

Indian Academy of Pediatrics (IAP)



GUIDELINES FOR PARENTS

Care of a Child with Diabetes Mellitus

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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?

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Care of a Child with Diabetes Mellitus

Q1

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**).

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.

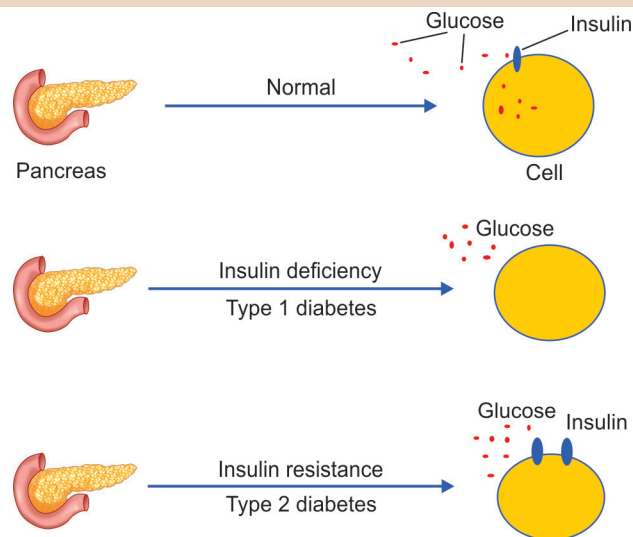


Fig. 1: Pathophysiology of diabetes mellitus.

Q2

When do I suspect my child has diabetes? Can others get diabetes from my child?

The common symptoms of diabetes include increased frequency of urination; increased thirst and hunger; weight loss; constant exhaustion; and skin and vaginal infections. Some patients observe ants around urine which raises the suspicion of diabetes.

Diabetes is not at all contagious.

Q3

How is diabetes treated? Is insulin needed lifelong? Will my child become addicted to insulin?

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.

Figs. 2A and B: (A) Double pot method for storing insulin: keep in cool, airy place; (B) Transportation of insulin.

How is insulin given? Where should it be given? How do we decide the doses?

Q4

- *Insulin syringes:* The dose is 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

Fig. 3: Error! Using U-40 syringe (red) with U-100 insulin.
Courtesy: Ms Shobha Setia.



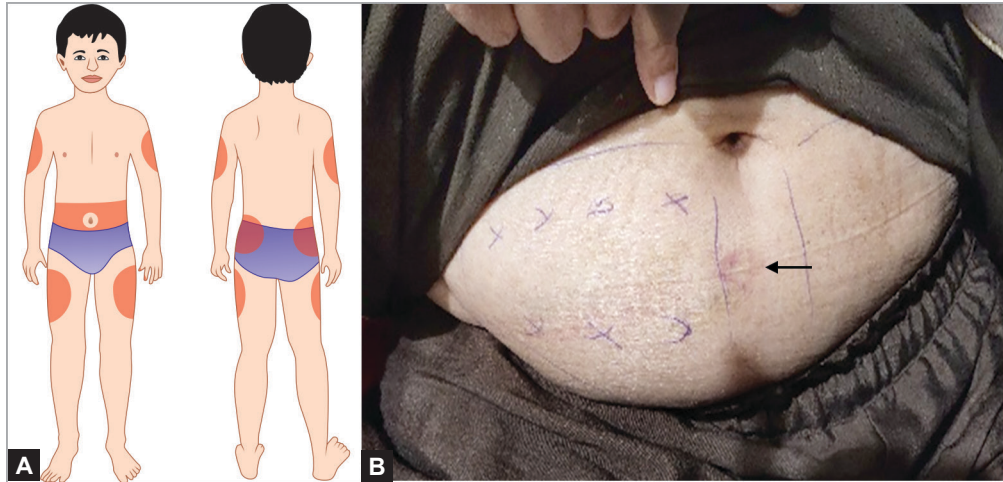
Fig. 4: From left: Disposable pens with 6 mm needle, 4 mm needle; reusable pen with cartridge; 1 mL U-100 (orange and black) syringe (2U increments), 0.3 mL U-100 syringe (0.5U increments); U-40 (red) syringe (1U increments).

