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ORIGINAL ARTICLE

Therapeutic play in the teaching of insulin therapy to children with diabetes: a qualitative case study

Brinquedo Terapêutico no ensino da insulinoterapia a crianças com diabetes: estudo de caso qualitativo

Rebecca Ortiz La Banca[1], Circéa Amalia Ribeiro[2], Marina Santos Freitas[2], Maria Aparecida de Oliveira Freitas[3], Lucila Castanheira Nascimento[4], Odete de Oliveira Monteiro[2], Regina Issuzu Hiroka de Borba[4]

ABSTRACT

To describe the expressions presented by children with type 1 diabetes who participated in a session on insulin therapy using the instructional therapeutic play (ITP). This is a qualitative case study in which inductive thematic analysis was conducted at a diabetes camp in 2014, and two school-aged children participated in an ITP session. The results revealed that children of the studied age group have difficulty mastering insulin therapy and need continued efforts to adapt cognitively to insulin therapy. The ITP session provided insight into the children's prior knowledge and their learning needs regarding the insulin storage and insulin injection technique using age-appropriate language such as playing. The ITP helped to identify educational needs and the involved care. The use of ITP strengthens the potential of play-based strategies to promote self-care related to insulin therapy in children with diabetes.

Descriptors: Play and Playthings; Diabetes Mellitus, Type 1; Insulin; Child; Education, Nursing.

RESUMO

Apresentar as manifestações de crianças com Diabetes mellitus tipo 1 participantes em uma sessão de Brinquedo Terapêutico Instrucional-BTI sobre a insulinoterapia. Estudo de Caso qualitativo, com análise temática indutiva, realizado em um acampamento de diabetes em 2014, com participação de duas crianças em idade escolar em sessão de BTI. As manifestações permitiram compreender que o domínio da insulinoterapia é um assunto complexo para a faixa etária, e demanda reforço contínuo visando a adaptação cognitiva da criança. A sessão de BTI oportunizou identificar o conhecimento prévio e as necessidades de aprendizagem sobre a conservação e técnica de injeção de insulina das crianças, com uso de linguagem adequada como o brincar. O BTI foi instrumento facilitador para identificar necessidades educacionais, além de sua ação assistencial. Seu uso reforça o potencial do lúdico na promoção do autocuidado relacionado à insulinoterapia da criança com diabetes.

Descritores: Jogos e Brinquedos; Diabetes Mellitus Tipo 1; Insulina; Criança; Educação em Enfermagem.

[1]Joslin Diabetes Center – Boston (MA), United States. E-mail: rebecca.ortizlabanca@joslin.harvard.edu

[2]Federal University of Sao Paulo – São Paulo (SP), Brazil. E-mails: caribeiro@unifesp.br; mafreeitas@hotmail.com; odete.oliveira@unifesp.br

[3]Postgraduate program in Health Sciences, Center for the Development of Higher Education in Health, Federal University of Sao Paulo – São Paulo (SP), Brazil. E-mail: cidaposdoc2016@gmail.com

[4]School of Nursing of Ribeirão Preto, University of Sao Paulo – Ribeirão Preto (SP), Brasil. E-mails: lucila@eerp.usp.br; rihborba@gmail.com.br

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INTRODUCTION

Approximately 586,000 people under 15 years of age have type 1 diabetes mellitus (T1D)[1], a chronic disease with treatment-related stressors, such as diet control, overprotection of family members and lack of adequate knowledge[2]. Diabetes education may prevent complications when provided in an individualized and age-appropriate manner, using a methodology that observes social and educational factors, and can improve glycemic control regardless of the social and cultural context [3,4].

Children with T1D must take daily subcutaneous insulin injections that require a series of guidelines to be administered correctly. Low adherence to practices such as rotating the insulin injection sites can lead to a subcutaneous tissue lipohypertrophy and consequent hyper or hypoglycemia[5]. Thus, nurses should encourage children with T1D to rotate the injection site and teach them how insulin acts and how to adequately store the medicine[6].

