GUIDELINES FOR PARENTS

Care of a Child with Diabetes Mellitus

Convener: Alok Gupta
Members: Anju Virmani, Deepika Harit, Neha Bhise
Reviewer: PSN Menon

10 FAQs on CARE OF A CHILD WITH DIABETES MELLITUS

1. What is diabetes mellitus? How does it occur?
2. When do I suspect my child has diabetes? Can others get diabetes from my child?
3. How is diabetes treated? Is insulin needed lifelong? Will my child become addicted to insulin?
4. How is insulin given? Where should it be given? How do we decide the doses?
5. What diet should my child follow?
6. Can my child play? Even competitive sports?
7. What should we tell school staff about my child?
8. How often do we need tests and doctor visits? What are the complications of diabetes? How can we prevent them?
9. What are the new technologies available for diabetes care? Are they very costly?
10. How to manage the stress of type 1 diabetes?
IAP Parent Guideline Committee

Chairpersons: Piyush Gupta, Bakul Parekh
IAP Co-ordinators: GV Basavaraja, Harish Kumar Pemde, Purna Kurkure

Core Group

National Co-ordinator: Deepak Ugra
Member Secretary: Upendra Kinjawadekar, Samir Dalwai
Members: Apurba Ghosh, CP Bansal, Santosh Soans, Somashekhar Nimbalker, S Sitaraman
Care of a Child with Diabetes Mellitus

**Type 1 Diabetes**
Children develop T1D when they cannot make enough insulin, because the body’s own immune system destroys the beta cells of the pancreas. It is not clear exactly what triggers this destruction. Type 1 diabetes often starts in childhood—care needs lifelong insulin and regular follow-up with the pediatric endocrinology team. Omission of insulin can endanger the child’s life.

**Type 2 Diabetes**
Here, the insulin demand is high, and even though insulin is produced, it is less effective: “insulin resistance”. Obesity and a family history of T2D increase the risk. T2D is less common in adolescents, but is more severe than in adults, and must be taken seriously. It can be managed effectively by healthy eating and other lifestyle modifications, as well as by metformin (an antidiabetic drug) in the early stages.

---

**What is diabetes mellitus? How does it occur?**
Diabetes mellitus is a lifelong medical condition with high blood sugar. The beta cells of the pancreas make the hormone *insulin* which controls blood sugar levels. Insulin allows entry of sugar into the body cells, to use as a fuel. The two main types of diabetes are: type 1 diabetes (T1D) and type 2 diabetes (T2D) (Fig. 1).

**Fig. 1:** Pathophysiology of diabetes mellitus.
Type 1 diabetes can only be treated with injectable insulin. Oral antidiabetic drugs do not help in T1D. Treatment with insulin is essential for survival and normal health, because the body cannot make enough. The child can become very sick (diabetic ketoacidosis) or even die if insulin doses are missed or too little. This is not an addiction.

Types of Insulin
Insulins are generally of two types—short acting (few hours) and long acting (12–24 hours). Multiple daily doses are needed, to try and copy the way a normal body works, hence twice daily doses of insulin do not help. Insulin is needed continuously in small amounts for all body organs to function—the "basal" need. A larger amount is needed for a short time after eating, so that the sugar absorbed from the food is stored in the liver—the "bolus" need. Your child needs a daily dose of long-acting (basal) insulin; and three or more doses of short-acting (bolus) insulin before meals and large snacks. Premixed insulins are discouraged in T1D.

Remember, insulin gets spoilt by heat and cold. Buy from a reliable pharmacy and carry it at 2–8°C (after purchase and during travel). At home, store it in the fridge, away from the freezer. An icebox or double mud pot can be used if fridge or electricity is not available (Figs. 2A and B). It should never be left above 25°C (direct sunshine, hot room, and vehicle) or frozen. Do not use insulin that has become cloudy.
How is insulin given? Where should it be given? How do we decide the doses?

**Insulin syringes**: The dose in drawn up from a vial. Be careful to use U-100 syringes with U-100 vials (100 units of insulin/mL) and U-40 syringes with U-40 vials (40 units of insulin/mL) (Fig. 3). The needles are 6 or 8 mm long.

