

Nutritional Approach for Children with Diabetes

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Diabetes in Children & Adolescents

Diabetes is one of the most common chronic diseases in children.

It can strike them at any age, even toddlers and babies.

Prevalence in Children & Adolescents

-Globally: Around 500,000 children <15 have type 1 diabetes.

-Every year, 70,000 children <15 develop type 1 diabetes.

-Type 1 diabetes is increasing fastest in pre-school children, at a rate of 5% per year.

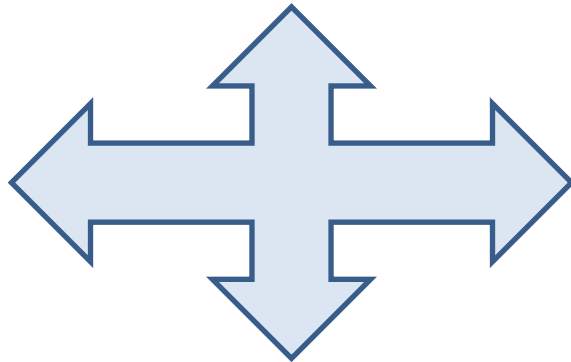
-Many countries are documenting higher numbers of newly diagnosed cases of type 1 diabetes, particularly in younger children.

- Type 2 diabetes has been increasingly reported in children and adolescents to such an extent that in some parts of the world it has become the main type of diabetes in children.

Types of Diabetes in Children

Maturity-Onset Diabetes of the Young

Type I Diabetes



Type II Diabetes

Hybrid or Mixed Diabetes

Type 1 Diabetes	Type 2 Diabetes	Maturity-Onset Diabetes of the Young	Hybrid or Mixed Diabetes
<p>Autoimmune disease in which the immune system destroys the insulin-producing beta cells of the pancreas.</p>	<p>Begins with insulin resistance. -In time, it loses the ability to secrete enough insulin in response to meals.</p>	<p>Rare form of diabetes in children that is caused by a single gene defect that results in faulty insulin secretion.</p>	<p>Children will be more likely to have elements of both type 1 and type 2 diabetes, given the fact that more children are becoming overweight.</p>

The Diabetes Warning Signs

*Children with type 1 diabetes may experience the following:

- Frequent urination
- Excessive thirst
- Increased hunger
- Weight loss
- Tiredness
- Lack of interest and concentration
- Blurred vision
- Vomiting and stomach pain

*In children with type 2 diabetes these symptoms may be mild or absent.

Identifying Children with Diabetes

- **Type I Diabetic Children:**

- Rate of beta cell destruction in type 1 diabetes: Rapid in some individuals (mainly infants and children) and slow in others (mainly adults).
- Ketoacidosis or modest fasting hyperglycemia may be the first indications of the disease in some.

- **Type II Diabetic Children:**

- Mostly overweight or obese, insulin resistant, and have a family history of type 2 diabetes.
- May have physical signs of insulin resistance such as acanthosis nigricans.

Testing for Type 2 Diabetes in Children

Criteria: Overweight (BMI>85TH percentile for age and sex, weight for height> 85th percentile, or weight> 120% of ideal for height)

+

Any of the 2 following risk factors:

- Family history of type 2 diabetes in first or second-degree relative.
- Race/ethnicity (American Indian, African-American, Hispanic. Asian/Pacific Islander)
- Signs of insulin resistance or conditions associated with insulin resistance: (Hypertension, Dyslipidemia, PCOs).

-Age of Initiation: 10 years or at onset of puberty if it occurs at a younger age.

-Frequency : Every 2 years.

-Preferred Test: Fasting Plasma Glucose.

Prevention Strategies for Type 2 Diabetes

- Global studies have shown that type 2 diabetes can be prevented by enabling individuals to lose 7-10% of their body weight, and by increasing their physical activity to a modest level. (*International Diabetes Federation, 2008*).
- Lifestyle changes include: Eating healthy, keeping at a healthy weight and staying active.
- New research findings will help determine effective ways to lower risk factors in high risk children.

