826.x>.
10. International Diabetes Federation. IDF Diabetes Atlas Seventh Edition [Internet]. 7th ed. Bruxelas: International Diabetes Federation; 2015. Available from: <https://www.idf.org/component/attachments/attachments.html?id=1093&task=download>.
11. Hermoso López F, Barrio Castellanos R, Garcia Cuartero B, Gómez Gila A, González Casado I, Oyarzabal Irigoyen M, et al. Asistencia al niño y adolescente con diabetes. Unidades de referencia en diabetes pediátrica. An Pediatría [Internet]. 2013 [cited 2017 dec 31];78(5):335.e1-335.e4. Available from: <http://doi.org/10.1016/j.anpedi.2012.10.001>.
12. Office Guide to Diagnosis and Classification of Diabetes Mellitus and Other Categories of Glucose Intolerance. Diabetes Care [Internet]. 1995 [cited 2017 dec 31];18(Suplemento 1):3-4. Available from: <http://doi.org/10.2337/diacare.18.1.S3>.
13. Oram RA, Patel K, Hill A, Shields B, McDonald TJ, Jones A, et al. A Type 1 Diabetes Genetic Risk Score Can Aid Discrimination Between Type 1 and Type 2 Diabetes in Young Adults. Diabetes Care [Internet]. 2016 [cited 2017 dec 31];39(3):337-44. Available from: <http://doi.org/10.2337/dc15-1111>.
14. The DIAMOND Project Group. Incidence and trends of childhood Type 1 diabetes worldwide 1990–1999. Diabet Med [Internet]. 2006 [cited 2017 dec 31];23(8):857-66. Available from: <http://doi.org/10.1111/j.1464-5491.2006.01925.x>.
15. Sociedade Brasileira de Diabetes. Diretrizes da Sociedade Brasileira de Diabetes 2015-2016 [Internet]. São Paulo: A. C. Farmacêutica; 2016 [cited 2017 dec 31]. Available from: <http://www.diabetes.org.br/profissionais/images/docs/DIRETRIZES-SBD-2015-2016.pdf>.
16. Leite SAO, Zanim LM, Granzotto PCD, Heupa S, Lamounier RN. Pontos básicos de um programa de educação ao paciente com diabetes melito tipo 1. Arq Bras Endocrinol Metabol [Internet]. 2008 [cited 2017 dec 31];52(2):233-42. Available from: <http://doi.org/10.1590/S0004-27302008000200010>.
17. Coffen RD, Dahlquist LM. Magnitude of Type 1 Diabetes Self-management in Youth Health Care Needs Diabetes Educators. Diabetes Educ [Internet]. 2009 [cited 2017 dec 31];35(2):302-8. Available from: <http://doi.org/10.1177/0145721708327534>.
18. Chaney D. Structured diabetes education for children and adolescents. Nurs Stand [Internet]. 2012 [cited 2017 dec 31];27(6):41-7. Available from: <https://doi.org/10.7748/ns2012.10.27.6.41.c9350>.
19. Wang J, Siminerio LM. Educators' Insights in Using Chronicle Diabetes. Diabetes Educ [Internet]. 2013 [cited 2017 dec 31];39(2):248-54. Available from: <http://doi.org/10.1177/0145721713475844>.
20. Standards of Medical Care in Diabetes - 2017: Summary of Revisions. Diabetes Care [Internet]. 2017 [cited 2017 dec 31];40(Suplemento 1):S4-5. Available from: <http://doi.org/10.2337/dc17-S003>.
21. Mendes KDS, Silveira RCCP, Galvão CM. Revisão integrativa: método de pesquisa para a incorporação de evidências na saúde e na enfermagem. Texto Context - Enferm [Internet]. 2008 [cited 2017 dec 31];17(4):758-64. Available from: <http://doi.org/10.1590/S0104-07072008000400018>.
22. Santos CMC, Pimenta CAM, Nobre MRC. The PICO strategy for the research question construction and evidence search. Rev Lat Am Enfermagem [Internet]. 2007 [cited 2017 dec 31];15(3):508-11. Available from: <http://doi.org/10.1590/S0104-11692007000300023>.

