LAB University of Applied Sciences

Caring for Type 1 Diabetic Children in Day-care

A guidebook for daycare workers

LAB University of Applied Sciences
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Abstract

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Title of the thesis

Caring for Type 1 Diabetic Children in Daycare

A guidebook for daycare workers

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Abstract

Finland has the highest case of type 1 diabetic in children in the world. Every year there is 500 new cases of type 1 diabetes in children under 15 in Finland. This makes it an important issue for people in Finland who care for children to understand how to care for type 1 diabetes.

Young children from infancy to the age of 6 in Finland can attend daycare. This makes it an important issue for the daycare workers in Finland to understand how to care for type 1 diabetes. Daycare workers who care for children with type 1 diabetes need to know basic information like monitoring blood sugars, insulin therapy, carbohydrate counting, hypoglycaemia and hyperglycaemia.

This bachelor thesis is aimed at providing a guidebook to daycare workers about how to care for children with type 1 diabetes. The purpose of this thesis is to increase knowledge of the workers in daycares in caring for a child with type 1 diabetes. This knowledge will allow the workers in daycares to take better care of children's diabetes while they are in the daycare.

The authors used evidence-based materials from different reliable sources for the information in the thesis. The thesis was done according to the LAB thesis guidelines. The guidebook was prepared according to the criterion of a good guidebook.

The thesis was a practice-based thesis and used the Plan, So, Study and Act model. An interview was done with a daycare worker to assess the usefulness of the guidebook.

The guidebook information is useful to daycare workers in caring for children with type 1 diabetes. The topic is an important topic because of the prevalence of type 1 diabetes in children in Finland.

Keywords

Diabetes, children, daycare

Tiivistelmä

Tekijä(t)	Julkaisun laji	Valmistumisaika
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Työn nimi

Tyypin 1 diabeetikkojen hoito päiväkodissa

Opaskirja päiväkodin työntekijöille

Tutkinto ja koulutusala

Sairaanhoitaja (AMK)

Toimeksiantajaorganisaatio (jos opinnäytetyöllä on toimeksiantaja)

The Teddy Bear Daycare

Tiivistelmä

Suomessa on maailman eniten tyypin 1 diabeetikkoja lapsilla. Suomessa todetaan vuosittain 500 uutta tyypin 1 diabetestapausta alle 15-vuotiailla lapsilla. Tämän vuoksi on tärkeää, että lapsia hoitavat suomalaiset ymmärtävät, miten tyypin 1 diabetesta hoidetaan.

Pienet lapset vauvasta 6-vuotiaaksi voivat Suomessa käydä päivähoidossa. Tämä tekee suomalaisille päivähoitajille tärkeän asian ymmärtää, miten tyypin 1 diabetesta hoidetaan. Päivähoitotyöntekijät, jotka hoitavat tyypin 1 diabetesta sairastavia lapsia, tarvitsevat perustiedot, kuten verensokerin seuranta, insuliinihoito, hiilihydraattien laskeminen, hypoglykemia ja hyperglykemia.

Tämän opinnäytetyön tarkoituksena on tarjota päivähoitotyöntekijöille opas tyypin 1 diabetesta sairastavien lasten hoitoon. Tämän opinnäytetyön tarkoituksena on lisätä päiväkotien työntekijöiden tietämystä tyypin 1 diabetesta sairastavan lapsen hoidosta. Tämän tiedon avulla päiväkotien työntekijät voivat huolehtia paremmin lasten diabeteksesta heidän ollessaan päiväkodissa.

Kirjoittajat käyttivät opinnäytetyön tietoihin näyttöön perustuvia materiaaleja eri luotettavista lähteistä. Opinnäytetyö tehtiin LAB:n opinnäytetyöohjeiden mukaisesti. Opas laadittiin hyvän oppaan kriteerin mukaisesti.

Opinnäytetyö oli käytäntöön perustuva opinnäytetyö, jossa käytettiin Suunnittele, niin, opi ja toimi -mallia. Oppaan hyödyllisyyden arvioimiseksi tehtiin haastattelu päiväkodin työntekijän kanssa.

Oppaan tiedoista on hyötyä päivähoitotyöntekijöille tyypin 1 diabetesta sairastavien lasten hoidossa. Aihe on tärkeä aihe tyypin 1 diabeteksen esiintyvyyden vuoksi lapsilla Suomessa.

Asiasanat

Diabetes, lapset, päiväkoti

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1 Introduction

Type 1 diabetes is a chronic illness that usually develops in childhood. The person's pancreas stops producing insulin, which is the hormone that regulates blood sugar levels in a person's body. When type 1 diabetes is diagnosed, that person needs to administer insulin through injections or an insulin pump for the rest of their life. (Diabetes Canada 2022.) Finland provides the highest numbers of type 1 diabetic children in the world. Yearly there are around 500 new cases of type 1 diabetes in children under the age of 15. (Diabeteslitto 2021.) Type 1 diabetes is one of the most common chronic diseases occurring in children and adolescents. 1 in 350 children under the age of 18, suffer from type 1 diabetes. However, the disease can develop at any age, it is typically diagnosed in children aged 4 years to 6 years or 10 years to 14 years. Type 1 diabetes is 15 times more likely to develop in people who have close relatives with type 1 diabetes. There is also even a higher chance to develop diabetes in certain ethnic groups such as Scandinavians (Calabria 2022.)

Daycares provide a safe place for parents to leave their children while they go to work. The children are at the daycare while their parents go to work. They do activities such as playing, eating, crafting and going outside. Children with type 1 diabetes also attend these daycares. The workers in the daycare need to be able provide sufficient care of the child's diabetes while they are there. (InfoFinland 2022; Opetushallitus 2022.)

The Purpose and the Aim of the Thesis

The purpose of this thesis is to increase knowledge of the workers in daycares in caring for a child with type 1 diabetes. This knowledge will allow the workers in daycares to take better care of children's diabetes while they are in the daycare.

The aim of this thesis is to create a short guidebook for the workers in daycares. The guidebook will include the basic information they need for caring for a child with type 1 diabetes. This information will include what type 1 diabetes is, how to measure blood sugar, what to do in the event of hypoglycaemia or hyperglycaemia, carbohydrate counting and insulin therapy.

Description of the Commissioning Party

The commissioning party is the Teddy Bear Daycare, which is an English daycare in Lahti, Finland. They are a daycare, preschool and afternoon club for children aged 3-6. They offer

early childhood education and preschool. It is a daycare which offers a cozy and safe atmosphere. In the daycare language immersion is used, which means that all the pedagogy is done in the English language. (The Teddy Bear Daycare 2023.)

The daycare prioritizes small groups and long-term staff. Lots of different activities while giving the children time to play. They emphasize a relaxed atmosphere with staff who care and wants to work with the children and their families. The daycare is for families who already know English, or families who want their children to learn English but don't yet. The staff have various qualifications in education, while coming from different nationalities and diverse early childhood education experience in Finland and abroad. (The Teddy Bear Daycare 2023.)

2 Type 1 Diabetes in Children

2.1 Type 1 Diabetes

In type 1 diabetes the pancreatic beta-cells, responsible to produce the hormone insulin in the pancreas, get destroyed as a result of an autoimmune reaction inside the body. This results in the person to have no insulin produced in their body or very little. (Käypä hoito 2022.)