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

Figs. 5A and B: (A) Injection sites (shown in orange); (B) An example of site rotation, marked with crosses. Arrow marks area of hypertrophy. The area under the belly button should not be used.



are—before each meal, at bedtime, if hypoglycemia (“hypo”) in which the blood sugar becomes low (<70 mg/dL), and frequently when the child is sick. Doses depend on the premeal blood sugar levels, amount and carbohydrate content of meals, activity levels, and the overall blood sugar patterns. Additional



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

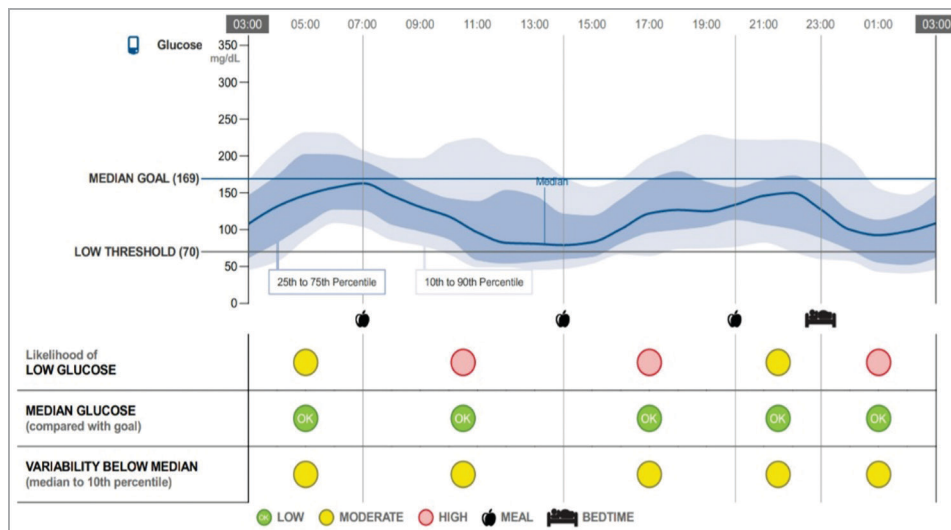


Fig. 7: Continuous glucose monitoring system (CGMS).



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).

Fig. 9: Diabetes log book.

Date तारीख		BLOOD SUGAR VALUE रक्त में शुगर की मात्रा					HYPOS हाइपोस	INSULIN DOSE इंसुलिन डोज					REMARKS Wt. B.P., Meal illness etc. टिप्पणी वजन बी. पी., भोजन, विमारी
BBF खाली पेट	ABF नाश्ते के बाद	BL लंच से पहले	AL लंच के बाद	BD दिनर से पहले	BT सोने से पहले	Time, BG समय, शुगर	Long Acting लम्बी अवधि	BBF खाली पेट	Mid Day दिन में	BL लंच के बाद	BD दिनर से पहले		
Mon 27/7	195		198	279*	170	202	8	3		11	4	* 4 extra before play	
Tue 28/7	169		150	207*	365 412	281	8	3	8	10	4	* 3H 412 - after birthday party Maggi, Frooti, cake	
Wed 29/7	264		121	331*	243	333	9 (off)	4		8	5	* Sweets Had 3 roti for dinner	
Thu 30/7	130		141	385*	212	198	9	4		8	6	* Ate biscuits after lunch Gave 3H	
Fri 31/7	144		159	168	149	172	9	4		9	6		
Sat 1/8	161		168		251	120	9	4		8	7		
Sun 2/8	82*		262 (H2)	120	170	149	9	3		10	6	* Played after dinner on Sat Large breakfast	
Mon 3/8	302*		133		210	152	9	6		8	6	* late dinner - forgot correction	

BBF : Before Breakfast
ABF : After Breakfast

BL : Before Lunch
AL : After Lunch

BD : Before Dinner
HYPO - Low Blood Sugar

BT : Bed Time
BG : Blood Sugar

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

Q5

What diet should my child follow?