23. Ilkowitz JT, Choi S, Rinke ML, Vandervoot K, Heptulla RA. Pediatric Type 1 Diabetes: Reducing Admission Rates for Diabetes Ketoacidosis. *Qual Manag Health Care* [Internet]. 2016 [cited 2017 dec 31];25(4):231-7. Available from: <http://doi.org/10.1097/QMH.000000000000109>.
24. Pennafort VPS, Silva ANS, Queiroz MVO. The perception of nurses regarding educational practices for children with diabetes in hospital care. *Rev Gaucha Enferm* [Internet]. 2014 [cited 2017 dec 31];35(3):130-6. Available from: <http://doi.org/10.1590/1983-1447.2014.03.43313>.
25. Cabrera SM, Srivastava NT, Behzadi JM, Pottorff TM, Dimeglio LA, Walvoord EC. Long-term glycemic control as a result of initial education for children with new onset type 1 diabetes: does the setting matter? *Diabetes Educ* [Internet]. 2013 [cited 2017 dec 31];39(2):187-94. Available from: <http://doi.org/10.1177/0145721713475845>.
26. Jönsson L, Hallström I, Lundqvist A. A multi-disciplinary education process related to the discharging of children from hospital when the child has been diagnosed with type 1 diabetes--a qualitative study. *BMC Pediatr* [Internet]. 2010 [cited 2017 dec 31];10:36. Available from: <http://doi.org/10.1186/1471-2431-10-36>.
27. Lange K, Sassmann H, von Schütz W, Kordonouri O, Danne T. Prerequisites for age-appropriate education in type 1 diabetes: a model programme for paediatric diabetes education in Germany. *Pediatr Diabetes* [Internet]. 2007 [cited 2017 dec 31];8 Suppl. 6:63-71. Available from: <http://doi.org/10.1111/j.1399-5448.2007.00277.x>.
28. Ramchandani N, Johnson K, Cullen K, Hamm T, Bisordi J, Sullivan-Bolyai S. CDE Perspectives of Providing New-Onset Type 1 Diabetes Education Using Formal Vignettes and Simulation. *Diabetes Educ* [Internet]. 2017 [cited 2017 dec 31];43(1):97-104. Available from: <http://doi.org/10.1177/0145721716676893>.
29. Nascimento LC, Amaral MJ, Sparapani VC, Fonseca LMM, Nunes MDR, Dupas G. Diabetes mellitus tipo 1: evidências da literatura para seu manejo adequado, na perspectiva de crianças. *Rev Esc Enferm USP* [Internet]. 2011 [cited 2017 dec 31];45(3):764-9. Available from: <http://doi.org/10.1590/S0080-62342011000300031>.
30. Edge JA, Ackland F, Payne S, McAulay A, Hind E, Burren C, et al. Care of children with diabetes as inpatients: frequency of admissions, clinical care and patient experience. *Diabet Med* [Internet]. 2013 [cited 2017 dec 31];30(3):363-9. Available from: <http://doi.org/10.1111/dme.12059>.
31. Edge J, Ackland FM, Payne S, McAuley A, Hind E, Burren C, et al. Inpatient care for children with diabetes: are standards being met? *Arch Dis Child* [Internet]. 2012 [cited 2017 dec 31];97(7):599-603. Available from: <http://doi.org/10.1136/archdischild-2011-301212>.
32. Ridge K, Thomas S, Jackson P, Pender S, Heller S, Treasure J, et al. Diabetes-Oriented Learning Family Intervention (DOLFIN): a feasibility study evaluating an intervention for carers of young persons with Type 1 diabetes. *Diabet Med* [Internet]. 2014 [cited 2017 dec 31];31(1):55-60. Available from: <http://doi.org/10.1111/dme.12333>.
33. Jaacks LM, Bell RA, Dabelea D, D'Agostino RB, Dolan LM, Imperatore G, et al. Diabetes Self-Management Education Patterns in a US Population-Based Cohort of Youth With Type 1 Diabetes. *Diabetes Educ* [Internet]. 2014 [cited 2017 dec 31];40(1):29-39. Available from: <http://doi.org/10.1177/0145721713512156>.