**Insulin pens**: There may be reusable or disposable (more expensive) pens; with 1-unit or 0.5-unit increments. They are convenient but costlier. Pen needles are 4, 5, and 6 mm long: 4 mm needles are the best (Fig. 4).

**Insulin pump**: It delivers insulin in a basal + bolus pattern through a small, flexible catheter inserted into the skin, most closely copying the body’s pattern.

Insulin is injected in the fat under the skin (subcutaneous). It can be given on the upper outer region of the buttocks, the tummy (below the belly button), and the front of the thighs (Fig. 5). A good plan is use buttocks for basal insulin and morning bolus, tummy for day boluses, and thighs for night boluses. The upper part of the arm can be used rarely (this site has many problems).

Change the place of the injection by 2–3 cm daily—“site rotation”. Repeated injections on the same site harden the skin (lipohypertrophy)—the pain is less, but insulin is not absorbed evenly, so blood sugars fluctuate.

Blood sugars must be tested many times daily, depending on your child’s needs—with a glucometer (Fig. 6) or ideally with a continuous glucose monitoring system (CGMS) (Fig. 7), inserted into the skin for 5–14 days. The minimum needs...
The area under the belly button should not be used.

**Fig. 6:** Glucometer for home monitoring of blood glucose.

**Fig. 7:** Continuous glucose monitoring system (CGMS).

**Fig. 8:** Meter for blood ketones.

Correction doses also may be needed. If blood sugar is over 300 mg/dL for a while, check ketones—correction dose is higher if ketones are present (Fig. 8).
Blood sugar levels, insulin doses, and diet and activity changes should be noted in columns—the diabetes diary—so patterns can be observed (Fig. 9).

This is important to plan sugar control—and life. Good diabetes control is not possible without daily multiple blood sugars.

**Fig. 9:** Diabetes log book.

<table>
<thead>
<tr>
<th>Date</th>
<th>BBF</th>
<th>ABF</th>
<th>BL</th>
<th>BD</th>
<th>BT</th>
<th>Time, BG</th>
<th>Long Acting</th>
<th>BBF</th>
<th>Mid Day</th>
<th>BL</th>
<th>BD</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon 27</td>
<td>195</td>
<td></td>
<td>198</td>
<td>219</td>
<td>170</td>
<td>202</td>
<td>4</td>
<td>3</td>
<td>11</td>
<td>4</td>
<td></td>
<td>+4.15 am before play</td>
</tr>
<tr>
<td>Tue 28</td>
<td>169</td>
<td>150</td>
<td>247</td>
<td>542</td>
<td>371</td>
<td>281</td>
<td>3</td>
<td>3</td>
<td>18</td>
<td>7</td>
<td></td>
<td>+3.14-12 Optional birthday party</td>
</tr>
<tr>
<td>Wed 29</td>
<td>264</td>
<td>121</td>
<td>331</td>
<td>243</td>
<td>333</td>
<td>9 (006)</td>
<td>4</td>
<td>3</td>
<td>18</td>
<td>7</td>
<td></td>
<td>Maggie, Prada, Cake</td>
</tr>
<tr>
<td>Thu 30</td>
<td>130</td>
<td>141</td>
<td>388</td>
<td>212</td>
<td>198</td>
<td>9</td>
<td>4</td>
<td>4</td>
<td>9</td>
<td>6</td>
<td></td>
<td>Birthday, needed a snack, gave 3.5 H</td>
</tr>
<tr>
<td>Fri 31</td>
<td>144</td>
<td>159</td>
<td>168</td>
<td>149</td>
<td>172</td>
<td>9</td>
<td>4</td>
<td>4</td>
<td>9</td>
<td>6</td>
<td></td>
<td>No sugar before lunch</td>
</tr>
<tr>
<td>Sat 1</td>
<td>161</td>
<td>168</td>
<td>251</td>
<td>120</td>
<td>9</td>
<td>4</td>
<td>8</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sun 2</td>
<td>82</td>
<td>26BD</td>
<td>120</td>
<td>170</td>
<td>149</td>
<td>9</td>
<td>3</td>
<td>3</td>
<td>10</td>
<td>6</td>
<td></td>
<td>Played all day, diabetes, large breakfast</td>
</tr>
<tr>
<td>Mon 3</td>
<td>702</td>
<td>133</td>
<td>240</td>
<td>152</td>
<td>9</td>
<td>6</td>
<td>8</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>Multi dinner-lighter</td>
</tr>
</tbody>
</table>

