Tools and Techniques for Working With Young People With Diabetes

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Diabetes is one of the most common chronic conditions in school-age children, affecting 151,000 children and adolescents in the United States, or approximately one in every 400–500 youth under 20 years of age. Every year, more than 13,000 youth are diagnosed with type 1 diabetes. In addition, more and more children and teens are being diagnosed with type 2 diabetes, a condition usually diagnosed in adults over the age of 40. It is now estimated that type 2 diabetes accounts for 8–45% of pediatric patients with newly diagnosed diabetes in large U.S. pediatric centers.[1]

Consensus statements and treatment guidelines for the medical management of type 1 and type 2 diabetes in children have been published by the American Diabetes Association (ADA).[2,3] These publications outline the current recommendations and treatment goals for this special population with diabetes.

Medical nutrition therapy (MNT) is an integral component of any treatment plan for a child with type 1 or type 2 diabetes, but often is the most difficult part of the treatment plan to successfully implement. The ADA's position statement "Evidence-Based Nutrition Principles and Recommendations for the Treatment and Prevention of Diabetes and Related Complications"[4] includes a section on nutritional recommendations for children and adolescents.

The nutrient requirements for children and adolescents with type 1 or type 2 diabetes appear to be similar to other same-age children and adolescents without diabetes, with an important difference: the food plan must be balanced with optimal glycemic control, exercise, and possibly diabetes medications to promote normal linear growth. Growing children who do not receive adequate calories will not grow to their height potential. Table 1 summarizes the nutrition goals for children with either type 1 or type 2 diabetes.[3,5,6]

Many children and adolescents with type 1 or type 2 diabetes will not receive an individualized MNT prescription from a dietetic professional or diabetes educator who is experienced with pediatric populations. These children may actually receive their only nutrition education from a physician, clinic nurse, medical assistant, school nurse, or lay health worker. For the nutrition component of the overall diabetes treatment plan to be effective, children need to be given realistic goals that are tailored to their unique needs. Youth typically cannot or will not follow "diet prescriptions" or strict calorie-controlled meal plans that do not incorporate foods their peers eat. Health care professionals working with children should make an effort to avoid the term "diet" when discussing changes in food choices. "Diet" implies a temporary solution and not a lifelong change.[7] The nutrition recommendations can be referred to as a food plan or behavior-change goals.

Almost all children like the taste of sweets and/or fried foods, even though they have diabetes. Diabetes health professionals working with children and adolescents need to strive to design food plans that balance treatment goals with realistic lifestyle choices. In addition, it is important to

Table 1. Nutrition Goals for Children and Adolescents With Diabetes

Type 1 Diabetes[5]	Type 2 Diabetes[3,6]
• Maintenance of age-appropriate glucose levels in desirable ranges by balancing food intake with insulin and activity levels • Provision of adequate calories for normal growth, weight, and development • Achievement of lipid levels in desirable ranges • Prevention, delay, or treatment of nutrition-related risk factors and complications • Improvement of overall health through optimal nutrition	• Development of a positive approach to meal planning focusing on healthy food choices and portion control • Improvement in life skills that will continue into adulthood, decreasing disturbed eating patterns and focusing on appropriate growth and development • Development of healthy lifelong eating and exercise habits while preserving social, cultural, and psychological well-being • Cessation of excessive weight gain with normal growth and near-normal fasting blood glucose and hemoglobin A_{1c} results • If weight reduction is desired, development of realistic goals for gradual weight loss

remember that it will be extremely difficult to effect change in a child's food choices if there is not support from the child's parents or caregivers.

The remainder of this article provides health care professionals with information and tips for working with pediatric populations and includes a review of some of the currently available nutrition education tools and resources specifically developed for use with young people with diabetes. Although exercise, medications, and self-monitoring of blood glucose are equally important components of diabetes self management, they are not addressed at length in this article.

