

KNOWLEDGE OF TEACHERS OF ELEMENTARY SCHOOL ON DIABETES AND ITS MANAGEMENT IN THE SCHOOL ENVIRONMENT

CONHECIMENTO DE PROFESSORES DO ENSINO FUNDAMENTAL SOBRE DIABETES E SEU MANEJO NO AMBIENTE ESCOLAR

CONOCIMIENTO DE LOS DOCENTES DEL SECUNDARIO SOBRE LA DIABETES Y SU MANEJO EN EL AMBITO ESCOLAR

 Evelin Matilde Arcain Nass ¹
 Pamela dos Reis ²
 Elen Ferraz Teston ³
 Sueli Mutsumi Tsukuda Ichisato ¹
 Maria Aparecida Salci ¹
 Sonia Silva Marcon ¹

¹ Universidade Estadual de Maringá – UEM, Programa de Pós-graduação em Enfermagem. Maringá, PR – Brazil.

² UEM, Programa de Pós-graduação em Enfermagem. Maringá, PR – Brazil; Instituto Adventista Paranaense – IAP, Curso de Enfermagem. Ivatuba, PR – Brazil.

³ Universidade Federal do Mato Grosso do Sul – UFMS, Curso de Enfermagem. Campo Grande, MS – Brazil.

Corresponding author: Evelin Matilde Arcain Nass
E-mail: evelinmarcain@gmail.com

Author's Contributions:

Conceptualization: Evelin M. A. Nass, Pamela dos Reis, Sonia S. Marcon; **Data Collection:** Evelin M. A. Nass, Pamela dos Reis; **Methodology:** Evelin M. A. Nass, Pamela dos Reis, Sonia S. Marcon; **Project Management:** Sonia S. Marcon; **Software:** Sonia S. Marcon; **Supervision:** Sonia S. Marcon; **Validation:** Evelin M. A. Nass, Pamela dos Reis, Elen F. Teston, Sueli M. T. Ichisato, Maria A. Salci, Sonia S. Marcon; **Visualization:** Evelin M. A. Nass, Pamela dos Reis, Elen F. Teston, Sueli M. T. Ichisato, Maria A. Salci, Sonia S. Marcon; **Writing – Original Draft Preparation:** Evelin M. A. Nass, Pamela dos Reis, Elen F. Teston, Sueli M. T. Ichisato, Maria A. Salci, Sonia S. Marcon; **Writing – Review and Editing:** Evelin M. A. Nass, Pamela dos Reis, Elen F. Teston, Sueli M. T. Ichisato, Maria A. Salci, Sonia S. Marcon.

Funding: No funding.

Submitted on: 2018/04/16

Approved on: 2019/04/11

ABSTRACT

Objective: to seize the knowledge of teachers about diabetes mellitus and its management in the school environment. **Methods:** exploratory and qualitative study that used the Brazilian *Programa Saúde na Escola* as a conceptual basis. Data was collected from October to December 2016, with 31 elementary school teachers, using a script with open and subjective questions that were submitted to content analysis. **Results:** two categories emerged – limited knowledge about the disease and the preventive care adopted, and limitations in the identification and management of glycemic decompensations. Teachers recognize the importance of training in this area and of a good communication between family members and education professionals for better child care in the school environment. **Conclusion:** there are numerous challenges in the care of children with diabetes mellitus in the school context, and it is necessary to rethink articulated actions among family, school and the health sector. **Keywords:** Diabetes Mellitus; Diabetes Complications; Child Health; School Health Services.

RESUMO

Objetivo: apreender o conhecimento de professores sobre o diabetes mellitus e seu manejo no ambiente escolar. **Métodos:** estudo exploratório qualitativo que utilizou como base conceitual o Programa Saúde na Escola. Os dados foram coletados no período de outubro a dezembro de 2016, com 31 professores do ensino fundamental, utilizando um roteiro com questões abertas e subjetivas, que foram submetidas à análise de conteúdo. **Resultados:** emergiram duas categorias – conhecimento limitado sobre a doença e cuidados preventivos adotados e limitações na identificação e manejo de desconcompensações glicêmicas. Os professores reconhecem a importância de capacitação nessa área e de uma boa comunicação dos familiares com os profissionais da educação para melhor cuidado da criança no ambiente escolar. **Conclusão:** numerosos são os desafios no cuidado às crianças com diabetes mellitus no contexto escolar, sendo necessário repensar ações articuladas entre família, escola e o setor saúde. **Palavras-chave:** Diabetes Mellitus; Complicações do Diabetes; Saúde da Criança; Serviços de Saúde Escolar.

