

# Diabetes Educator's Handbook

changing  
diabetes®  
in children

Care for children and  
adolescents living with diabetes



Jennifer Anthony,  
type1, Bangalore, India



# DIABETES EDUCATOR'S HANDBOOK: CARE FOR CHILDREN & ADOLESCENTS LIVING WITH DIABETES

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# Preface

That diabetes mellitus is a gargantuan pandemic is known to all. The huge proportions it has acquired have attracted much needed preventive and therapeutic efforts. Parallel emphasis has also been laid on adequate diabetes education and counselling. Most capacity building initiatives, however tend to focus in adults with type 2 diabetes. The unique needs of children, adolescents and adults with type 1 diabetes are often ignored in type 2 diabetes centric services.

Pioneer authors have tried to address this gap by preparing print and online material for use by diabetes educators dealing with children and adolescents. The guidance provided by them has been of invaluable help to diabetes care professionals across the world.

Diabetology praxis in the developing world, however, faced with resource constrains, presents a multi-layered challenge. Many countries including India face a severe shortage of qualified, trained nurses, dieticians and diabetes educators. Their responsibilities are shouldered by a committed team of paramedical personnel, peer educators and family members who provide essential support to people with diabetes. These enthusiastic healthcare providers perform their duties to the best of their ability, but are handicapped by lack of appropriate training material. This is especially true in relation to children and adolescents, whose needs and requirements differ from those of adults.

The above background forms the noesis of this book. Crafted in simple, reader friendly terminology, this book provides easily understandable information on diabetes in children and adolescents. Its utility should extend beyond diabetes educators, to all cadres of diabetes care providers, and beyond the borders of India, across the globe.

With this hope, and with a prayer that it helps improve the lives of children with diabetes, we place this book before our readers.

Dr. Sanjay Kalra  
Special Editor

# Foreword

Type 1 diabetes is one of the most common endocrine and metabolic conditions in childhood. The incidence of diabetes is rapidly increasing, especially among young children.

Insulin-treatment is life-saving and should be taken lifelong. In many countries, especially in the less privileged families, access to self-care tools and insulin is limited, and this may lead to severe handicap and early death in children with diabetes. India has a huge population of over 6.5 crores people with diabetes; out of this 95% have type 2 diabetes, which has led to overlooking of children with type 1 diabetes.

Management of diabetes in children is crucial as these patients are at a higher risk of developing kidney failure, heart disease, stroke, blindness, etc. Management of type 1 diabetes is best undertaken by a multidisciplinary healthcare team and requires constant attention towards many aspects, including insulin administration, blood glucose monitoring, meal planning, and screening for comorbid conditions and related complications.

However, major challenges in the management of type 1 diabetes remain at the level of diagnosis, healthcare delivery, trained physicians, infrastructure, availability of insulin, monitoring and providing psycho-social support. Therefore, a concerted effort needs to be made to sensitize diabetes care professionals, including nurses, dietitians and doctors for the management of type 1 diabetes in children.

This diabetes educator's handbook is a joint effort by some key doctors across the country, working closely on the management of type 1 diabetes in children. The main objective of this initiative is to strengthen the diabetes care support system for managing diabetes in these children in the best possible way.

This book has been designed as a ready reckoner of 12 chapters with 2 topics covered in each of them. Each topic is covered in a single sheet having all the needed information. Since Diabetic Ketoacidosis (DKA) is an inherent and latent problem that can strike children with diabetes anytime, a special 2 page write-up on its management has been put at the end of the book.

Since managing type 1 diabetes in children involves very close monitoring and follow-up on a regular basis all 365 days, the diabetes educators, paramedical personnel, peer educators and family members can all contribute to support in this cause. This book will be an invaluable ready reckoner for all these groups while they offer their support to children with type 1 diabetes.

Dr. K. M. Prasanna Kumar

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Center for Diabetes and Endocrine Care  
Chairperson, Changing Diabetes in Children, India



# Acknowledgement

I am privileged and deem it an honour that I have been entrusted with the work of coordinating and creating this book entitled, "Diabetes Educator Handbook: Management of children and adolescents with type 1 diabetes".

As we are witnessing, diabetes in India is increasing at an alarming pace, the incidence of children with type 1 diabetes is also increasing with an annual estimate of over 3%. As recommended by the ADA, T1DM requires a multidisciplinary approach for proper care and management. With the health disorders increasing relentlessly, advances to manage them are also making continuous progress. With all this increase there is an escalating demand for trained healthcare professionals like doctors, trained nurses, dieticians and diabetes educators. The other support system like the paramedical staff, peer educators and family members, who provide essential support to people with diabetes, are also needed to pitch in, to offer their care to the children with type 1 diabetes. The focus of this book is to be a ready reckoner to empower these support groups.

This book would not have attained this form without the wholehearted support of all my medical friends and colleagues. Special mention for Dr. Sanjay Kalra for taking that additional effort to design the format of the book, sharing and reviewing content to complete it as planned. Other special contributors include Dr. K. M. Prasanna Kumar, Dr. P. Raghupathy and Dr. Sujoy Ghosh, thank you all for taking the time to add immense value through your contributions. I would like to acknowledge the help and support offered by the entire board of reviewers, viz., Dr. P. V. Rao, Dr. S. S. Srikanta, Dr. Vijay Viswanathan, Dr. Bipin Sethi, Dr. Sunil M. Jain, Dr. Ashok K. Jhingan, Dr. Nikhil Tandon, Dr. Subhankar Chowdhury, Dr. Nalini Shah, Dr. Archana Sarada, Dr. Banshi Saboo, Dr. Vaman Khadilkar, Dr. Rishi Shukla, Dr. Alok Kanungo, Dr. Rajesh Joshi, Dr. P. K. Jabbar, Dr. Surendra Kumar and Dr. Manoj Chadha for spending quality time to review the contents of the book.

The help rendered by Mr. Melvin D'souza for bringing the Changing Diabetes in Children program to India through Novo Nordisk Education Foundation, is gratefully acknowledged. I shall be failing my duties if I do not acknowledge the scientific support offered by Dr. Samir Zargar, Dr. Shuchy Chugh and technical support by Dr. Bharathi, Dr. Neera Gupta, Ms. Anupama Rau Attawar and Mr P. Dinakaran of Messrs Novo Nordisk India Pvt. Ltd. And finally to my wife for providing me her valuable support and forbearance while I was busy in the preparation of this book.

I might have missed many by oversight; I thank one and all for their help and support.

Dr. Ashok Kumar Das  
MD, MNAMS, PhD, FICP, FAMS  
Past President, Association of Physicians of India  
Past National President, RSSDI  
Past Additional Director General of Health Services, Govt. of India  
Retd. Medical Superintendent and Director- Professor of Medicine,  
Jawaharlal Institute of Post-Graduate Medical Education and Research, Puducherry

## Managing type 1 diabetes children is different from type 2 diabetes

The diagnosis of type 1 diabetes is often made during childhood. They can have long, healthy and normal lives with your support and encouragement.

**“LET'S TAKE A STEP TO ENSURE THAT THESE LITTLE WARRIORS BECOME WINNERS”**



# DIABETES EDUCATOR'S HANDBOOK: CARE FOR CHILDREN & ADOLESCENTS LIVING WITH DIABETES

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## I. OVERVIEW

Farin Majumder Shupti & Mithila Hag Farin,  
type 1, Bangladesh





# OVERVIEW – TYPE 1 DIABETES

## Statistics from around the world

Type 1 diabetes is one of the most common chronic illnesses effecting children. It affects nearly 5,00,000<sup>1</sup> children below the age of 15 years. Of these, over half live in developing nations. The incidence of type 1 diabetes among children is increasing in many countries, particularly in children under the age of 15 years. Some 79,100<sup>1</sup> children under 15 years of age are estimated to develop type 1 Diabetes annually worldwide.

## Statistics from South Asia

South East-Asia (SEA)<sup>2</sup> region consisting of India, Sri Lanka, Bangladesh, Bhutan, Mauritius and Maldives.

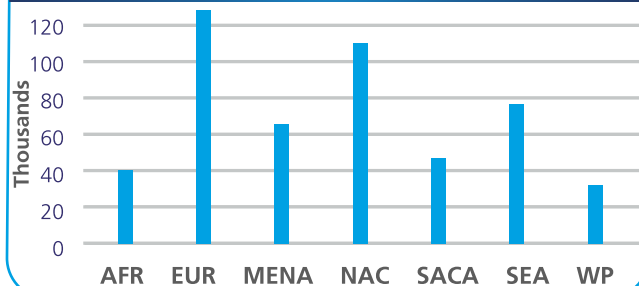
- SEA region has one of the highest estimates of prevalence of T1DM in children with 77,890<sup>3</sup> affected in 2013.
- India has the second highest number of children with type 1 diabetes after the US. The annual increase in the incidence of T1DM was found to be 3%.
- India lacks a diabetes registry but few studies have reported the prevalence of T1DM in India.
- Chennai has reported an urban incidence of 10.5/100,000<sup>5</sup> population in 1996.
- At Karnal in Haryana, the average prevalence of T1DM was found to be 10.2/100,000<sup>6</sup> population.
- The Karnataka state T1DM registry listed an incidence of 3.7/100,000 in boys and 4.0/100,000 in girls, over 13 years of data collection.

