

DIABETES

OVERVIEW

Definitions

Type 1 diabetes is an autoimmune disease that occurs when T cells attack and decimate the beta cells in the pancreas that are needed to produce insulin, so that the pancreas makes too little insulin (or no insulin). Without the capacity to make adequate amounts of insulin, the body is not able to metabolize blood glucose (sugar) to use it efficiently for energy, and toxic acids (called ketoacids) build up in the body.

In Type 2 diabetes, the beta cells of the pancreas produce insulin but the body is unable to use it effectively because the cells of the body are resistant to the action of insulin. Although this type of diabetes may not carry the same risk of death from ketoacidosis, it otherwise involves many of the same risks of complications as does type 1 diabetes (in which there is a lack of insulin). Type 2 diabetes is also known as insulin-resistant diabetes, non-insulin dependent diabetes, and adult-onset diabetes.

Symptoms

Type 1 diabetes: the classic symptoms of Type 1 diabetes are frequent urination (*polyuria*), unusual thirst (*polydipsia*), extreme hunger (*polyphagia*), unusual weight loss, extreme fatigue and irritability.

Type 2 diabetes: any of the type 1 symptoms, plus frequent infections, blurred vision, cuts/bruises that are slow to heal, tingling/numbness in the hands/feet, recurring skin, gum, or bladder infections. People with type 2 diabetes often have no symptoms.

<http://www.diabetes.org/diabetes-basics/symptoms/>

Complications

Complications of diabetes –from the International Diabetes Federation:

Type 1 and type 2 diabetes are chronic, life-long conditions that require careful monitoring and control. Without proper management they can lead to very high blood sugar levels which can result in long term damage to various organs and tissues.

Cardiovascular disease: affects the heart and blood vessels and may cause fatal complications such as coronary heart disease (leading to heart attack) and stroke. Cardiovascular disease is the major cause of death in people with diabetes, accounting in most populations for 50% or more of all diabetes fatalities, and much disability.

Kidney disease (diabetic nephropathy): can result in total kidney failure and the need for dialysis or kidney transplant. Diabetes is an increasingly important cause of renal failure, and indeed has now become the single most common cause of end stage renal

disease, i.e. that which requires either dialysis or kidney transplantation, in the United States and around the world.

Nerve disease (diabetic neuropathy): can ultimately lead to ulceration and amputation of the toes, feet and lower limbs. Loss of feeling is a particular risk because it can allow foot injuries to escape notice and treatment, leading to major infections and amputation.

Eye disease (diabetic retinopathy): characterized by damage to the retina of the eye which can lead to vision loss.

<http://www.idf.org/complications-diabetes>

Incidence & Causes

The incidence of both type 1 and type 2 diabetes is increasing. According to the Centers for Disease Control & Prevention's Diabetes Report Card 2012, from 1990 through 2010, the annual number of new cases of diagnosed diabetes almost tripled.

The increase in type 2 diabetes is directly correlated with the increased incidence of obesity. The increase in the incidence of type 1 diabetes is less easily explained. Research has implicated a number of factors – autoimmune, genetic and environmental, however except for known genetic links, nothing has been conclusive. .

According to the 2011 National Diabetes Fact Sheet (CDC, released Jan. 26, 2011), a total of 25.8 million children and adults in the United States—8.3% of the population—have diabetes.

Under 20 years of age

- 215,000, or 0.26% of all people in this age group have diabetes
- About 1 in every 400 children and adolescents has diabetes

Note- According to an article, *The Rise of Childhood Type 1 Diabetes in the 20th Century* (Edwin A.M. Gale, Diabetes, December 2002), a number of factors have been found to have a positive correlation to the development of type 1 diabetes. A hereditary link (genetic susceptibility) has long been known. Others include rapid growth in childhood (children are growing taller and at a faster rate than in past centuries) and the possible loss of protective factors in the childhood environment. An example of this later possibility is research with NOD (non obese diabetic) mice. This mouse strain develops spontaneous autoimmune diabetes. They were much less likely to develop diabetes in the presence of pinworms, once a very common childhood infestation. <http://diabetes.diabetesjournals.org/content/51/12/3353.full>

Management at School

Schools must provide necessary accommodations to facilitate management with as little impact on the school day as possible and have trained staff to assist as needed (blood glucose monitoring, insulin administration, insulin pump monitoring, carbohydrate counting, glucagon administration in an emergency, etc.).