Optimal Plasma Blood Glucose & HbA1C Goals for Type 1 Diabetes by Age Group

Age (Years)	Plasma Blood Glucose Goal Range: Before meals	Plasma Blood Glucose Goal Range: Bedtime/Overnight	Hb A1c%
Toddlers & Preschoolers < 6 Y	100-180mg/dl	110-200mg/dl	<8.5 BUT >7.5
School Ages:6-12 Y	90-180mg/dl	100-180mg/dl	< 8
Adolescents/Young Adults: 13-19 Y	90-130mg/dl	90-150mg/dl	<7.5

*A lower goal (<7.0) is reasonable if it can be achieved without excessive hypoglycemia

Blood Glucose Monitoring

Frequency and circumstances requiring blood glucose checks

Insulin administration if necessary: doses/injections times prescribed for specific blood glucose values, storage of insulin.
Meals and snacks including food content, amounts and timing.

Symptoms and treatment of hypoglycemia

Symptoms and treatment of hyperglycemia

Chronic Complications in Children and Adolescents with Type 1 Diabetes

-LDL-goal < 100 mg/dl.
*If >100 mg/dl: Advise with an exercise plan and a Step 2 American Heart Association Diet.

-Retinopathy: Although most common after the onset of puberty & 5-10 years of diabetes duration, it has been reported in pre-pubertal children and with diabetes duration of only 1-2 years.

-Hypertension in childhood is defined as an average systolic or diastolic blood pressure > 95th percentile for age, sex, and height measured on at least three separate days.

-Nephropathy: To reduce the risk and/or slow the progression of nephropathy, optimize glucose and blood pressure control.
-Annual screening for micro albuminuria should be initiated once the child is 10 years of age and has had diabetes for 5 years.

-Celiac disease is an immune-mediated disorder that occurs with increased frequency in patients with type 1 diabetes (1–16% of individuals versus 0.3–1% in the general population).

-Neuropathy: The risk for foot complications is increased in people who have had diabetes over 10 years.
*Still unclear whether foot examinations are important in children and adolescents.

Treatment Strategies

- No single recipe to manage diabetes that fits all children.
- The cornerstone of diabetes management for children with is:
 - Healthy eating with portion control, blood glucose monitoring and increased physical activity.
 - To control their diabetes, children with type 2 diabetes also may need to take oral anti-diabetes medication, insulin, or both.
 - The basic elements of type 1 diabetes management are insulin administration, nutrition management, physical activity, blood glucose testing, and the avoidance of hypoglycemia. Algorithms are used for insulin dosing based on blood glucose level and food intake.

Standards of Medical Care for People with Diabetes

At Diagnosis:

- Establish the goals of care and required treatment.
 - Check lipids in children with a significant family history
 - Begin diabetes self-management education about healthy eating habits, daily physical activity, and insulin/medication administration, and self-monitoring of blood glucose levels if appropriate.
 - Provide nutritional therapy by an individual experienced with the nutritional needs of the growing child and the behavioral issues that have an impact on adolescent diets.
 - Conduct a psychosocial assessment to identify emotional and behavioral disorders.
- * In children with no significant family history, check lipids at puberty and if normal, repeat profile every 5 years.

Helping Children Manage Diabetes

- The health care provider team, in partnership with the young person with diabetes and caregivers, can develop a personal diabetes plan for the child that puts a daily schedule in place to keep diabetes under control.

A- A healthy meal plan

B-Get regular physical activity

C-Check blood glucose levels

D-Take insulin or oral medication as prescribed

E-Manage hyperglycemia and hypoglycemia.

A-Following a Healthy Meal Plan

For children with Type 1 Diabetes:
The meal plan must ensure proper
nutrition for growth.

For children with Type 2 Diabetes:
The meal plan should outline
appropriate changes in eating
habits that may lead to obesity.

Label foods: Calories, sources of the calories, mineral and vitamin content, types and amounts of carbohydrates, amount of cholesterol, amounts and types of fatty acids, and if any, the amount & type of artificial sweetener.

General guidelines for meal plans should be flexible as to allow a variety of foods that meet individual differences such as food preferences, socio-economic, cultural, & ethnic background.