Symptoms

As type 1 diabetes develops in the child, they will develop hyperglycemia. Hyperglycemia can be symptomless but can also cause common problems such as frequent urination, weight loss and excessive thirst. Children may start wetting their bed at night again or have daytime accidents. Children in diapers, might fill their diapers more quickly or they may be heavier. Children might be waking up at night to drink as well. Other symptoms in children can be impaired growth, increased tiredness, nausea, vomiting and blurry vision. After many days to weeks of these symptoms, diabetic ketoacidosis will develop if the child is not treated. (Käypä hoito 2022.; Duodecim 2021b.)

Diagnosis

Diabetes can be diagnosed through measuring blood glucose measurements. Diagnosing children is similar to diagnosing adults. Usually, blood glucose levels are measured after a person starts experiencing the symptoms of diabetes. Blood glucose levels that are used to diagnose diabetes can be fasting or random plasma glucose levels. Hba1c levels can also be used. The type of blood glucose level tests used for diagnosing can depend on if the person is experiencing symptoms of diabetes or not. Measurements over 11.1 mmol/L for random plasma glucose levels, over 7.0 mmol/L for fasting plasma glucose levels and over 48 mmol/mol for HbA1C would be considered diabetic. (Käypä hoito 2022.)

To determine the type of diabetes, more tests need to be done. Tests such as for autoantibodies against pancreatic islet cell proteins, C-peptide levels and insulin levels can help determine if the child has type 1 of diabetes. Two thirds of new diabetic cases in children are diagnosed as type 1. (Käypä hoito 2022.)

Normal Glucose levels

Normal glucose levels in general are between 4-10mmol/L. Before eating, the blood sugar range should be between 4-7 mmol/L and after meals should be below 8-10 mmol/L. The goal is to have the blood sugar in these ranges for about 70% of the time. The blood sugar

can be temporarily higher or lower. This is not a concern if the blood sugar is generally in the correct range. It is important to remember testing devices can be about 10 % off from the actual blood sugar reading, and if the blood sugar is changing quickly, it can be even more off from the actual number. (Ilanne-Parikka 2021.)

2.2 Treatment of type 1 diabetes

Type 1 diabetes requires insulin treatment, regular blood glucose levels monitoring and lifestyle changes to keep plasma glucose levels steady and in the target. This is important to avoid life threatening health conditions such as diabetic ketoacidosis, hypoglycemia and hyperglycemia. As type 1 diabetes can occur already at a young age in a child, parents and other care givers are intensively involved in the treatment. Insulin administration must be adjusted to the carbohydrate's intake before every mealtime, blood glucose levels must be regularly monitored during the day and during the nighttime too. Parents, relatives, friends, workers in daycare, teachers, coaches and other people around the little type 1 diabetes patient need to get educated towards treatment, symptoms of life-threatening health conditions and their required treatment in emergency situations. (Centers of Disease Control and Prevention 2022.) Type 1 diabetes is treated with insulin administration either through insulin shots or an insulin pump. Blood glucose levels can be measured with a small drop of blood from the fingertip analyzed by a blood sugar monitor, continuous glucose monitoring or with an intermittent continuous glucose monitor. A multi professional health care team is providing the child patient and the parents with needed guidance and support. (Käypä hoito 2022.)

Monitoring blood sugar levels

Monitoring the levels of type 1 diabetic children is essential to their treatment. Without monitoring the blood sugar levels, the blood sugar of the child could be too high or too low. It is also essential information to have when administering insulin, so the right amount of insulin can me administered. The three main ways to monitor blood sugar levels are through rapid blood glucose meters, intermittent continuous glucose monitors or continuous glucose monitors. (Ilanne-Parikka 2021.)

There are many different rapid blood glucose meters available and are given to all type 1 diabetic children in Finland to help monitor their blood sugar. These can be used as the main device to monitor blood sugar, or to supplement other blood sugar monitors. This device is easy and cheap to use but it is the most invasive as it requires multiple finger prick a day. Blood sugar is monitored by pricking the fingertip of the child with a lancet and putting

a small drop of blood on a testing strip which is then read by the rapid glucose monitor. With this type of device blood sugar usually needs to be checked in the morning, before meals and 2 hours after meals. This type of measurement is usually the most accurate but has its limitations. It can be painful to continuously prick the child's fingers, as well as not being able to tell which direction the blood sugar is going and the past blood sugar levels. (Ilanne-Parikka 2021; Diabetes Canada 2020.)

Intermittent continuous glucose monitors, also can be known as flash glucose monitoring devices, are an easy way to track a child's blood sugar levels. This is used by placing a sensor under the skin, where the sensor tracks the blood sugar through interstitial fluid. Only a small part of the sensor is under the skin while the rest of the device is adhered on top of the skin. These devices measure the blood sugar every minute and store the data every 15 minutes. The data can be retrieves by placing the reading device, which can also be a smart phone, on top of the sensor for one second. The blood sugar levels will then be shown on the reading device. It will tell the current blood sugar and the past 8 hour history of the child's blood sugar. It will also tell which direction the blood sugar is going with an arrow. This is less invasive than rapid glucose meters, as applying the sensor is quick and only needs to be change every 7-14 days. It gives more information on the blood sugar which is valuable in helping keeping blood sugar in the child at the right level. It may cause skin irritation is certain individuals and may have problem stayed adhered to the child. (Diabetes Canada 2020; Ilanne-Parikka 2021.)

The last type of blood sugar monitor is the continuous glucose monitor. This is a good choice for children who have frequent low blood sugars or children who are not able to tell when they are having a low blood sugar. These devices also let parents or caregivers continuous access to monitor the child's blood sugar through their own smart phone and to receive alarms when the blood sugar is too high or low. It has a sensor inserted under the skin like the intermittent continuous glucose monitor, but it also has a transmitter. The transmitter allows the blood sugar data to be continuously transmitted to a device such as a smart phone. It reads the blood sugar every 5 minutes, and also gives the direction the blood sugar is heading. As it is always reading the child's blood sugar, it will give a full history of what the child's blood sugar has been while wearing the sensor and transmitter. The sensors need to be changed every 7-10 days and finger pricks may be needed to calibrate the sensor. The alarms on this device can warn if the blood sugar will be low soon, which allows the child to correct his or her blood sugar before experiencing a low. The limitations are potential skin irritation or adhesive issues. As well as children/caregivers may experience alarm fatigue from the frequent alarms when the blood sugar goes out of range. (Ilanne-Parikka 2021; Diabetes Canada 2020.)