### AT A GLANCE

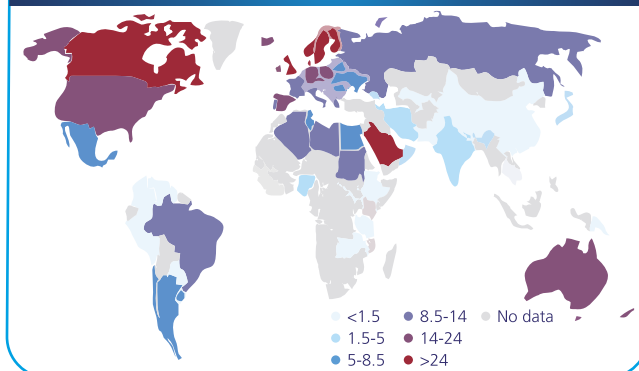
2013

Total child population (0-14 years, billions)	1.9
<b>TYPE 1 DIABETES IN CHILDREN (0-14 YEARS)</b>	
Number of children with type 1 diabetes (thousands)	497.1
Number of children per year (thousands)	79.1
Annual increase in incidence (%) <sup>1,2</sup>	3

### Estimated number of children (0-14 years) with type 1 diabetes by IDF Region, 2013



### New cases of type 1 diabetes (0-14 years per 100,000 children per year), 2013



### Must Always

- Think of diabetes in every clinical setting
- Think of diabetes at public health level
- Encourage a healthy lifestyle including balanced diet, regular physical activity and Vitamin D intake
- Advocate for children with diabetes
- Include diabetology in all educational and informational programs

### Must Never

- Think that type 1 & type 2 diabetes are the same
- Send home a suspected or diagnosed type 1 child without taking their contact details
- Ignore warning symptoms of diabetes
- Forget to check blood glucose in every sick child
- Forget to check ketones in every sick child



**Quote of Wisdom:** Type 1 diabetes in children is likely, and a possible diagnosis.



# DIABETES IN CHILDREN

## Types of Diabetes and their symptoms

### Type 1 (immune-mediated) Diabetes

- Often recent weight loss; usually not overweight
- Presence of classic symptoms of increased hunger, increased thirst and frequent urination
- Presence of ketones in urine
- Only about 5% have a family history (in first or second degree relatives) of diabetes
- May have Goitre or other thyroid-related diseases

### Type 2 (insulin-resistant) Diabetes

- Little or no weight loss; overweight at diagnosis
- Absence of classic symptoms
- No ketones in urine
- Strong family history of type 2 diabetes
- Some children with type 2 diabetes have dark shiny patches on the skin (acanthosis nigricans), between the fingers, toes, on the back of the neck (dirty neck) or in axillary creases

### MODY (Maturity Onset Diabetes of the Young)

- Rare form of diabetes; several varieties exist

## Unique features of Type 1 diabetes:

- Children with type 1 diabetes always need insulin
- Calorie restriction is required only when child is overweight
- If the diagnosis or treatment is delayed, the severe lack of insulin can result in a life threatening condition called diabetic ketoacidosis (DKA)
- When properly treated, children with diabetes can grow like normal individuals who are productive, fertile and long-lived adults

## Child friendly tips

- Check urine ketone if in doubt.
- Assess c-peptide, anti-GAD, islet cell antibodies and insulin antibodies only if easily available and if diagnosis is doubtful.
- Do not limit calorie intake in underweight children.
- Treat diabetes diagnosis, monitoring and treatment as a game of self discipline
- Create peer support groups for children and their families

**If all advice regarding meals, exercise and insulin is followed regularly with discipline, the child with diabetes can be healthier than the family members with less discipline.**

## Criteria for diagnosis

- Symptoms of diabetes plus casual/random
- Plasma glucose level above or equal to 200 mg/dl
- Fasting Plasma glucose above or equal to 126 mg/dl

5 year old Teddy Ryder was among the first twelve people with diabetes to receive insulin in the year 1922



Teddy Ryder  
July 10<sup>th</sup>, 1922



Teddy Ryder  
July 10<sup>th</sup>, 1923



Teddy Ryder  
Toronto, 1990

[http://archives.cbc.ca/health/medical\\_research/clips/4065/accessed on 4<sup>th</sup> Jan 2011](http://archives.cbc.ca/health/medical_research/clips/4065/accessed%20on%204%20Jan%202011)  
[http://www.multilingualarchive.com/ma/deviki/en/Theodore\\_Ryder/accessed on 4<sup>th</sup> Jan 2011](http://www.multilingualarchive.com/ma/deviki/en/Theodore_Ryder/accessed%20on%204%20Jan%202011)

## Must Always

- Consider classic type 1 diabetes in most children
- Be aware of various other types of diabetes
- Treat children with love and affection
- Realize that parents and siblings are part of the diabetes care team
- Use child-friendly treatment strategies

## Must Never

- Stop insulin suddenly in children
- Make categorical statements if you are uncertain
- Treat children like little adults with diabetes
- Assume that all children know everything
- Assume that all parents know everything



**Quote of Wisdom:** Children with diabetes are special, they need special care.

## II. DIAGNOSIS

Alireza Ghaemmaghami,  
type 1 diabetes, Iran



# CLINICAL FEATURES

## Introduction

Diabetes is a disorder characterized by high glucose levels in the blood. Glucose in the blood comes from food (sugar, starches and other carbohydrates) and from stores in the body, including liver and muscles. Insulin is a hormone that is needed to convert glucose to energy. Diabetes occurs when there is either a deficiency or no production of insulin. There are two major types of diabetes: Type 1 diabetes and Type 2 diabetes. Type 1 diabetes is the most common type of diabetes in children and adolescents. Type 1 diabetes is an auto-immune disease, in which the antibodies destroy insulin-producing beta cells in the pancreas. It is a lifelong condition that is treated with insulin.

## Symptoms of Type 1 diabetes

1. Excessive thirst
2. Excessive and frequent urination/bed wetting
3. Excessive hunger
4. Weight loss
5. Lack of energy
6. Fatigue
7. Blurred vision

A family history of diabetes is not common in children with type 1 diabetes, so parents are unlikely to recognize it.

## Signs of Type 1 diabetes

- Urinating a lot
- Losing weight
- Lacking energy
- Drinking water a lot



## Child friendly tips

- Share the diagnosis of diabetes calmly.
- Do not attribute any particular cause to type 1 diabetes. This leads to confusion and adds to dilemma of parents.
- Diabetes can coexist with any other illness too.

### Must Always suspect diabetes when child is

- Excessively thirsty or hungry yet losing weight
- Is urinating excessively/has restarted bed wetting
- Is producing urine that attracts ants
- Is unconscious, vomiting or dehydrated
- Carries a fruity sweet smell in breath

### Must Never

- Delay blood glucose testing in a sick child
- Delay treatment with insulin
- Blame the child for illness
- Blame the parents for the child's illness
- Scare the child or the family



**Quote of Wisdom:** Timely diagnosis can save a life.

# INVESTIGATIONS

## Introduction

Once high blood glucose levels are found in a child, following tests need to be undertaken:

1. Blood glucose
2. Blood and urine ketones
3. HbA1c
4. Blood urea and electrolytes
5. Urine protein
6. Hemoglobin
7. White cell count

(The date of onset of type 1 diabetes can be much earlier than from that of actual confirmed diagnosis. Symptoms may be present from a few weeks to occasionally a few months).

## Essentials to remember

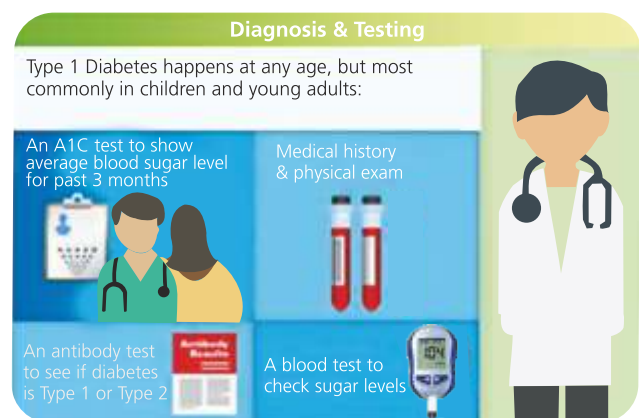
- Do not forget to take the phone numbers of parents before giving the diagnosis of type 1 diabetes. Parents may deny the diagnosis initially and leave.
- Try to get all blood tests which require intra venous blood in one visit.
- Presence of ketones in blood or urine indicates that child needs urgent treatment. He/she should have fluid and electrolyte treatment, and insulin started without delay.

## Advanced investigations

- Advanced investigations may be needed for diagnosis of cause and type of diabetes, and for early detection of other concomitant illnesses.
- ICA (Islet Cell Antibodies), IAA (Insulin Auto-Antibodies), GAD – Auto-Antibodies to Glutamic Acid Decarboxylase, IA-2A (Insulinoma Associated 2 Auto-Antibodies) to confirm cause of diabetes.
- Free T4 and TSH for thyroid function.
- Tissue transglutaminase antibodies to screen for coeliac disease.

## Child friendly tips

- Be friendly with children while taking blood samples
- Distract children with toys and small talk while sampling blood
- Some children may prefer to bring urine samples from home



## Must Always

- Have written guidelines for diagnosis and basic investigations
- Check ketones in sick children
- Check for infection if diabetes is uncontrolled
- Check HbA1c if feasible
- View investigations as a helping hand in giving correct diagnosis and achieving good control

## Must Never

- Prescribe unnecessary tests
- Prescribe tests of doubtful value
- Suggest that all expensive tests are better than economical tests
- Omit essential investigations
- Forget to record the test results



**Quote of Wisdom:** Right investigations can make a big difference.



### III. LIFESTYLE



Ranjith S  
type1 diabetes, Bangalore, India

## Introduction

Dietary management is the cornerstone of diabetes care. Children with type 1 diabetes need enough food to allow proper growth and development. At the same time, they should not take foods which increase glucose levels. Insulin regimens and doses should be tailored to their food intake patterns. These patterns should be linked with local, religious and family traditions and with school timings as well. The main goal of the diet for children with diabetes is to:

- Maintain normal blood glucose levels
- Ensure proper nutrition

## The Eight A's of diet

An ideal diet should be:

- Accurate
- Available/ Accessible
- Acceptable
- Achievable
- Appropriate
- Attractive
- Affordable
- Absorbable/ Digestible.



### Must Always

- Correlate food portions with insulin doses
- Ensure a balanced diet containing whole grains, vegetables and fruits
- Encourage eating at same time and eating snacks to prevent hypoglycaemia
- Ensure variety of meals
- Always ask to carry sweets to treat hypoglycaemia (3-4 hard candies)

## Dietary focus on

- Total carbohydrates one eats, rather than where it comes from
- Distribution of meals in a single day
- Fibre in diet
- Quantity
- Types of fat and amount of fat
- Exercise
- Dosage and time of medication

## Child friendly tips

- Basal – bolus insulin regimen allows flexibility for the child in meal quantity and time.
- Adding greens, sprouts or crushed vegetables in chapati, parathas, puri, idli or dosa makes food tastier and healthier.
- Child can eat foods having sugar occasionally, but should either exchange it with other carbohydrates or take extra short acting insulin to avoid high blood glucose levels.
- Artificial sweeteners do not effect blood glucose levels and may be consumed in moderation.

## Flexible carbohydrate and insulin adjustment

Carbohydrate counting is a method of matching insulin requirements with the amount of carbohydrates one eats and drinks. Three Rules to be followed

- Count carbohydrates and match with appropriate dose of insulin
- know pre meal blood glucose levels
- Decide maximum amount of carbohydrate per meal

### Must Never

- Miss meals
- Miss insulin
- Overeat
- Be too rigid with children
- Recommend a very strict regime, as this may encourage children to lie to their parents and educators.