Learning Needs and Considerations of Children and Adolescents

The learning needs of children and adolescents differ from those of adults. Therefore, nutrition education sessions must be developmentally appropriate. Learning materials, content, demonstration skills, and expectations must be adjusted to the age, abilities, and attention span of the child.[8] Tables 2 and 3 offer examples of nutrition education resources for children with type 1 or type 2 diabetes.[9]

Preschool and early school-age children

Children in this age group learn primarily through play. Education is often limited to spontaneously occurring opportunities associated with diabetes management and providing answers to questions asked by the children. Educational tools that are well received by this age group may include dolls or puppets shaped like foods and coloring books. Most nutrition education for children in this age group must be directed at parents or other caregiving adults.

School-age children

This age group typically responds well to information presented in an interesting and fun way. School-age children also continue to learn well through play. Videos, games, and puzzles are examples of useful educational tools. There are also many diabetes story books for this age group that include nutrition themes.

At each nutrition education session, health care professionals should try to determine who is performing the diabetes management tasks and activities at home. Parents usually perform the majority of school-age children's diabetes management, but this is a good time to start transitioning some tasks to the children themselves.

School-age children are beginning to eat more meals away from home, and for this reason it is helpful to have them start becoming more involved in their food plan and food choices. However, this age group should not be responsible for their total diabetes self-management because they do not yet have the maturity necessary to take on all diabetes-related tasks.[10]

Working with adolescents

Teens learn best when education session content is pertinent to adolescent issues. Videos and books may be useful nutrition education resources. Teens who embrace technology are often receptive to using hand-held, electronic personal data assistants that can store vast amounts of information about their food choices, calculate carbohydrate-to-insulin ratios, and perform other diabetes-related functions. Discussion sessions with peers are effective, as well.

Older teens may be more open to sharing information during nutrition education sessions conducted without

Table 2. Nutrition Education Resources for Children With Diabetes

TITLE	AUTHOR	PUBLISHER
Raising a Child With Diabetes	L. Siminerio, J. Betschart	American Diabetes Association
Sweet Kids: How to Balance Diabetes Control & Good Nutrition With Family Peace	B. Brackenridge, R. Rubin	American Diabetes Association
The Ten Keys to Helping Your Child Grow Up With Diabetes	T. Wysocki	American Diabetes Association
Diabetes Care for Babies, Toddlers, and Preschoolers: A Reassuring Guide	J. Betschart, S. Thorn	Wiley & Sons
A Magic Ride in Foozbah Land: An Inside Look at Diabetes	J. Betschart	Wiley & Sons
In Control: A Guide for Teens	J. Betschart	Wiley & Sons
Understanding Insulin Dependent Diabetes, 10th Edition	H.P. Chase	Children's Diabetes Foundation
Trim Kids	M. Sothern, T.K. von Almen, H. Shumacher	HarperResource
How To Get Your Kids To Eat... But Not Too Much (General nutrition information)	E. Satter	Bull Publishing
Carb Cards	J. Vanderwist	Carb Cards LLC, www.carbcards.com

Adapted from ref. 9.

Table 3. Web Sites for Children and Teens With Diabetes

Web site	Address
Children With Diabetes	www.childrenwithdiabetes.com
ADA Youth Zone	www.diabetes.org/wisdom
JDRF Kids Site	www.jdf.org/kids
National Diabetes Education Program: Children With Diabetes	www.ndep.nih.gov
Kids Learn About Diabetes	www.geocities.com/HotSprings/6935
Pump Girls	www.pumpgirls.com
Center for Science in the Public Interest	www.smart-mouth.com
Weight Control Health Information Network	www.niddk.nih.gov/health/nutrit/nutrit.htm
The "VERB: It's What You Do" campaign	www.verbnow.com
USDA Team Nutrition	www.fns.usda.gov/tn

Adapted from Ref. 9.

the presence of their parents or caregivers. It may be helpful for health professionals to hold one-on-one sessions with teens and then summarize the session goals at the end of the appointment with the parents or caregivers present. This ensures the crucial continued involvement of adult caregivers in teens' treatment plan.

It should be recognized that many young teens still may not be cognitively ready to assume responsibility for independent self-care.[11] Teens also are typically poor record keepers and often simply forget to perform daily self-management tasks. Therefore, diabetes management is most effective when adolescents and parents work as a team.