Insulin therapy

The two main ways to administer insulin to type 1 diabetic children is through insulin injections or through an insulin pump. When using insulin injections, children need to take multiple insulin injections every day. Two types of insulins are administered when using insulin injections. First a basal insulin is given once or twice a day. This insulin lasts all day and helps regulate the blood sugar levels in between meals and from the sugar which is released from the liver. This insulin is taken usually in the evening before bed but can sometimes be taken in the evening and the morning. The other insulin administered is a bolus insulin also known as mealtime insulin. This is a short acting insulin which is given before eating food. The amount of bolus insulin given depends on how many carbohydrates the child is about to eat. The child will also have his or her own insulin to carbohydrate ratio. This can be anywhere from 1 unit of insulin for 5 grams of carbohydrates to 1 unit of insulin for 50 grams of carbohydrates. In general children 5 years and younger will have a ration of around 1 unit of insulin for 30 grams of carbohydrates. Insulin will also need to be administered to correct too high blood sugar. This is the same insulin as the mealtime insulin, just more is given to correct for the too high blood sugar. The child will have a correction dose amount pre-calculated by their doctor, depending on their blood sugar level. (Käypä hoito 2022; Ilanne-Parikka, P. 2021; Wherrett et al. 2018.)

Insulin pump therapy is another popular way to administer insulin to children. It is less invasive as it does not involve multiple injection a day. It involves a child wearing a catheter under the skin which is connected to an insulin pump. The pump can be with or without tubing. With an insulin pump only the fast-acting type of insulin is used. This is because the pump can continuously administer insulin to the child, so a long-acting insulin is not needed. By administering fast acting insulin, more precise blood sugars can be obtained while also having less hypoglycaemic events or less severe hypoglycaemic events. The pump can be programmed to give different rates of insulins at different times, allowing for more precise blood sugar levels. Through the pump, the child or child's caregiver can put in how much carbohydrates they ate, and the pump administers the insulin through the catheter. Correction doses are also able to be given through the pump, as well as pausing insulin dosages if the blood sugar is going low. With insulin pumps it is important to remember to rotate the infusion site, where the catheter is placed under the skin, to avoid lipohypertrophy. Lipohypertrophy is when lumps of fatty tissue develop where insulin is being administered. When these fatty tissues develop, these sites can cause the insulin to be absorbed inconsistently. This will cause problems in the child's blood sugar levels. This is important to remember

with insulin injections as well, not to always inject in the same spot. (Käypä hoito 2022.; Ilanne-Parikka, P. 2021; Wherrett et al. 2018.)

Insulin pumps can also come with the closed-loop pancreas system. This system works together with a continuous glucose monitor and automatically gives more or less insulin depending on the child's blood sugar levels. It does require entering the amount of carbohydrates eaten, but otherwise works automatically to administer the correct amount of insulin. This allows much less burden on the child or caregiver in managing the child's blood sugar. This system lowers the amount of hypoglycemic events and has better outcomes in keeping blood sugar in the proper range. (Käypä hoito 2022.; Ilanne-Parikka, P. 2021; Wherrett et al. 2018.)

2.3 Possible Complications

Diabetic ketoacidosis

This is a serious condition that is common in type 1 diabetics. It can occur when the child first develops diabetes or later if the child is experiencing too high blood sugar. Other common times when ketoacidosis can occur is during infection, serious illness, injury, not taking their insulin or stress. (MedlinePlus 2022.)

Diabetic ketoacidosis is when the body breaks down fat too quickly. If the body breaks down fat too quickly, the liver processes the fat into ketones. These ketones enter the blood stream and if there is too many, the blood then becomes acidic. Ketones are normal in the body and occur usually if a person has a long break in between meals. Ketones are not dangerous unless they are produced too quickly and build up in the bloodstream, which is what happens during diabetic ketoacidosis. When there is not enough insulin in the body, cells cannot use glucose as a fuel source, the body cannot process the amount of fat which is breaking down, and the liver produces a large amount of blood sugar. This then causes diabetic ketoacidosis. (MedlinePlus 2022.)

The main symptoms of diabetic ketoacidosis are frequent urination, excessive thirst and fruity smelling breath. Other symptoms are dehydration, headaches, stomach pain, nausea, vomiting, decreased alertness and a flushed face. (MedlinePlus 2022.)

To treat ketoacidosis, blood sugars need to be corrected to the normal levels. This is done with insulin. It can be administered through injections, insulin pump or intravenously. Fluid replacement can also be part of treatment if fluids were lost through vomiting or excessive

urination. If left untreated, diabetic ketoacidosis can lead to cardiac arrest, kidney failure, cerebral edema or death. (MedlinePlus 2022.)

Risks of other autoimmune diseases

Children with type 1 diabetes are at greater risk of developing other autoimmune diseases. Thyroid disease and celiac disease are very common diseases to develop if the child has type 1 diabetes. (Calabria 2022.)

Hyperglycemia

Hyperglycemia happens when the blood sugar of the child is above their normal range. Typically, the normal range is between 4-10mmol/L, but every child can have their individual range where they are normally comfortable at. Hyperglycemia happens when the child does not have enough insulin. As children with type 1 diabetes are not able to make their own insulin in their bodies, this would be caused by not getting enough insulin. This can happen if the child did not take enough insulin, missed an insulin dose, miscalculated the amount of insulin needed, ate more carbohydrates without adjusting the amount of insulin needed or used insulin that did not work properly due to reasons such as expiration or improper storage. Other reasons can affect as well such as becoming ill, being stressed, or taking certain medicines. All these can raise the blood sugar more than usual. (Käypä hoitio 2022.)

Symptoms of hyperglycemia are excessive thirst, peeing more than usual and feeling tired. If these symptoms occur the child's blood sugar should be checked. If the blood sugar is higher than usual, insulin should be given to correct it. (Käypä hoito 2022.)

Hypoglycemia

This is a common complication of type 1 diabetes in children and can occur often. Many children experience hypoglycaemia a few times a week. Hypoglycemia can be mild or severe. Usually, hypoglycemia will be a mild case. In Mild cases the symptoms are sweating, shaking, tiredness, sudden hunger, moodiness, headaches and blurred vision. If a diabetic child presents any of these symptoms, their blood sugar should be checked for hypoglycemia. Mild hypoglycemia usually occurs when the blood sugar is below 4 mmol/L, but symptoms can sometimes be felt before the blood sugar goes below 4 mmol/L. Treatment is usually 5-15 g of fast acting carbohydrates, depending on the age and size of the child. 15 grams of fast acting carbohydrates should raise the blood sugar by 2.1 mmol/L in 20 minutes. It is important to not treat with too much carbohydrates, as this can result in hyperglycemia. (Yale et al. 2018.) Treatment is always individualized to the child, but in general

5 grams of carbohydrates fir children under 5, 10 grams for children 5-10 and 15 grams for children over 10 years should be the amount to treat hypoglycemia (Wherrett et al. 2018).

In severe hypoglycemia, a child may present symptoms such as seizures, confusion or not being able to wake up. Severe hypoglycemia happens less often and can be a medical emergency if the blood sugar cannot be raised quickly enough. In severe hypoglycemia the blood sugar fall below 2.8 mmol/L and the person will need assistance in receiving carbohydrates. Oral carbohydrates may be able to be given but in most cases a glucagon 1 mg intramuscular injection will need to be administered. Without treatment, severe hyperglycemia can cause coma or death. (Käypä hoito 2022; Yale et al. 2018.)