Long-term evaluation of the exchange system in the dietary instruction of child with Type I diabetes and his family.



Fructose and sorbitol to be used in restricted amounts as parts of nutritious and well-balanced meal plan.

Consider the effects of food form, nutrient-nutrient interactions, and non-nutritive components of food on the Glycemic effect of a given food.

Calorie intake:
- 50% to 60% carbohydrate
- 15% to 20% protein
- 20% to 25% fat

“Simple/“Complex”
Carbohydrates .

Plot height and weight measurements on standard growth grids at regular intervals as part of nutritional assessment.

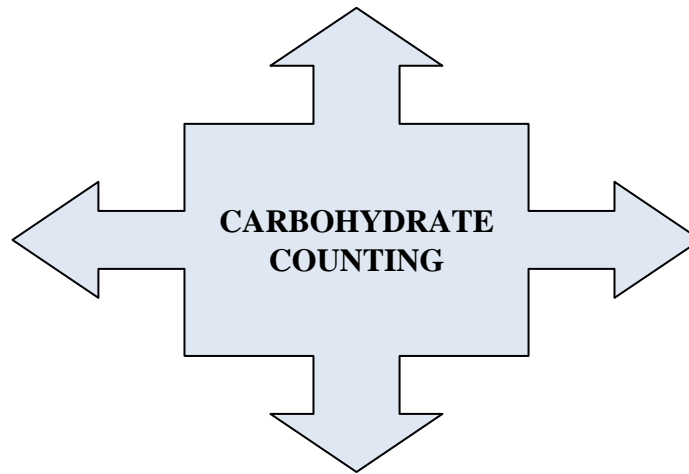
Nutrition education of the child and family about the principles of good nutrition, the significance of a balanced meal plan, and the rationale behind food exclusion.

SIMPLE CARBOHYDRATE COUNTING

-One carbohydrate serving is equal to 15 g of carbohydrate.

Helpful tools

- Measuring cups and spoons.
- Food scales.
- Food package labels.
- Carbohydrate counting books.
- Food exchange list books.
- Nutrition facts panel.



Things to Consider

- Portion size
- Balanced diet
- 30% of daily caloric intake
- Consistency in the timing, type, and amount of carbohydrate-containing foods consumed
- Protein & fat are still important.

ADVANCED CARBOHYDRATE COUNTING

- Match short-acting insulin dose to the amount of carbohydrate grams to be eaten
 - Three to four insulin injections daily, or use of insulin pump.
- Records of your food intake and blood sugars to determine the amount of insulin to take for the amount of carbohydrate to eat. : carbohydrate to insulin ratio.
- Work with a professional diabetes team to help determine individual carbohydrate to insulin ratio.

Nutritional Guidelines for Children with Diabetes

- Eat a healthy and nutritious diet.
- Aim to eat relatively consistent amounts of food everyday.
- Use food labels.
- Use the Glycemic Index concept.
- Consider the potential effects of fats and proteins in the diet.
- Use blood glucose monitoring to assess the effects of different food types on their post-meal (2 hr) blood glucose levels (e.g. compare whole-wheat varieties of bread, rice and pasta vs refined products).
- Match the amount/types of insulin with foods consumed.

B-Physical Activity

-Studies show that physical activity helps to lower blood glucose levels, especially in children and adolescents with type 2 diabetes.

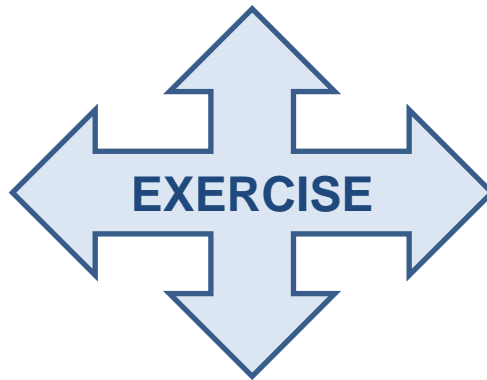
-Children with diabetes need regular physical activity, ideally a total of 60 minutes each day.

-Vigorous physical activity and warm temperatures speed blood flow, increase the rate of insulin absorption and set the stage for a hypoglycemic reaction which may occur after several hours.