BBF: Before Breakfast
ABF: After Breakfast
BL: Before Lunch
AL: After Lunch
BD: Before Dinner
HYPO: Low Blood Sugar
BG: Blood Sugar
There is no special “diabetic diet”. A person with diabetes should have a healthy and balanced diet (Fig. 10)—so should everyone in the family! Each plate should have carbohydrates (“carbs”), protein, fiber and fat in proportion: a third of the plate full of vegetables and fruits, a third of protein (e.g., whole dal, low fat milk and milk products, whole eggs, fish, chicken, meat), and a third of complex carbs (e.g., cereals, millets—preferably whole grains, and starchy vegetables like potatoes). A mix of unsaturated fat (e.g., nuts, seeds, and peanut oil) and saturated fats (e.g., butter and cheese) is best.

There is no need to stop sugar, but avoid too much sugar, salt, and fat. Natural sugars like whole fruits are best; small amounts of sweeteners can be used. Processed food should be as little as possible—read food labels to understand serving sizes and amount of carbs, fats, salt, and other contents. So called “diabetic” foods are not recommended.

On festive occasions and when eating out, allow everything—manage by eating small portions of calorie-dense foods, choosing healthier options where possible, making insulin dose changes, and encouraging more activity. This improves compliance.

Encourage physical activity for at least 60 minutes daily (entire family!)—it improves blood sugar, blood pressure (BP), weight, intelligence, stress… everything! It could be any sports, running, dancing—whatever is practical and enjoyable—consult your doctor for precautions, and insulin dose/food adjustments to prevent hypos during or after play. Extra carbs may be needed for intense/unexpected play. Exercise should be avoided during hypoglycemia and ketosis. The child need not stop competitive sports—precautions to prevent hypos are essential.
Inform school staff and give copies of a ready reckoner explaining briefly about T1D, with clear dos and don’ts; an action plan indicating actions to be taken on certain sugar levels and emergencies; and important contact numbers. This will help the school take better care of your child.

The child should always carry a diabetes alert card which contains all necessary details and contact numbers of the guardians and the medical personnel to ensure that they get proper attention in times of an emergency (Fig. 11). Templates are available on websites listed at the end of the document.

**Q: What should we tell school staff about my child?**

**A:**

- Take permission for self-care activities: Checking blood sugar (glucometer/CGMS) and taking insulin before mid-morning snack/meal in the medical room or similar clean, private place; taking extra snack if blood sugar is falling or expected to fall, e.g., unexpected or intense or prolonged exercise; or using the toilet more often if sugars are high.
- Not being tense about diabetes helps the school gain confidence that this is a manageable condition. Be open, communicative, and understanding with the teachers—this also helps.
- Insist that the school allows the child to participate in activities without discrimination.

**Fig. 11:** Diabetes alert card: The child should always carry such a card.

---

---

---

---

---
How often do we need tests and doctor visits?
What are the complications of diabetes? How can we prevent them?

At the time of diagnosis, admission may be needed initially or frequent visits may be required. Education needs time, patience, and cooperation. Once you are familiar with diabetes care, visit the endocrine team (comprising of your pediatric endocrinologist, nutritionist, and diabetes educator) at least every 3 months with hemoglobin A1c (HbA1c) test (which reflects average blood sugar for the last 2–3 months) or if the child is sick. The child’s growth, BP, injection sites, and feet should be examined each time. You should get the contact numbers to stay in touch with your doctors telephonically in case of an emergency.