Considering the importance of planning diabetes education, therapeutic play (TP) can be used as a teaching strategy for nurses with pediatric patients. The three types of therapeutic play are dramatic play, the physiologically enhancing play and the instructional play. The instructional therapeutic play (ITP) prepares children for the therapeutic procedure[7] by reducing their anxiety when undergoing invasive procedures and enabling acceptance and participation in care[8].

In this sense, we created the Play-based Educational Program in Diabetes (PROLUDI) to promote self-care in school-aged children with T1D using the ITP as the main educational tool. The PROLUDI comprised four sessions with children, in which nurses addressed the seven self-care behaviors advocated by the American Association of Diabetes Educators[9]. The sessions were based on a lesson plan containing subject, overview, specific goals, methodology, resources, assessment and bibliography[10]. The aim of this paper is to describe the expressions of children with T1D who participated in the PROLUDI sessions with regard to insulin therapy.

METHODS

This is a qualitative case study conducted to understand comprehensively the study group with emphasis on context interpretation to portray reality in all its expressions. In this research, we chose the single integrated case study because it is ideal for testing, confirming, challenging or broadening a theory[11] and we selected the PROLUDI as study case.

Insulin therapy, which was addressed in the second PROLUDI session, comprises the use of a specific syringe or pen for administering insulin. The overall objective of this session was to understand the basic aspects of insulin therapy, while the specific objectives were to understand the function of insulin in the body, why there are different types of insulin, how to store insulin correctly, the importance of rotating the insulin application sites and how to inject insulin.

The learning objectives were prepared considering the cognitive development of children based on the cognitivist theory of Jean Piaget[12], consisting of stages according to the children's age group. The material used was a rag doll, a glucometer with strips, disposable lancets, cotton, alcohol, a fixed needle syringe, a regular insulin vial, a disposable insulin pen and 4mm needles for the insulin pen. The material was selected according to the recommendations in the literature for preparing the therapeutic procedure[13].

The individual ITP session was planned and conducted by a nurse according to five steps:

1. Invite the child to participate in playtime and respect any refusal;
2. Ask the child to talk about the function of insulin in the body, the reason for the existence of various types of insulin and the place for storing insulin;
3. Ask the child to use the doll to show how insulin is injected at home;
4. Tell the child a story about a young person who has diabetes and applies insulin several times a day, as shown in Chart 1, while performing the procedure on the doll for the child to see;
5. Ask the child to show how insulin is injected on the doll to validate the concepts mentioned in the story.

Data were collected at a camp for the recreation and education of children and adolescents with T1D in January 2014. Approximately 80 young people from eight to 15 years of age are enrolled in the camp every year and supervised by a team of health care professionals without the presence of their parents. The principal researcher, who was responsible for data collection, has been a volunteer at the camp since 2009. She is also a diabetes educator certified by the Brazilian Diabetes Society and the International Diabetes Federation and a member of the Play Studies Group linked to the CNPq, which certifies her competence to conduct the ITP sessions.

At a meeting before the camp season started, the children and their parents were invited to participate in the research and had access to the informed consent and assent forms. At the same meeting, the coordination team answered any queries of the parents and caregivers regarding the research activities. The ethical precepts complied with resolution 466/12 of the National Health Council and the study was approved by the Research Ethics Committee of the Federal University of Sao Paulo on August 13, 2012 (Report No. 72608).

On the day the participants left for camp, the parents returned the forms to the researchers and asked any further questions they had regarding data collection. The

Chart 1. Story of the ITP session.