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 cabs (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.

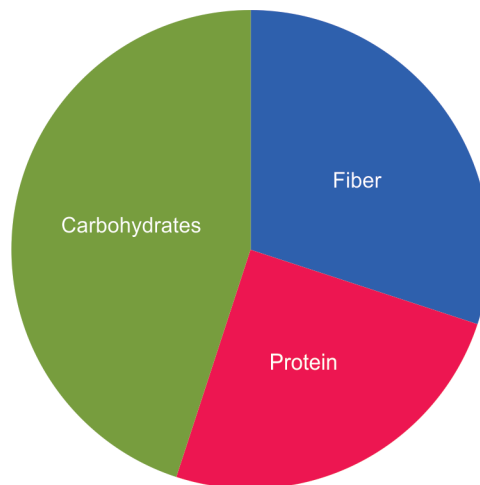


Fig. 10: A plate illustrating the proportion of nutrients.

Q6

Can my child play? Even competitive sports?

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.

Q7

What should we tell school staff about my 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.

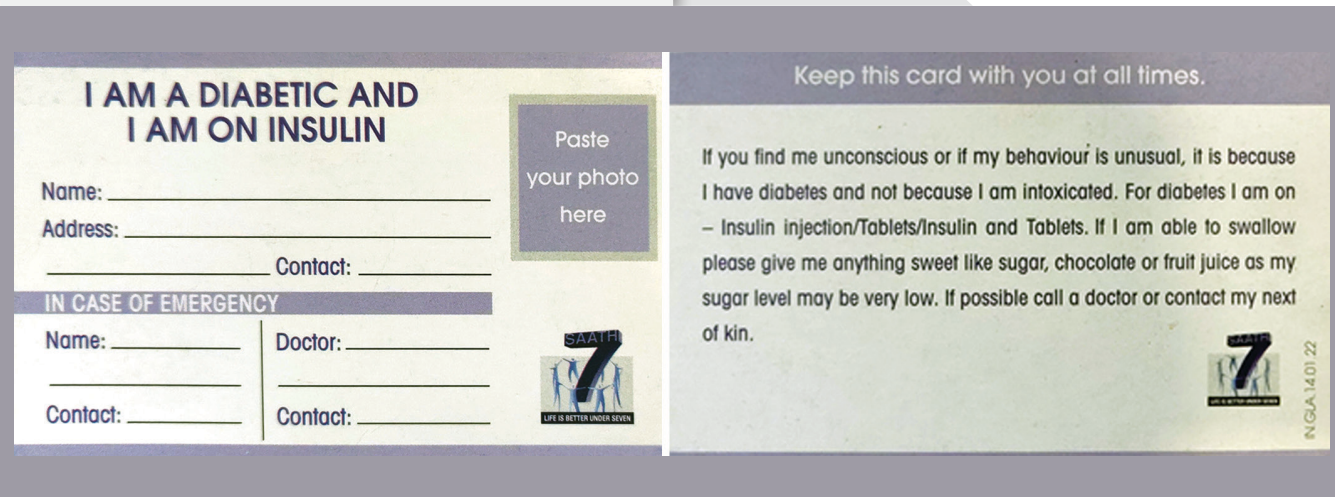


Fig. 11: Diabetes alert card: The child should always carry such a card.

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.