TYPE 1 DIABETES: Management is complex and multifaceted.

- Blood glucose levels need to be monitored several times a day, as tight glucose control has been shown reduce complications (Diabetes Control and Complications Trial Research Group, 1996).
- Insulin (often more than one type) is administered throughout the day to keep blood glucose levels as close to a normal range as possible.
- Students need to have the carbohydrate content of meals/snacks calculated to determine the necessary dose of insulin, while also factoring in the blood glucose level.
- Physical activity influences blood glucose levels and insulin needs.

Also:

- The student needs to be continually observed for signs and symptoms of high or low blood glucose.
- If the student's blood glucose level drops too low, it may rapidly become a medical emergency.
- If the student becomes ill, management is complicated and they are more susceptible to a medical emergency.

The following are excerpts from the National Association of School Nurse's position statement *Diabetes Management in the School Setting* (the link below leads to the full document and references). This document gives an excellent overview of school management.

It is the position of the National Association of School Nurses that the registered professional school nurse (hereinafter referred to as school nurse) is the only school staff member who has the skills, knowledge base, and statutory authority to fully meet the healthcare needs of students with diabetes in the school setting. Diabetes management in children and adolescents requires complex daily management skills (American Association of Diabetes Educators [AADE], 2008) and health services must be provided to students with diabetes to ensure their safety in the school setting and to meet requirements of federal laws.

The school nurse develops the Individualized Health Plan from the Diabetes Medical Management Plan (DMMP) (medical orders) by collaborating with the child's family, obtaining additional assessment findings, and outlining the diabetes management strategies and personnel needed to meet the student's health goals in school (NDEP, 2010).

The IHP identifies the student's daily needs and management strategies for that student while in the school setting. The school nurse also coordinates the development and staff education of the Emergency Care Plan (ECP) which directs the actions to be taken by school personnel for symptoms of hypoglycemia and hyperglycemia.

The goals of the DMMP and Individual Health Plan (IHP) are to promote normal or near normal blood glucose with minimal episodes of hypoglycemia or hyperglycemia, normal growth and development, positive mental health, and academic success.

Hypoglycemia (low blood glucose) is the greatest immediate danger to the student with diabetes. During hypoglycemic incidents, the student may not be able to self-manage due to impaired cognitive and motor function. A student experiencing hypoglycemia should never be left alone or sent anywhere alone.

Hyperglycemia (high blood glucose) can develop over several hours or days, and untreated can lead to the life-threatening condition, diabetic ketoacidosis (DKA).

Managing diabetes at school is most effective when there is a partnership among students, parents, school nurse, health care providers, teachers, counselors, coaches, transportation, food service employees, and administrators. The school nurse provides the health expertise and coordination needed to ensure cooperation from all partners in assisting the student toward self-management of diabetes.

Poorly controlled diabetes and fluctuating blood glucose levels not only affect academic performance but can lead to long-term complications such as retinopathy, cardiovascular disease, and nephropathy. Maintaining blood glucose levels within a target range can prevent, reduce, and reverse long-term complications of diabetes (DDCT, 1996).

The school nurse's role is critical in the case management and coordination of care for recognition and treatment of the student experiencing hypoglycemia in school (Butler, 2007). The school nurse fosters independent decision making, promotes healthy life-style choices and diabetes self-care ensuring a smooth transition between high school and adult diabetes medical care.

<http://www.nasn.org/Portals/0/positions/2012psdiabetes.pdf>

School Management Resources

The **National Diabetes Education Program (NDEP)**: *Helping the Student with Diabetes Succeed: A Guide for School Personnel* (2010)

<http://ndep.nih.gov/publications/PublicationDetail.aspx?PubId=97#main>
(includes emergency action plans for hypoglycemia and hyperglycemia)

NDEP is a partnership of the National Institutes of Health, the Centers for Disease Control & Prevention, and more than 200 public and private organizations.

The American Diabetes Association: <http://www.diabetes.org>. This site has a wealth of information for families and schools – see the **Safe at School** section.

<http://www.diabetes.org/living-with-diabetes/parents-and-kids/diabetes-care-at-school/>

Also, the **National Association of School Nurses** has a webpage dedicated to Diabetes in Children: <http://nasnupgrade.winxweb.com/ToolsResources/DiabetesinChildren>.