Psychosocial Assessment

Children's sense of self-efficacy or confidence will affect their self-care behaviors. The more confident children feel about performing a set of behaviors related to their food choices, the more likely they are to actually engage in those behaviors.

The diabetes empowerment scale, a measure of psychosocial self-efficacy, is a 30-item questionnaire originally developed for use with adolescents. It is an effective way to measure youths' perceptions of diabetes self-efficacy and the confidence they feel about performing diabetes self-care behaviors.[12]

Health care professionals should also routinely assess children's readiness to change and motivation. If time is limited, an easy question to ask to determine motivation about changing food behaviors is simply, "Do you follow a food plan to help you manage your diabetes?" For children who are not following a food plan, the additional question, "What's holding you back from following a food plan?" is appropriate. Children's responses can help to determine the level of commitment that they are willing to make at that time.

When developing individualized food plans, professionals should try to engage children or adolescents in the discussion. Except for those who are toddlers or younger, children should be able to participate in the dialogue. All too often, busy health professionals find it easier to develop food plans based on responses from parents without much input from the young people with diabetes themselves.

Preparing for Nutrition Education Sessions

Before holding initial nutrition sessions, health professionals should try to find out how children or teens and their families are currently eating. Assessing the cultural, environmental, and personal circumstances of the children and families will help educators develop individualized goals for the sessions. Determining social factors will prove crucial to the success of behavior-change goals and to attaining family involvement and support.

If possible, have children or their caregivers complete a food, beverage, activity, and—if applicable—medication record for a few days before the initial nutrition education session. These records can provide a wealth of information about typical food and beverage choices, portion sizes, snacking habits, food preparation techniques, meal and snack times, and meals and snack locations (i.e., home, school, fast-food restaurants, or friend's houses). Food records can help professionals quickly identify a few foods or beverages that may be contributing significant calories or excessive carbohydrates to children's food intake on a daily basis.

Recommendations for Children With Type 1 Diabetes

Most children with type 1 diabetes use either the basic carbohydrate counting or advanced carbohydrate counting meal planning approach for their diabetes food plans.

Basic carbohydrate counting approach[13]

Carbohydrate counting is a simple approach that can be successfully used with children. This approach emphasizes the carbohydrate content of food intake. Parents and children are taught how to determine the carbohydrate choices and/or grams of carbohydrate in foods. This information is obtained from "Exchange Lists for Meal Planning"[14] and from the Nutrition Facts panels on packaged food labels.

Carbohydrate counting provides increased flexibility in meal planning while keeping the amount of carbohydrate consistent from day to day. Foods from the protein and fat groups contain no carbohydrate and therefore are tracked in this approach. Registered dietitians or certified diabetes educators can develop individualized food plans, ideally based on a thorough nutritional assessment, to fit the unique nutritional needs of each child.

Families and children are taught that one carbohydrate choice is equal to 15 grams of carbohydrate. The amount of carbohydrate will vary based on the needs of each child. Many younger school-age children will consume two to four carbohydrate choices per meal (30–60 grams of total carbohydrate), and older children and adolescents may consume four to six carbohydrate choices per meal (60–90 grams of total carbohydrate.) Older children who are more physically active will require more

carbohydrate choices than younger, less active children. Most children also consume one to two carbohydrate choices for between-meal snacks (15–30 grams of total carbohydrate). Depending on the type of insulin plan a child is following, snacks may not be necessary.

Advanced carbohydrate counting approach[15]
Bolus insulin is the amount of rapid-acting or short-acting insulin that is needed to "cover" the amount of carbohydrate consumed and bring blood glucose levels back to target ranges. A carbohydrate-to-insulin ratio is used to help calculate this amount of insulin.

Carbohydrate-to-insulin ratios are the preferred meal planning strategy to be used with more advanced insulin plans and insulin pump therapy. Children or their parents should have a good understanding of basic carbohydrate counting principles, as well as:

- food label reading skills
- ability to determine carbohydrate content of home-prepared foods by actually weighing and measuring portions
- math skills, including addition, multiplication, and division.

The total carbohydrate content of meals and snacks is more important than the type of carbohydrates consumed. However, it should be reinforced that some carbohydrate foods are more nutritious than others.