-Children can participate in any exercise or outdoor activity.

-Children should eat an additional snack before participating in strenuous exercise(15g CHO/30 mn).



-Parents can provide glucose tablets: work best and are not confused with candies.

-Children who use insulin should check their blood glucose levels before and after engaging in physical activity.

*If blood glucose <100mg/dl: Physical activity should not be undertaken.

*If blood glucose >300mg/dl: Physical activity should be avoided.

**Insulin
& Physical
Activity**

Children on insulin regimens are expected to check their blood glucose levels routinely before and after engaging in physical activity.

Children who are known to have nocturnal hypoglycemia are often advised to undertake the activity early in the day or reduce the insulin dose when the activity is undertaken late in the day.

In general, insulin should be taken more than an hour before physical activity.

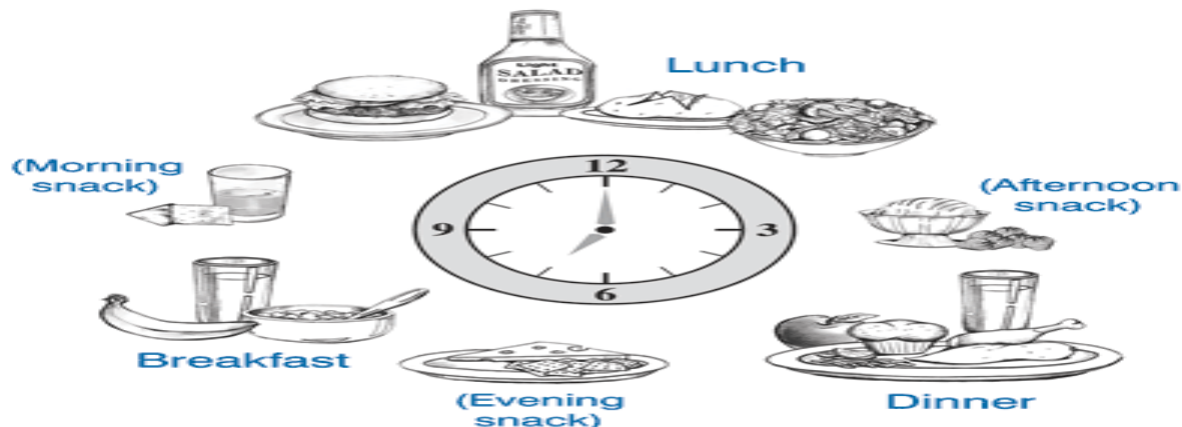
Adjustment of insulin or food intake is very important and may be made based on anticipation of special circumstances such as increased exercise.

C-Checking Blood Glucose Levels Regularly

- Young people with diabetes should know the acceptable range for their blood glucose. Children, particularly those using insulin should check blood glucose values regularly with a blood glucose meter, preferably one with a built-in memory.

D-Diabetes Medications

- Parents, caregivers & school nurses can help a child /teen learn how to take medications as prescribed.
- Children with type 1 diabetes should take insulin at prescribed times each day via multiple injections or an insulin pump.
- Young people with type 2 diabetes may need oral medication, insulin or both if the treatment goals with nutrition education and exercise are not met.
- The first oral agent used should be metformin since it has an advantage over other agents on reducing HbA1c and blood glucose levels without the risk of hypoglycemia. (*Diabetes Care, 2000*).



Insulin Pill: An end to Injections?



Scientists from the National Tsing Hua University in Taiwan have announced they are developing an insulin pill to replace daily injections.

Initial Tests

- When tested on rats with diabetes who had fasted for 12 hours, the new insulin pills significantly lowered their blood glucose levels. However, in order for the insulin to be effective, very high doses were required.

New Insulin Pill Research

- More recently, researchers have found that insulin can be protected in a chemical coating known as a novel chitosan polymer, bringing the chance of oral insulin - an insulin capsule - ever closer.
- The coating is a key step to ensuring that insulin taken in pill form is not broken down by enzymes in the stomach and rendered useless before being absorbed in the small intestine & entering the blood stream, say the team of researchers from Aberdeen's Robert Gordon University.

What the Researchers Say?

- “Further testing of this complex is needed to determine its suitability as an insulin delivery system - a goal that is some years away”.

	Hypoglycemia	Hyperglycemia
Causes	<ul style="list-style-type: none"> -Taking too much insulin. -Missing a meal or snack. -Exercising too much. 	<ul style="list-style-type: none"> -Forgetting medications on time. -Eating too much. -Getting too little exercise. -Being ill.
Symptoms	<p>Irritability, shakiness and confusion Loss of consciousness or seizures may develop.</p>	<p>Over time, damage to the eyes, kidneys, nerves, blood vessels, gums & teeth.</p>
Treatment	<p>Drink or eat a concentrated sugar (15-20g glucose) to raise the blood glucose value to greater than 80 mg/dl. *If unable to eat or drink, a glucose gel may be administered to the bucal mucosa of the cheek or glucagon may be injected. *I.V glucose may be necessary in severe cases.</p>	<p>Can usually be treated with either oral agents or insulin. If blood glucose levels don't respond to insulin or medication, diabetics are advised to contact their GP immediately.</p>
Things to Remember	<p>Most young children have a form of "hypoglycemic unawareness." & lack the cognitive capacity to recognize and respond to hypoglycemic symptoms.</p>	<p>Families need to be taught management for severe hyperglycemia and ketoacidosis.</p>

Special Issues

Diabetes presents unique issues for young people with the disease. Simple things, such as going to a birthday party, playing sports, or staying overnight with friends, need careful planning.

- Young people and their families learn to adjust to the lifestyle changes needed to stay healthy.

-Family Support

-Transition to Independence

Role of Nutrition Educators in Managing Diabetes in Children

- According to recent reports, tailored community-based healthcare with specific focused diet and lifestyle goals could help people with type 2 diabetes to better control their blood glucose levels. (*Diabetes U.K, 2008*)

Dietitians & food / nutrition experts and can help with the following food-related tasks:

- Find out how different foods affect blood glucose
- Find and recommend good cookbooks and food guides
- Fit favorite foods into the meal plan
- Change the meal plan when your child's life changes
- Learn how to fit special occasions (parties, holidays) into the meal plan
- Choose healthy foods in the grocery store and in restaurants
- Learn how to treat low blood glucose



Initial assessment



Development/Adjustment of meal plans to be consistent with the patient's growth.



Changes in physical activity level



Nutritional Management of Complications.

Diabetes at School

- School principals, administrators, teachers and all the health care team all play a role in helping students with diabetes succeed.
- Diabetic Students should be entitled to accommodations in classrooms, physical education sessions, field trips & for after school activities for them to stay healthy.
- Written plans outlining each student's diabetes management may be very helpful.

***Diabetes Medical Management Plan:** Developed by the student's personal health care team and family.

***Quick Reference Emergency Plan:** Describes how to recognize hypoglycemia and hyperglycemia and what to do as soon as signs or symptoms are observed.

***Care Plan or Individual Health Plan:** Generated by the school nurse that provides instructions to faculty and staff.

***Education Plans**

Date of Plan _____

Diabetes Medical Management Plan

Effective Dates _____

This plan should be completed by the student's personal health care team and parents/guardian. It should be reviewed with relevant school staff and copies should be kept in a place that is easily accessed by the school nurse, trained diabetes personnel, and other authorized personnel.

Student's Name _____ DOB _____ Date of Diabetes Diagnosis _____

Grade _____ Homeroom Teacher _____ Physical Condition: Diabetes Type 1 Diabetes Type 2

Contact Information

Parent/Guardian #1 _____ Address _____

Phone: Work _____ Home _____ Cell _____

Parent/Guardian #2 _____ Address _____

Work _____ Home _____ Cell _____

Student's Doctor/Health Care Provider:

Name _____ Address _____

Phone: _____ Emergency Number: _____

Other Emergency Contacts:

Name _____ Relationship _____

Phone: Work _____ Home _____ Cell _____

Notify parents/guardian or emergency contact in the following situations: _____

Blood Glucose Monitoring

Target range for blood glucose is 70-150 70-180 Other

Usual times to check blood glucose: _____

Times to do extra blood glucose checks (circle all that apply)

Before exercise

After exercise

Student exhibits symptoms of hyperglycemia

Student exhibits symptoms of hypoglycemia

Other (explain) _____

Can student perform own blood glucose? Yes No

Meals and Snacks Eaten at School

Is student independent in carbohydrate calculations and management? Yes No

Meal/snack _____ Time: _____ Food content/amount _____

Breakfast _____

Mid-A.M. snack _____

Lunch _____

Mid-P.M. snack _____

Dinner _____

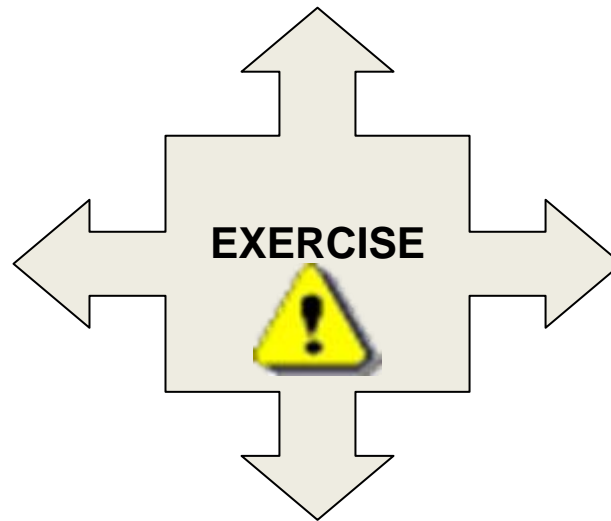
Snack before exercise? Yes No

Snack after exercise? Yes No

Other times to give snacks and content/amount: _____

Preferred snack foods: _____

Foods to avoid, if any: _____



AT SCHOOL

If gym or recess is right before lunch, kids should be permitted to eat a snack before participating and to carry emergency glucose to treat hypoglycemia, especially if located far away from the clinic or classroom premises.

Physical education and recess can be challenging since they lower blood sugar like insulin.

Teachers should keep a supply of emergency glucose on hand to treat hypoglycemia.

Nutrition Goals for Children & Adolescents with Diabetes

TYPE I DIABETES	TYPE II DIABETES
<p>-Maintenance of the age-appropriate glucose levels in desirable ranges by balancing food intake with insulin and activity levels.</p>	<p>-Development of a positive approach to meal planning focusing on healthy food choices and portion control.</p>
<p>-Provision of adequate calories for normal growth, weight and development.</p>	<p>-Improvement in life skills that will continue into adulthood, decreasing disturbed eating patterns and focusing on appropriate growth and development.</p>
<p>-Achievement of lipid levels in desirable ranges.</p>	<p>-Development of healthy lifelong eating and exercise habits while preserving social, cultural and psychological well-being.</p>
<p>-Prevention, delay or treatment of nutrition related risk factors and complications.</p>	<p>-Cessation of excessive weight gain with normal growth and near-normal fasting blood glucose and HbA1c results.</p>
<p>-Improvement of overall health through optimal nutrition.</p>	<p>-If weight reduction is desired, development of realistic goals for gradual weight loss.</p>

Educated children and families sensibly about the use of dietary salt, with little use of added salt and a choice of foods without excessive sodium content.

BUT... supplemental sodium chloride may be necessary when there is glycosuria in a newly diagnosed or poorly controlled patient.

Blood pressure to be monitored every 6 to 12 months.

There is no reason, however to avoid all sugary foods. In the context of a healthy diet, an occasional plan for the inclusion of sweets in the diet to ensure enough insulin in the system to handle the carbohydrates in the sweets.

At least yearly monitoring of children with type I diabetes fasting serum, total and high-density lipoprotein, cholesterol and the triglyceride level .

Type I diabetes does not result in increased dietary requirements for iron, magnesium, zinc, selenium, chromium, or other trace minerals or vitamins.



General Guidelines

Advise families to follow principles of good nutrition in their own meal planning as a way to enhance dietary compliance by their diabetic children.

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