Taking medicine
Juju was at school one day and had to apply insulin before a snack. Márcio, the friend who sat next to her in the classroom, asked why he was injecting himself. Juju explained that he had type 1 diabetes, which means the pancreas does not produce insulin or it produces a very small amount for a while. "Pancreas?" Márcio asked. Juju answered, "The place in the body where insulin is produced is called the pancreas." "And what happens?" "Without insulin, blood sugar, called glucose, cannot reach important places like the leg muscles and give us the energy we need to run. And this is the same in all parts of the body.
So, a child with diabetes has to take the insulin injection. As the pancreas no longer produces this "cart" that carries the sugar, we put it inside our bodies artificially. The cart is the insulin! We need many types of "carts" to imitate the human body." "What's that supposed to mean?" It means that people who have type 1 diabetes need to take more than one type of insulin many times. We have the long-acting insulin, the rapid-acting insulin and the ultra-rapid insulin. The doctor decides which type of insulin you should take, but you must know what each insulin is used for, so you do not feel tremors, hunger and other bad symptoms.
To ensure that the insulin you take every day is working, you have to take some precautions. The first precaution is to store the vial or the insulin pen in the right place. The unopened insulin should be stored in the refrigerator, preferably in a place that we do not use much, like the fruit drawer! Once it has been opened, you can store it outside the fridge, in a cool place and away from sunlight, for up to 28 days and you must remember to write the expiry date after you open it! Now, how about preparing and applying the injection for Juju together?
Wash your hands thoroughly. Take out the pen, needle and cotton wool with 70% alcohol. If the insulin is the NPH, gently roll the pen between your hands at least 20 times. Make sure you never shake the insulin. Clean the rubber where the needle will be placed with cotton and alcohol and wait for it to dry. Remove the seal from the needle and screw it to the pen – remember we should use a new needle with each application. Check for bubbles inside the pen and do the drop test by discarding a unit of insulin. That way, you know you are taking the right amount and you can make sure the needle is not clogged and the pen is working properly.
Select the dose of insulin by rotating the unit counter of the pen and place it on the table. Where should Juju apply the insulin, do you know? He can apply it on the outside of his arm, three fingers below the armpit and three fingers above the elbow; on his belly, at the waistline, three fingers to the right or left of the belly button; on the outer upper part of the butt; or on the thighs, three fingers below the crotch and three fingers above the knee, dividing the front part in half and using the outside. The most important thing is to remember to switch locations with each application, so you do not form hard "lumps" on the skin that prevent insulin from working! Before injecting yourself, pinch the place so can fold the skin where you will apply the insulin. Do you know what a skin fold is? It is when you use your thumb and forefinger to pinch the skin gently to make the skin soft. Clean the injection site with cotton and alcohol and wait for it to dry. Then insert the needle into the chosen location, press the pen button and count to 10. All done! You just took your dose of insulin. Before storing the pen, remove the needle using the external protector so you do not get hurt. Throw the needle into a hard container that can be closed and delivered to the nearest health unit when full.

Source: Prepared by the principal researcher.

researcher selected the signed forms belonging to the school-aged children and collected information from the medical records of the selected children on their diagnosis and treatment of T1D.

Two boys, with the fictitious names Chico Bento and Franjinha, were selected to participate in the PROLUDI. These boys were selected because they met the inclusion criteria, which was subjects between six and 12 years of age and subjects without a neurological disorder or a cognitive difficulty that could prevent their participation in the program activities and use of the insulin pen. Six school-aged children did not participate in the program because they used an insulin infusion pump and 10 did not participate because they were teenagers.

The PROLUDI session on insulin therapy lasted 14 minutes and it was video recorded for further analysis. Six phases were used for inductive thematic analysis, namely repeated readings of the interview transcripts; listing of ideas about the data; classification of data into main themes; review; nomination and construction of the results[14].

RESULTS AND DISCUSSION

Each participant of the PROLUDI was used to create a unit of analysis of the integrated qualitative case study. The statements are identified with the letter C for child and R for researcher.

Chico Bento, 10 years old, received a diagnosis of T1D four years prior to data collection. He did not have siblings with T1D. His basal-bolus regimen included insulin glargine and lispro and he applied insulin in the abdomen and arm using a pen. The records included a glycated hemoglobin (HbA1C) of 8.2% and the mother´s report of the child´s need to become more independent in self-care. He was participative and interested in the activities of the camp.