RESUMEN

Objetivo: comprender el conocimiento de profesores sobre la diabetes mellitus y cómo se manejan en el ambiente escolar. **Método:** estudio exploratorio cuantitativo en base al programa Salud en la Escuela. Los datos se recogieron entre octubre y diciembre de 2016 con 31 profesores de enseñanza fundamental por medio de cuestiones abiertas y subjetivas. Las respuestas se analizaron según su contenido. **Resultados:** se establecieron dos categorías – 1) conocimiento limitado sobre la enfermedad y los cuidados preventivos adoptados y 2) limitaciones en la identificación y manejo de desconcompensaciones glucémicas. Los profesores reconocen la importancia de la capacitación en ese campo y de la necesidad de buena comunicación entre familiares y profesionales de educación

How to cite this article:

Nass EMA, Reis P, Teston EF, Ichisato SMT, Salci MA, Marcon SS. Knowledge of teachers of elementary school on diabetes and its management in the school environment. REME – Rev Min Enferm. 2019[cited ____ - ____];23:e-1186. Available from: _____ DOI: 10.5935/1415-2762.20190034

para cuidar mejor al niño en el ambiente escolar. Conclusión: el cuidado de niños con diabetes mellitus en el ambiente escolar enfrenta muchos retos y, por ello, habría que proponer acciones coordinadas entre la familia, la escuela y el sector de salud.

Palabras clave: Diabetes Mellitus; Complicaciones de la Diabetes; Salud del Niño; Servicios de Salud Escolar.

INTRODUCTION

Diabetes *mellitus* (DM) as a chronic condition is one of the major childhood diseases worldwide. In Brazil, it is estimated that approximately 300 thousand children and teenagers present the disease.¹ The main types of DM are type 1 (T1D), which is more frequent in children – it corresponds to 90% of cases in children under 15; and type 2 (T2D), more frequent in adults and the elderly. The prevalence of T1D varies between 0.1 and 0.3%, with 78,000 new cases appearing each year, especially in children, while the prevalence of T2D is 7.6%.² However, it is observed that overweight, unhealthy eating habits and increasingly sedentary lifestyle have resulted in increased T2D in youth.³

Regardless of type, DM imposes the need for continuous medical treatment, lifestyle and specific diet, which in childhood requires constant supervision, mainly by parents, in addition to regular follow-up with health professionals and support from educational institutions.²

Adaptations in lifestyle should be transversal to daily life in the family, school and social environments of the child, bringing repercussions on the quality of life and health promotion.⁴ Thus, considering the time that children remain in school, this institution must be prepared to admit those with some chronic condition, in order that this fact is not perceived as a threat to their health. In this context, teachers can play a fundamental role in monitoring the health status of children with DM. Thus, they can have a differentiated performance, allowing them to recognize manifestations of clinical changes and to prevent risks due to acute complications.⁵

To maintain glycemic levels, the daily routine of school children with DM may include insulin administration, capillary glycemia measurement, food reeducation and regular practice of physical activity, requiring a complex network of care.¹ This set of activities can trigger a significant psychosocial impact in childhood, affecting overall functioning and quality of life.⁶ This is because, in addition to restricting habitual activities that are part of the different stages of child development, it can also interfere with socialization, self-image, self-esteem and relationships with colleagues, thus increasing the chances of psychological problems.⁶

One of the basic cornerstones for the prevention and management of DM as a chronic disease is the creation of a “healthy school” that provides recreation, physical activity and

healthy food. With this, the future need for the school and especially for its teachers to be informed about DM is evidenced, as well as how to identify and manage the main acute manifestations related to glycemic decompensation.³

The Brazilian *Programa Saúde na Escola* (PSE) is a public policy aimed at the integration and permanent articulation of the areas of education and health, strengthening the development of actions to address vulnerabilities that compromise full development of Brazilian children, teenagers and young people. It is implemented through the interaction of primary care health teams with education teams, involving the planning, execution and monitoring of prevention, promotion and evaluation of the health conditions of the students.⁷

Considering these aspects, teachers and everyone working in the school environment need to be sensitized about the role and importance of this institution in the formation of healthy habits. Given this context that involves the epidemiological scenario of DM, the time that children and teenagers engage in the school routine and the role of teachers as influencers of healthy behaviors and habits, the following research question arose: “in view of the purposes of the PSE, are elementary school teachers prepared to deal with/support children with DM in the school environment?”. In order to answer it, the following was defined as the objective of the study: to grasp the knowledge of primary school teachers about diabetes *mellitus* and its management in the school environment.

METHODS

A descriptive and exploratory study with a qualitative data approach, which used the PSE⁷ as a conceptual basis. It was carried out with the elementary school teachers of all the schools (two public and one private) of a small municipality in the northwest of the state of *Paraná*. 31 teachers participated in the study. As inclusion criteria, the following were defined: teachers of both genders, who taught in elementary school for more than six months. Those who were on vacation or leave of absence of any kind and those absent on the days defined by the directors for the visits in the school were excluded.