3 Diabetic Children in Daycare

3.1 Daycares in Finland

Finnish daycares provide early childhood education for children at the age of 9 months to 5 years. Mostly, daycares are open from the morning until the afternoon, but some daycare centers provide care for children around the clock due to the parents working schedule. Three meals including breakfast, lunch and an afternoon snack are served to the children in daycare during the day. Children activities in daycares are pedagogically well considered and include crafting, playing, drawing, exercising, playing games and role games, outdoor activities and more. The children visiting daycares in Finland should be able to learn social skills and the activities provided during the day should support the children's learning and individual development. Daycares meet the needs of each child individually; therefore, special education is provided for children with special needs. Additionally, Daycares also offer Finnish language support for children with a different mother tongue. (InfoFinland 2022.)

Daycare workers are working in multi-professional surroundings. This includes early childhood education teachers, social workers, practical nurses and nannies. It is their aim to support a child's early childhood development and promote the wellbeing of the child. Before a child starts in a daycare, an individual early childhood education plan for the child is set up in a meeting between the parents of the child and the early childhood education teacher. (Opetushallitus 2022.)

3.2 Diabetic care at Daycare

Once diagnosed, the child might be hospitalized where a multidisciplinary team of pediatric diabetologists, dieticians, diabetes nurses and pediatric psychologists take care of the child and the whole family. During the hospitalization, the parents meet with the different health care professionals to discuss treatment and care of type 1 diabetes. It is important that the parents or other official caregivers learn to treat and handle type 1 diabetes of their own child because poor treatment can cause major health care issues or complications to the child. (Kingod & Grabowski, 2020.) During the hospitalization the parents will get to know the treatment possibilities considering the child and his/her hobbies. Treatment of type 1 diabetes has immensely approved in the last years to make life as normal as possible for the child once being diagnosed. Different ways of administration the insulin with the insulin pen or an insulin pump should not restrict the child's life any longer. (Kuitinen 2021.)

The responsibility for a child's medical treatment lies always with the parents or the official caregivers of the child. When a child with daily medical treatment needs visits the daycare, this obligation is shifted towards the daycare workers. A health care worker trained to administer medicine would in first place take care of the medical treatment of a child in daycare but as such not available, other daycare workers are obligated to administer medicine orally or injected under the skin in individual cases and when it is ensured that the daycare worker got sufficient guidance and orientation about the treatment plan. (Opetushallitus 2022.)

A guide published by the Ministry of Social Affairs and Health on safe medication treatment should give the needed support for early childhood education teachers and other working staff at the daycare to administrate medicine safely to a child according to the child's needs (Suomen Lähi- ja Perushoitajaliitto Super Ry. 2021). When a child with a long-term illness like diabetes starts daycare, the child's needs and regular medical treatment need to be discussed together with the parents or official caregiver and the early childhood education teacher. It is the responsibility of the early childhood education organization to ensure that the implementation of the regular medication is documented properly and according to the child's health care plan. (Opetushallitus 2022.)

In Finland, the health care workers are primary responsible for monitoring, guidance and the coordination of the care of a child suffering from a chronic illness like diabetes. Younger children visiting daycares during the day need somebody around them who is familiar with diabetes treatment, the administration of insulin and possible complications. In a meeting set up together with the parents or official caregivers, the daycare working staff and a doctor or a registered nurse who is familiar with the child's health care plan, the medical care of the child is discussed and written down in the child's early education plan. One daycare worker is decided to be responsible for the medication administration for the child during daycare hours with another daycare worker being named as back up. The registered nurse and parents or official caregivers act in the function of educators to provide the daycare workers with the needed information about the right storage of medication, safe and proper medication administration and the right injection techniques. The doctor is finally giving the daycare workers the permission, to administer medication orally or injected once the daycare workers have shown that they have gained the right knowledge and techniques required to take care of a child suffering from a chronical illness like diabetes. (Opetushallitus 2022.)

3.3 Need for the guidebook at Daycare

The onset of type 1 diabetes in young children of preschool age has recently increased rapidly. In 2013 the estimated number of children diagnosed with type 1 diabetes under the age of 14 years was estimated to be 497 000 worldwide. Although alone in Europe living more than a quarter of the total amount of type 1 diabetes children's patients, research on how type 1 diabetes of a children can affect the family's daily life is limited. The chronic autoimmune illness, one of the most common chronic diseases in children and adolescents, is a very demanding disease to take care of, especially with children at a young age. Type 1 diabetes requires continuous self-care and support. The little patients and their families or official caregivers must cover up 95% of the whole treatment care in surroundings outside of health care surroundings. The management and self-care of type 1 diabetes in young children is challenging, the treatment requires knowledge about the internal body system functioning and how external factors like lifestyle and food can influence blood sugars levels to raise or lower, something a child in young age is not properly able to understand and communicate. Parents or official caregivers need to adjust to the new situation once a child is diagnosed with a chronic disease. They have to learn to monitor glucose levels, count carbohydrates, change needles and vials with insulin pumps or inject insulin. (Kingod & Grabowski, 2020.)

A young child getting diagnosed with type 1 diabetes has a major impact not only for the child but also for the parents or their official caregivers. The family has to adjust to a new life, reshuffle their normality and identity the family was used to before the diagnose. Parents or official caregivers start to constantly worry about the diagnosed child. Especially in young children, the care relies mostly on the parents or official caregivers straight after the diagnosis. Poorly care of diabetes can cause severe complications up to life threatening incidents and death. Type 1 diabetes demands lifelong treatment. It can put a strain on parents or official caregivers, the load of information and responsibility can be stressful at the start. (Kingod & Grabowski 2020.)

Managing treatment can be challenging, medically and emotionally. Parents or official caregivers might be at constant worry about blood glucose levels of their child, the impact on the quality of life of the child and complications in the future. Parents or official caregivers develop symptoms of depression, stress, anxiety and distress as research has shown. The combination of complex care management and the difficulties a young child might have communicating their symptoms or needs might lead to the parents or official caregivers

considering putting their child into the hands of others to take care of. A study with parents or official caregivers has shown that 44% of the parents' or official caregivers' decision to enroll their child to daycare/school has been affected by the diagnose while 12% of the parents or official caregivers even removed their type 1 diabetes child from a daycare or school because of the difficulty to manage the complex type 1 diabetes care in daycare or school surroundings. (Commissariat et al. 2021.)

Despite constantly worrying about the child with type 1 diabetes and feeling emotionally affected by the treatment demands, parents or other caregivers also feel overwhelmed by the responsibility given to them to educate and explain other adults about the type 1 diabetes care and management of their child. Frustration arises for parents and other official caregivers when the responsibility of the diabetic care of the child however stays with them because teachers or daycare nurses would constantly reach out during the day to ask questions about the diabetic care of the child. Parents talked about their experiences getting interrupted during their workday because blood sugar levels of the child were slightly above the ideal level and school teachers or day care nurses asked the parents to pick up the child because of it. Other parents talked about their child, who was not allowed to eat any sweets or snacks at a party just because teachers or daycare nurses were too afraid of the raising blood sugar levels. Diabetic type 1 children are often confronted with needless restrictions just because teachers or daycare nurses are not properly able to take care of a diabetic type 1 child during school or daycare time. (Commissariat et al. 2021.)