This meal planning approach allows the greatest flexibility in the timing of meals and amount of carbohydrate consumed. The ability to estimate or count the carbohydrate content of meals and snacks allows for the matching of the action of the insulin to the post-meal blood glucose excursion. However, children need to realize that just because they can determine and "cover" the carbohydrate content of their meals or snacks does not mean they should sacrifice the principles of good nutrition and eat whatever they want whenever they want.

Children or their caregivers should also have an understanding of how fat can delay the emptying of the stomach. High-fat meals can result in prolonged elevations in blood glucose. This means that the action of rapid-acting insulin administered before a high-fat meal may actually be finished by the time the fatty meal is emptied from the stomach several hours later. This is an especially important concept for adolescents, who typically consume many high-fat foods and snacks.

Exchange lists approach[14]
In addition to the actual lists mentioned above, "Exchange Lists for Meal Planning" is an entire meal planning approach. It is a bit more complicated to teach to younger children because it involves six different food group lists instead of the three main groups (carbohydrate, protein, and fat) used with basic carbohydrate counting. However, it is still used effectively by many professionals working with children.

Meal plans and insulin: putting it all together
Conventional or split-mixed insulin plans (two to three shots per day). Children and teens following a conventional or split-mixed insulin plan will need to keep the prescribed amount of carbohydrate more consistent at meals and snacks from day to day. The main determinant of the glucose excursion following a meal or snack is the amount of carbohydrate consumed. Therefore, if children are taking fixed doses of insulin, it is recommended that the carbohydrate content of their meals and snacks be consistent to better match the action of their insulin.

Conventional insulin plans often require a more predictable schedule for meal and snack times, as well. More consistent carbohydrate intake at more consistent meal and snack times should ultimately result in more predictable blood glucose levels.

Multiple daily injections (more than four shots per day or insulin pump therapy plans. A more intensive insulin plan consisting of background (basal) insulin and pre-meal (bolus) insulin doses allows for more flexibility in timing and frequency of meals, amount of carbohydrate eaten at meals and snacks, and management of physical activity. Snacks are typically not necessary with this type of plan, although they can be included if children choose to eat them. If snacks include more than 10–15 grams of carbohydrate, an additional insulin injection will be needed to control the resulting glycemic excursion.

During the school day, older school-age children and teens may need to independently determine their bolus insulin doses based on a formula that includes the amount of carbohydrate they consume at that time, their blood glucose level, and their anticipated physical activity. Parents and professionals can work out a variety of strategies in advance to assist younger children with their insulin dose calculations.

Recommendations for Children and Teens with Type 2 Diabetes
Nutrition education for young people with type 2 diabetes should focus on only two or three behavior-change goals at a time. Professionals should try not to label foods as "good" or "bad" (e.g., regular soda is "bad;" water is "good"), but to try instead to use terms such as "everyday foods" or "once-in-a-while foods."

Ideally, information obtained from children's food and activity records should be used to individualize nutrition intervention strategies. In general, however, nutrition education should include the following goals, as applicable.

- Reduce consumption of high-calorie/high-fat foods. Work with children and teens to choose acceptable alternatives that are lower in calories, fat, and sugar. Frequently, children are unaware of the caloric content of the foods and beverages they regularly consume. However, be mindful that children and teens can be overwhelmed or turned-off by too many dietary facts.
- Reduce consumption of sugary beverages that are high in "empty" calories. Children and teens can choose types of sugar-free or "diet" beverages to substitute for higher-calorie versions. They should also be encouraged to drink water when they are thirsty. If children still want to consume regular sugar-containing beverages, suggest smaller servings to be consumed less frequently.
- Encourage the adoption of healthful snacking strategies. Suggest that children and teens try not to eat

snack foods right out of the box or bag. Putting snacks on a plate or in a bowl helps control portions. Try to encourage young people to eat in designated areas, such as at the kitchen table, instead of in front of the television or computer or in their bedroom. This can help reduce mindless over-indulging.