Data was collected from October to December 2016, using a questionnaire with objective and subjective questions, composed of three parts: the first one, addressing sociodemographic characteristics; the second, knowledge about the disease (definition and characteristics of the disease and treatment, signs and symptoms of glycemic control, definition and symptoms of hypo and hyperglycemia and what to do in each case and food care); and the third, composed of questions related to the management of the child with DM (experience in having students with diabetes, information and training received about the disease and its management, care taken dur-

ing classes, intervals and commemorative dates and knowledge about medication and physical activity).

In order to define the study participants, visits were made to the schools, previously scheduled by telephone with the directors, who informed the number of teachers in activity, those who were temporarily away and the best days and times to address them, without prejudice to their activities.

During the data collection period, 59 teachers (40 in public schools) worked in primary school, of which four were discharged as a result of medical treatment or leave and eight were absent on the days scheduled. The others (47) were approached in the teachers' room and invited to participate in the research. On that occasion, an envelope containing the Written Informed Consent (WIC) and the data collection instrument was given and guidance was offered on the importance of answering it individually and without consultation. It was also agreed that, if not answered at that time, the envelopes should be left in the school office within a maximum of one week.

Participants were included in the study for convenience, and of the 47 questionnaires distributed, 31 (19 from the public institutions and 12 from the private institution) were considered, since four were not returned and 12 were incomplete or blank. The school secretary checked the returned questionnaires in her list and wrote the return date on the envelope. Researchers returned to the schools every two days to collect the returned envelopes.

For the organization of the material, the questionnaires were numbered according to the order of return, regardless of school, sociodemographic data recorded in the software Excel for Windows and the answers to each of the subjective questions recorded in an individualized file in the Microsoft Word. Subsequently, the answers of all the participants were grouped by questions constituting the *corpus* of analysis and submitted to content analysis, thematic modality, followed by the pre-established stages.⁸ In the pre-analysis, floating and intensive readings of the data set were carried out in order to raise the relevant points for the study objective. In the second phase, the material exploration phase, data was coded, whereby raw data is systematically processed and aggregated into units. Finally, in the data processing stage, categorization was performed, which consists of the classification of elements according to their similarities and differentiation, with the subsequent regrouping according to common characteristics, which allowed the identification of two categories: restricted knowledge about the disease and preventive care, and limitations in the identification and management of glycemic decompensations.

All participants signed the WIC, ensuring preservation of dignity, respect for autonomy and defense of the vulnerability of the people involved in the research, according to Resolution 466/12 of the Brazilian *Conselho Nacional de Saúde* of the *Ministério da Saúde* (CNS/MS). Research was carried out after

approval by the Committee of Ethics in Research with Human Beings of the signatory institution (Opinion no. 1,897,195). In order to guarantee confidentiality and anonymity and to preserve the identity of the participants, the excerpts of their reports were identified with the letter P, followed by a number referring to the order of return of the questionnaires, regardless of the type of school, for example: P1, P2, P3 [...].

RESULTS

The 31 participants had ages ranging from 25 to 58 years old, 28 being females. As for their training, 19 had completed higher education, eight had specialization and four, a Master's degree. The time of work as a teacher ranged from one to 31 years, with an average of 13 years. The experience of previously having students in their care in the classroom with DM was reported only by 10 teachers, who reported that they became aware of the diagnosis through the parents' statement to the school board, which in turn passed on the information to all involved in the educational process. Only two teachers reported that in their training they received basic information about this disease and none of them reported having received training for its management in the school environment. The categories that come from the analysis process are presented below.

Data analysis allowed to identify that, although the teachers under study have some knowledge about the disease, this knowledge is very superficial, which may compromise effective action in some situations, especially in cases of glycemic changes. These findings are contained in the two categories from the analysis process, which will be described below.

LIMITED KNOWLEDGE ABOUT THE DISEASE AND PREVENTIVE CARE

In the conception of the participants, they have knowledge about DM. In contrast, when referring to the disease, they reported only basic characteristics and some signs and symptoms.

It is a chronic disease characterized by excess blood sugar (P3).

In diabetes, the body does not properly absorb large amounts of sugars (P15).

The child has an exaggerated appetite, unexplained weight loss, is sleepy, very thirsty and tired (P5).

They also reported knowing the importance of prevention and treatment, as well as the need to associate drug and non-drug treatment for disease control.

It is important to monitor the glucose level in the body, the exercise routine and food control (P3).

[...] eating sugar-free foods, avoiding pasta, engaging in physical activity, and control with medication (P5).

