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Overview of Diabetes in Children and Teens

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Type 1 and type 2 diabetes affect about 186,000 youth under age 20. Previously considered an adult disease, type 2 diabetes is becoming increasingly common in overweight minority youth over 10 years of age. Criteria help to identify young people at risk for type 2 diabetes as well as those with the disease. Prevention or delay of type 2 requires weight loss through healthy eating, portion control and increased physical activity, along with family counseling and support. Type 1 diabetes usually has an acute onset and needs prompt diagnosis and treatment. It is important not to confuse its diagnosis with gastroenteritis. For both types of diabetes, management is determined by the family and diabetes care team depending on the child's type of diabetes and individual needs. Healthy eating and daily physical activity are key components. For those using glucose lowering medications, especially insulin (which is essential for type 1 diabetes), avoiding low blood glucose is important. Careful ongoing management of diabetes contributes to well-being and the avoidance or delay of onset of the long term diabetes complications. These complications affect normal function of the eyes, nerves, kidneys and cardiovascular system. Psychological support helps youth cope with the ongoing demands of diabetes management. Educators can help ensure the child's full participation in school activities.

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Role of Health Educators in Assisting Youth and Adolescents with Diabetes

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Management of diabetes in children requires balancing nutrition, physical activity and medication on a daily basis in order to achieve blood glucose targets. The health educator can assist children and their families in meeting their diabetes management goals by better understanding the current recommendations and tasks involved to achieve them. Whereas children with type 1 diabetes require multiple injections of insulin per day or use of an insulin pump, children with type 2 diabetes may require an oral medication, insulin or both. Nutrition and physical activity recommendations are similar for children with diabetes as they are for all healthy children. Meal planning for children with diabetes usually involves a method of carbohydrate counting, since this is the main nutrient that raises blood glucose. Short term management outcomes for children with diabetes include the prevention of hypo- and hyperglycemia, while long term outcomes include the prevention of micro and macro-vascular complications.

Spiegel GA, Evert A, Shea L. Role of health educators in assisting youth and adolescents with diabetes. *Am J Health Educ.* 2009;40(5):264-270. This paper is part of a sponsored set of papers contributed through the National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health.

Providing a Safe Environment for Students with Diabetes

Janet H. Silverstein, Crystal C. Jackson, Nichole Bobo, Francine R. Kaufman, Sarah Butler, and Katie Marschilok

Current diabetes regimens require more effort than ever before. The level of diabetes control students are able to maintain is affected greatly by their ability to care for their diabetes during the school day. This article reviews use of School Health Plans and Diabetes Medical Management Plans in schools. Students with diabetes, their families, health care providers and school personnel all have responsibilities that should be outlined in these plans. School nurses coordinate school-based diabetes care, provide training to school staff members, advocate for students and monitor implementation of students' school plans. Normal growth and development, prevention of complications and full participation in academic and social opportunities should be possible for students with diabetes. A variety of resources that support students with diabetes are described and referenced.

Silverstein JH, Jackson CC, Bobo N, Kaufman FR, Butler SS, Marschilok K. Providing a safe environment for students with diabetes. *Am J Health Educ.* 2009;40(5):271-275. This paper is part of a sponsored set of papers contributed through the National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health.

Psychosocial Issues that Affect Youth with Diabetes

Christina Cammarata, Kara J. Meyer, Gary Geffken, Dania Felipe, Diane Franz, Alfonso Vargas, and Jodi L. Kamps

Type 1 diabetes, one of the most common diseases of childhood, requires adherence to a complicated regimen which is often times difficult to manage resulting in stress for children, siblings, and caregivers. Many children with diabetes are nonadherent, likely due to the difficulty and complexity of the tasks required, and, thus, are at greater risk for diabetes related complications. For health care educators, it is important to understand the various psychosocial issues that affect adherence and adjustment to diabetes. This article will discuss these issues, including coping with a new diagnosis, school factors, regimen adherence and family variable and parenting strategies. Recommendations for health care educators are also discussed.

Cammarata C, Meyer K, Geffken G, Felipe D, Franz D, Kamps JL, et al. Psychosocial issues that affect youth with diabetes. *Am J Health Educ.* 2009;40(5):277-281. This paper is part of a sponsored set of papers contributed through the National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health.

