Diabetes

What is diabetes?

- Diabetes is a disorder that affects the way the body uses or converts food for energy and growth.
- There are 2 types of diabetes.
  - Type 1 diabetes mellitus is a disease in which the immune system destroys the cells in the pancreas that make insulin. Insulin is the hormone that helps our bodies metabolize glucose ("sugar"), which is the immediate fuel of the body. Children with type 1 diabetes mellitus need to take insulin to live.
  - Type 2 diabetes mellitus is a disease in which the pancreas produces insulin, but the body cannot use it effectively, often because of obesity and a high genetic risk.
- Both types of diabetes cause levels of glucose to rise in the blood. This glucose can't be used by the body as fuel. The body excretes the excess glucose in the urine, causing increased urination.

How common is it?

- Diabetes affects 20.8 million people in the United States, or about 7% of the population.
- Type 1 diabetes mellitus is most common in children, with about 3 million affected. About 1 in 500 US children have type 1 diabetes mellitus. It is one of the most common chronic diseases in children.
- Type 2 diabetes mellitus typically develops in people after age 40, but it can be seen earlier. It has recently begun to present more frequently in children, especially among adolescents who have obesity.

What are some common characteristics of children who have diabetes or of diabetes as children present with it?

- Symptoms of diabetes can include excessive thirst, frequent urination, and increased appetite with weight loss, fatigue, or lethargy. Sudden onset of unexplained urinary wetting (incontinence) is also a warning sign to check for diabetes.
- Children with type 1 diabetes mellitus can develop *diabetic ketoacidosis* (DKA), a serious condition in which their blood glucose levels are high and they become severely dehydrated because they do not produce sufficient insulin. A dangerous electrolyte imbalance accompanies the child's high blood glucose level. Children with DKA may have vomiting that worsens the dehydration, a "fruity" smell to their breaths, labored breathing, and progression to unconsciousness and death if not treated.

AAP

Child wearing an insulin pump

- Type 2 diabetes mellitus generally has a slower and more gradual onset of the same symptoms caused by high glucose levels. Sometimes, type 2 diabetes mellitus produces no symptoms in children and adults. Other times, people with type 2 diabetes mellitus can present with severe dehydration and high glucose levels, making it difficult to distinguish type 2 diabetes mellitus from type 1.
- Short-term complications of diabetes are related to blood glucose levels being too high or too low.
- Long-term complications include vision problems, early heart disease, poor wound healing, high blood pressure, nerve damage, and renal (kidney) failure.
- Children with diabetes need exercise and a healthy diet as part of their treatments. Carbohydrate counting allows them to eat many types of food, and even sweet foods, because insulin is dosed accordingly. They should be given the same opportunities to participate in child care and school activities but may need some adjustment of their insulin doses or food intakes to accommodate changes in activity.
- Children with type 2 diabetes mellitus may be on meal plans that are designed to limit excess weight gain.

Diabetes (*continued*)

Who might be on the treatment team?

- A pediatric endocrinologist, nurse practitioner, and dietitian often direct the medical treatment of children with diabetes in association with diabetes nurse educators.
- Often, but not always, social workers or psychologists are working with such multidisciplinary teams. These professionals may serve as a resource for information or training for program staff.

What are some elements of a Care Plan for children with diabetes?

- All children with diabetes should have an individualized health Care Plan in place before the start of the school year or before entrance into a child care program.
- Following are components of a Care Plan for children with type 1 diabetes mellitus:
  - Managing diabetes requires frequent finger-stick tests to check for blood glucose levels, progress of diet adjustments, and insulin levels.
  - Children receive insulin by injection, either an insulin pen or an insulin syringe, or through an insulin pump.
  - The Care Plan should include
    - When finger-stick tests should be done and the results checked and how the testing material should be disposed of safely.
    - What blood glucose–level range is expected for the child and what actions should be taken immediately if the blood glucose level is outside the range.
    - Where and how insulin injections are given. Ideally, a written plan should describe how to adjust insulin doses, how to recognize and treat low blood glucose levels, and when to call for parents/guardians or diabetes team assistance.
    - The typical symptoms of hyperglycemia (blood glucose level too high) or hypoglycemia (blood glucose level too low) for this child.
    - When to check the blood or urine for ketone bodies and what to do when ketone body levels are elevated.
    - The type, frequency, and amount of insulin used. Insulin comes in long- and short-acting varieties that are frequently used together. During the day, most children require only premeal or pre-snack doses of the fast-acting insulin.
    - Be sure all staff who will care for the child go over the Care Plan with the child's parents/guardians, and keep foods that will correct low blood glucose levels available at all times (eg, juice, glucose tablets or gels).
    - Close communication with parents/guardians is essential. Program staff or school nurses should keep a log of the child's blood glucose levels and ask parents/guardians to keep them informed of blood glucose levels at home. Parents/guardians should be able to provide logbooks and can work with program staff or school nurses to develop a successful communication process.
    - There should be a written plan concerning how to respond to a low or high blood glucose level and how to reach parents/guardians and the pediatric diabetes team for further advice or assistance.

AAP

Insulin pump


AAP

Insulin vial


AAP

Measuring insulin

Diabetes (*continued*)

What adaptations may be needed?

Medications

- Children with type 1 diabetes mellitus must receive insulin injections to control the disorder. More detailed information is listed in the What are some elements of a Care Plan for children with diabetes? section earlier in this Quick Reference Sheet.
- Children with type 2 diabetes mellitus are usually on oral medications to control their blood glucose levels, but sometimes they also receive insulin injections.
- Glucagon is an emergency medication, usually administered by injection, that can raise the blood glucose level in an emergency, that is, when the child has a critically low glucose level and has altered mental status that would make correcting it with oral glucose potentially dangerous.
- All staff who will be administering medication should have medication administration training (see Chapter 6).