- Increase intake of whole fruits and low-calorie vegetables. The recommended number of servings for fruits and vegetables is five per day. However, the typical child in the United States consumes only one to two servings daily. Professionals should try to encourage consumption of these healthful foods by the whole family. Children typically model their eating behaviors after the eating habits of older family members, so it is especially important to have older siblings and parents eat these foods, too. Suggest fruit or vegetables as snack alternatives.
- Slow down snack and meal times, waiting 15 minutes before taking second helpings. This allows the body enough time to process foods already eaten and send fullness cues to the brain.
- Reduce trips to fast-food restaurants and choose healthier alternatives. Review children's favorite foods when dining out and provide options to decrease or replace unhealthful choices. Condiments should be reviewed and healthier options suggested. Educate on appropriate portion sizes for both food and drink choices in restaurants.
- Suggest strategies for school lunches. Children should be encouraged to bring healthful lunches from home or purchase low-fat, lower-calorie choices from the school cafeteria.

As the nutrition education sessions continue, other topic areas might include helping with the meal- and snack-time food selections, participating with grocery shopping, and educating on preparation of low-fat meals. Depending on the age of the child, awareness of hunger and fullness cues might also be addressed.

National Diabetes Education Program (NDEP) Information for Young People With Diabetes

The NDEP has worked with representatives from the leading diabetes, pediatric, primary care, nutrition, and education organizations to develop an Internet-based resource to inform health care professionals, parents, school personnel, and the media about the onset and management of diabetes in children. The Web site includes useful background information for lay audiences, along with access to up-to-date resources and biomedical literature about this emerging health problem.

The following resources are available on the NDEP Web site, www.ndep.nih.gov:

- **Helping the Student With Diabetes Succeed: A Guide for School Personnel**
  The NDEP has worked with several other diabetes, education, and health organizations to develop a guide for managing children with diabetes in the school setting. The purpose of the guide is to educate school personnel about diabetes, particularly type 1 diabetes, and to share a set of practices that enable schools to ensure a safe environment for students with diabetes.

  The guide includes a primer on the basics of diabetes management; lays out the roles and responsibilities of key school personnel, parents, and students with diabetes; includes tools to help implement effective diabetes management; and offers an overview of federal laws that address school responsibilities to students with diabetes. This valuable resource can be downloaded from the Web site for use by school personnel, health care professionals, and parents.

  A free copy of this guide can be ordered by calling the National Diabetes Information Clearinghouse (NDIC) at 800-438-5383. The first copy is free; each additional copy is $3, with a six-copy limit. Or, a copy of the guide can be downloaded from the NDEP Web site, www.ndep.nih.gov. All sections of the guide may be reproduced and distributed with no copyright restrictions. If bulk copies are desired, a printer-ready disk can be ordered from the NDIC for $20.

  To supplement the NDEP's efforts, the ADA has created a set of Internet-based training modules based on the guide. Called "Diabetes Care Tasks at School: What Key Personnel Need to Know," these modules are available on the ADA Web site, www.diabetes.org.
- **New Tip Sheet Series for Kids With Type 2 Diabetes and Their Families**
  The NDEP's Diabetes in Children and Adolescents Work Group has developed four fact sheets: "Eat Healthy Foods," "Stay at a Healthy Weight," "Be Active," and "What Is Diabetes?" The fact sheets focus on key components of a personal diabetes plan. Written at the sixth-grade reading level and field-tested with a variety of ethnic groups, they are bright, colorful, and geared toward school-age children. Download copies of the tip sheets from the NDEP Web site (www.ndep.nih.gov) or call the NDEP to order tip sheets: 800-438-5383.
- **Diabetes in Children and Adolescents Fact Sheet**
  This informative guide offers basic information on the different types of diabetes, special issues related to children, steps that family members and children can take to control diabetes, and a resource list. It may be downloaded and distributed to family members of newly diagnosed children, school personnel, and health professionals concerned about diabetes and children.
- **Resource Directory: Diabetes in Children and Adolescents**
  This Internet-based directory lists government, education, and volunteer organizations that offer information and resources related to children and adolescents with diabetes. Users will find links to relevant information and education programs; resources for modifying diabetes risk factors related to obesity, nutrition, and physical activity; and programs designed for reaching racial and ethnic minorities.