**Quote of Wisdom:** A happy family eats together, eat what your child with diabetes eats.



# PHYSICAL ACTIVITY

## Introduction

Physical activity and fun are two words for the same activity, for most children. Some children, however, dislike games and exercise. Sometimes parents discourage their children from exercising, fearing falls and injuries. Other children find it difficult to access safe, comfortable facilities for exercise. Physical exercise should be encouraged in children with diabetes as it helps in weight control and limits the rise of blood glucose after meals.

## Safe exercising

- Ideally the child should check blood glucose values before and after physical activity.
- If frequent monitoring is not possible, a child should involve himself/herself in lower intensity activity at same time every day.
- All strenuous activities should include eating a snack e.g. a fruit, 2 high fiber biscuits or a sandwich every 30 minutes.
- After prolonged activity, the child needs an additional snack with more fat or protein content to prevent hypoglycemia during the night.
- Have plenty of water.

The benefits of exercise outweighs the risks of erratic control. Understanding body metabolism during exercise is helpful to cope with possible swings in blood glucose during and after exercise. Hypoglycaemia can occur during or after exercise, when the body has used up much of its stored sugar, especially if insulin levels in the body are still high following an injection. So, one may need to

check blood glucose levels and have an extra snack to prevent low blood glucose episodes. Sometimes hyperglycaemia may also follow exercise. The muscles need more energy during exercise, so the body responds by releasing stored glucose into the blood. If the muscles does not have enough insulin to use the glucose, then it will stay high in the blood.

## Exercise, food and blood glucose

### Pre-exercise carbohydrate replacement

Plasma blood glucose	Simple carbohydrate (CHO)
< 80 mg/dL	Withhold physical activity + ingest 15g CHO (cereal bar, fruit, honey sachets, etc.
80 to 140 mg/dL	Ingest 1 to 2 g/kg body weight of CHO prior to activity.
> 140 mg/dL < 250 mg/dL	Within safety range; ingest 15 to 30g CHO after activity.
> 300 mg/dL, no ketonuria	Begin activity. No CHO replacement necessary.
> 300 mg/dL, with ketonuria	Postpone activity until ketone levels return to normal. Take fluids (water). No CHO replacement necessary.

CHO = simple carbohydrate.  
Source: Adapted from the Brazilian Diabetes Society (Sociedade Brasileira de Diabetes, SBD).

## Child friendly tips

- Aerobic activity like walking, running, swimming, cycling or dancing lowers glucose levels during and after exercise.
- Anaerobic activities like sprinting or weight lifting and short periods of any intense activity can increase glucose levels.
- Strenuous exercise with poor blood glucose control can result in diabetic ketoacidosis.

### Must Always

- Ensure that physical activity is
- Fun
  - Regulated
  - Regular
  - Accompanied by snacks
  - With friends

### Must Never

- Allow physical activity to be
- Monotonous
  - Repetitive
  - Too strenuous
  - Too long
  - Between injection and meal



**Quote of Wisdom:** All work and no play will not control diabetes in anyway.

## IV. INSULIN



Samin Ahmed & MD. Monowar Tarek Parvez,  
type 1, Bangladesh

# INSULIN-PREMIXED

## Introduction

Insulin is essential for management of type 1 diabetes. The choice of insulin is based upon the patient's needs and preferences, as well as other factors. In premixed regimen, 2 doses of premixed insulin (short and long acting e.g. 30/70) before breakfast and dinner are given. Children on this regimen need to have a fixed diet at particular times, with least variations in activities to achieve the optimal glucose control.

## Advantages & disadvantages

- In this regimen, patient adherence is better as insulin is to be injected twice a day.
- The overlap of short-acting and long-acting insulin between meals means that additional snacks are often required to avoid hypoglycemia.
- This regimen allows less scope for self-dose adjustment.

## Other insulin regimes

Although it is difficult to achieve best glucose control with premixed insulin treatment, it is difficult to motivate people for having intensive insulin treatment. For convenience of patients, many different regimens which are mid-way between intensive and standard insulin treatment are suggested. These include:

- Two doses of self-mixed dose of short acting and long acting.
- Two doses of short acting before breakfast and lunch, and one dose of premixed insulin at night before dinner.
- Two doses of premixed insulin before breakfast and dinner, and one dose of short acting before lunch.

## Child friendly tips

- Titrate morning, breakfast dose based upon day time glucose values.
- Titrate evening, dinner dose based upon fasting glucose.
- Even when child is using premixed insulin, one vial of short acting insulin or pen can be kept at home to manage very high blood glucose levels.

### Types of insulin-onset and duration of action\*

Types of insulin	How soon it starts working	When it works the hardest	How long it lasts
Short-acting(regular)	30 min.	2½ to 5 hrs.	8 hrs.
Rapid-acting analog	10 to 20 min.	1 to 3 hrs.	3 to 5 hrs.
Intermediate-acting (NPH)	1 to 2 hrs.	4 to 8 hrs.	10 to 20 hrs.
Long-acting analog	50 to 120 min.	Relatively flat	Up to 24 hrs.
Ultra long-acting analog	30 to 90 min.	Peakless	More than 42 hrs.
Premixed human	30 to 45 min	2 to 8 hrs.	Up to 18 hrs.
Premixed analog(70/30)	10 to 20 min.	2 to 3 hrs.	Up to 24 hrs.

\*The duration of action of any insulin may vary in different persons or in the same person at different times. Because of this variation, time period indicated here should be considered general guidelines only.

### Must Always

- Check blood glucose levels
- Check compatibility of syringes and vials
- Follow instructions for insulin – meal intervals
- Roll insulin vial or cartridge gently before injecting
- Focus on good blood glucose control

### Must Never

- Miss meals
- Miss insulin shots
- Compare insulin doses of two different individuals
- Use premixed insulin for dose correction
- Count number of pricks for children with diabetes



**Quote of Wisdom:** Two is a team and teamwork makes us strong.



# INSULIN-INTENSIVE

## Introduction

Intensive insulin treatment is best for keeping blood glucose in tight control especially in children with type 1 diabetes. In this regimen, a child needs to take three or more insulin shots of short acting insulin along with main meals per day, and one or two doses of long or intermediate acting insulin for maintaining basal requirement throughout the day. Doses of short acting insulin can be adjusted according to the food eaten.

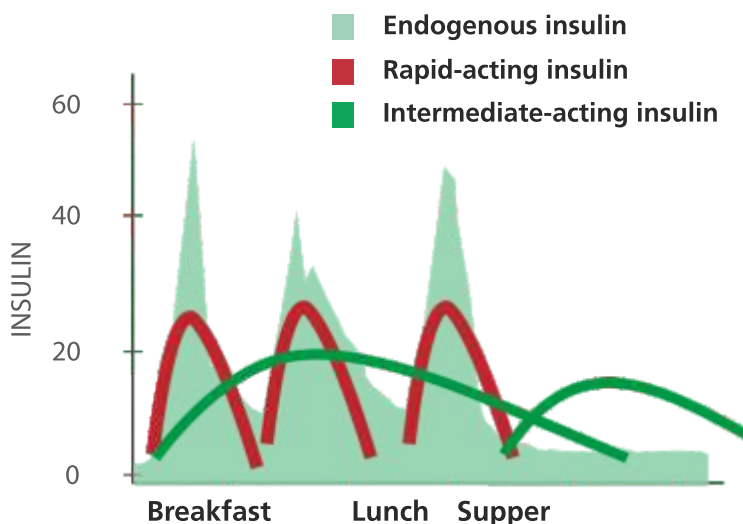
## Advantages & disadvantages

- This regimen is more convenient, and may provide good glucose control with fewer hypoglycemic episodes and flexibility.
- Patient needs to remember, and take insulin many times a day.
- This regime may seem complicated but it provides empowerment to children.

## Advanced treatment

Talking about newer treatments give sometimes hope to do better and control diabetes in current situation. Even small shifts like changing from syringe to pen device can fill the life of a child with joy. Insulin analogues with improved pharmacokinetics and faster absorption, continuous subcutaneous insulin infusion using insulin pumps are a tremendous innovation and give good glycemic control.

## Basal-Bolus Regimen



### Child friendly tips

Time of test	Assess adequacy of insulin
Fasting glucose	Evening dose of long acting insulin
After breakfast level	Dose of rapid insulin at breakfast
After lunch level	Dose of rapid insulin at lunch (mid day meal)
After dinner level	Dose of rapid insulin at dinner
Pre-lunch level	Doses of insulin at breakfast, effect of mid-morning snack and morning long acting insulin
Pre-dinner level	Doses of insulin at lunch, effect of mid-morning snack and morning long acting insulin
3.00 AM	Evening dose of long acting insulin
All levels	Affected by snacks and exercises

### Must Always

- Check blood glucose before deciding short acting insulin dose
- Consider appropriateness and adherence
- Determine availability, accessibility, affordability and attitude of parents and child
- Follow 3+3 meal pattern with intensive insulin
- Follow regular exercise pattern

### Must Never

- Miss insulin
- Take extra insulin without consulting doctor
- Change insulin brand without asking doctor
- Do self adjustment of long acting insulin
- Take more than 1-2 units of short acting insulin to cover consumption of sweets, cakes, etc.



**Quote of Wisdom:** One minute (15 sec x 4) of injecting insulins provides fun and freedom for one whole day.

## V. INSULIN TREATMENT



Vincent Revo Londa,  
type 1, Indonesia

# INSULIN STORAGE AND DISPOSAL

## Introduction

### Insulin storage

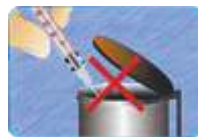


Insulin is the corner stone of diabetes management. To be effective, it has to be stored properly. Exposure of insulin to extreme cold or extreme heat denatures or breaks down the insulin protein. This prevents

it from exerting its effects. Insulin should not be used after the expiration date mentioned on the package. Using improperly stored insulin is potentially dangerous. If you think your insulin or after its date of expiry has gone bad, don't take any chances - discard the bottle immediately and open a new one.

### Safe disposal

Safe disposal of used insulin vials, lancets and needles are as important as safe injection. It is important to collect used vials, syringes and needles in a separate bin and dispose them as medical waste. If there is no specialized container for sharp objects then collect all used syringes, needles and lancets in a transparent container, seal it and dispose with garbage.



Never throw loose syringes or lancets into the trash bin



Destroy the needle with safe clip

## Practical tips to store insulin

- Store insulin in a working refrigerator and keep unopened vials or pens towards the back.
- Lack of a fridge does not mean that we cannot use insulin. It can be stored in any cool place, e.g. a earthen pot kept in mud or a cloth bag dipped in water and hung up in well ventilated and shady place.
- In cold climates, insulin should be wrapped in multiple layers of woolen cloth and kept in a warm place such as kitchen.