Franjinha, 11 years old, diagnosed with T1D six months prior to the data collection and had no family history of T1D. He was using glargine and aspart insulin pens and he did not inject in the abdomen or buttocks. The records showed a diagnosis of hypothyroidism, HbA1C 7.1% and a description of the child as being shy with difficulties in self-injecting insulin, but also as being very enthusiastic about the activities of the camp.

The ITP session planned to teach insulin therapy with pen starts with a demonstration of the procedure using the doll. Chico Bento easily performs the procedure and partially completes the sequence correctly. Franjinha, however, attaches the needle to the pen without disinfecting the rubber and forgets to count to 10 before removing the needle.

> *C: First, I get the alcohol. Get the insulin* [the pen]. *Get the cotton for cleaning* [the arm]. *Then he* [the doll] *cleans his arm where he is going to apply it. Gets the needle* [he says, holding onto the tip of the pen], *then he tests to see if it is coming out. Puts one unit in* [rotates the dose counter of the pen to number one]. *Then, it comes out. Then he... he tests it. He will take two units* [selects two units in the insulin pen]. *He puts it in his arm* [he says, applying the injection to the doll's arm], *counts to 10* [...]. *He takes it out* [removing the needle from the arm of the doll], *puts the lid back on* [unscrewing the needle from the insulin pen], *throws it away* [leaves the needle separate from the other materials]. *And puts it away.* (Chico Bento)

> *C: He holds this* [gets a needle for the pen and screws it on, uncapping it] R: *Um. C: He opens it... Then, he wipes the area with alcohol* [points to the arms]. *He wipes it with alcohol* [cleans the back of the doll´s left arm and applies the pen, removing it immediately afterward]. *R: Uh-huh. Then what does he do? C: Then he applies the alcohol again* [rubs the doll's arm with the cotton wool]... *Sometimes mine bleeds.* (Franjinha)

The nurse continues the session by telling the proposed story. When the participants were asked who decides which type of insulin they should take, Franjinha mentions the physician and shows he understands the relationship between long-acting insulin and its action profile, but then says he does not know the profile of ultra-rapid insulin.

> *R: What other types of insulin do you take? C: Rapid-acting R: The rapid-acting one, that you...* [waits for the child to complete the phrase]. *C:* Oh... *Ultra-rapid. I don't know what it is.* (Franjinha)

Although Chico Bento has difficulty understanding the question, he says all health workers should instruct users on how to take the medication to ensure their safety.

> *R: But, I'm not a physician, do I need to know which insulin you take? C: Yes! R: Because we have to know what we are taking... C: Otherwise, you might take the wrong amount! R: Right. And you have to know its effect, right? C: Yes!* (Chico Bento)

They reported knowing some aspects of the insulin action, but they do not master the subject, showing that, similarly to the adult T1D population, education regarding the time insulin acts is still deficient[15].

The children participating in the PROLUDI revealed that, despite their different diabetes duration and HbA1C values, the insulin injection technique is complex for their age group, indicating the diabetes education process must continuously be reinforced to ensure self-care practices are learned and maintained[16].

Knowledge is incorporated as the child acquires new experiences in a process called assimilation. Over time, the schemes are accommodated, with the concomitant assimilation, by the dynamics of adaption[12]. The schemes of the insulin action profile and insulin injection technique are already adapted in the participants.

The nurse asks the children how they store insulin and Chico Bento says that the medicine should be protected from sunlight. Then, she asks him to state where he stores the sealed or opened insulin pens in his house. Chico Bento is confused at the beginning but answers correctly after being prompted. To confirm that he knows this information, he is asked to say exactly where he stores the sealed insulin. This time, Chico Bento seems more confident and even explains why he is afraid to keep the insulin in the refrigerator door.