Additional Nutrition Resources

General diabetes nutrition information

The following recently updated pamphlets and booklets are available from

the ADA (http://store.diabetes.org) or the American Dietetic Association (www.eatright.org):
- "Basic Carbohydrate Counting"
- "Advanced Carbohydrate Counting"
- "Exchange Lists for Meal Planning"
- "The First Step in Diabetes Meal Planning"
- "Eating Healthy With Diabetes"
- "Healthy Food Choices"

Nutrition information for children with type 2 diabetes or prediabetes
- *Eating Healthy Rocks*, published by the International Diabetes Center (www.internationaldiabetescenter.org)
- *Helping Your Overweight Child* and *Take Charge of Your Health! A Teenager's Guide to Better Health*. Published by the Weight Control Information Network (WIN), a service of the National Institute of Diabetes and Digestive and Kidney Diseases. WIN assembles and disseminates to health professionals and the general public information on weight control, obesity, and nutritional disorders (www.niddk.nih.gov/health/nutrit/nutrit.htm)

References

[1]Fagot-Campagna A: Emergence of type 2 diabetes mellitus in children: epidemiological evidence. *J Pediatr Endocrinol Metab* 13 (Suppl. 6):1395–1402, 2000

[2]Tamborlane WV, Gatcomb PM, Savoye M, Ahern J: Type 1 diabetes in children. In *Therapy for Diabetes Mellitus and Related Disorders*. 3rd ed. Lebovitz HE, Ed. Alexandria, Va., American Diabetes Association, 1998, p. 61–69

[3]American Diabetes Association: Type 2 diabetes in children and adolescents (Consensus Statement). *Diabetes Care* 23:381–389, 2000

[4]American Diabetes Association: Evidence-based nutrition principles and recommendations for the treatment and prevention of diabetes and related complications (Technical Review). *Diabetes Care* 25:148–198, 2002

[5]Holzmeister LA: Medical nutrition therapy for children and adolescents with diabetes. *Diabetes Spectrum* 10:268–274, 1997

[6]Mazze R, Robinson R, Simonson G, Gerken S, Sundem S, Spencer M, Idrongo I, Strock E, Bergenstal R, Etzwiler D: *Quickguide: Detection and Treatment of Metabolic Syndrome and Type 2 Diabetes in Children and Adolescents.* Minneapolis, Minn., International Diabetes Center and Dunn & Semington, 2002

[7]Howelett HC, Bailey CJ: A risk-benefit assessment of metformin in type 2 diabetes mellitus. *Drug Safety* 20:489–503, 1999

[8]Betschart JE: Diabetes during childhood and adolescence. In *A Core Curriculum for Diabetes Education.* 4th ed. Franz MJ, Kulkarni K, Polonsky WH, Yarborough PC, Zamudio V, Eds. Chicago, American Association of Diabetes Educators, 2001, p. 3–25

[9]Siminerio L: Pediatric diabetes resources. *On the Cutting Edge* 22 (6):24–27, 2001

[10]Anderson B, Laffel LM. Diabetes self-care tasks: what can a kid do? *Diabetes Interview* 9:57, 2000

[11]Ingersoll GM, Orr DP, Herrold AJ, Golden MP: Cognitive maturity and self-management among adolescents with insulin dependent diabetes mellitus. *J Pediatr* 108:620–623, 1986

[12]Anderson RM, Funnell MM, Fitzgerald JT, Marrero DG: The diabetes empowerment scale: a measure of psychosocial self-efficacy. *Diabetes Care* 23:739–743, 2000

[13]Daly A, Bolderman K, Franz M, Kulkarni K: "Basic Carbohydrate Counting." Alexandria, Va., and Chicago, American Diabetes Association and American Dietetic Association, 2003

[14]Daly A, Franz M, Holzmeister LA, Kulkarni K, O'Connell B, Wheeler M: "Exchange Lists for Meal Planning." Alexandria, Va., and Chicago, American Diabetes Association and American Dietetic Association, 2003

[15]Daly A, Bolderman K, Franz M, Kulkarni K: "Advanced Carbohydrate Counting." Alexandria, Va., and Chicago, American Diabetes Association and American Dietetic Association, 2003

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