## Child friendly tips

- Insulin should be the last item to be purchased during a trip to the market, and the first to be stored upon return.
- Insulin vial taken from the refrigerator is cold and causes intense pain if injected immediately. Hence it may be left outside for 20 minutes to warm up.
- It is good to rotate gently vial of insulin 8-10 times before injecting.
- Store pens, needles and lancets out of reach of children.
- Carelessly disposed needles or syringes can cause physical injury like cuts or puncture wounds.

## Reuse of Insulin Syringe

If reusing insulin syringe, do take care

- It should be kept capped
- Never let the needle touch anything but clean skin and the top of the insulin bottle.

Do not risk insulin syringe reuse, when there are open wounds on hand or there is poor resistance to infection.

## Must Always

- Store insulin properly
- Store unopened, not-in-use insulin at 2-8°C
- Use insulin within one month of opening
- Keep an extra vial or pen of insulin for emergency
- Ensure that insulin and accessories are not accessible to children

## Must Never

- Store insulin in the freezer
- Keep insulin in direct sunlight
- Use opened vials/pens of insulin stored for more than 3 months
- Use stored insulin with particles or discoloration
- Throw loose needles, syringes and vials/pens in rubbish or in open places



**Quote of Wisdom:** Improperly stored insulin is injurious to health.



# INSULIN INJECTION SITE & TECHNIQUE

## Introduction

Insulin is a life-saving medicine and children with diabetes require to take it lifelong. Taking an insulin injection is not difficult; it has to be injected in the fatty layer beneath the skin and above the muscle. For very small children, parents need to learn how to inject insulin, but older children and adolescents can learn to take their insulin injection themselves.

## Insulin can be taken by

- Syringe, filled from a vial of insulin
- Insulin pen
- Insulin pump



## Taking Insulin from vial and syringe

- Roll the vial of insulin gently (especially if it looks milky or cold) for 8-10 times between your hands and clean the top of vial with alcohol swab.
- Draw in air according to number of insulin units. Push this air in insulin vial and draw insulin into syringe.
- Make sure there is no air in the syringe before injecting.
- After injecting, wait for 6 seconds before you take your needle out.
- You can eat half an hour after the insulin injection, if you use human insulin and you can eat immediately after injecting modern insulin.

## Must Always

- Match insulin syringes with correct strength of insulin (U-40 or U-100) vials
- Roll cloudy insulin gently 8-10 times before injecting
- Draw short acting insulin first while mixing insulin
- Prime the pen and remove any air from the needle
- Wait for 6 seconds after injecting before you take your needle out

## Taking insulin from insulin pen

- Screw in a new pen needle
- If necessary, prime the pen to remove any air from the needle
- Dial up the amount of insulin you need. This can be seen in the display window and on some pens can be heard as an audible click.
- Insert the needle into the skin. Press the button on the end of the pen to deliver the dose
- Count to six and remove

## Rotation of insulin injection site

- Arm
- Abdomen
- Thigh
- Hips



## Child friendly tips

- To prevent formation of hard lumps it is good to rotate within each injection site. Keep each of your injections at least two fingers' width from the last injection.
- Use the same part of the body for injections at a particular time, e.g. abdomen for morning dose and thigh for evening dose.
- Insulin injections are to be given on either side of abdomen and not around the belly button.

## Must Never

- Stop insulin without doctor's advice
- Let the needle touch anything but clean skin and the top of the insulin bottle
- Clean the needles with alcohol swab
- Share needles
- Inject insulin over scars, moles and ulcers or 2 inches around the navel



**Quote of Wisdom:** Self reliant children should be able to self inject.

## VI. MONITORING



Mithila Hag Farin,  
type 1, Bangladesh

# GLYCAEMIC MONITORING

## Introduction

Treatment of diabetes with insulin is effective only if we have a clear picture of how blood glucose levels change throughout the day. This helps to prevent both too high and too low blood glucose levels.

## Glucose Meter

A blood glucose meter is a small portable device that measures the level of blood glucose in whole blood. These glucometers use strip of plastic containing chemicals or electrodes which gives rise to an electric current or color change when a small drop of blood, normally taken from finger is placed on the strip.

## 7 point testing

1. Fasting
2. Post-breakfast
3. Pre-Lunch
4. Post-Lunch
5. Pre-Dinner
6. Post-Dinner
7. At 3.00 am

[All these 7 tests are important, but testing all 7 times is not possible as this makes management of diabetes very expensive. Repeated daily testing one time a day alone (e.g. for fasting glucose levels) is also not recommended, as this does not give complete picture of blood glucose levels throughout the day. If HbA 1c value is high then it is ideal to focus on fasting and pre-meal tests first.

### Must Always

- Wash and dry hands before testing blood glucose levels
- Check coding and expiry date of strips
- Check the units of blood glucose readings – mmol/l or mg/dl
- Ensure correct technique and proper documentation
- Correlate glucose value with HbA1c

## “Gluco-meal Diary

	Date	Time	Food Eaten	Glucose Level	Other Remarks
Fasting					
Post breakfast	19/8/2011	10:30 am	3 idlis 1 cup sprouts	143	Studied for exams
Pre lunch					
Post lunch					
Pre dinner					
Post dinner					
3 am					

## Child friendly tips

- Blood glucose reading is not a test in which a child either fails or passes. It is like a radar (direction indicator) which tells how to plan the next step in diabetes treatment.
- If blood glucose readings are persistently above 240 mg/dl, then get blood ketones or urine ketones level checked. If ketones are positive doctor's consultation is required.
- If blood glucose readings do not correlate with HbA1c, then check the glucometer. Most posture glucometers have memory which show previous readings with time and date.

### Must Never

- Rely on single reading for insulin dose adjustment
- Expose unused strips to moisture
- Interpret blood glucose values without knowledge of
  - time of test
  - previous insulin doses regime and glucose values
  - time and nature of previous meals



**Quote of Wisdom:** Glucose testing, without recording, interpretation and action, is a waste of time, efforts and money.



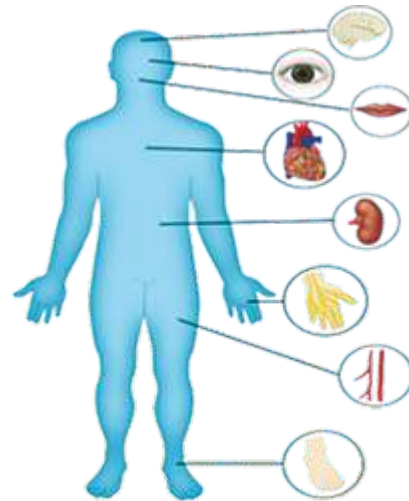
# LONG TERM MONITORING FOR CHRONIC COMPLICATIONS AND COMORBID CONDITIONS

## Introduction

Along with self monitoring of glucose, it is very essential to undergo regular health check up. This is important as uncontrolled diabetes can result in damage to various organs which includes eyes, kidney, blood vessels, nerves, etc. These complications may take many years to develop. Early detection and specific treatment for many complications can prevent later problems. As type 1 diabetes is an autoimmune disorder, thyroid and coeliac disease, need to be assessed periodically.

(If you find a child has delayed sexual growth, please refer to chapter - Transition to Adulthood for guidance).

### DIABETES CAN AFFECT VARIOUS PARTS OF THE BODY



## Screening for chronic complications and comorbidities\*

S. no	TEST	FREQUENCY
1	Growth	Ideally every quarter / at least twice a year
2	Weight	Every visit
3	BMI	Ideally every quarter / at least twice a year
4	Blood Pressure	Once a year unless elevated
5	Blood Lipids	Three months after diagnosis, if 12 years or older. If normal, repeat every 5 years
6	HbA1c	Three - four times / year
7	Microalbuminuria	At least once a year from puberty or from 7 years after diagnosis
8	S. Creatinine	At diagnosis and annually if microalbuminuria is present
9	Eye Fundus Examination	Once a year
10	Neuropathy	Once a year
11	TSH and Antibodies	Every second year
12	Coeliac Antibodies	Every year for first five years and if symptoms indicate

### Must Always

- Do regular HbA1c and check for infections if glucose control is poor
- Monitor microalbuminuria and lipid profile as advised
- Perform fundus examination as recommended
- Check blood pressure with pediatric cuff
- Keep other autoimmune disease in mind

### Must Never

- Scare children or parents about monitoring
- Prescribe unnecessary tests
- Share confidential test results with others
- Leave abnormal values unexplained and unresolved
- Follow adult values for normal ranges



**Quote of Wisdom:** Prevention of chronic complications is better than treatment of these adverse events.

## VII. SELF MANAGEMENT



Keenan Hendrickse,  
Type1, South Africa

# COPING SKILLS

## Introduction

Coping is the process of handling stress. Coping can be in thought, in speech, and in action. Diabetes can be stressful, and the way in which one works to understand, adjust, tolerate and minimize the impact of this stress, is termed as coping with diabetes. Coping skills are the ways by which one approaches various stress. Coping skills training helps in internalizing health or positive ways of coping, while de-learning negative or unhealthy methods of coping. Both the child with diabetes, and his/her family, must learn how to cope with the condition in a healthy manner. Once coping skills are mastered, the battle is half-won!

## Positive Coping Strategies (The 4 positive Ps)

Acceptance, eg, I accept that I have type 1 diabetes. This is the way I am.

- Pleasant thought, e.g., thinking or talking about games and hobbies.
- Putting in perspective, e.g., I have diabetes, but this is just one facet of my personality. Having diabetes doesn't mean I am sick or disabled.
- Positivity search, e.g., having diabetes makes me a more self-disciplined, more concerned, more empathetic person.
- Planning for the future, e.g., let me save money to buy a glucometer.

## Negative Coping Strategies

- Thinking only from perspective of diabetes management and not the child
- Thinking in extreme, e.g., the world will come to an end because of one high blood glucose reading
- Discourage self- blame, e.g., it is all my fault that I developed diabetes
- Discourage other- blame, e.g., my neighbor cast an evil spell upon him.

### COPING SKILLS TRAINING: THE AEIOU MODEL

- A.** Analyze your coping strategies
- E.** Eliminate the negative strategies
- I.** Internalize the positive methods of coping
- O.** Observe yourself on ongoing basis.
- U.** Understand and upgrade yourself

## Child friendly tips

Depending on the situation, need, and child, there are numerous ways to teach children and their parents coping skills.

Remember WATER  
W-Welcome Warmly  
A-Ask and Assess  
T- Tell the Truth  
E- Explain with Empathy  
R- Reassure and Rehearse the management

Do not forget, the ultimate goal of this exercise is to make child and family capable of accepting and managing diabetes.