> *C: You can't leave it in the sun, you have to always keep it where it´s cold, you can put it in the fridge It can´t be too cold, but then you can't leave it in the sunlight because it*

warms up the insulin and the insulin doesn't work. (Chico Bento)

Franjinha says he stores the unopened cartridge at the bottom of the fridge and the open cartridge inside the pen, outside the refrigerator. He is asked why he cannot store the insulin in the refrigerator door, and he responds that the door area can get too cold. When asked about the consequences of applying cold insulin, he says that it stings.

R: Where can we store the insulin in the fridge? C: This is the fridge, so you have to put it here [lowering his hands]. *R: Lower? C: Lower. R: If we put it on the door, what happens? C: It gets too cold. R: What can happen when we apply cold insulin? C: It might sting a little.* (Franjinha)

Regarding the expiry date of the insulin bottle after open, Chico Bento stated that his mother keeps a record of the due date in her computer and that he does not know the correct date. Franjinha admitted that he does not check the expiry date of the insulin.

R: That's why it's important to write the date down because otherwise, we can forget the day it was opened. C: Right. When the month is up, even when there is a little left, my mother says, "Let's change the insulin." (Chico Bento)

R: And then it lasts up to 28 days out of the fridge. Do you usually put a date on the vial you opened? C: [shakes his head]. (Franjinha)

The doubts the children have regarding the expiry date and storage of insulin can be a reflection of deficient teaching. Storing insulin correctly ensures the medication is used safely, so health workers should provide these guidelines to people with diabetes[7]. In the education experience with an adult group, all the adults answered the questions related to storage correctly, which could be applied to the groups of children[16].

Subsequently, the nurse starts to explain the insulin injection technique by telling the story. The nurse mentions the importance of resuspending some types of insulin, such as the NPH, and continues with the explanation before application. When talking about the drop test to ensure permeability of the pen needle, Franjinha shows he understands the purpose of the drop test despite not reporting whether he does the test beginning of the session.

R: I attached the needle. How do I know if the pen is working? C: Put in a unit and... [points to the pen] *Upward.* (Franjinha)

With regard to the injection sites, Franjinha is asked where he usually administers the insulin and he answers that he only injects it in his arm and leg, while showing the recommended sites. He does not mention the buttocks as an injection site, but he recognizes the abdomen. When the nurse mentions these sites and the importance of rotating them, he accompanies the explanation by pointing to the cited places on his own body and agreeing.

R: Where in the arm can it be? C: You have to count, four fingers... three fingers here [points to the armpit], *three up to here* [points to the elbow region]. *R: This entire region here, look, on the outside, it can be injected in this whole part. Some people always inject it in the same place, right? Do you know what happens if we inject the insulin in the same place? Have you ever seen the lumps that appear? C*: [nods his head]. (Franjinha)

When Chico Bento is asked about the injection sites, he indicates all the sites correctly and without hesitating. Although he knows the importance of rotating, he says he prefers to inject in places he feels less pain. To reinforce the importance of switching sites, the nurse mentions the risk of lipohypertrophy. He immediately justifies himself, showing that he gives priority to rotation, regardless of his preference.

R: Where can we give insulin shot? C: Butt, arms, legs, belly. [...]. *I give it in the corner* [of the leg] *mostly; it hurts less. R: Do you like it better? Then if we start getting a mark, we have to... C: Start doing it somewhere else. R: You have to change the place on your leg!* [...]. *You have to be careful, whenever we realize that the place is getting...* C: [interrupts the nurse] *I change it every day! In the morning, I'll do it on my arm. If I need to inject at snack time, I'll do it on my butt, and later I'd do it on my leg. Afterwards, I'll do it in my belly.* (Chico Bento)

Failure to adhere to site rotation when applying insulin, and the consequent worsening of glycemic control, may be related to the pain experienced during the invasive procedure, as reported by Chico Bento. Health workers must track the pain and control the anxiety of these children at each appointment with intervention and monitoring proposals[16].