A research from Denmark in 2022 has shown, that insecurity can arise for day care nurses or schoolteachers once a diagnosed type 1 diabetic child enrolls or a recently diagnosed type 1 diabetic child returns to the daycare or school. Daycare nurses or schoolteachers feel overwhelmed with the responsibility of diabetic care. They fear that their knowledge about diabetes-specific emergencies is insufficient and may refuse blood sugar testing, injecting insulin and deciding on the dosage of insulin to a type 1 diabetic child because of their insecurity. Some daycare nurses and schoolteachers think, that diabetic care lies beyond their responsibility that nobody wants to take care off while others are especially concerned about the care for a type 1 diabetic child because of their lack of experience with diabetic care itself. Therefore, daily communication with the parents gives daycare nurses and schoolteachers a sense of security to know that it is possible to reach out when questions arise. As a result, some daycare nurses and schoolteachers claim the wish for better educational support for diabetic care and treatment not only relies on the responsibility of the teachers but also including health care staff workers. (Johansen et al. 2022.)

4 Methodology

4.1 Practice based thesis

This thesis was implemented as a practice-based thesis. The main part of a practice-based thesis is the product that is produced. The product could be for example a guidebook, video, poster or event. The aim is to gain new knowledge through the means of a practice and the results of that practice. Practice based thesis can be described as creative and innovative. A practice-based thesis includes the produced product as well as a written report. In the report is explained the reason for the product, research, evaluation of the product and discussion. (Candy 2006.)

A practice-based thesis also includes a commissioning partner. The commissioning partner is where the product that is created is implemented. The authors of the thesis work together with the commissioning partner to create a product that meets the commissioning partner's needs. (Salonen 2013, 16-20.)

The product that was produced in this practice-based thesis was a guidebook. The daycare workers are who the guidebook is for. After talking with some daycare workers who have cared for children with type 1 diabetes, it was clear some basic knowledge could be used on caring for children with type 1 diabetes.

The product is a guidebook for caring for type 1 diabetic children. Basic knowledge about the common challenges of caring for type 1 children will be in the guidebook. Monitoring blood sugar levels, treating hyper or hypo glycemia, carbohydrate counting and insulin therapy. The information for this guidebook was collected from evidence-based research. This research was found from databases such as Cinahl and Pubmed as well as nursing guidelines such as Diabetes Canada Clinical Practice Guidelines and Duodecim.

The guidebook was implemented in a daycare in Finland. Since the authors created the guidebook in English, they searched to partner with an English daycare. The Teddybear Daycare in Lahti was interested in having this guidebook in their daycare and was the authors commissioning partner.

4.2 Plan Do Study Act model

The methodology that was used is the Plan DO Study Act also know as the PDSA model. This model is a framework that is based in scientific method that helps implement quicker

action. It implements changes through developing and testing that lead to improvement. (NHS 2022.)

The plan stage of the PDSA model defines the objective and answers questions of Who? What? Where? and When? (NHS 2022). Daycare workers do not always have sufficient knowledge on how to care for children with type 1 diabetes. That is where the objective to create a guidebook for daycare workers was started.

The do stage of the PDSA model is about implementing the plan (NHS 2022). The plan was carried out. The guidebook for daycare workers about caring for children with type 1 diabetes was created and distributed to the daycare.

The study stage is where the data is analysed in the PDSA model (NHS 2022). The data in this thesis was the feedback received from the daycare. The guidebook was assessed after it is distributed to the daycare. The assessment was done through an interview. From this interview we evaluated if the guidebook was successful in increasing the knowledge of caring for type 1 diabetic children in daycare workers.

The act stage is where it is decided whether to implement the change that is made or to repeat the cycle (NHS 2022). The guidebook was accepted and implemented and another PSDA cycle was not needed.

4.3 Criteria of a guidebook

When creating a guidebook, there is some guidelines to consider. One would be plain or clear language. A guidebook should be easy to read and understandable to a wide range of people. People's educational background and understanding of medical terms can vary widely. That is why it is important to use simple language that can be understood. The purpose of a guidebook is to educate people on a certain topic, and this is done best with simple language. Clear language is not only the vocabulary used, but also how it is written. It is best to avoid long sentences and to keep the writing clean and concise. (Centers for Disease Control and Prevention 2010; Rudd 2019.)

Another criterion to consider is who the reader is. Depending on who the guidebook is for, can change how it is written. Consider the readers gender, background, education and general knowledge of the topic. Think about what the key message is that the reader needs to learn and determine the best way to communicate it to them in the guidebook. (Centers for Disease Control and Prevention 2010; Rudd 2019.)

A clear message is also another important criterion in a guidebook. This criterion is about keeping the message clear and concise. Think carefully what the most important information is to provide to the reader and stick to the most essential facts. Provide links to other sources if the reader wants to find out more information from a reliable source. Be consistent with the vocabulary to keep the information clear and not to confuse the reader. (Centers for Disease Control and Prevention 2010.)

Design is another important factor. The guidebook should be pleasing to the eye, have good visuals and appropriate layout. The font should be big enough to read easily, 12-point size or bigger, and an easy-to-read font style. There should be appropriate spacing between lines. The pages should not be overfilled and have some blank white space as well. The pictures should be relevant and helpful to the information you are trying to provide. They should help explain the information you are trying to explain in the text. The layout should be in an order which is logical. There should be a good flow of information, that doesn't become confusing. The order of information should be in the most logical order for the reader. (Centers for Disease Control and Prevention 2010; Rudd 2019.)

4.4 Developmental process

Planning Stage

This is the first stage in developing the guidebook. In this planning stage of a guidebook there are certain questions that need to be answered such as Who? What? Where? When? Also, to answer what is the objective and aim of the guidebook. (NHS 2022; MN department of health 2022.)

The authors of this thesis started by choosing what type of thesis they wanted to create. The authors chose to make a practical based thesis and searched for a commissioning partner who would be in need. Through some searching, it became clear that daycares struggled sometimes in knowing how to care properly for type 1 diabetic children. This was a suitable and interesting topic to the authors and they decided to create a guidebook on caring for type 1 diabetic children for daycare workers. The authors asked around to a few English-speaking daycares and found one who was interested in having this guidebook. A cooperation agreement was made between the authors and The Teddy Bear Daycare in Lahti. The authors used English speaking countries current care guidelines on diabetes as well as Finland for the information on how to care for children with type 1 diabetes. The authors also searched for suitable information through databases such as EBSCO, Pub-Med, Medline and other reputable sources.

During the planning stage, what type of information that would go into the guidebook was chosen. There was an overflow of information that could have been put in the guidebook. The authors chose carefully what subjects were the most important to cover, and to keep them brief as to not overwhelm the reader of the guidebook.

Implementation Stage

The is the part where the authors implemented the plan they made in the planning stage. The plan is carried out, data is collected, and it is the beginning of the analysis of the data (NHS 2022; MN department of health 2022). Information was collected from the planned reputable sources and gathered to be put into the guidebook. As the guidebook was being created, some information was added while others were cut out. The guidebook was created in an A4 template, with a white background and purple background for the headings. Canva was used to find suitable images for the guidebook. The images were used to make the guidebook more appealing looking, but also some images were important in showing different types of diabetic tools. The font size was 14/16 for the text and 26 for the headings. The font style was Corbel, which seemed clear to read.