Regarding the action to prevent glycemic decompensation in the school environment, participants pointed out some situations in which they are aware when children with DM are under their responsibility.

We always have an interview at the beginning of the year with the family, about the student. Thus, it is easier to serve the student in his particularities (P13).

Aim to control the intake of foods with high-glucose content, to drink plenty of water (P3).

Mainly take out the sugar, avoid foods like breads, pizza, pasta and others that are carbohydrates. Do not consume "normal" soda – with sugar (P26).

They also mentioned high-risk situations, considered problematic, due to children's exposure to inadequate diet. These situations are recognized as moments that demand more attention from teachers:

At school, children are in direct contact with sweets, cakes, birthday parties and all of this should be avoided! Need to guide and monitor well, as children share their snacks. Not only in the sweet is the danger, but in salty snacks and excess fruits also (P17).

LIMITATIONS IN THE IDENTIFICATION AND MANAGEMENT OF GLYCEMIC DECOMPENSATIONS

When questioned about how they identify children with glycemic decompensation and how they would act to help them, teachers demonstrated to recognize some signs of hypoglycemia. However, it is possible to identify failures in the conduct of complications that require immediate intervention.

Low blood sugar generates drowsiness, irritation, poor performance. Need to guide to find a professional (P22).

Low blood sugar makes you constantly tired and weak. Need to refer to a doctor (P25).

Some even mentioned performing immediate actions; however, without verification of capillary glycemia.

Lack of blood sugar generates body drowsiness and sometimes even fainting and sweating. Must offer something with sugar (P3).

When blood glucose goes down a lot, you have to send the child to the infirmary, if there is no such option, I would give a candy (P17).

[...] too much heat, sweat, weakness, dizziness. [...] give a glass of water with a spoonful of sugar or tea or sugared milk (P26).

They have also shown the ability to recognize some signs and symptoms of hyperglycemia, which may also be confused with signs of hypoglycemia.

[...] it is high blood sugar. May cause dizziness, blurred vision, need to be referred immediately to the emergency care (P5).

[...] thirst is one of the symptoms. [...] see the food prepared in the school and if he is using medication at the correct times (P10).

It is worth mentioning that not all participants were sure about the acute complications of the disease, manifesting insecurities and limitations regarding possible behaviors. And although they were aware of some acute complications, acknowledging the existence of hypo and hyperglycemia, they did not demonstrate the ability to differentiate one complication from the other.

I do not know if hypoglycemia is the lack or excess of insulin. I imagine that you should experience tremors, dizziness, pressure fall and should put the child to sleep, increase water and glucose intake (P21).

I believe that the symptoms should be very similar [...] drowsiness, somnolence [...] send to an adequate care facility, stimulate water consumption, exercise and use insulin (P21).

However, all of them recognized limitations on the management of the child with glycemic decompensation, attributed this responsibility to the parents, but showed interest in receiving information about how to deal with acute complications.

The teacher has no specific information on how to act in such cases and the family must pass on such information (P6).

We need the support and accompaniment of parents, guidelines to know how to act properly (P13).

Symptoms are not always the same. Many people do not know if blood glucose is high or low. Parents need to help the school to follow up and to act properly (P26).

Some participants also acknowledged and mentioned the importance of expanding the support network to accommodate these students, involving family, health professionals and the school.

For cases like this, or for any other of students with special needs, the whole school needs to be involved: teachers, direction, coordination and colleagues. And family partnership is essential (P13).

I believe it is worth to have a meeting of health professionals with teachers for the transmission of content, not only about diabetes, but about other diseases involving our students (P19).

[...] none of the health care relies directly upon the teacher, except when it occurs in the classroom (P21).

DISCUSSION

The categories identified in this study emphasize that teachers had limited knowledge about the disease, which implies identifying and managing interurrences, as well as influencing the direction of preventive care that can be adopted in the school environment among children with DM.

The restriction of this knowledge becomes worrisome, since at the moment when a child with a certain chronic health condition attends the school environment, the responsibility for the observation and maintenance of their care, during their stay lies on the institution that welcomes him.

It should be noted that in this environment teachers are very important because they have the closest contact with children. They need, therefore, to know strategies that allow early recognition and monitoring of possible acute complications of the disease. To do this, they need science-based guidelines that allow them to develop strategic actions that enable the child to do self-care and make healthy choices based on the limits of the disease.