## Must Always

- Think and counsel positively
- Be happy; The future is bright
- Try to improve yourself
- Involve family and friends
- Discuss challenges and find solutions
- Remember there are others with diabetes and living successful lives.

## Must Never

- Make them feel lonely
- Sound sad
- Ask them to avoid social gatherings
- Compare them with others
- Blame them; for having diabetes



**Quote of Wisdom:** Don't worry, be happy.



# SICK DAY MANAGEMENT

## Introduction

Any kind of sickness, as simple as cold, flu, sore throat, and infections of the ear, teeth or bladder, vomiting or diarrhea or more serious illnesses like pneumonia or a foot infection affects diabetes in many ways. This means that diabetes is more difficult to control when one is sick. When the child is ill, the blood glucose levels are likely to rise. If the blood glucose levels are higher than 240 mg/dl, urine ketones should be checked. Diabetic ketoacidosis if present is a cause of concern and needs to be treated immediately.

## Child friendly tips

- Whenever the child visits any doctor, inform him or her about diabetes
- If blood glucose levels are managed properly along with acute illness, it prevents acute complications and hospitalization.
- Persistently high blood glucose adds to the infection, delays healing and worsens the vicious cycle of ill health

## 4 main concerns and preventive actions

1. High blood glucose levels	Check glucose more often and take corrective doses of short acting clear insulin, as per doctor's advice.
2. Low blood glucose levels	Check glucose more often and even if you do not feel like eating, eat small amounts at frequent intervals.
3. Dehydration	Drink plenty of fluids especially like butter milk, vegetable and lentil soup, lemon water, etc.
4. Diabetic ketoacidosis	Rest and stay warm. Do not exercise vigorously - call your doctor if glucose levels are continuously more than 240 mg / dl. Measure ketones at home.

### OTHER CAUSES OF UNCONTROLLED DIABETES - THE DIETS MNEMONIC

Alphabet	Cause	Description
D	Diet	Inappropriate quantity or timing of meals
D	Drugs	Intake of drugs which cause hyperglycemia, e.g., steroids, cough syrups, indigenous drugs of unknown nature
I	Infection	Skin, ear/nose/throat, chest, foot and urinary infections
I	Instruments	Error in technique, meter or interpretation of glucometer readings
E	Endocrine	Hormonal diseases, e.g. thyroid, PCOS (Polycystic Ovary Syndrome)
E	Emotions	Feeling sad, "low", or anxious, sleep disturbance
T	Technique	Incorrect insulin technique or insulin regime, e.g. taking premixed insulin instead of basal - bolus regime
T	Teaching	Lack of diabetes education and awareness
S	Sports	Lack of games, exercise or physical activity
S	Support	Lack of support from family, friends and community

### Must Always

- Monitor blood glucose levels more frequently
- Do home monitoring for ketones
- Have supplemental short-acting insulin regimens for high blood glucose levels
- Have easily digestible liquid diets even when cannot eat
- Visit the doctor, in case of doubt

### Must Never

- Stop insulin
- Self Medicate
- Stay at home, when all glucose levels are more than 240 mg/dl or less than 70mg/dl for last 24 hours, visit doctor
- Stop eating and drinking
- On a sick day take over-the-counter medications and syrups
- Exert too much and do strenuous exercise



**Quote of Wisdom:** Sickness usually means higher insulin requirement.

## VIII. ACUTE COMPLICATIONS



Ana Miriam Méndez Valdez,  
Type1, MX

# HYPOGLYCAEMIA & HYPERGLYCAEMIA

## Introduction

The term hypoglycemia is a technical term for when blood glucose level is below 70 mg/dl. The term hyperglycemia is a technical term for, when blood glucose level is above 126 mg/dl while fasting and above 200 mg/dl at any point of time. Persistently high glucose levels can cause unwanted complications. If blood glucose levels are constantly high or constantly low then a review of insulin dosage is needed.

## Classification of severity of hypoglycaemia

- Mild Hypoglycaemia - Usually <70mg/dl, mostly self treatable
- Moderate Hypoglycaemia - Aware of symptoms, but needs assistance to take care of themselves
- Severe Hypoglycemia - Usually < 45mg/dl, there is loss of consciousness (coma), convulsion, marked confusion

## Treatment

**HYPOGLYCEMIA:** It can be treated by eating something with high sugar right away, such as, ½ cup of regular fruit juice or cold drink or 3 to 4 glucose tablets or hard candies or 2 to 3 teaspoons of sugar. It has to be followed up with a snack if optimal monitoring is not possible. If the child is not able to eat, then he/she must be given either glucagon injection or IV glucose.

**HYPERGLYCEMIA:** When blood glucose becomes unexpectedly high, a correction bolus of short acting insulin can be used to bring it down.

- High blood glucose correction dose = Difference between actual blood glucose and target blood glucose ÷ Correction factor.
- If pre lunch value is 290mg/dl, then one need to lower 290 - 140 = 150 glucose levels.
- Correction Factor = 1800 ÷ Total Daily Insulin Dose (TDD) = 1 unit of insulin will reduce the blood sugar so many mg/dl.
- If one takes total dose of 40 units then correction factor = 1800 ÷ 40 = 45, then one needs to take 150 ÷ 45 = 3.3, that means a person needs to take 3 units of short acting insulin.



## Child friendly tips

- Children may not be always able to tell that they are having a hypo, they may need help of family, friends and teachers, and so they must know about hypoglycemia and its treatment
- An occasional high blood glucose level, can be treated by
  - Adjusting short acting insulin,
  - Cutting down on the amount of food in one meal
  - Exercising and drinking low calorie drinks like water and buttermilk
  - Relaxing

## Must Always

- Treat hypoglycaemia immediately
- Teach to recognize hypo to family members and friends
- Try to find cause of hypo and hyper
- Check ketone levels if blood glucose levels are persistently above 240mg/dl
- Check blood glucose levels after hypoglycemia treatment and administering correction dose for hyperglycemia

## Must Never

- Wait for glucometer to start treatment of hypoglycaemia
- Blame the glucometer for being faulty and ignore hyperglycemia
- Over treat hypo or miss entire next dose of insulin required
- Delay medical help, if no improvement happens in 30-45 minutes after beginning of hypo treatment
- Change all insulin closes at one time and re-change before 3 days.



**Quote of Wisdom:** Avoid blame game; act appropriately to achieve good control.

# SURGERY AND TYPE 1 DIABETES

## Introduction

Optimal glycemic control, adequate hydration and minimizing the risk of hypoglycemia are required in children with diabetes requiring surgery or any other procedure that requires sedation or anaesthesia. The stress of surgery can cause hyperglycemia, which increases the risk of postoperative infection. So both these conditions need to be managed

## Essentials

### Pre Operative control

- People with poorly controlled diabetes have a 10-fold higher risk of postoperative infections.
- Good glycemic control with continuous intravenous insulin infusion decreases complications and morbidity in post operative patients. However such administration requires a trained staff.
- It is reasonable to aim for blood glucose levels between (90-180 mg/dl) during surgical procedures in children.
- Admit patients 2-3 days before elective surgery, particularly if outpatient adjustments are difficult.
- Ensure good pre-operative control usually with short-acting insulin (or a mixture of short and intermediate-acting insulin) twice daily and monitor blood glucose regularly.

## Essentials

### Pre and Post operative control

- On the day of the surgery do not allow your child to eat from midnight onwards and do not give him/her the morning dose of insulin.

## Must Always

- Keep glucose under control before and after the surgery
- Get admitted a night before elective surgery
- Label your insulin and accessories
- Monitor glucose frequently
- Explain current insulin regime and requirement to the hospital staff

- Operation should be as early as possible (i.e. put the patient with diabetes first on the OT list).
- Glucose and electrolytes have to be checked early on the day of surgery.
- Start intravenous (IV) infusions of dextrose and insulin.
- Glucose has to be checked every 2 hours and electrolytes every 6-12 hours, adjusting infusions after surgery are necessary.
- Infusions can be continued, but when eating normally, subcutaneous insulin can be restarted (as before surgery).

## Child friendly tips

- Surgery can be as safe in people with diabetes, provided glucose is kept under control.
- Use play therapy (NOTTI<sup>®</sup> toy) for engaging the child during hospital stay.
- Take the opportunity to make new friends for the child.

## Dental Surgery

Performing extractions or other dental procedures can become complicated if proper instructions are not followed.

- Tell the dentist about diabetes.
- Take the dental appointments after having major meals
- Keep blood glucose levels between 120 to 160mg/dl
- Soft food items such as porridge made of broken wheat or rice khichdi and dalia can be prepared in advance and kept in refrigerator for the child.
- Regular dental check-ups, preferably every six months are advised.

## Must Never

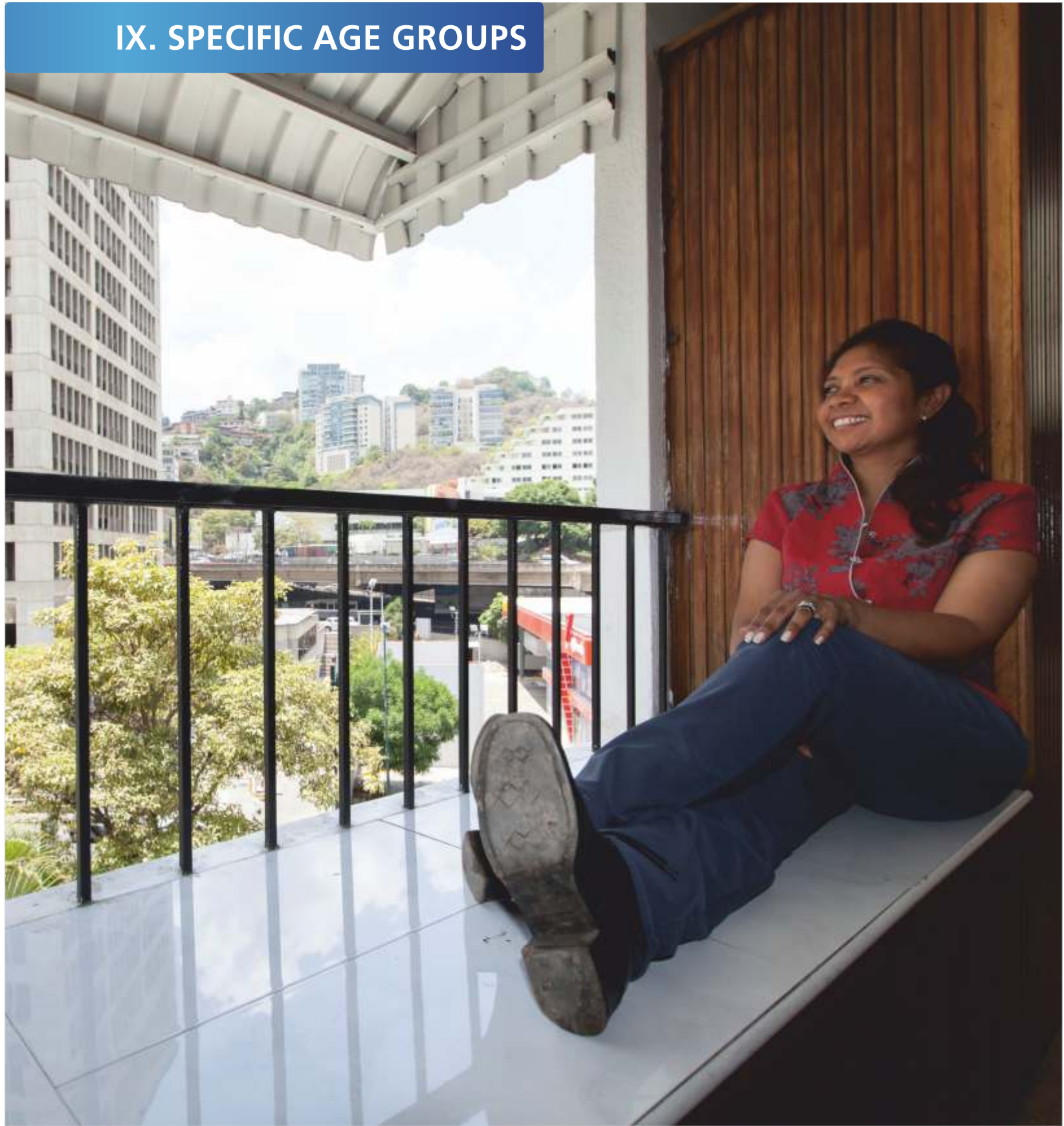
- Hide relevant details from the doctor
- Miss basal insulin
- Take solid food at least 6 hours prior to surgery
- Mix your insulin with that of other patients
- Take undue stress about the surgery



**Quote of Wisdom:** Good diabetes control during and after surgery is as important as the surgery.



IX. SPECIFIC AGE GROUPS



# INFANTS AND TODDLERS

## Introduction

It is difficult for parents to accept that their child has diabetes and it becomes even more difficult when the child is very young. We do not choose diabetes, but we can certainly choose how we live with it. It is a condition which the family needs to live with and win over. Feeling guilty, blaming each other or arguing over trivial issues will not help.

## Hypoglycemia in Infants & Toddlers

Even with careful insulin management and good eating, infants can have hypoglycemia at times, because they are unable to tell you about it. As brain development requires a constant supply of glucose, some signs to watch for Hypoglycemia are:

- Inconsolable cry
- Becoming pale or cranky
- Sweating or trembling
- Having a bluish tinged fingers or lips
- Restlessness in sleep

These are signs to do a blood check. If you cannot do it right then, treat for hypoglycemia anyway. It is safer than waiting.



## Child friendly tips

- Tell parents, giving insulin and monitoring blood glucose levels will make sure your child grows up healthy and normal
- Have a meter that requires a small blood sample
- Make the insulin injecting time peaceful and joyful by offering child his/her favorite toy or by cuddling and patting the child
- Children eat unpredictably, hence both hyperglycemia and hypoglycemia are greater possibility. So it is essential to check blood glucose values. Parents can be taught to do urine glucose readings along with blood glucose to reduce pricks.
- Parents should be advised not to argue with their children at meal times, and not to force feed those who do not finish their portions. If they worry about insulin dose then they can be advised to give insulin after meals when the child has eaten food
- Diaper rash or dermatitis should not be ignored in children with type 1 diabetes as it can be result of high blood glucose levels and also can cause high blood glucose levels
- The availability of glucagon and ketone sticks at home is of greatest importance in this age group.
- Repeated hypoglycemia to the developing brain must be avoided at all costs. Therefore the goals of therapy are relaxed for this age group, if so needed.

### Must Always

- Understand the special needs of little children
- Use small, frequent doses of insulin
- Monitor glucose frequently
- Monitor height and weight regularly
- Utilize play therapy

### Must Never

- Unduly restrict calories
- Stop games and play
- Scold or discourage little children
- Use negative reinforcement, or negative words
- Worry unduly when sugar level fluctuates widely in a young infant or a toddler



**Quote of Wisdom:** Little children should enjoy life, with or without diabetes

# ADOLESCENTS

## Introduction

Adolescence is the time when the child reaches a stage of growth, attains some independence and responsibility, begins to have some awareness of the future and wants to take his/her own decisions. Usually adolescents with type 1 diabetes find it difficult to have a very good metabolic control, partly because of biological changes (growth hormone) and partly because of developmental transition and psychosocial factors. Self identity and independence are challenges for many teens and their parents.

### Tips for helping teens

T	Trusting the ability of child but still observing
E	Engaging in education about life and diabetes
E	Enabling mutually acceptable decisions
N	Need to identify individual requirements
S	Scary thoughts and social comments to be addressed

## Talking Diabetes

Diabetes Management is a delicate balance. Keep in mind a few points, which parents should also follow while communicating about diabetes to children.

- Never comment that we are doing so much for child and the child is non cooperative.
- Talk to child as a responsible person and ask him or her about their wish.
- Do not comment on blood glucose levels as bad or wrong. This adds to the anger, frustration and disappointment of the child. It is always better not to comment at that moment about food eaten or nag her/him for not exercising, instead you can use words such as out of range or high.
- Do not make diabetes a topic for every conversation.
- Alcohol intake should be discussed It is better to avoid but if the adolescent persists, limits and safe drinking habits like having liquor with food should be discussed.

### Must Always

- Maintain balance of work and play
- Anticipate increase in insulin requirement during puberty
- Address questions about growth and sexuality
- Provide non-judgemental support
- Facilitate transition from child to adult clinic

## Contraception

Children with type 1 diabetes will in due course grow up into young adults. Sex and contraception should not be considered taboo and the treating team needs to discuss the issues frankly. Furthermore, diabetes complications might increase during pregnancy. Good glucose control before conceptions results in both healthy mother and baby. Therefore, conception should be planned and the patient should be metabolically well controlled, clinically properly screened, treated for complications and counselled with regards to possible risks.

### Safe contraceptive methods for people with diabetes:

Barrier methods, behavioural methods, single hormonal pills and even intrauterine devices can be used in consultation with the treating physician.

### Child friendly tips

- Ideally basal and bolus insulin therapy is better for adolescents as it gives more flexibility and good control
- Set small goals and try to achieve them one by one
- Set targets on safe sugar zone but accept list, glucose levels cannot be accurate 24x7
- Parent counseling is sometimes necessary to deal with problems of adolescents living with diabetes

### Must Never

- Hide diabetes from friends and relatives
- Give in to peer-pressure
- Skip insulin or meal to reduce weight
- Take extra insulin to increase weight
- Ignore symptoms like burning or itching in private parts



**Quote of Wisdom:** Diabetes helps one achieve self-discipline.



## X. SPECIFIC SITUATIONS





# TRANSITION TO ADULTHOOD

## Introduction

Life is full of transitions, and one such transition occurs when a child grows into a young adult. Timely diagnosis and management of type 1 diabetes would lead to normal growth and sexual development. Good glycemic control also helps in maintaining normal sexual functions. A child with well controlled diabetes can grow up to be a productive, fertile and long-lived adult. The healthcare team needs to address important issues like further education, employment, sexuality, independent living and having family along with type 1 diabetes management.

## Essential transitions to be discussed

- **Adult Diabetes Clinic** - Slow and gradual transition should be made.
- **Education/vocational training** - Child can opt for majority of all courses except perhaps the armed forces and heavy vehicle driving.
- **Employment** - Child should be motivated to find gainful employment in adulthood.
- **Independent living** - Roles and responsibilities should be clearly defined
- **Marriage** - Children with diabetes can definitely marry and have children but relationship should not be based on lies. Give positive examples
- **Pre-conception counselling** - It is essential, should be done on positive note and reinforced at appropriate time.

If you find your child has delayed sexual growth, please make sure you discuss it with their doctor and take further advice. Crossing of two major percentile lines (upward or downward) e.g., going from above 75<sup>th</sup> percentile to below 50<sup>th</sup> percentile on height or weight chart is cause for concern.

### Must Always

- Ask questions regarding the growth and sexuality
- Ask menstrual history in a girl child
- Practise personal and menstrual hygiene
- Avoid peer pressure
- Take good care of blood glucose levels for normal growth

## Criteria for referral for child between nine to eighteen years:

- A child below or above mid parental range for height.
- BMI over the 85<sup>th</sup> percentile at all ages. Arrest at the same stage of puberty for more than 2 years.
- Micropenis.
- Unilateral or bilateral gynecomastia in boys.
- Hirsutism and menstrual irregularities in girls.
- Delayed puberty in girls with no breast budding by 14 years or no menarche by 15 years and in boys with no signs of puberty by 16 years.

## Child friendly tips

- Never make them feel that they are in anyway inferior to people without diabetes. With good treatment one can achieve normal growth and development.
- You can take inspiration from great people with diabetes who have achieved great feats and keep yourself motivated.
- Life and diabetes both require **MIND** (**M** - Monitoring **I** - Initiation and Involvement **N** - Need to know more **D** - Discipline)

## Sexual identity, awareness and type 1 diabetes

Adolescence is the time when young girls and boys become aware of their sexual identity and start looking upon their future life. Explain them that controlled diabetes is not an hindrance in their normal sexual growth and function. They can marry and have children like others, but need to control their diabetes.

### Must Never

- Lose confidence because of the disease
- Attribute every problem to diabetes
- Shy away from doubts regarding growth and sexual development from physician
- Delay counselling on these topics after the child turns adult
- Think that persons with diabetes can not achieve, marry and have children



**Quote of Wisdom:** Good glucose control is the best way to ensure growth and development.

# SCHOOL, EXAMINATIONS AND TYPE 1 DIABETES

## Introduction

Diabetes needs to be managed 24/7. For a child diagnosed with diabetes, it goes along with him/her to school. Every child has the right to receive education and appropriate care for diabetes while at school. Diabetes is not a hindrance in achieving good grades. It is very important that a safe and supportive school environment is available for every child with diabetes.

## Responsibility of the school

- Provide education and equal opportunities to grow for the child.
- Provide support to the child in management of diabetes.
- Allow the child to eat a snack to prevent hypoglycemia.
- Allow the child to use bathroom for frequent urination in case of acute hyperglycemia.
- Allow the child to check blood glucose levels and take insulin when needed.
- Support the child in treatment of hypoglycemia.

### Check list: items needed for school

- Adequate lunch and snacks for the day
- Sugar, hard candies or juice
- Access to glucose meter and strips
- Contact details of parents and the child's doctor
- Glucagon Hypo kit, if possible.

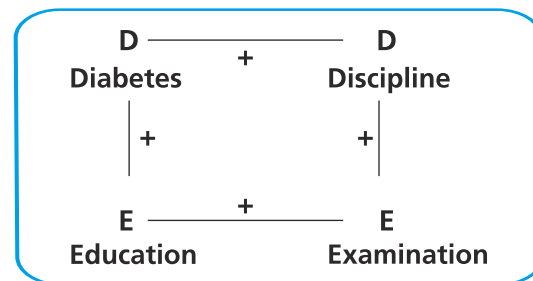
## Responsibility of the parents and the healthcare team

Educating the teachers and support staff. This should be repeated regularly and should include:

- Information about diabetes in the child and his/her medication.
- Information about hypoglycemia and hyperglycemia including treatment.
- Information about effects of diet and exercise on diabetes.
- Supplies for management of diabetes like insulin, needles, glucometer, strips and food.

## Child friendly tips

- Let the child understand that both examinations and diabetes are part of life and can be managed by education and discipline.



- During stressful periods like exams, take 5 min exercise break every hour, walk while revising lessons, have food and insulin on time and monitor regularly.

## Must Always

- Inform teachers and school staff about diabetes
- Wear a diabetes identity card
- Ensure availability of emergency diabetes care
- Allow children to take snacks during periods or exams
- Adjust insulin regimes according to school timings

## Must Never

- Hide diagnosis of diabetes
- Skip snacks and insulin doses
- Indulge in long periods of exercise without break
- Participate in long periods of study without break
- Project diabetes as an excuse for not attending school and examinations



**Quote of Wisdom:** Living with diabetes is an education in itself.

## XI. SPECIFIC SITUATIONS



# FEASTING AND FASTING IN TYPE 1 DIABETES

## Introduction

India is a land of festivals. The numerous and varied festivals that are held throughout the year are a source of joy and celebrations in lives of people. These festivals include variety of foods, feasts and celebrations and sometimes involve fasting. Many times, these festivals create problem in the life of children with diabetes. They may feel that they are unable to celebrate properly. Festivals may lead to uncontrolled diabetes if dietary indiscretion occurs.

## Festivals may mean

- Different variety of food (Fried items / sweets)
- Too much food or no food
- Too much exertion or no exercise
- Emotional excitement (joy and sadness)
- Visit to religious places, friends and relatives
- Fasting, willingly abstaining from some or all food, drinks or both, for some duration

All this can make it difficult to control diabetes.

## Fasting and Type 1 diabetes

If a person with type 1 diabetes decides to fast, he/she should just consult the doctor

- People with diabetes who fast should self monitor their blood glucose regularly.
- Checking should be done more frequently than one normally does.
- The most favoured regimen for fasting would be a dose or two of long-acting insulin and 1 or 2 doses of short-acting insulin before food.
- Whenever a diet is planned, let it be a healthy balanced diet instead of fried and rich food.

## Child friendly tips

- Diabetes shouldn't stop children from doing the things they enjoy.
- Too much restriction and diabetes policing by parents sometimes may make the child uncooperative, and diabetes very difficult to control.
- Child can be allowed to have sweets and ice cream containing sugar free sweeteners in moderation occasionally. Sugar free sweeteners can be used to make sweet dishes at home also. Using fat-free milk, as well as fruits in suitable quantities can supplement food as well as satisfy the taste buds.
- Slight imagination, originality and effort on the part of the family can produce many diabetes friendly dishes which are tasty and healthy such as vegetable cutlets, palak , puris or dosas, sprouts chat.
- Eating sweets at a meal time adds to the carbohydrates. This can be adjusted by reducing other starches like chapatti, bread , rice or pasta.



## Must Always

- Follow moderation
- Take diabetes care along
- Monitor blood glucose more frequently
- Keep extra short acting insulin for festival time
- Be prepared to treat hypoglycemia and other medical emergencies

## Must Never

- Miss insulin
- Be too rigid about following diet and exercise
- Stop monitoring in fear of high blood glucose levels
- Hide diabetes from friends and family
- Go overboard with alcohol or other drugs



**Quote of Wisdom:** Education and moderation are the key to enjoying festivals.



# TRAVEL AND CAMPS

## Introduction

Life is a journey and diabetes a companion which travels along. When a person with diabetes needs to travel, they have to consider needs of diabetes management to enjoy travel and have good health. Planning is the best way to make sure that one enjoys the experiences of travelling to new places or visiting family and friends.

## Packing Checklist

- Insulin, syringes, pen needles, blood glucose meter, test strips and lancets.
- Prescriptions for medications and testing supplies.
- Treatment for hypoglycaemia.
- Non-perishable snacks like biscuits.
- First-aid medications.
- Medical ID, phone numbers of doctor /nurse.

- Do wear comfortable shoes. Avoid walking barefoot especially on hot sand or pavements.
- Check your feet regularly and take treatment immediately for any minor injury also.
- Have more than enough (around double) diabetes supplies with you, in case of extra stay or emergency.



## Other key essentials

- Whether you are in a restaurant or at relatives place, wait until food is served before insulin shot is taken. Otherwise, a delay in the meal could lead to low blood glucose.
- Try as far as possible to stick to your routine of staying active. Walking is the one exercise which you can do almost anywhere.
- Any physical effort can have impact on blood-sugar. When in doubt, measure blood sugar levels. Have extra monitoring supplies for traveling.

## Child friendly tips

- Sending children to camps or tour makes them confident and independent.
- If it is not possible to check blood glucose levels, take snacks every 2-3 hours to prevent hypoglycemia
- Wash hands more often and take care of hygiene as any infection can lead to high blood glucose levels.

### Must Always

- Carry your diabetes supplies with you in your handbag
- Keep your insulin in a cool pouch
- Carry sugar/ sweets to treat hypoglycemia and snacks to prevent hypoglycemia
- Check glucose levels more frequently
- Have a diabetes identification card and inform the camp instructor beforehand

### Must Never

- Miss insulin, not even one shot
- Keep insulin or devices in direct sun, any hot place or in the glove compartment of the car
- Forget your prescription
- Assume that there will be food wherever you are
- Assume that every one knows everything about diabetes



**Quote of Wisdom:** Diabetes self-care is the safest travel companion.

## XII. MANAGING THE ENVIRONMENT



# PHYSICAL ENVIRONMENT AND TYPE 1 DIABETES

## Introduction

Diabetes is an eco sensitive condition. This means that it is sensitive to environment. An healthy physical environment, whether at home, in school, or in the surroundings, helps improve glucose control. On the other hand, a hostile physical environment may worsen diabetes. Therefore, apart from managing insulin and glucose values, it is important to manage the physical environment. For a child with diabetes, a friendly physical environment should always be aimed for.

## Child friendly tips

- Encourage activities/ exercises/ games which are fun, give education and are cost effective.
- Encourage activities which involves team work.
- Encourage games which involve aerobic exercises e.g. cycling and dancing.
- Avoid continuous exercise without breaks, e.g. a marathon.



## Tips for Managing Physical Environment

**THE KITCHEN:** Much of diabetes management takes place in the kitchen. Cooking hygienic, balanced diet, in a safe manner, with minimal exposure to hazards such as fire, is necessary.

**THE HOME:** The home should allow options for leisure and exercise. For example, an airy courtyard where the child can play safely, helps achieve diabetes control.

**THE SCHOOL:** The child spends a significant part of the waking day at school. The school environment should have facilities for play, rest, healthy food and privacy while injecting insulin. School teachers and other staff, e.g., bus drivers, should be aware of first aid which may be required by children with diabetes.

**SPORTS FACILITIES:** Sports facilities, such as playgrounds, stadiums, courts and gymnasiums, should have areas where one can check blood glucose and take snacks if necessary.

**THE SURROUNDINGS:** The surroundings should be healthy and clean. They should allow children to walk and play, without fear of traffic or strangers.

## Must Always

- Advocate for diabetes-friendly environments
- Keep sharps and insulin's in a safe place
- Have areas which allow privacy for injection at home and school
- Have safe access to playgrounds, stadiums and gymnasiums
- Have safe footpaths, pedestrian pathways and cycling lanes

## Must Never

- Drink contaminated water
- Eat snacks from unhygienic road side vendors
- Stock harmful high-calorie foods and drinks in school canteens
- Play on busy roads or in poorly lit areas
- Miss physical activity and games periods in school



**Quote of Wisdom:** Healthy cities mean healthy children.

# SOCIAL ENVIRONMENT AND TYPE 1 DIABETES

## Introduction

Type 1 diabetes is an autoimmune disorder and does not discriminate between rich and poor, urban or rural, educated and uneducated and various other community classifications. The family and community has an important role to play in diabetes management. Positive family communities have a positive outcome on health and lives of children with diabetes and vice versa.

## Counseling parents when child is diagnosed with Type 1 diabetes.

Initial Counselling	Advanced Counselling	Individualized Counselling
Explaining Diagnosis of Diabetes	Dispelling myths and beliefs	Addressing fears
Basic diabetes education	Diabetes care in day to day life	Sharing diabetes care between parent and child
Sharing the burden	Giving hope/ giving facts	Meeting parents available in similar situation

## The family is an active participant in diabetes care as they -

- Are main care-givers of a child
- Arrange and give medications
- Provide proper nutrition
- Monitor child's well-being on daily basis
- Manage day to day emergencies

## Child friendly tips

- Positive examples and positive reinforcement can fill the life of a child with type 1 diabetes with hope and determination to win over diabetes.
- Making diabetes education room in hospital child-friendly by adding colourful posters, Mishti comics, snake and ladder game and other child friendly education tools.