The last subject addressed before asking the child to demonstrate the procedure on the doll was the need for a skinfold. When asking which needle Chico Bento uses in the pen, he said he uses the purple, green and blue needles (various sizes identified by colors and manufacturers). Then, the nurse explains to him that the green needle does not require a skinfold. He answers that he learned this from the camp nurse and shows how he does it alone.

R: The little green one doesn't need a fold, it's pretty short, right? C: Yes, Tania [fictional name of the camp nurse] *said it doesn't need the fold.* [...] *On the arm, I do this* [leans his arm on his leg], *then I put* [the arm] *and lean. It's easier that way.* (Chico Bento)

Franjinha states he folds his skin when applying the injection to the abdomen. When mentioning the exact region, he points to the wrong place and then to the correct place after getting an explanation.

R: Where on my belly can I inject it? C: Three [fingers] *this way, here* [points to left side of the abdomen, at the waist]. *R: From the belly button. C: Here* [repositions his hand, showing the three-finger distance correctly]. (Franjinha)

The skin is the first obstacle of the needle when injecting insulin and several studies have shown that the difference between the skin thickness of adults and children is irrelevant. Despite the clear indication in the literature on the use of 4mm needles[7], the appropriate material is not available in the Brazilian public health service, which causes problems when teaching the technique, as demonstrated by Chico Bento and Franjinha.

Once the story is over, the two boys are asked to explain to Juju, the doll, how to prepare and administer the insulin injection. Chico Bento describes the technique step by step and he remembers to clean the rubber of the bottle with alcohol 70% and the correct application sites. At the end of his demonstration, he describes how to dispose of the pen needle. Franjinha partially describes the insulin injection preparation and administration technique correctly, because he forgets the drop test and needs to be reminded by the nurse.

R: Where does he throw the needle? C: Inside the... You can't throw it in the trash, he has to throw it... What do you call it? R: In that little hospital box, right? C: Yes. R: Or in another hard container. C: It has to be hard plastic. R: Yes, very good! (Chico Bento)

The children's demonstration after the ITP session shows immediate positive results regarding the formation of new schemes and their correct assimilation[12]. The adoption of play-based strategies is stated in the national and international recommendations for teaching children with diabetes[17,18] and the ITP helped the nurses in this process by enabling the use of an age-appropriate language for this pediatric age group.

FINAL CONSIDERATIONS

The expressions of the children in this study confirm the potential use of ITP in the teaching of insulin therapy. We consider that the PROLUDI planned teaching of insulin therapy might be used for populations with similar characteristics to those of the two boys, that is, school-aged children without a neurological disorder or cognitive difficulty, with a diagnosis of T1D and on an insulin pen regime.

Because this was a qualitative case study, the results presented in this research elucidate the children's expressions in the context of the diabetes camp. Thus, other studies are needed to analyze the contributions of ITP among children with T1D in different health care settings.

To replicate the PROLUDI, our recommendation is that a basic kit for the ITP material should be determined according to the needs of the clientele. The training of the principal researcher as a diabetes educator was also a great contribution to data collection and analysis, so we believe that the inclusion of other health professionals in the PROLUDI should follow the same professional rigor and qualification.

The theoretical framework in the light of the cognitivist theory allowed us to reflect on the process of constructing knowledge among the participating children and it will support the development of interventions in the field of diabetes education. Further studies are needed to verify the contributions of ITP in the teaching of insulin therapy to different age groups, such as adolescents. The application of PROLUDI in groups is considered a knowledge gap that should be investigated, and its effect should be related to clinical and psychosocial parameters.

This study highlighted the ITP as a tool that helps to identify the educational needs of children with T1D, in addition to its care-related effects. By using the ITP for evaluation and intervention processes, nurses can plan their next care actions in terms of a methodology for permanent education. Thus, use of the ITP in the PROLUDI proved to be a nursing tool that can promote self-care related to the insulin therapy of children with diabetes.

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