Teachers' basic knowledge regarding the chronic conditions is an indispensable tool for the management of the child in the

school environment.^{2,4} It is noteworthy that monitoring the signs of decompensation and a proper management contribute to student safety, reduces damage from acute DM complications, and decreases parental concern. In addition, a study reveals that the child tends to be quieter and calmer when he realizes that in the classroom or even in school, someone can help him if necessary, which allows him to learn and play like any other student and, in his own time, assume responsibilities related to his self-care.⁹

A research study conducted with Australian children with special health care needs showed that they tended to have weaker school performance, since teachers could not perceive the nuances of the complex condition, i.e., the experience of a chronic illness. These children, however, could benefit from the early identification of their needs and from an adequate care of their specificities, based on the integrated partnership between the health and education sectors.¹⁰

This partnership, characterized by intersectoriality, when consolidated, can integrate the school schedule, include training for teachers, favor the welcoming of children with special health needs and the reduction of risk behaviors by school children, in addition to developing health promotion actions.⁷ More specifically, the articulation of these sectors can contribute to educators receiving training and, when necessary, consultancies of health professionals on aspects related to diseases, such as DM and its management in the classroom. On the other hand, educators who spend more time in contact with children can provide important information about their evolution and the needs of their families and the health teams.

A research study carried out in the state of *São Paulo* with relatives of nine insulin-dependent children (age between three and 12 years old) found that most of them had already presented interurrences such as hypoglycemia or hyperglycemia and that the time of living with the disease and the support network existing – which includes the school – favors an adequate management of the disease by the families. These results led the authors to suggest the active participation of nursing professionals in the monitoring and instrumentalisation of these families and emphasized that the process of diabetes education should be early and continuous, in addition to involving the whole family and also the school.¹¹

Regarding the performance of children with DM in the school environment, teachers described limitations in the identification and management of glycemic decompensations, highlighting the difficulties in differentiating the type of alteration in progress and doubts regarding the best attitude to be taken. This, in turn, causes difficulties and insecurity in the management of these students, constituting a risk factor for their health in the school environment.⁵

However, daily coexistence in this environment allows the teacher to identify changes, however minimal, in the child's health

condition, which makes it possible to anticipate an action that may prevent worsening of the condition or even prevent short-, medium- and long-term health complications. The development of actions to promote health and prevention of complications in case of diseases already installed is a useful tool for teachers to improve the knowledge children regarding healthy behaviors.¹²

Therefore, it is necessary to invest in health education activities in the school environment, especially for teachers, whose qualification is paramount for the follow-up, care and support of the child in their health needs in the school environment.^{2,13} In this sense, the training of everyone working in this environment makes it possible for children to never be in a position to be solely responsible for their DM care.⁹

Still in relation to the limitations and non-readiness of teachers, it is considered that discontinuity of treatment in the school environment is a serious problem, which deserves attention on the part of the family and the health sector. A study carried out in Serbia found that non-verification of blood glucose levels and that not administering insulin during the period in which the child is in school results in a significant frequency of severe hypoglycemia in this environment.¹⁴ This result highlights the importance of glycemic monitoring being performed at school, as a systemic community that aims at intersectoriality to adequately meet the demands of these children. Understanding the daily record of glycemic levels, for example, would enable teachers to identify the activities that the child can develop among those scheduled.

In the United States, while some research advocates that student assistance with DM should be conducted only by school nurses, others recommend that professionals in regular contact with children, especially teachers, receive training and provide routine and emergency care. In addition, the parents of these students consider that teachers and other professionals who work in the school environment and who received training and permission to attend children with DM are able to guarantee their safety, reducing the occurrence of complications and the need for specialized support by health professionals.⁹

It is important to highlight that the quality of life of children with this disease is related to their physical and emotional well-being, which can be stimulated by the social interactions provided by the school environment. This well-being reflects in the learning process, because coexistence with other children and the diversified activities that they experience in this environment interferes positively in their self-confidence and independence.^{2,15} The teacher, therefore, can appear as a facilitator of this process, through the implementation of pedagogical strategies that help the child to assimilate practices and healthy habits of life, as proposed by the PSE.⁷

This program aims to “contribute to the integral formation of students through actions of promotion, prevention and

health care, with a view to addressing the vulnerabilities that compromise the full development of children and young people in the public school system”.⁷ The integration of public policies, therefore, is indispensable to permanently updating and renewing the fundamental meanings of education and health, with a view to completeness.⁷

Although the teachers of this study, according to their reports, have not received any training to manage children with health problems, they demonstrated basic knowledge about the disease and its main signs and symptoms. However, this is not enough. This knowledge needs to be systematized and scientifically based to sustain appropriate conducts in emergency situations.