## Tips for handling peer pressure

Children give in to peer pressure because they want to be liked, to fit in, or they worry that other children might make fun of them if they don't go along with the group. Sometimes they are curious to try something new that others are doing which allows them to leave their better judgment, or their common sense, behind. Every child at some point gives up to peer pressure. Some things which may help a child are:

- Talk openly • Give options rather than restrictions • Educate and involve friends
- Discuss smoking, drugs and alcohol abuse • Avoid behaving like diabetes police

### Must Always

- Listen to the family and identify what help is actually needed
- Give them information and hope in simple words and demonstrations
- Give them realistic goals and expectations
- Let them meet other families in similar situation
- Involve religious leaders and teachers to ensure a diabetes-friendly social environment

### Must Never

- Consider parents fear as baseless
- Use technical terms for giving information
- Give all information in one sitting
- Forget that diabetes may be an unknown entity for the parents and community
- Ignore family's role as a cause of poor control



**Quote of Wisdom:** Diabetes affects the family, not only the individual.



XIII. Useful Tables



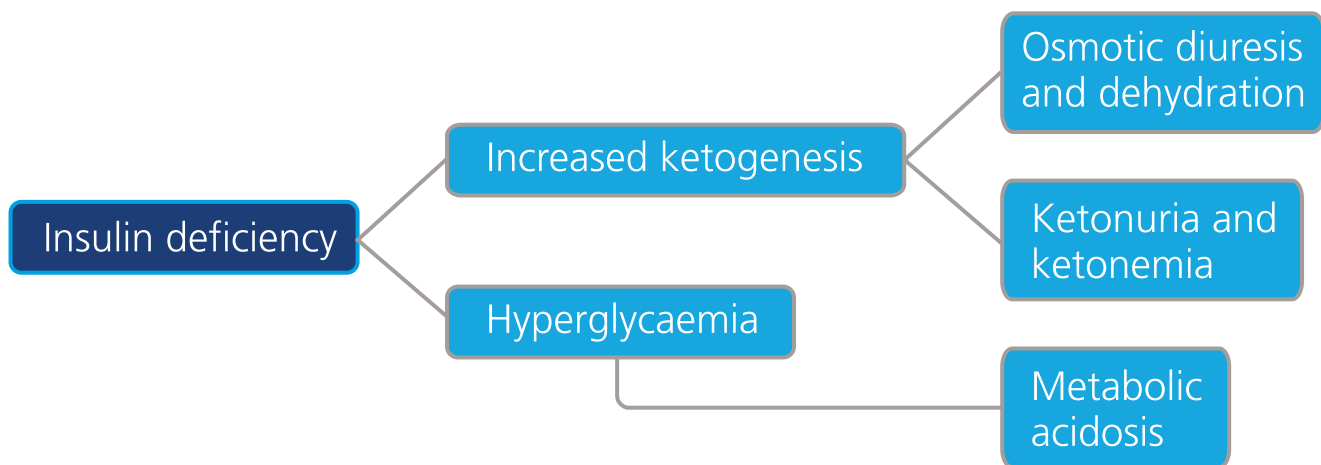
# DIABETIC KETOACIDOSIS

## Definition

Diabetic ketoacidosis is a grave clinical condition of metabolic derangement resulting from severe absolute or relative insulin deficiency characterized by all three of the following:

- Hyperglycemia (blood glucose > 250 mg/dl)
- Acidemia ( venous pH <7.3 or bicarbonate < 15 mmol/L)
- Ketonemia and ketonuria

It is associated with severe depletion of fluid/water and electrolyte from both intra- and extracellular compartment with increased level of counterregulatory hormones leading to severe dehydration, hyperglycemia and ketoacidosis.



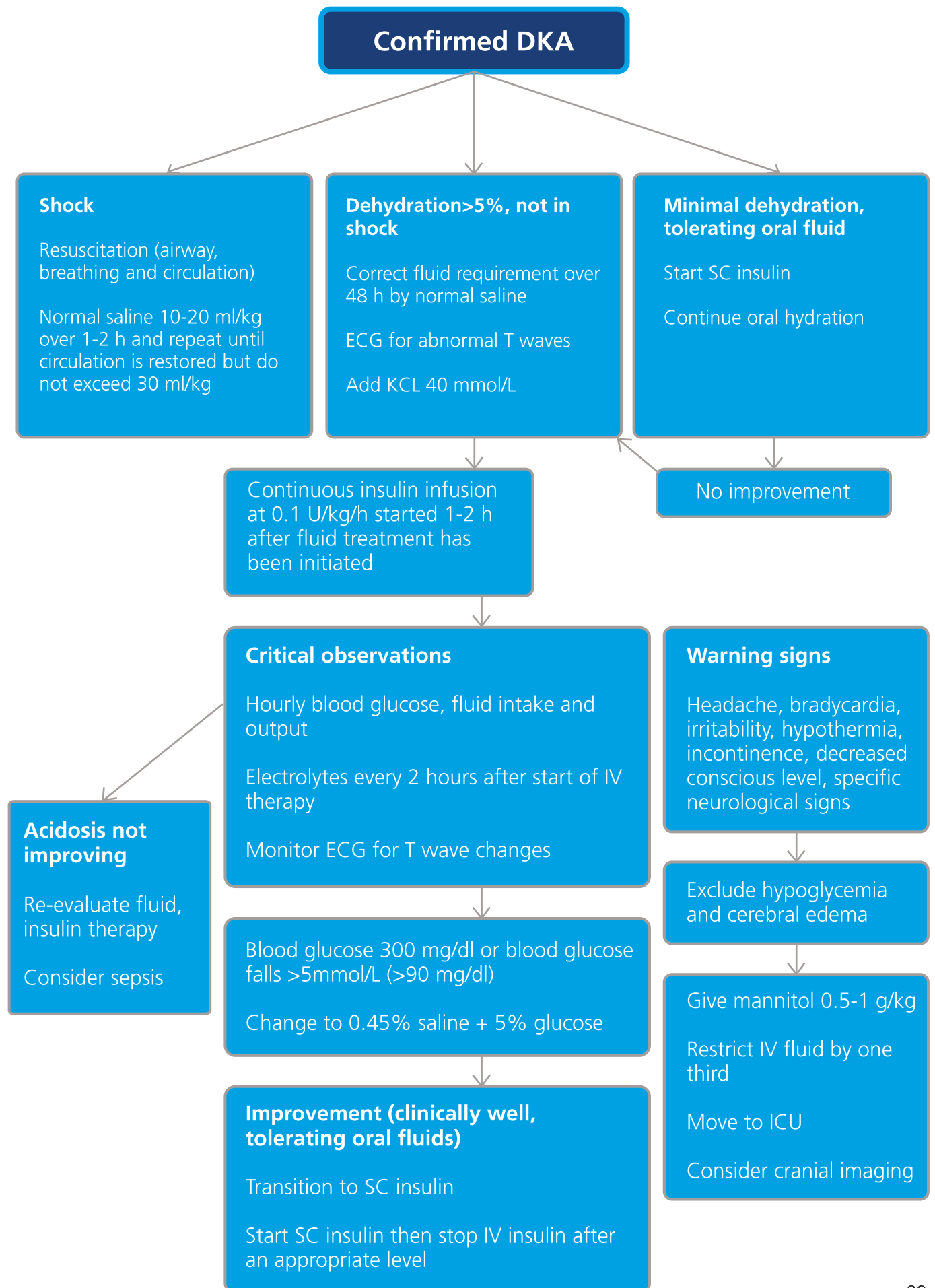
## Clinical manifestations

- Dehydration
- Rapid deep sighing (kussmaul) respiration
- Nausea, vomiting, abdominal pain mimicking acute abdomen
- Progressive obtundation and loss of consciousness
- Fever
- Neck rigidity despite absence of meningeal infection

## Biochemical manifestations

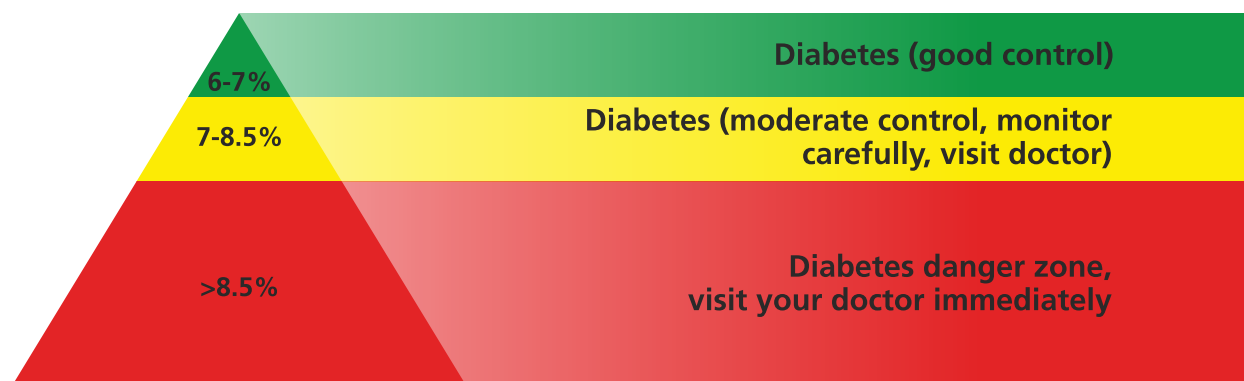
- Dyselectrolytemia
- Leukocytosis with left shift
- Elevated amylase and lipase
- Hyperglycemia
- High anion gap metabolic acidosis
- Ketonemia, ketonuria
- Ph<7.3 and bicarbonate<15 mmol/L

# Management of Diabetic Ketoacidosis



# HbA1c Conversion Chart

Average blood glucose (ml/dl)	HbA <sub>1c</sub>
126	6
140	6.5
154	7
169	7.5
183	8
197	8.5
212	9
226	9.5
240	10
255	10.5
269	11
283	11.5
298	12
312	12.5
326	13
341	13.5
355	14
369	14.5
384	15
398	15.5
412	16
427	16.5
441	17
456	17.5
470	18
484	18.5
499	19





XIV. APPENDIX



# Check list for Educators

S.No	Check list for education at diagnosis of type 1 diabetes
1	What is Type 1 diabetes
2	How to take insulin
3	When to take insulin
4	Self-monitoring blood glucose levels
5	Hypoglycemia and its treatment
6	Dietary advise especially on time
7	Contact number for emergency
	<b>Check list for education within one month of diagnosis</b>
1	Insulin Rotation site
2	Where to store and buy insulin/ syringes/refill cartridges
3	Return to school
4	Talking about diabetes in the child with family and friends
5	Monitoring of Ketones
6	Importance of Exercise
7	Healthy eating habits in detail
	<b>Check list for education within one year of diagnosis</b>
1	HbA1c and its significance
2	Insulin dose adjustment
3	Sick Day rules
4	Travel and diabetes
5	Annual tests needed and their significance
6	Prevention of long term complications
7	Talking about doubts/ psychosocial issues and long term fears
	<b>Check list for Adolescents</b>
1	Diabetes and sexual health
2	Diabetes and eating out
3	How to reveal diabetes to friends
	<b>Other topics of importance</b>
1	Complementary therapies
2	Fasts, festival and religious traditions
3	Career counselling
	Diabetes Education Sessions to be repeated at regular intervals

**We thank everyone reading this book and ultimately making a difference for Children with Diabetes.**