Lowering Risk for Type 2 Diabetes in High-risk Youth

Nichole Bobo, Shirley Schantz, Francine R. Kaufman, and Sobha Kollipara

Among children and youth who develop type 2 diabetes (T2DM) there are a number of genetic and environmental factors that lead to a combination of insulin resistance and relative-cell secretory failure of the pancreas. These factors include ethnicity (highest in American Indian youth), obesity, sedentary behavior, family history of T2DM, puberty, low birth weight, intrauterine diabetes exposure and female gender. The American Diabetes Association (ADA)

has recommended guidelines to screen children and youth for diabetes risk. School nurses in a National Association of School Nurses' program use the ADA guidelines, and then refer at-risk children to a health care provider for further evaluation and intervention. The HEALTHY trial funded by the National Institutes of Health is assessing whether school-based strategies can reduce diabetes risk. Prevention and intervention of overweight and obesity in children—a risk factor for the development of T2DM in children and youth—is a shared responsibility among parents, schools, health care providers and communities.

Bobo N, Schantz S, Kaufman FR, Kollipara S. Lowering risk for type 2 diabetes in high-risk youth. *Am J Health Educ.* 2009;40(5):282-284. This paper is part of a sponsored set of papers contributed through the National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health.

Effects of Physical Activity on Diabetes Management and Lowering Risk for Type 2 Diabetes

Connie L. Tompkins, Arlette Soros, Melinda S. Sothern, and Alfonso Vargas

Physical activity is a proven form of diabetes management and is considered a cornerstone in the prevention of diabetes. In children with diabetes, physical activity may improve insulin sensitivity and glucose uptake in skeletal muscle. Aerobic-based physical activity lasting 40-60 minutes daily for a minimum of four months is shown to enhance insulin sensitivity, and may reduce the risk for type 2 diabetes. An important adjunct to aerobic-based physical activity for diabetes prevention is resistance training. The American Academy of Pediatrics supports properly supervised strength/resistance training as a safe method for strength development in preadolescent children. Resistance training may increase skeletal muscle mass, therefore increasing whole-body glucose disposal capacity. In addition to immediate health benefits during childhood, increased physical activity in children and adolescents is likely to contribute to the establishment of healthy leisure habits over a lifetime and improved adult cardiovascular health. Large-scale intervention studies, however, are needed to determine the most effective physical activity strategies for prevention and management of type 2 diabetes in children and adolescents.

Tompkins CL, Soros A, Sothern MS, Vargas A. Effects of physical activity on diabetes management and lowering risk for type 2 diabetes. *Am J Health Educ.* 2009;40(5):286-290. This paper is part of a sponsored set of papers contributed through the National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health.

Diabetes Technologies and Their Role in Diabetes Management

Sobha Kollipara, Janet H. Silverstein, and Katie Marschilok

The 1993 Diabetes Complications and Control Trial (DCCT) showed that controlling blood glucose prevents and delays the progression of long term complications of diabetes. New diabetes technologies can make control of diabetes possible and safer. This paper reviews these technologies used to monitor blood glucose, administer insulin and evaluate effectiveness of therapy. Self-monitoring of blood glucose has been a standard of care for several decades. Today, patients and practitioners can gain great benefit from data that can be provided by using

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Continuous Glucose Monitoring (CGM). Current physiologic insulin therapy regimens have improved blood glucose control capabilities. Insulin therapy devices; including pens and pumps are reviewed. Advantages of insulin pump therapy and features of the latest 'smart' pumps are described. Children with diabetes, and their families, have many challenges as well as many opportunities to employ new technologies in diabetes management plans. The ability of school and care givers to support children can impact the overall success of any diabetes therapy regimen.

Kollipara S, Silverstein JH, Marschilok K. Diabetes technologies and their role in diabetes management. *Am J Health Educ.* 2009;40(5):292-297. This paper is part of a sponsored set of papers contributed through the National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health.

Community Resources for Promoting Youth Nutrition and Physical Activity

Kelly R. Moore, Melissa K. McGowan, Karen A. Donato, Sobha Kollipara, and Yvette Roubideaux

Childhood obesity is a national public health crisis. The National Diabetes Education Program (NDEP), the National Institutes of Health and Kaiser Permanente have developed community tools and resources for children and families to lower their risk for obesity through healthier, active lifestyles. The authors describe innovative practices and community mobilization case studies from the NDEP "Move It! and Reduce Your Risk for Diabetes" program and the NIH We Can!™ - Ways to Enhance Children's Activity and Nutrition, and programs from Kaiser Permanente for the promotion of healthier lifestyles for children and families. Replication of these creative programs can be modified to be implemented in communities throughout the United States.

Moore KR, McGowan MK, Donato KA, Kollipara S, Roubideaux Y. Community resources for promoting youth nutrition and physical activity. *Am J Health Educ.* 2009;40(5):298-303. This paper is part of a sponsored set of papers contributed through the National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health.