The language used in the guidebook was simple and easy to read. The authors made a point to use simple language in the guidebook so it would be more accessible for everyone to use. The topics were to the point and the most essential information included in the guidebook. Additional sources as well as references were found at the end of the guidebook, so if the workers wanted to read more, they knew where to find reliable information.

Assessment

In this stage, the guidebook was analysed or studied if it was effective in its aim. The data is analysed, compared to its original predictions and a summary of what is learned is made (NHS 2022; MN department of health 2022). The assessment method used was an interview. This is a qualitative form of research and the most common type of data collection in qualitative research. The interview was semi-structured with pre-planned questions. The pre-planned questions made sure certain feedback was received. (Jamshed 2014.) But the interview format allowed for a more open discussion if the commissioning partner had feedback to give which was not part of the questions. The goal of the interview was to find out if the guidebook would be useful to the daycare workers in caring for a child with type 1 diabetes. If the guidebook improved their knowledge on this topic, and if they would find it useful in their work.

The guidebook received excellent feedback from the daycare. When interviewing a member of the daycare staff, four questions were asked. The first being: What new information did you learn from the guidebook?

The staff member said that the guidebook contained very useful information. It was a good guide to learning the basics of type 1 diabetes in children. It gives good information to look out for such as symptoms of hypo or hyperglycemia. It is also a good refresher of information as some of the staff has had training previously on this subject but could have forgotten some of the information.

The second question was: How can daycare workers benefit from the information found in the guidebook?

The staff member emphasized that the guidebook was very clear and easy to read. This makes it easy for staff members to read and learn the material without it being too complicated. This allows the daycare workers to retain and learn this information more easily.

The third question was: How did you find the layout and readability of the guidebook?

The staff member was impressed with this aspect of the guidebook. He found the color scheme pleasing, the text soft and the graphics well done. He said it was pleasing to the eye and easy to read.

The fourth and final question was: What kind of improvement suggestions do you have regarding the guidebook?

This was the most difficult question to answer according to the staff member. He said the guidebook was very useful and would only wish that it could be in Finnish as well. If it was in Finnish, it could be distributed to even more people.

Overall, the feedback received from the daycare was very positive. But it was clear from the feedback that the aim and purpose of this thesis was met. A guidebook was created and used in a daycare which increased their daycare workers knowledge of caring for children with type 1 diabetes.

Action

In this part, it was decided if the guidebook was accepted to be used in the daycare or does it need to be improved on. If the guidebook was rejected, another PSDA cycle would be done to improve the guidebook for the purpose of the aim (NHS 2022).

The guidebook was accepted and implemented into the daycare.

5 Discussion

5.1 Assessment of the guidebook

Caring for type 1 diabetic children in Finland is a common challenge daycare workers face. The author's aim was to create a guidebook that could help the daycare workers with this challenge at their work. The guidebook contained the essential information the daycare workers needed such as what is type 1 diabetes, how to measure blood sugar, how to handle hypoglycaemic or hyperglycaemic events, carbohydrate counting and insulin therapy.

The purpose of the thesis was to increase the knowledge of the workers in daycares in caring for children with type 1 diabetes. This will allow the workers to provide better care to children who have diabetes that go to daycare. The authors used the PSDA method to create a guidebook that fulfilled this purpose.

Through the interview it was found that this guidebook would be useful to daycare workers in caring for a child with type 1 diabetes. The aim and purpose of this thesis was met. The guidebook would has increased the daycare workers knowledge of caring for a child with type 1 diabetes.

Creating the guidebook did bring some challenges. Type 1 diabetes is a very complex disease with many different factors which can affect it. Trying to limit the important information was a challenge. If the guidebook was too long, the workers might not read it all and miss essential information. The aim was to keep the guidebook brief so that daycare workers would be able to find essential information quickly and learn the basics of caring for children with type 1 diabetes. While creating the guidebook, the authors kept in mind the criteria for a good guidebook. The authors used these criteria to help make a more effective guidebook.

The authors succeeded in creating a guidebook that would increase the knowledge of the daycare workers in caring for children with type 1 diabetes in daycare. The authors would have liked to be able to interview more daycare workers and receive their feedback on the guidebook, but this was not possible dure to time and resources of the daycare workers.

Overall, the aim and purpose of the thesis was met, and an informative guidebook was created and put in use in an English daycare.

5.2 Ethical consideration and trustworthiness

Research aims to be considered reliable and ethically acceptable. In order to achieve these goals, certain guidelines must be followed. The Finnish Advisory Board on Research Integrity, in short form known as TENK, has published certain guidelines for the promotion of the liable conduct of research and to prevent a research's misconduct. Established by the Finnish Ministry of Education and Culture, The Finnish Advisory Board observes regulations of these guidelines but also deal with possible violations. These ethical guidelines consider all ethical aspects of a research and promote trustworthiness. This is applied to all Finnish academic institutions, including Universities of Applied Sciences. (Finnish Advisory Board on Research Integrity 2012, 29.)

Trustworthiness and its assessment are part of the research process. Sufficient data and material must be collected and scientifically analyzed in order to create a reliably and validly research. Every kind of material searched or analyzed is important and must be documented whether it is later usable or nonessential material for the further research process. Documentation of the research process should be clear, logically and easy to follow. (Salonen 2013, 23-25.) The authors used evidence-based guidelines, EBSCO, PubMed and the Joanna Briggs institute EBP Database to search for reliable and evidence-based material and data that was used for their thesis.

Committed to the process of a practice-based thesis, the authors of this thesis agreed to follow ethical guidelines and regulations as defined by the Finnish Advisory Board on Research Integrity. The thesis was created in the best-known scientific writing manner by crediting other researcher's own ideas and research material correctly and prevent misconduct. At the beginning of the process the authors signed a contract with the commissioning party to ensure responsibilities and rights of all parties involved in the thesis. Received data from the interview of the daycare workers was researched thoroughly and honestly. Moreover, received data was stored and handled confidentially and respectfully correct.

The two authors of this thesis produced a guidebook for their commissioning partner. The product should be beneficial and useful for daycare workers. It should increase their knowledge of type 1 diabetes in children and help them with managing the care during daycare hours. Received data and material was handled confidentially, and participation was always voluntary. All participants were treated respectfully and in a kind manner by following ethical guidelines and regulations.

Ideas for future development

Considering the feedback received from the daycare, it could be considered to translate the guidebook and develop a Finnish version as well. This would allow a broader range of daycares and daycare workers to use the guidebook. This was a challenge for the authors to do as Finnish is their second language. But with some outside cooperation, a Finnish version could be made of the guidebook.