Glucagon Training Standards

http://www.diabetes.org/assets/pdfs/state-school-laws/ca_glucagontrainingstds.pdf

Help with glucagon training- A Lilly Diabetes Mobile Application is available for those who support people with type 1 diabetes. The free app serves as a teaching tool for school nurses and can provide guidance for treatment with Lilly Glucagon for Injection (rDNA origin) during severe hypoglycemic events. The app is designed to help people be more prepared, and also provides an opportunity to store locations and expiration dates of their Lilly Glucagon Emergency Kits. The Lilly Glucagon Mobile App is now available on the iTunes® store as a free download for iPhone® or iPad® mobile devices.

Also, for a free Glucagon training kit you can call Lily @ 1-800-545-5979.

Insulin

Each state's Nurse Practice Act determines which tasks may be delegated to unlicensed personnel. The California Nurse Practice Act does not allow for the delegation of injections except for Education Code permitted emergency medications.

School Nurses should be aware of the K.C. et al v. Jack O'Connell Diabetes Case Settlement and subsequent lawsuit - American Nurses Association and American Nurses Association\CA vs. the California Department of Education (appeal pending).

The California Department of Education <http://www.cde.ca.gov/ls/he/hn/diabllegalqa.asp>

The California School Boards Association

http://www.csba.org/Services/Services/PolicyServices/~/_media/Files/Services/PolicyServices/PolicyBriefs/diabetes_policy_brief.ashx

The American Diabetes Association

http://advocacy.diabetes.org/site/DocServer/BRN_NPA_Cmte.let.pdf?docID=5583

The California School Nurse Organization <http://www.csno.org/wp-content/uploads/2011/doc/2010-InsulinAdministrationSchools.pdf>

TYPE 2 DIABETES: some students may be on oral medications at school. Less often, students may need to check their blood glucose level and/or take insulin while at school.

The goal of treatment is to normalize the blood glucose in an attempt to prevent or minimize complications. People with type 2 diabetes may experience marked hyperglycemia, but most do not require insulin injections. 80% of all people with type 2 diabetes can be treated with diet, exercise, and, if need be, oral hypoglycemic agents (drugs taken by mouth to lower the blood sugar).

Type 2 diabetes requires good dietary control including the restriction of calories, lowered consumption of simple carbohydrates and fat with increased consumption of complex carbohydrates and fiber. Regular aerobic exercise is also an important method for treating type 2 diabetes since it decreases insulin resistance and helps burn excessive glucose. Regular exercise also may help lower blood lipids and reduce some effects of stress, both important factors in treating diabetes and preventing complications.

Note: Since 2010, Education Code 49452.7 specifies that school districts are to provide parents/guardians of incoming 7th graders with an information sheet regarding type 2 diabetes. See <http://www.cde.ca.gov/ls/he/hn/type2diabetes.asp> for this information which is available in a number of languages.

Additional Resources:

Barbara Davis Center for Childhood Diabetes:
<http://www.barbaradaviscenter.org>

Centers for Disease Control and Prevention, Division of Diabetes Translation
<http://www.cdc.gov/diabetes>

Children with Diabetes
<http://www.childrenwithdiabetes.com>

Colorado Kids with Diabetes: an example of a collaborative partnership
<http://www.coloradokidswithdiabetes.org/>

Juvenile Diabetes Research Foundation International
<http://www.jdrf.org>

Centers for Disease Control & Prevention (CDC)
<http://www.cde.ca.gov/ls/he/hn/type2diabetes.asp>

CDC Report Diabetes Report Card
<http://www.cdc.gov/diabetes/pubs/pdf/DiabetesReportCard.pdf>

CDC National Diabetes Fact Sheet 2011 http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2011.pdf

Overview of Diabetes in Children and Adolescents from the National Diabetes Education Program (NDEP) http://ndep.nih.gov/media/youth_factsheet.pdf

News http://articles.nydailynews.com/2012-06-12/news/32199708_1_juvenile-diabetes-diabetes-patients-american-diabetes-association

NOD Mice <http://www.ncbi.nlm.nih.gov/pubmed/15771578>

CDE <http://www.cde.ca.gov/ls/he/hn/diabetesmgmt.asp>

Legal References

The Americans with Disabilities Act/Section 504

Education Code 49400

Education Code 49452.7

Education Code 49414.5