Empirical knowledge makes it difficult for teachers to perceive the severity of hypoglycemic decompensation (glycemia below 60 mg/dL) and acute hyperglycemia (glycemia above 250 mg/dL), which can trigger cognitive impairment, either in verbal or spatial intelligence, motor skills and problem solving.^{9,16} It may, however, lead them to realize the need to be trained to prevent risk situations for the child. A study carried out in two primary schools in the north of England showed that parents of children with DM relied on the school care offered to their children because they knew that the school staff could identify glycemic changes and, if necessary, intervene in an initial stage.¹⁷

In order to prevent the development of more serious clinical conditions, these complications require immediate action, which can and should be carried out in the school environment, and even in the classroom, provided that professionals are able to recognize and handle them adequately or if there is a reference service to guide the actions to be taken.¹⁶ Teachers, as facilitators of the construction of knowledge, need to receive training and basic education on the main diseases, signs and symptoms, treatment and prevention of complications that may affect school health.¹⁸

In health promotion, knowledge has become an important tool to empower people for self-care and decision-making. Knowledge by the teacher is a positive factor in monitoring the health condition of the school and in the planning of strategies to promote quality of life.⁵ Adequate care for children in the school environment, in addition to preventing and treating uncontrolled Glycemia, also aims to increase their confidence, resilience and independence through self-management of the disease. The joint action between school, parents and health teams to support them and encourage them to use their knowledge and skills is crucial so that independence in self-care is achieved until adolescence.^{2,7,17}

Regarding the treatment of DM, research participants revealed the importance of the association between drug and non-drug therapy. This is determined by modifiable behaviors and habits that can be stimulated in the school environment, such as healthy eating and physical exercise, as cited by the in-

interviewees. In fact, one of the functions of the teacher, especially of basic education, is to stimulate and help children, through play and group activities, to know and value healthier lifestyles.

Among the attention to be developed among children with DM, teachers emphasized food control. One of the great difficulties of the child with DM is to follow a diet that values the schedules, quantities and quality of meals, as well as variations in physical activity, resulting in large glycemic oscillations throughout the day.¹ All this makes the school a vulnerable environment for these oscillations, if the child does not have supervision and control.

The school has an influence on the formation of children's habits, including food, which makes it a propitious space for health promotion and education activities.¹⁹ Thus, educational actions focused on a balanced and healthy diet must be developed, in an effective and integrated way, in the school syllabus, since child nutrition is determinant for current and future health conditions. School meals, for example, should respect standardized schedules, so that the therapeutic schemes are adapted, taking into account the type of food offered, recommending to make healthy choices available at school or to take home. Planning of meals should also consider physical education days in which it may be necessary to add carbohydrates in the meal to avoid hypoglycemia after activities.^{1,2}

The study participants also recognized the importance of parents informing the school and, in particular, teachers about the child's health condition and the care needed in case of acute complications. Effective communication between school and family favors the treatment and follow-up of these students, as it can strengthen health guidelines, encourage adherence to diet, physical exercise and medication treatment recommendations.

Knowledge gained over time provides the family with the necessary empowerment for the realization of daily care, which will be learned and, in the future, carried out by the child himself. However, in order for such care to be permanent and effective, it is important for the family to build this knowledge up with the child, the professionals of the school and those in the health realm, and, that everyone is available to talk, to listen, to support, to exchange knowledge and to pass on information, with the ultimate goal of empowering the child to self-managing his health-disease process.²⁰

Although the interviewees emphasized the importance of establishing a care support network and the need for intersectoral actions for an integral and continuous care of the school child who presents this chronic condition, this network is still a challenge. Lack of communication between education and health areas is a limiting factor for the care and management of DM in children. The school, however, can help in the implementation of strategies to control this condition and, even, favor an approximation to the real difficulties faced by the child in the school environment.²⁰

The effective implementation of the PSE can favor communication between education and health professionals and the family, ensuring the exchange of information about children's health conditions and minimizing the vulnerabilities related to the health-disease process in daily school life. It should be emphasized that both the health and school sectors should encourage the family and the child to participate in activities that promote and enable the sharing of backgrounds and successful experiences in controlling the disease, as this contributes to the empowerment and quality of life of children with DM.^{7,21}

Still, the instrumentalization of school professionals does not impair the importance of nurses in this environment, since it has specific attributions, such as systematized and planned assistance with identification of the child's peculiar needs, which encompasses more than the condition of illness. It is, therefore, a joint action that aims to enable first care, to avoid more serious complications.

It should be noted that since the 1970s in the United States of America, support for people with disabilities is guaranteed by law and by policies that value early intervention, by offering specific education services to children with special health needs.²² Children and adolescents with DM fall within this classification because they are clinically fragile and require a type of health care differentiated from that offered to the majority of children of the same age.²³

In Brazil, children with DM, in general, are still not recognized as having special health needs by society or explicitly by the Statute of the Person with Disabilities, established in 2015 (Law no. 13.146).²⁴ Families and health and education professionals need to join forces to overcome the challenge of protecting the rights of children with a chronic condition, such as DM, ensuring inclusion in school education, with safety.

CONCLUSION

The elementary school teachers under study demonstrated that their knowledge about DM was insufficient, that they did not know how to correctly identify glycemic decompensations or how to handle them correctly, which emphasizes insecurities and limitations regarding the behaviors necessary to the care of the child in the school environment. Also, they recognized the importance of being trained and of an effective communication between family members and education professionals for a better care of the child in the school environment.

These results instigate reflections on the challenges for the provision of quality care of children with DM in the school context, which are numerous and multifaceted. It is necessary to rethink and implement articulated actions among family, school and the health sector, to meet the multiple specific demands of children with this condition, aiming at the preven-

tion and management of acute complications. It is assumed that the implementation of thePSE, guided by the intersectoral relation between primary health care and schools, could meet much of the needs identified in this study. Thus, the need for the school to organize itself through training and qualification of teachers and staff to accommodate the child with DM in his multiple needs is reasserted.

As a limitation, it is mentioned that data was not obtained by interviews, which would allow the participants to have a more fluid manifestation. In any case, their results bring advances to the knowledge on this theme, as they show that teachers have difficulties for the adequate management of children with DM in the school environment. This is a profitable field for interventions in the health sector in this scope, and also for new investigations that focus on verifying intersectorality and its implications in daily school life.

REFERENCES

- Sociedade Brasileira de Diabetes (SBD). Diretrizes da Sociedade Brasileira de Diabetes. 2015-2016. São Paulo: A.C. Farmacêutica; 2016. Available from: <http://www.diabetes.org.br/profissionais/images/docs/DIRETRIZES-SBD-2015-2016.pdf>
- Jackson CC, Albanese-O'Neill A, Butler KL, Chiang JL, Deeb LC, Hathaway K, et al. Diabetes care in the school setting: a position statement of the American Diabetes Association. *Diab Care*. 2015[cited 2016 June 07];38:1958-63. Available from: <http://care.diabetesjournals.org/content/38/10/1958>
- Patterson C, Guariguata L, Dahlquist G, Soltész G, Ogle G, Silink M. Diabetes in the young – a global view and worldwide estimates of numbers of children with type 1 diabetes. *Diabetes Res Clin Pract*. 2014[cited 2016 Sept 11];103(2):161-75. Available from: [http://www.diabetesresearchclinicalpractice.com/article/S0168-8227\(13\)00388-4/pdf](http://www.diabetesresearchclinicalpractice.com/article/S0168-8227(13)00388-4/pdf)
- Queiroz MVO, Brito LMMC, Pennafort VPS, Bezerra SM. Sensitizing children with diabetes to self-care: contributions to educational practice. *Esc Anna Nery Rev Enferm*. 2016[cited 2016 Aug 01];20(2):337-43. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1414-81452016000200337
- Garcia LRS, Araújo TDVC, Silva PGO, Medeiros HGS, Barros SS, Garcia LCS. Conhecimento sobre diabetes mellitus entre profissionais da Rede pública de ensino. *Rev Bras Promoç Saúde*. 2017[cited 2016 Aug 18];30(1):57-63. Available from: <http://periodicos.unifor.br/RBPS/article/view/5455/pdfhttp://dx.doi.org/10.5020/18061230.2017.p57>
- Braga TMS, Bomfim DP, Sabbag D. Necessidades especiais de escolares com diabetes mellitus tipo1 identificadas por familiares. *Rev Bras Educ Espec*. 2012[cited 2016 Sept 22];18(3):431-48. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-65382012000300006
- Ministério da Saúde (BR). Ministério da Educação. Passo a Passo - Programa Saúde na Escola - Tecendo caminhos da intersectorialidade. Brasília: Ministério da Saúde; 2011.
- Bardin L. Análise de conteúdo. São Paulo: Edições 70; 2011.
- Driscoll KA, Volkening LK, Haro H, Ocean G, Wang Y, Jackson CC, et al. Are children with type I diabetes safe at school? Examining parent perceptions. *Pediatr Diab*. 2015[cited 2018 Jan 12];16(8):613-20. Available from: <https://onlinelibrary.wiley.com/doi/epdf/10.1111/pedi.12204>
- Goldfeld S, Connor MO, Quach J, Tarasuik J, Kvalsvig A. Learning trajectories of children with special health care needs across the severity spectrum. *Acad Pediatr*. 2015[cited 2017 Mar 26];15(2):177-84. Available from: [http://www.academicpedsjnl.net/article/S1876-2859\(14\)00325-8/fulltext](http://www.academicpedsjnl.net/article/S1876-2859(14)00325-8/fulltext)
- Okido ACC, Almeida A, Vieira MM, Neves ET, Mello DF, Lima RAG. As demandas de cuidado das crianças com Diabetes Mellitus tipo 1. *Esc Anna Nery Rev Enferm*. 2017[cited 2017 Jan 24];21(2). Available from: <http://dx.doi.org/10.5935/1414-8145.20170034>
- Ayers K, Li Z, Quintana Y, Van KVA, Klosky JL. St Jude cancer education for children program: the impact of a teacher-led intervention on student knowledge gains. *J Cancer Educ*. 2016[cited 2017 Oct 17];31(1):26-30. Available from: <https://doi.org/10.1007/s13187-016-1010-9>
- Särnblad S, Åkesson K, Fernström L, Ilvered R, Forsander G. Improved diabetes management in Swedish schools: results from two national surveys. *Pediatr Diab*. 2016[cited 2017 Nov 22];18(6):463-9. Available from: <http://dx.doi.org/10.1111/pedi.12418>
- Jesic MD, Milenkovic T, Mitrovic K, Todorovic S, Zdravkovic V, Jesic MM, et al. Problems in diabetes management in school setting in children and adolescents with type 1 diabetes in Serbia. *Vojnosanit Pregl*. 2016[cited 2016 Oct 11];73(3):273-6. Available from: <http://www.doiserbia.nb.rs/img/doi/0042-8450/2016/0042-84501600007.pdf>
- Bultas MW, Steurer LM, Balakas K, Brooks C, Fields Heidi. Psychosocial outcomes of a summer overnight recreational experience for children with heart disease. *J Child Health Care*. 2015[cited 2017 Jan 19];19(4):542-9. Available from: <http://journals.sagepub.com/doi/abs/10.1177/1367493514540350?journalCode=chca>
- Ministério da Saúde (BR). Departamento de Atenção Básica. Estratégias para o cuidado da pessoa com doença crônica: diabetes mellitus. Brasília: Ministério da Saúde; 2013.
- Marshall M. Supporting young children with type 1 diabetes in primary schools in the north of England. *J Diab Nurs*. 2017[cited 2018 Feb 03];21(6):217-22. Available from: http://www.thejournalofdiabetesnursing.co.uk/media/content/_master/5088/files/pdf/jdn-21-6_217-22.pdf
- Aycan Z, Önder A, Çetinkaya S, Bilgili H, Yildirim N, Bas VN, et al. Assessment of the knowledge of diabetes mellitus among school teachers within the scope of the managing diabetes at school program. *J Clin Res Pediatr Endocrinol*. 2012[cited 2017 Jun 18];4(4):199-203. Available from: http://cms.galenos.com.tr/Uploads/Article_189/JCRPE-4-199.pdf
- Melo MCP, Santos MM, Mendes RNC, Sales JRP, Silva RM. Perception of adolescents on immunization in a public school in Petrolina – PE. *REME - Rev Min Enferm*. 2013[cited 2018 Apr 11];17(2):374-80. Available from: <http://www.reme.org.br/artigo/detalhes/656>
- Sparapani VC, Liberatore JR, Damião EBC, Dantas IRO, Camargo, RAA, Nascimento LC. Children with type 1 diabetes mellitus: self-management experiences in school. *J Sch Health*. 2017[cited 2017 Dec 06];87(8):623-9. Available from: <http://dx.doi.org/10.1111/josh.12529>
- Targa T, Pimentel RRS, Scardoelli MGC. Diabetes mellitus in children and adolescents: repercussions in daily life of families. *Ciênc Cuid Saúde*. 2017[cited 2017 Dec 15];16(1). Available from: <http://periodicos.uem.br/ojs/index.php/CiencCuidSaude/article/view/30435/pdfhttp://dx.doi.org/10.4025/ciencucuidsaude.v16i1.30435>
- Lipkin PH, Okamoto J. The individuals with disabilities education act (idea) for children with special educational needs. *Am Acad Pediatr Clin Rep*. 2015[cited 2018 Feb 03];136(6):1650-62. Available from: <http://pediatrics.aappublications.org/content/136/6/e1650>
- Neves ET, Cabral IE, Silveira A. Family network of children with special health needs: implications for nursing. *Rev Latino-Am Enferm*. 2013[cited 2018 Mar 10];21(2):562-70. Available from: <http://dx.doi.org/10.1590/S0104-11692013000200013>
- Congresso Nacional (BR). Lei nº 13.146, de 06 de julho de 2015. Dispõe sobre a inclusão de pessoa com deficiência. *Diário Oficial da União*. Brasília, 06 jul. 2015[cited 2018 Mar 20]. Available from: http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2015/lei/l13146.htm