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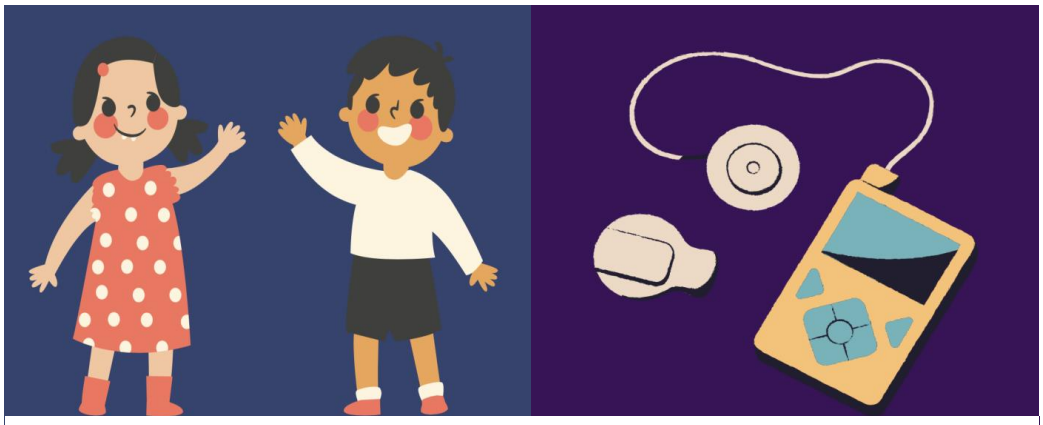
Appendix 1. Guidebook

Caring for Children with Type 1 Diabetes



A Guidebook for Daycare Workers

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LAB University of Applied Sciences

2023

Images source: canva.com

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Image source: canva.com

What is Type 1 Diabetes

Finland has the highest number of type 1 diabetic children in the world, making it an important condition to learn about if you work with children in Finland.

Type 1 diabetes is when a person cannot produce insulin, or very little insulin in their body. Insulin is produced by the pancreas, but in diabetics it does not work properly. Insulin is needed to help your body process glucose. This means that a person who has diabetes needs insulin when they eat. They need to take insulin to help their body regulate their blood sugar. Insulin is given through an injection or through an insulin pump. Proper blood sugar regulation is important to prevent short- and long-term complications.

Type 1 diabetes has no cure or way to prevent it from developing. People with type 1 diabetes need to take insulin the rest of their lives to maintain proper blood sugar levels. Without proper blood sugar levels serious complications can arise.

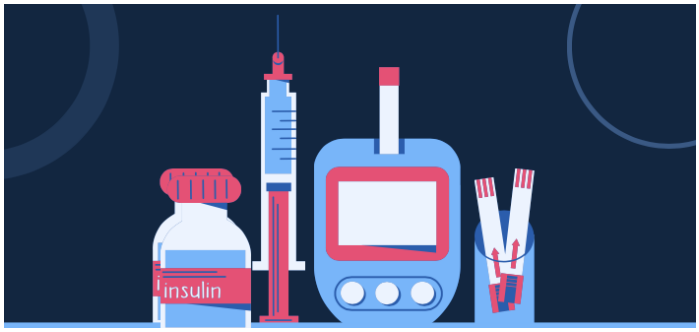

Image source: canva.com

Care plan

A child who has type 1 diabetes, will have a care plan for how his diabetes will be treated at the daycare. At least 2 or more daycare workers will be trained on how to care for the child's diabetes and how to give the child's medication. Every child has an individual care plan for their diabetes, so it is important to know how to treat that specific child. This guidebook will go over general treatment of type 1 diabetes in children, but always remember to check the child´s specific care plan!

Image source: canva.com

Measuring Blood Sugar

When caring for a type 1 diabetic child, it is important to be able to monitor and measure the blood glucose levels. A child's blood sugar measurement should be between 4-10 mmol/L. Before meals 4-7 mmol/L is normal, and after meals 8-10 mmol/L. A good goal is to have the blood sugar in these ranges 70% of the time. If the blood sugar drops below 4 mmol/L, fast acting carbs are needed to be given to the child. If the blood sugar goes above 10 mmol/L, it should be considered if insulin is needed to be given to the child.

There are three main ways to monitor blood sugar levels. The first type is a rapid glucose monitor, which is the typical blood sugar monitor that requires a drop of blood to get a blood sugar measurement. This is done by using a tiny needle which makes a quick small hole in the child's skin, which than a little bit of blood can come out. This blood is then placed on the tip of the testing strip.

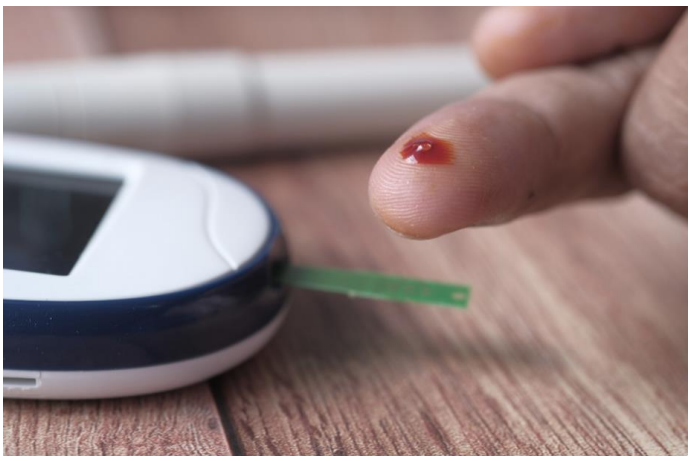

Image source: canva.com

Measuring Blood Sugar

In Finland, it is typical for children to have the other two types of blood glucose monitors which are a flash glucose monitor or a continuous glucose monitor. In both monitors, the child has a sensor placed on their body, where the monitor can read the child's blood glucose levels. The sensors are usually on the back of the upper arm but can be placed in many different areas such as on their stomach or thighs. The sensors are replaced every 7-14 days typically.

Image source: canva.com

With a flash glucose monitor, a device is needed to be pressed against the sensor to receive a blood glucose measurement. With a continuous glucose monitor, the blood sugar measurements are updated automatically to the monitor, without needing it to be placed against the sensor. The monitor which shows the blood sugar measurements can be a device which comes with the sensor, or an application on a smart phone. With these two devices, the blood sugar measurement will also give the directions which the blood sugar is moving. An arrow can be showing up, meaning the child's blood sugar is raising. Down, meaning the blood sugar is lowering. Or the arrow can be showing to the right, meaning the blood sugar is staying steady.

Hypoglycemia

Hypoglycemia is a common complication of type 1 diabetes. Hypoglycemia occurs when a person's blood sugar drops too low. When a child's blood sugar drops below 4 mmol/L, fast acting carbohydrates should be given to the child to raise their blood sugar. 5-15 grams of carbohydrates should be given, depending on the size of the child. After eating the carbohydrates, wait 15 minutes before checking the child's blood sugar again. If it is still low, treat again. Continue to do this until the child's blood sugar is back in a normal range.

Examples of fast acting carbohydrates are:

- Juice, soda, milk
- Candy, sugar, honey
- Grapes, raisins, banana
- Glucose tablets

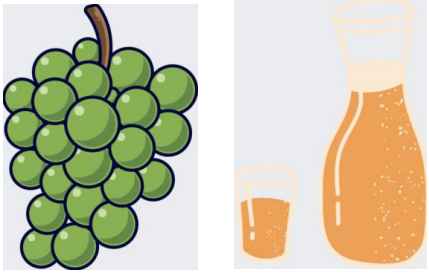

Image source: canva.com

It is important that at first the child eats only plain carbohydrates that don't contain a lot of protein. Complex carbohydrates, protein and fat will slow the absorption of carbohydrates. Which would lead to a longer time before the child's blood sugar is raised. When the child's blood sugar is back to a normal range, then food with protein can be good for the child to have to steady their blood sugar.

Hypoglycemia

Symptoms to watch out for that could indicate a low blood sugar in a child:

- Sweating, shaking, tiredness
- Sudden hunger, moodiness
- Headaches and blurred vision

If a child presents these symptoms, check the child's blood sugar immediately to be sure they are not experiencing hypoglycemia.

If a child's blood sugar drops too low, and they are not able to eat, an injection of glucagon can be given if it is part of the child's diabetic care plan. If the child is unresponsive or has a low blood sugar and does not have a glucagon injection and is not able to eat/drink anything, call 112 immediately.

Image source: canva.com

Hyperglycemia

Hyperglycemia is when the child's blood sugar is too high. Normal blood sugar range is 4-10mmol/L. When the child's blood sugar is above 10, it is too high. There are many reasons the child's blood sugar can go too high. A child with type 1 diabetes cannot make their own insulin, so if the child is not given enough insulin through injections, their blood sugar will go too high. Reasons this can happen are if the child did not take enough insulin, missed an insulin dose, miscalculated the amount of insulin needed, ate more carbohydrates without adjusting the amount of insulin needed or used insulin that did not work properly due to reasons such as expiration or improper storage. Other reasons can affect as well such as becoming ill, being stressed, or taking certain medicines. All these can raise the blood sugar more than usual.

If the child's blood sugar is too high, they will usually need to take an insulin shot. Factors such as when they last ate, when their last insulin shot was, how high their blood sugar is and if they will exercise can affect how much insulin should be given. Follow the child's individual care plan on how much insulin should be given when they have too high blood sugar.

Symptoms of hyperglycemia are:

- Excessive thirst
- Tiredness
- More frequent urination

If you observe these symptoms in a child with type is diabetes, check the child's blood sugar.

Carbohydrate Counting

When giving insulin to children with type 1 diabetes, one thing to consider is how many carbohydrates they are going to eat. Before eating, the child needs to take insulin either through an insulin injection or through their insulin pump. The amount of insulin given to them depends on how many carbohydrates the child is going to eat. It is important then to be able to count the amount of carbohydrates in food. The child will have an insulin to carbohydrate ratio. For example, they could have a 1:25 ratio. Which means for every 25 grams of carbohydrates they eat, they will need one unit of insulin. If they are going to eat a meal which has 50 grams of carbohydrates, they would then need 2 units of insulin. So, to be able to give the right amount of insulin, you need to know how to count carbohydrates!

Here are some examples of how many grams of carbohydrates are in some typical foods:

BREAD, RICE, POTATOES, STARTCHES	**FRUITS AND VEGETABLES**	**DRINKS**
1 slice of bread 15g	1 medium apple/pear 10g	1 dl juice 10g
1 bread roll (sämpylä) 30g	1 medium orange 10g	1 dl soda 10g
1 crispbread (näkkileipä) 10g	1 mandarin 5g	1 dl milk 10g
1 ricepie 20-25g	1 dl grapes 10g	1 dl buttermilk (piimä) 10g
1 dl porridge 10g	1 medium banana 20g	
1 dl porridge with milk 15g	1 tbsp raisins 10g	**MILK PRODUCTS**
1 dl cereal 10g	2-3dl berries 10g	2 dl plain yogurt 10g
1 medium potato 10g	4-5dl raspberries 10g	2 dl flavored yogurt 20-25g
1 dl mashed potatoes 10g	1.5dl cherries 10g	1 dl ice cream 10g
1 dl cooked pasta 15g	1 tbsp jam 5-10g	
1 dl of cooked rice 15-20g	1 dl corn 15g	
1 tortilla 20g	1 dl peas 5g	
WARM FOOD		**DESSERTS**
1 dl lasagne 15g	4 spinach pancakes 15-20g	1 dl berry curd (marjarahka) 10-15g
1 dl macaroni casserole 15-20g	2-3 fish sticks 10g	1 dl berry sauce (marjakiisseli) 10-15g
1 dl carrot casserole 15-20g	1 meatpie 35g	1 dl fruit salad 10g
3 dl pea soup 15-20g	1 hamburger 30g	1 pancake 20g
3 dl of fish/meat soup 20g	1dl French fries 15g	1 cinnamon bun 30g

Insulin Therapy

Insulin is the medication that type 1 diabetic children need to take multiple times a day. Normally our bodies will release insulin naturally, but since type 1 diabetics cannot do this, they need to administer it to their bodies throughout the day. There are 2 main ways of administration: through multiple daily needle injections or through an insulin pump.

When using multiple daily injections, the child will take 2 different insulins. One is a long term acting insulin which is only taken once a day. This will usually be administered at home by the parents. The other insulin is their short acting insulin, or meal insulin, which they will need to take before eating or if their blood sugar is too high. Presently, insulin injections come in the form of an insulin pen. Insulins pens are prefilled with insulin. They are easy to use, as you just turn the dial on the pen to the correct number of units of insulin you are going to administer. Amounts are always determined by the child's individual care plan. The plan will tell what the child's insulin to carbohydrate ratio is. For children under 5, 1 unit of insulin for 30 grams of carbohydrates is the average amount. The plan will also tell if more or less insulin needs to be given for certain food, at what time the insulin should be given or any other special information. Insulin is also given to correct high blood sugars. The child's care plan will give the requirements of when to give insulin for high blood sugars and how much.

Image source: canva.com

Insulin Therapy

Insulin pumps are another way to administer insulin to a child. The pump is a machine which is connected to the child that gives them insulin without injections. Through the pump the child only uses one type of insulin, but it is given constantly in small amounts throughout the day. When the child eats, the amount of carbohydrates they will eat will need to be inputted into the insulin pump. The pump will then administer the right amount if insulin they need for that amount of carbohydrates. The pump can also administer correction doses of insulin automatically for when the child's blood sugar is too high. As with daily multiple injections, the child will have instructions in their care plan on what needs to be done with their specific insulin pump.

Image source: canva.com

Good resources

Here is a list of good sources to find more information on type 1 diabetes:

General information on diabetes

- https://www.diabetes.fi
- https://www.terveyskyla.fi/lastentalo/tietoa-lasten-sairauksista/diabetes-lapsilla-ja-nuorilla
- https://www.terveyskirjasto.fi/dlk00774/tyypin-1-diabeteksen-hoito?q=diabetes
- https://jdrf.org.uk/information-support/newly-diagnosed/support-newly-diagnosed-children/
- https://guidelines.diabetes.ca/cpg/chapter34
- https://www.kaypahoito.fi/hoi50116?tab=suositus

Carb counting

- https://diabetes.org/healthy-living/recipes-nutrition/understanding-carbs/carb-counting-and-diabetes
- https://jdrf.org.uk/information-support/managing-type-1-diabetes-3/carb-counting/

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Yale, J., Paty, B. & Senior, A. 2018. Diabetes Canada 2018 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada: Hypoglycemia. Diabetes Canada. Available at https://guidelines.diabetes.ca/cpg/chapter14

Appendix 2. Interview Question

What new information did you learn from the guidebook?

How can daycare workers benefit from the information found in the guidebook?

How did you find the layout and readability of the guidebook?

What kind of improvement suggestions do you have regarding the guidebook?