Q8

**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	Types of Complications	Acute Complications	Long-term Complications
<p>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.</p>	<p>Poorly controlled diabetes can cause many complications— immediate effects (acute) and long-term (chronic) effects.</p>	<p>The immediate ones are dangerous.</p> <ul style="list-style-type: none"> ○ 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. 	<p>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.</p> <p>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.</p>



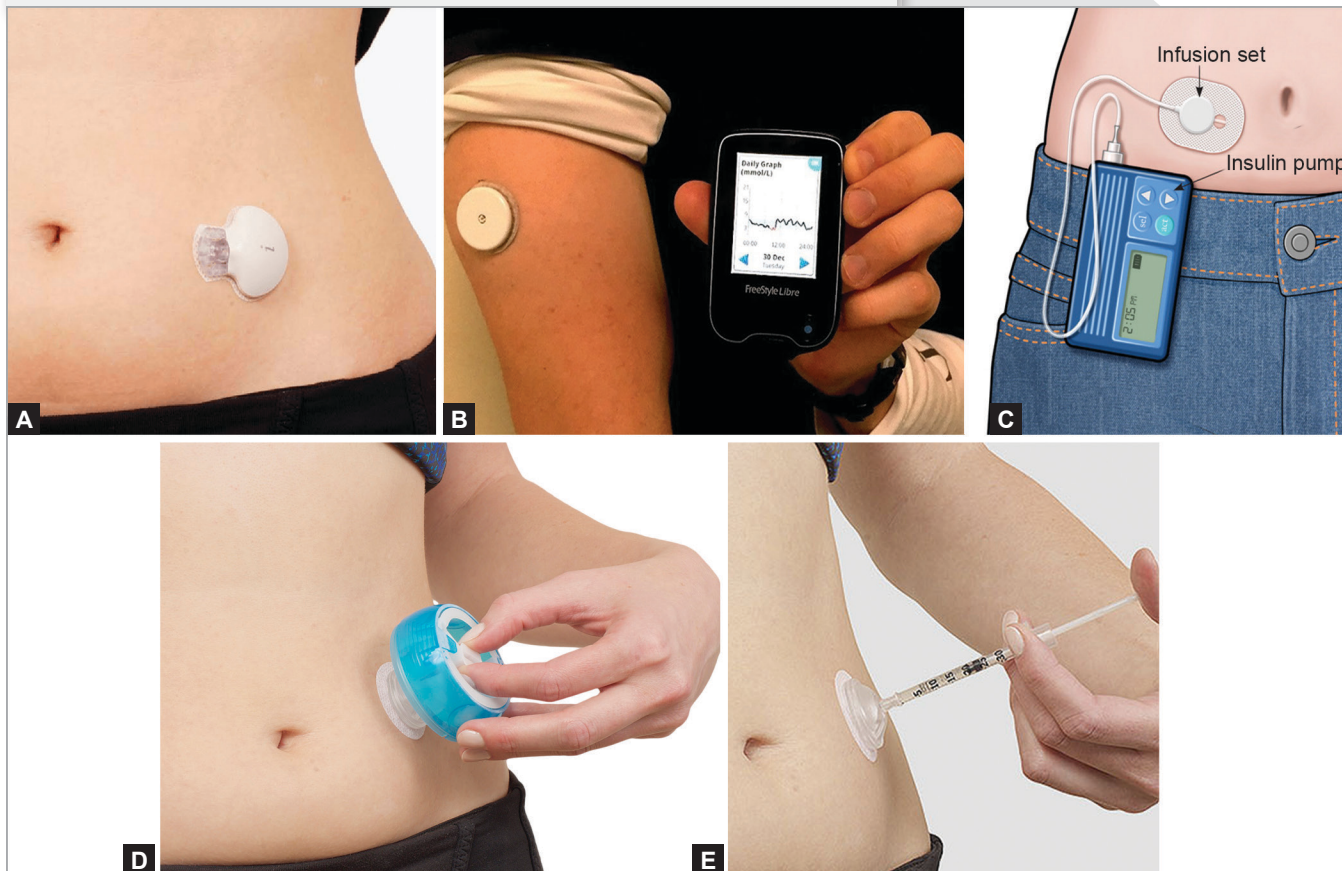
Fig. 12: Glucagon injection kit.

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.

Q9

What are the new technologies available for diabetes care? Are they very costly?



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.

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.

Q10

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>

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