### Monitoring for Complications
Some regular tests are important to check sugar control and look for complications or comorbidities. Urine and blood tests for kidney function, eye test for diabetes complications, and blood tests to look for thyroid disorders, celiac disease (immune disease of the gut) and lipid abnormalities are needed initially and from time to time, as advised by your doctor.

### Types of Complications
Poorly controlled diabetes can cause many complications—immediate effects (acute) and long-term (chronic) effects.

### Acute Complications
The immediate ones are dangerous.
- Hypoglycemia (blood sugar <70 mg/dL) can cause various symptoms including irritability, confusion, lethargy, trembling, and sweating and in severe cases, it can cause coma, fits, or even death. Glucagon injection should be available at home/during travel for severe hypoglycemia (Fig 12). Nasal glucagon is available abroad.
- Ketoacidosis happens if sugars are very high, e.g., during illness or if insulin doses are missed: causing vomiting, deep breathing, and even coma.

### Long-term Complications
Long-term damage can affect all organs, especially kidneys (nephropathy), eyes (retinopathy), nerves (neuropathy), heart and blood vessels (vascular disease), and intestine (gastroparesis). Poor control can also affect growth and puberty. Complications can be prevented/reduced by controlling diabetes and leading a healthy life.

Children with diabetes should get all recommended vaccines. With well-controlled diabetes, they can study, work, marry, and can lead a normal life as long as they take precautions. They should not be discriminated against.

![GlucaGen HypoKit 1 mg](image)

**Fig. 12:** Glucagon injection kit.
What are the new technologies available for diabetes care? Are they very costly?

Technology has transformed diabetes care (Figs. 13A to E). Needles are thinner, syringes and meters are better and cheaper, and better types of insulin are available.

Continuous glucose monitoring systems (CGMS) test and display sugars every few minutes through sensors inserted into the skin. Used intelligently, you can anticipate high or low sugars by seeing trends and get much tighter sugar control, especially at night, with increased time in range (percentage of blood sugars in normal range), while avoiding multiple finger pricks. This improves quality of life and reduces acute and chronic complications. In India, Medtronic, Dexcom, and Abbott are available.

In India, Medtronic, Dexcom, and Abbott are available. Insulin pumps (Medtronic and Ypso in India) are devices which copy the body’s insulin patterns more closely by giving basal infusion and bolus doses. Used intelligently, pumps improve quality of life and sugar control. Closed loop systems are available abroad. Pumps are very expensive. A cheaper alternative is Medtronic I-port which allows multiple injections to be given into it.

Newer technology is definitely expensive. Good diabetes care is possible even with cheaper insulins and glucometer testing, combined with good diabetes education and effective self-care. Discuss with your doctor what you find worthwhile and what you cannot afford.

Figs. 13A to E: (A) Sensor: Guardian Connect; (B) Sensor and reader: LibrePro; (C) Insulin pump; (D and E) Inserting injection port, injecting into I-port.
How to manage the stress of type 1 diabetes?

Type 1 diabetes is difficult to manage, so do not hesitate to take help. If your diabetes team has a psychologist, that is wonderful.

- Also, ask the team to introduce you to other T1D families; look for local support groups. Talk to supportive relatives.
- Do not worry about being perfect, and avoid making unnecessary drastic changes.
- Explain and listen to your child, involve in daily decision making; understand and acknowledge his/her feelings and frustrations.
- Focus on issues which matter to the child: looks, studies, and handling peer pressure.
- Avoid pity, over-pampering, singling out in public, or frightening.
- Adolescents need independence, which diabetes hampers: give freedom along with supervision.

As parents, be kind to yourselves: try to normalize life, enjoy family activities and hobbies, get exercise, and enough sleep.

For further information, please refer to:
- www.ispae.org.in
- www.ispad.org
- http://www.digibete.org
- http://deapp.nhs.uk/what-deapp-covers
- http://www.runsweet.com

ACKNOWLEDGMENTS

We thank our patients and families for their valuable inputs. Special thanks to Ms Megha Arha, Dr Anil Vedwal, and Mr Naman Sharma.

All the above information is only indicative. Please consult your endocrinology team for all treatment. IAP takes no responsibility for any treatment errors.