Dietary Considerations

- Talk with parents/guardians or a registered dietitian/nutritionist to help plan the child's meals and provide carbohydrate counts so that insulin may be given appropriately. A written copy of the child's meal plan should be available so that the entire staff is aware of the child's food and snack needs.
- Have parents/guardians suggest or supply foods for their child that can be given during class celebrations or birthdays. Be creative about using activities as rewards, rather than sweets, for all children. Children with diabetes may have the same treats as their classmates if the Care Plan stipulates how to give insulin according to the carbohydrate count in the snack.
- Children with type 2 diabetes mellitus often have overweight and may be on a special lower-calorie diet.
- Develop strategies for accommodating children with diabetes. Suggestions include
  - Learn about the symptoms of low blood glucose levels and high blood glucose levels in children, and know what to do about these symptoms.
  - Know what causes low blood glucose levels. A child may develop a low blood glucose level if a meal or snack is delayed, if his or her physical activity level is higher than normal, or if he or she does not eat enough food to match the insulin administered. Hypoglycemia is rarely seen in children with type 2 diabetes mellitus but may occur if a child is taking insulin.
    - Symptoms of low blood glucose levels include hunger, shakiness, confusion, vomiting, headache, irritability, and sleepiness.
    - Severe low blood glucose levels (hypoglycemia) can occur if such symptoms are undetected and might cause loss of consciousness or seizures. Severe hypoglycemia is a medical emergency and requires glucagon injection and specialty medical assistance. Most, but not all, severe low blood glucose levels can be prevented by frequent blood glucose monitoring, matching the amount of insulin administered to the amount and type of food eaten, and awareness of the early signs and symptoms of hypoglycemia.
    - Orange juice, granulated sugar, jam, or jelly can be given to quickly raise a child's blood glucose level if the child is alert and conscious and not at risk of aspiration.
    - Glucagon emergency injections are also available to treat severe low blood glucose levels (hypoglycemia) if the child is unable to drink or eat because of altered mental status.
  - Know what causes high blood glucose levels. A child may develop a high blood glucose level if he or she is ill, stressed, or not as active as usual; missed an insulin injection; or ate too much food without sufficient insulin of any kind, especially food with too many carbohydrates.
    - Symptoms of high blood glucose levels include frequent urination, thirst, and stomachache.
    - If you suspect a high blood glucose level, check for it with a finger-stick test. If the level is above the target range, having the child drink water or sugar-free liquid may help. Check the child's Care Plan for other details about providing interventions such as additional doses of insulin and when to check for blood or urinary ketone bodies.

Physical Environment and Other Considerations

Physical activity is important in addressing obesity and inactivity as underlying causes of type 2 diabetes mellitus in children, so outdoor play is part of their therapies. Children with type 1 diabetes mellitus should be able to play normally. Staff should take a portable pack with testing equipment, insulin, syringes, high-calorie supplements, and glucagon in case of an emergency whenever the child is in a different location or on a field trip. A glucometer, a small device used to check blood glucose level, should also be available. All children and the adults caring for them should be up-to-date on their vaccinations, including their annual influenza vaccinations.

Diabetes (*continued*)

What should be considered an emergency?

- Call emergency medical services (911) if the child
  - Vomits repeatedly and becomes disoriented or unconscious
  - Cannot keep any food or fluids down when his or her blood glucose level is low
  - Develops lethargy, cannot be aroused, or has a seizure
- Call the parents/guardians or the diabetes team according to the Care Plan for
  - High blood glucose level with or without concomitant ketone bodies positive for the levels per the plan provided
  - Low blood glucose level if the child is alert and taking food
  - More-frequent urination
- In the event of a programmatic (facility) emergency that requires evacuation, the child's insulin and any necessary emergency equipment must be brought with the child.

What types of training or policies are advised?

- Medication administration training, including how to operate the specific insulin pump of the child
- Dietary guidelines
- Diabetes education for all staff
- Emergency management training, including how to administer glucagon
- Standard precautions (eg, gloves, handwashing)
- Glucose monitoring training, including how to interpret the results

What are some resources?

- American Diabetes Association: www.diabetes.org, 1-800-DIABETES (1-800-342-2383)—American Diabetes Association. Diabetes care in the school and day care setting. *Diabetes Care*. 2014;37(suppl 1):S91–S96. http://care.diabetesjournals.org/content/37/Supplement_1/S91.short
- Centers for Disease Control and Prevention: www.cdc.gov, 1-800-CDC-INFO (1-800-232-4636)
  - "Diabetes in Schools" (Web page), www.cdc.gov/healthyschools/npao/diabetes.htm
  - "Managing Chronic Health Conditions in Schools" (Web page), www.cdc.gov/healthyschools/chronicconditions.htm
- Children with Diabetes—The Online Community for Kids, Families and Adults with Diabetes: www.childrenwithdiabetes.com
- International Society for Pediatric and Adolescent Diabetes: www.ispad.org
- Juvenile Diabetes Research Foundation, International: www.jdrf.org, 1-800-533-CURE (1-800-533-2873)
- National Institute of Diabetes and Digestive and Kidney Diseases, National Diabetes Education Program: *Helping the Student With Diabetes Succeed: A Guide for School Personnel* (guidebook), www.niddk.nih.gov/health-information/communication-programs/ndep/health-professionals/helping-student-diabetes-succeed-guide-school-personnel

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN®