Section 1

Diabetes Primer for School Personnel

Contents

How To Use the Diabetes Primer

- Copy and distribute the Diabetes Primer to all school personnel who are responsible for students with diabetes during the school day.
- Incorporate the content into diabetes management training for school personnel.
- Use the National Diabetes Education Program's electronic slide presentation about diabetes for school district and other staff. Visit: **http://ndep.nih.gov/hcp-businesses-and-schools/Schools.aspx**
- Review sections of the Diabetes Primer at school health team meetings.
- Share the Diabetes Primer with the parents/guardian, other school personnel, and health care professionals who are seeking the latest information about children with diabetes.
- Prepare a science or health education lesson about diabetes using the information in the Diabetes Primer.

What Is Diabetes?

Diabetes is a chronic disease in which blood glucose (sugar) levels are above normal. People with diabetes have problems converting food to energy. After a meal, food is broken down into a sugar called glucose, which is carried by the blood to cells throughout the body. Insulin, a hormone made in the pancreas, allows glucose to enter the cells of the body where it is used for energy.

People develop diabetes because the pancreas produces little or no insulin or because the cells in the muscles, liver, and fat do not use insulin properly. As a result, the glucose builds up in the blood, is transported into the urine, and passes out of the body. Thus, the body loses its main source of fuel even though the blood contains large amounts of glucose.

When insulin is no longer made, it must be obtained from another source—insulin injections or an insulin pump. When the body does not use insulin properly, people with diabetes may take insulin or other glucose-lowering medications. **Neither insulin nor other medications, however, are cures for diabetes; they only help to control the disease.**

Taking care of diabetes is important. Over the years, ongoing high blood glucose, also called hyperglycemia, can lead to serious health problems. If not managed effectively, diabetes can affect the blood vessels, eyes, kidneys, nerves, gums, and teeth, making it the leading cause of adult blindness, kidney failure, and non-traumatic lower limb amputations. Diabetes also increases a person's risk for heart disease and stroke.

Some of these problems can occur in teens and young adults who develop diabetes during childhood. The good news is that research shows these problems can be greatly reduced, delayed, or possibly prevented through intensive treatment that keeps blood glucose levels near normal.

Taking care of diabetes is important. Over the years, ongoing high blood glucose, also called hyperglycemia, can lead to serious health problems.

The three main types of diabetes are type 1, type 2, and gestational diabetes.

Type 1 Diabetes

Type 1 Diabetes

Symptoms:

- Increased thirst and urination
- Weight loss
- Blurred vision
- Feeling tired all the time

Risk Factors:

- Genetics
- Environment

Type 1 diabetes, formerly called juvenile diabetes, is a disease of the immune system, the body's system for fighting infection. In people with type 1 diabetes, the immune system attacks the beta cells (the insulin-producing cells of the pancreas) and destroys them. Because the pancreas can no longer produce insulin, people with type 1 diabetes must take insulin daily to live.

Type 1 diabetes can occur at any age, but onset of the disease occurs most often in children and young adults. Most cases of diabetes in children under age 10 are type 1 diabetes. In adults, type 1 diabetes accounts for 5 to 10 percent of all cases of diagnosed diabetes.

Symptoms. The symptoms of type 1 diabetes are due to an increase in the level of glucose in the blood and include increased thirst and urination, weight loss, blurred vision, and feeling tired all the time. These symptoms may be mistaken for severe flu or another rapid-onset illness. If not diagnosed and treated with insulin, the child with type 1 diabetes can lapse into a life-threatening condition known as diabetic ketoacidosis (KEY-toe-asi-DOE-sis) or DKA. Signs of DKA include vomiting, sleepiness, fruity breath, difficulty breathing, and if untreated, coma and death. (For more information about DKA, see page 44.)

Risk factors. Although scientists have made much progress in predicting who is at risk for type 1 diabetes, they do not yet know what triggers the immune system's attack on the pancreas' beta cells. They believe that type 1 diabetes is due to a combination of genetic and environmental factors that are beyond the individual's control. Researchers are working to identify these factors and to stop the autoimmune process that leads to type 1 diabetes.

Type 2 Diabetes

Type 2 diabetes, formerly called adult-onset diabetes, is the most common form of the disease. People can develop it at any age, even during childhood. A progressive disease, type 2 diabetes usually begins with insulin resistance, a condition in which muscle, liver, and fat cells do not use insulin properly. At first, the pancreas keeps up with the added demand by producing more insulin. Over time, however, the pancreas loses its ability to secrete enough insulin in response to meals or to even control the glucose level overnight or during periods of fasting.

Managing type 2 diabetes includes lifestyle changes such as making healthy food choices and getting regular physical activity. In addition, people with type 2 diabetes may take insulin and/or other glucose-lowering medications to control their diabetes.

In the past, type 2 diabetes used to be found mainly in overweight or obese adults ages 40 or older. Now, as more children and adolescents in the United States have become overweight and inactive, type 2 diabetes is occurring in young people.

Symptoms. Symptoms of type 2 diabetes in children may be similar to those of type 1 diabetes. A child or teen may feel very tired or thirsty and have to urinate often due to high blood glucose levels. Other symptoms include weight loss, blurred vision, frequent infections, and slow-healing wounds. High blood pressure or elevated blood lipids (cholesterol) are associated with insulin resistance. In addition, physical signs of insulin resistance may appear, such as acanthosis nigricans (A-can-tho-sis NIG-reh-cans), a condition in which the skin around the neck, armpits, or groin looks dark, thick, and velvety. Often, this condition is mistaken for poor hygiene.

Some children or adolescents (and adults) with type 2 diabetes may have no recognized symptoms when they are diagnosed. For that reason, it is important for the parents/guardian to talk to their health care providers about screening children or teens who are at high risk for type 2 diabetes.

Type 2 Diabetes

Symptoms:

- Feeling tired all the time
- Increased thirst and urination
- Weight loss
- Blurred vision
- Frequent infections
- Slow-healing wounds

Risk Factors:

- Being overweight
- Having a family member who has type 2 diabetes
- Being African American, Hispanic/Latino, American Indian, Alaska Native, Asian American, or Pacific Islander including Native Hawaiian

Risk factors. The key risk factors for type 2 diabetes include being overweight or obese and having a family member who has type 2 diabetes. In addition, type 2 diabetes is more common in certain racial and ethnic groups such as African Americans, Hispanics/Latinos, American Indians, Alaska Natives, Asian Americans, and Pacific Islanders including Native Hawaiians. Other risk factors include having a mother who has had diabetes during her pregnancy (gestational diabetes), having high blood pressure, high cholesterol, abnormal lipid levels, polycystic ovary syndrome, and being inactive.

For children and teens at risk, health care professionals can encourage, support, and educate the entire family to make lifestyle changes that may delay—or prevent—the onset of type 2 diabetes. Changes include making healthy food choices, reaching and maintaining a healthy weight, and engaging in regular physical activity.

Gestational Diabetes

Gestational diabetes develops during pregnancy and is caused by the hormones of pregnancy. These hormones can cause insulin resistance or a shortage of insulin. Although gestational diabetes usually goes away after the baby is born, a woman who has had it is at increased risk for developing diabetes for the rest of her life. In addition, the offspring of that pregnancy are at increased risk for obesity and developing type 2 diabetes.

What Is Effective Diabetes Management at School?

- Maintaining optimal blood glucose control
- Assisting the student with performing diabetes care tasks
- Designating trained diabetes personnel

Maintaining Optimal Blood Glucose Control

The goal of effective diabetes management is to control blood glucose levels by keeping them within a target range determined by the student's personal diabetes health care team. Optimal blood glucose control helps to promote normal growth and development and to prevent the immediate dangers of glucose levels that are too high or too low. Maintaining blood glucose levels within the target range also can help prevent or delay the long-term complications of diabetes such as heart disease, stroke, blindness, kidney failure, gum disease, nerve disease, and amputations of the foot or leg.

The key to maintaining optimal blood glucose control is to balance carefully food intake, physical activity, insulin, and/or medication. **As a general rule, food makes blood glucose levels go up. Physical activity, insulin, and diabetes medications make blood glucose levels go down.** Several other factors, such as growth and puberty, physical and emotional stress, illness, or injury, also can affect blood glucose levels.

With all of these factors coming into play, maintaining optimal blood glucose control is a constant juggling act—24 hours a day, 7 days a week.

Students with diabetes should check their blood glucose levels throughout the day using a blood glucose meter and/or a sensor if prescribed. The meter gives a reading of the level of glucose in the blood at the time it is being monitored. When blood glucose levels are too low (hypoglycemia) or too high (hyperglycemia),

students need to take corrective actions. **Low blood glucose levels, which can be life-threatening, present the greatest immediate danger to people with diabetes.** (See hypoglycemia, page 36.)

All students with diabetes will need help during an emergency.

Assisting the Student with Performing Diabetes Care Tasks

Diabetes management is needed 24 hours a day, 7 days a week. Many students will be able to handle all or almost all of their nonemergency diabetes care tasks by themselves. Others, because of age, developmental level, or inexperience, will need help from school personnel. (See section on diabetes self-management, page 60.) In addition to the routine care required to meet daily needs, diabetes emergencies may happen at any time. School personnel need to be prepared to provide diabetes care at school and at all school-sponsored activities in which a student with diabetes participates.

The school nurse is the most appropriate person in the school setting to provide care for a student with diabetes. Many schools, however, do not have a full-time nurse, and sometimes a single nurse must cover more than one school. Few middle schools and high schools in the United States have a nurse on staff. Moreover, even when a nurse is assigned to a school full time, she or he may not always be available during the school day, during extracurricular activities, or on field trips. The school nurse or another qualified health care professional plays a major role in selecting and training appropriate staff and providing professional supervision and consultation regarding routine and emergency care of the student with diabetes.

Designating Trained Diabetes Personnel

Nonmedical school personnel—called "trained diabetes personnel" in this guide—can be trained and supervised to perform diabetes care tasks safely in the school setting. Some schools may call these individuals unlicensed assistive personnel,

assistive personnel, paraprofessionals, or trained nonmedical personnel.

Care tasks performed by trained diabetes personnel may include blood glucose monitoring, insulin and glucagon administration, and urine or blood ketone testing. In addition to learning how to perform general diabetes care tasks, trained diabetes personnel should receive student-specific training and be supervised by the school nurse or another qualified health care professional. (See Level 3 training, pages 28-29.)

The school nurse has a critical role in training and supervising trained diabetes personnel to ensure the health and safety of students with diabetes. Given the rapid changes in diabetes technology, therapies, and evidence-based practice, the school nurse who provides care to students with diabetes and facilitates diabetes management training for school personnel has the professional responsibility to acquire and maintain knowledge and competency related to diabetes management. See the section on Training School Personnel (pages 27-31) and the Resources section for information on training resources related to diabetes management in the school setting.

Assignment of diabetes care tasks, however, must take into account State laws that may be relevant in determining which tasks are performed by trained diabetes personnel.

Once it has been determined that a student-specific diabetes care task may be delegated, the school nurse should be involved in the decision making process to identify which school personnel are most appropriate to be trained. A diabetes-trained health care professional, such as a school nurse or a certified diabetes educator, develops and implements the training program, evaluates the ability of the trained diabetes personnel to perform the task, and establishes a plan for ongoing supervision throughout the school year. **When trained diabetes personnel carry out tasks specified in the student's health care plans, under no circumstances should they make independent decisions about the daily, ongoing management of a student with diabetes.**

Trained diabetes personnel may include:

- Health aides
- Teachers
- Physical education personnel
- School principal
- School secretary
- Guidance counselor
- Food service personnel
- Other appropriate personnel

How Do Schools Plan and Implement Effective Diabetes Management?

- Assembling a school health team
- Reviewing the Federal laws
- Assembling health care plans
  - o Diabetes Medical Management Plan (prepared by the student's personal diabetes health care team)
  - o Individualized Health Care Plan (prepared by the school nurse)
  - o Emergency Care Plans for Hypoglycemia and Hyperglycemia (prepared by the school nurse)
- Preparing an education plan (if needed)
  - o 504 Plan
  - o Other education plans
  - o Individualized education program
- Training school personnel

Students with diabetes are more likely to succeed in school when the student's school health team and the student's personal diabetes health care team work together.

Assembling a School Health Team

Collaboration and cooperation are key elements in planning and implementing successful diabetes management at school. **As is true for children with other chronic diseases, students with diabetes are more likely to succeed in school when the student's school health team and the student's personal diabetes health care team work together.**

To work collaboratively, a school health team should be assembled that includes people who are knowledgeable about diabetes, the school environment, and Federal and State education and nursing laws. **School health team members** should include the student with diabetes, the parents/guardian, the school nurse and other health care personnel, the staff members designated as trained diabetes personnel, administrators, the principal, the 504/IEP coordinator, office staff, the student's teacher(s), the guidance counselor, the coach, lunchroom and other school staff members.

The school health team is distinct from the **student's personal diabetes health care team.** Members of this team include the student with diabetes, the parents/guardian, the student's doctor, nurse, registered dietitian, diabetes educator, and other health care providers involved in the student's care.

The school health team members work together to implement the medical orders in the Diabetes Medical Management Plan (see page 21) **developed by the student's personal diabetes health care team, using the strategies outlined by the school nurse in the Individualized Health Care Plan** (see page 22). In addition, the school health team should be part of the group that develops and implements the student's Section 504 Plan, other education plan, or individualized education program (IEP). These plans are developed to address students' needs for services to manage diabetes safely and effectively in school, where required under Section 504 of the Rehabilitation Act of 1973 or the Individuals with Disabilities Education Act.

Members of the School Health Team
Student with diabetes
Parents/guardian
School nurse
Other school health care personnel
Trained diabetes personnel
Administrators
Principal
504/IEP coordinator
Office staff
Student's teacher(s)
Guidance counselor
Coach, lunchroom, and other school staff members

Members of the Student's Personal Diabetes Health Care Team
Student with diabetes
Parents/guardian
Doctor
Nurse
Registered dietitian
Diabetes educator
Other health care providers involved with the student's care

Reviewing the Federal Laws

Three Federal laws address the school's responsibilities to help students with diabetes:

- Section 504 of the Rehabilitation Act of 1973 (Section 504)
- Americans with Disabilities Act of 1990 (ADA)[1]
- Individuals with Disabilities Education Act (IDEA)

In addition, the Family Educational Rights and Privacy Act (FERPA) and IDEA protect the student's privacy. FERPA and IDEA prohibit schools, with certain exceptions, from disclosing personally identifiable information in a student's education record, unless the school obtains the prior written consent of the student's parents/guardian or the eligible student (a student who is 18 years old or older or who attends an institution of post-secondary education).

These Federal laws provide a framework for planning and implementing effective diabetes management in the school setting, for preparing the student's education plan, and for protecting the student's privacy. The requirements of Federal laws must always be met. (See Section 4 for additional information on these Federal laws.) School administrators and nursing personnel also should determine whether applicable State and local laws need to be factored into helping the student with diabetes.

[1] Both the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 (ADA) were amended in 2008. See ADA Amendments Act of 2008, P.L. 110–325.

Assembling Health Care Plans

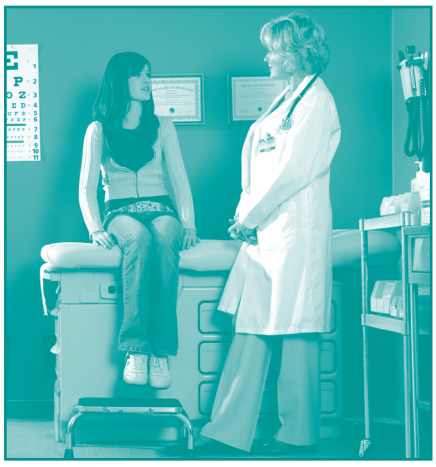
Health care plans outline how each student's diabetes will be managed. These plans help students, their families, school personnel, and the student's personal diabetes health care team to know what is expected of each of them. These expectations should be laid out in writing in the following health care plans:

- Diabetes Medical Management Plan (prepared by the student's personal diabetes health care team)
- Individualized Health Care Plan (prepared by the school nurse)
- Emergency Care Plans for Hypoglycemia and Hyperglycemia (prepared by the school nurse)

The **Diabetes Medical Management Plan**, prepared by the student's personal diabetes health care team, contains the medical orders tailored for each student.

Diabetes Medical Management Plan

The Diabetes Medical Management Plan (DMMP) contains the medical orders prepared by the student's personal diabetes health care team. (See Section 3 for a sample plan.) The student's health care provider should sign this plan. The DMMP is the basis for all of the health care and education plans designed to help the student manage diabetes effectively at school and must be in place for the student's diabetes care plan to be implemented in the school. Although the DMMP is not required by Section 504, ADA, or IDEA, the information it contains can be useful in addressing the requirements of these Federal laws for the student with diabetes.



The school nurse uses the information in the DMMP to develop the student's Individualized Health Care Plan and the Emergency Care Plans. This information also should be incorporated into any Section 504, other education plan, or IEP.

Information in the DMMP may include:

- Date of diagnosis
- Current health status
- Emergency contact information
- Specific medical orders
- 72-hour disaster or emergency plan
- Assessment of student's self-care skills for performing diabetes care tasks
- List of diabetes equipment and supplies
- Blood glucose monitoring requirements
- Insulin, glucagon, and other medications to be given at school
- Meal and snack plan
- Physical activity requirements
- Additional monitoring (e.g., for ketones)
- Typical signs, symptoms, and prescribed treatment for hypoglycemia
- Typical signs, symptoms, and prescribed treatment for hyperglycemia

The student's personal diabetes health care team should complete and approve the DMMP before the child returns to school, after diagnosis, or when a child transfers to a new school. The DMMP should be reviewed and updated each school year or upon a change in the student's prescribed care plan, level of self-management, school circumstances (e.g., a change in schedule), or at the request of the student or his or her parents/guardian.

Individualized Health Care Plan

The Individualized Health Care Plan (IHP) is a written plan developed by the school nurse in collaboration with the student's personal diabetes health care team and the family to implement the student's DMMP. (See Section 3 for a sample plan template.) The IHP, sometimes called the nursing care plan, is based on the medical orders in the student's DMMP and

incorporates an assessment of the school environment as well as student-specific information (e.g., familial, psychosocial, and developmental information).

The school nurse uses the information in the DMMP and the nurse's additional assessment findings to outline the diabetes management strategies and personnel needed to meet the student's health goals, as outlined in the DMMP. The school nurse reviews the IHP with the student and the parents/guardian before it is implemented and establishes a timeline to revisit the plan periodically to evaluate progress toward desired health goals throughout the school year.

The **Individualized Health Care Plan** is developed by the school nurse in collaboration with the student's personal diabetes health care team and the family to implement the student's Diabetes Medical Management Plan.

Information in the IHP may include:

- Plan for maintaining the student's blood glucose within the target range specified in the DMMP (which includes strategies for blood glucose monitoring, administering insulin, treating hypoglycemia and hyperglycemia, adhering to the student's meal plan, and participating in physical activity)
- Supplies needed and where they will be kept
- Need for free access to the restroom and water
- Nutritional needs, including provisions for meals and snacks
- Participation in all school-sponsored activities and field trips, with coverage provided by trained diabetes personnel
- Guidelines for communicating with the family and the student's personal diabetes health care team
- List of trained diabetes personnel and the diabetes care tasks they will perform
- Plan and timeline for training and supervising trained diabetes personnel
- Plan and timeline to train other school personnel (e.g., teachers, physical education instructors, food service, and transportation personnel)
- Timeframe for ongoing review of student outcomes
- Strategies to ensure the student avoids inappropriate penalties

for health care appointments and to provide accommodations during the school day

- Plan for the student who independently manages diabetes at school
- Maintenance of confidentiality and the student's right to privacy

The **Emergency Care Plans** summarize how to recognize and treat hypoglycemia and hyperglycemia and what to do in an emergency.

Emergency Care Plans for Hypoglycemia and Hyperglycemia

The Emergency Care Plans for Hypoglycemia and Hyperglycemia are based on the medical orders in the student's DMMP. (See Section 3 for sample emergency plans.) The school nurse usually will coordinate developing these plans. The plans summarize how to recognize and treat hypoglycemia and hyperglycemia and what to do in an emergency. **Distribute the plans to all school personnel who have responsibility for students with diabetes.**

Preparing an Education Plan (If Needed)

The school health team should be part of the group that plans how the DMMP will be implemented and be part of the group that determines the student's eligibility under Section 504 or IDEA as well as the student's needs for services to manage diabetes safely and effectively in school. This information should be included in any Section 504 Plan, other education plan, or IEP developed for the student and should be distributed to all school personnel who will be involved with implementing these plans.

- **A "504 Plan"** is the commonly used term for a plan of services developed under Section 504 of the Rehabilitation Act. For a student with diabetes, the plan would be developed and reviewed by a team that usually includes the school nurse, the parents/guardian, 504 coordinator, school administrator, guidance counselor, and teacher.
- **An IEP** is required for students with disabilities who receive special education and related services under the IDEA. For a student with diabetes, the IEP would be developed and reviewed by the IEP team, including the parents/guardian; at least one regular education teacher and one special education

teacher of the child; a qualified school district representative such as the IEP coordinator or school administrator; an individual who can interpret the instructional implications of the student's needs; and, at the discretion of the parent or school district, other personnel with knowledge or special expertise regarding the child, usually the school nurse, guidance counselor and/or trained diabetes personnel.

The information in the DMMP and IHP should be used in developing either a 504 Plan or an IEP, but it is not a substitute for these plans.

The **504 Plan**, other education plan, or IEP, address each student's needs for services to manage diabetes safely and effectively in school, where required under Section 504 or the Individuals with Disabilities Education Act (IDEA).

Individual students with diabetes have different needs, but their education plans are likely to address the following common elements:

- Where and when blood glucose monitoring and treatment will take place
- Identity of trained diabetes personnel—the staff members who are trained to perform diabetes care tasks such as monitoring blood glucose, administering insulin and glucagon, and treating hypoglycemia and hyperglycemia
- Location of the student's diabetes management supplies
- Need for free access to the restroom and water
- Nutritional needs, including provisions for meals and snacks
- Full participation in all school-sponsored activities and field trips, with coverage provided by trained diabetes personnel
- Alternative times and arrangements for academic exams if the student is experiencing hypoglycemia or hyperglycemia
- Permission for absences without penalty for health care appointments and prolonged illness
- Maintenance of confidentiality and the student's right to privacy

It is strongly recommended that the information in the education plan be agreed upon before each school year begins (or upon diagnosis of diabetes) and be written down and signed by a representative of the school and the parents/guardian.

Written plans help ensure that school personnel, the parents/guardian, and students know their responsibilities. Parents/guardian must be notified in a timely manner of any proposed changes in the provision of services and must be included in related discussions. (See Section 4 for more information about the Federal laws related to education plans.)

Plans for Diabetes Management

Plan	Contents	Who Develops It
Diabetes Medical Management Plan (DMMP)	**Medical orders:** all aspects of routine and emergency diabetes care	**Student's personal diabetes health care team**
Individualized Health Care Plan (IHP)	**School nursing care plan:** how diabetes care, as prescribed in the Diabetes Medical Management Plan, will be delivered in the school	**School nurse**
Emergency Care Plans	**Tool for school staff:** how to recognize and treat hypoglycemia or hyperglycemia and what to do in an emergency	**School nurse**
504 Plan, Other Education Plan, or Individualized Education Program	**Education plans:** address each student's needs for services to manage their diabetes safely and effectively in school, where required under Section 504 or the Individuals with Disabilities Education Act	**504 team** **IEP team**

Training School Personnel

Diabetes management training for school personnel is essential to facilitate appropriate care for students with diabetes. **Knowledgeable and trained school personnel can help to ensure that students with diabetes are safe, ready to learn, and able to participate in all school-sponsored events.** All school personnel should receive the appropriate level of diabetes care training suited to their responsibilities for students with diabetes. See the section on Diabetes Management Training Resources (page 30) and the Resources section for examples of standardized training programs and materials.

Diabetes management training should be facilitated by a diabetes-trained health care professional such as the school nurse or a certified diabetes educator. Training should occur at the beginning of each school year and should be repeated when an enrolled student is first diagnosed with diabetes or when a student with diabetes enrolls in the school. Periodic refresher training is recommended.

Three levels of training are needed to keep students with diabetes safe at school. Training should be designed to include the elements outlined below using standardized training materials.

Level 1. Diabetes Overview and How to Recognize and Respond to an Emergency Situation

Level 1 training is for all school personnel and should cover:

- An overview of diabetes
- How to recognize and respond to hypoglycemia and hyperglycemia
- Who to contact for help in an emergency

Level 2. Diabetes Basics and What to Do in an Emergency Situation

Level 2 training builds on Level 1 and is designed for school personnel who have responsibility for the student with

diabetes throughout the school day (e.g., classroom, physical education, music, and art teachers and other personnel such as lunchroom staff, coaches, and bus drivers).

Level 2 training should cover:

- Content from Level 1 with specific instructions for what to do in case of an emergency
- Roles and responsibilities of individual staff members (outlined in Section 2, Actions for School Personnel, Parents, and Students)
- Expanded overview of diabetes (types of diabetes, the role of blood glucose monitoring, the importance of balancing insulin/medication with physical activity and nutrition and how it is done)
- Procedures and brief overview of the operation of devices (or equipment) commonly used by students with diabetes
- Impact of hypoglycemia or hyperglycemia on behavior, learning, and other activities
- The student's Individualized Health Care Plan, 504 Plan, other education plan, or IEP
- The student's Emergency Care Plans
- How to activate Emergency Medical Services in case of a diabetes emergency
- Tips and planning needed for the classroom and for special events
- Overview of the legal rights of students with diabetes in the school setting

Level 3. General and Student-Specific Diabetes Care Tasks

Level 3 training is for one or more school staff members designated as trained diabetes personnel who will perform or assist the student with diabetes care tasks when allowed by State law. Level 3 training should be provided by a diabetes-trained

health care professional such as the school nurse or a certified diabetes educator.

Level 3 training should cover:

- All the information from Level 1 and Level 2 training
- General training on diabetes care tasks specified in the student's DMMP:
  - Blood glucose monitoring
  - Ketone testing (urine and blood)
  - Insulin administration
  - Glucagon administration
  - Basic carbohydrate counting
- Student-specific training, when addressing each diabetes care task, includes:
  - Clear identification and understanding of the task as outlined in the student's DMMP
  - Each student's symptoms and treatment for hypoglycemia and hyperglycemia
  - Step-by-step instruction on how to perform the task using the student's equipment and supplies
  - Clear parameters on when to perform the task, when not to do so, and when to ask for help from a health care professional
  - How to document all care tasks performed
  - Plan for ongoing evaluation

A diabetes-trained health care professional such as the school nurse or a certified diabetes educator develops the instruction on performing the care tasks, provides for demonstration and return demonstration of the tasks, evaluates the trained diabetes personnel's competency, and establishes a plan for ongoing supervision to occur throughout the school year. The school nurse or other qualified health care professional also documents the instruction, competency evaluation, and ongoing supervision that are provided.

Diabetes Management Training Resources

There are many resources available for training school nurses and staff about diabetes management.

- The **National Association of School Nurses** offers a continuing education program for school nurses about managing diabetes in the school setting, called Helping Administer to the Needs of the Student with Diabetes in School (H.A.N.D.S.℠). Information about H.A.N.D.S. can be found on the Internet at:
  - **http://www.nasn.org/Default.aspx?tabid=411**
- The **American Diabetes Association** offers "Diabetes Care Tasks at School: What Key Personnel Need to Know," a curriculum containing a set of training modules and corresponding DVD video segments. These materials are designed for use by the school nurse or other diabetes-trained health care professionals when training a school's trained diabetes personnel. Information about the association's resources can be found on the Internet at:
  - **www.diabetes.org/schooltraining** (Training curriculum)
  - **http://www.diabetes.org/living-with-diabetes/parents-and-kids/diabetes-care-at-school/school-staff-trainings/training-resources.html** (Training resources)
- A number of **State Diabetes Prevention and Control Programs** have developed training curricula based on the American Diabetes Association's curriculum, including California, New York, Texas, and Virginia. These training resources can be found on the Internet at the following locations:
  - **http://www.diabetes.org/assets/pdfs/state-school-laws/ca_glucagontrainingstds.pdf**
  - **http://www.nyhealth.gov/diseases/conditions/diabetes/for_health_care_providers.htm**
  - **http://www.diabetes.org/assets/pdfs/state-school-laws/tx_guidelinestrainingschempl_hb984.pdf**
  - **http://www.diabetes.org/assets/pdfs/state-school-laws/va_trainingmanual_insulin-glucagon.pdf**

Diabetes Management Training for School Personnel

Level 1. Diabetes Overview and How To Recognize and Respond to an Emergency Situation	
WHO:	**All school personnel**
WHAT:	• General overview of diabetes • How to recognize and respond to signs and symptoms of hypoglycemia and hyperglycemia • Who to contact for help in an emergency
Level 2. Diabetes Basics and What To Do in an Emergency Situation	
WHO:	**Classroom teachers and all school personnel who have responsibility for the student with diabetes during the school day**
WHAT:	• Content from Level 1 • Specific instruction on the Emergency Care Plans • How to activate Emergency Medical Services in case of a diabetes emergency • Roles and responsibilities of individual staff members (see Actions, pages xx-yy) • Expanded overview of diabetes • Impact of hypoglycemia or hyperglycemia on behavior and learning • Tips and planning needed for the classroom and for special events • The student's health care and education plans • Legal rights of students with diabetes
Level 3. General and Student-Specific Diabetes Care Tasks	
WHO:	**Trained diabetes personnel**
WHAT:	• Content from Level 1 and Level 2 training • General training on diabetes care tasks specified in the student's Diabetes Medical Management Plan • Student-specific training, using the student's equipment and supplies for each diabetes care task

What Are the Elements of Effective Diabetes Management in School?

- Checking glucose levels
- Planning for disposal of sharps and materials that come in contact with blood
- Recognizing and treating hypoglycemia (low blood glucose)
- Recognizing and treating hyperglycemia (high blood glucose)
- Administering insulin
- Planning for disasters and emergencies
- Following an individualized meal plan
- Getting regular physical activity
- Maintaining a healthy weight
- Planning for special events, field trips, and extracurricular activities
- Dealing with emotional and social issues

Diabetes management involves checking blood glucose levels throughout the day, following an individualized meal plan, getting regular physical activity, and administering insulin and/or glucose-lowering medications. These actions are taken to try to maintain blood glucose levels in the target range and to prevent hypoglycemia or hyperglycemia. **Students with diabetes must have access to supplies and equipment for immediate treatment of high and low blood glucose levels.**

Additional elements of effective diabetes management in school include planning for appropriate disposal of sharps and materials that come in contact with blood, planning for disasters and emergencies, planning for school-sponsored events outside the usual school day, and dealing with the emotional and social aspects of living with diabetes.

Checking Glucose Levels

One of the most important diabetes management tasks is regular checking (or monitoring) of blood glucose levels, which is done with a blood glucose meter. Some students use a meter in combination with a continuous glucose monitor.

Blood Glucose Meter

A blood glucose meter is a small portable machine used to check blood glucose levels. After pricking the skin with a lancet (a small needle inserted in a spring-loaded device), one places a drop of blood on a test strip that is inserted in the machine. The meter then gives the blood glucose level as a number on the meter's digital display. The skin may be pricked at the fingertip (called a finger prick), forearm, or other test site. Before using the blood glucose meter, wash and dry hands and the test site.

Use of the forearm or other test site to obtain a drop of blood (called alternative site testing) requires a specific type of blood glucose meter. The fingertip always should be used if hypoglycemia is suspected.

Continuous Glucose Monitor

Some students use a continuous glucose monitor (CGM), a device that records blood glucose levels throughout the day. The CGM works through a sensor inserted under the skin that measures interstitial glucose (the glucose found in the fluid between cells) levels at regular intervals and sends the current glucose level wirelessly to a monitor. The monitor may be part of the insulin pump or a separate device that is carried or worn by the student in a pocket, a backpack, or a purse. The CGM sets off an alarm when glucose levels are too high or too low.

Treatment decisions and diabetes care plan adjustments should not be based solely on CGM results. The sensor blood glucose levels should be confirmed with a blood glucose meter. Appropriate action should be taken in accordance with the student's DMMP. The CGM is a useful tool for identifying trends and can enhance the ability of the student's personal diabetes health care team to make needed adjustments to the student's diabetes care plan.

Checking Glucose During the School Day

The student's personal diabetes health care team may order blood glucose checking with a meter several times during the school day. Blood glucose levels may need to be checked before and after eating snacks and meals, before physical activity, or when there are symptoms of hypoglycemia or hyperglycemia. In some children, symptoms may be subtle; blood glucose should be checked whenever symptoms are suspected.

Many students can check their own blood glucose level. Other students need supervision. Still others need to have this task performed by a school nurse or trained diabetes personnel. **All students, even those who can independently perform blood glucose monitoring, may need assistance when experiencing low blood glucose.**

Students must be able to check their blood glucose levels and respond to levels that are too high or too low as quickly as possible. If recommended by the student's personal diabetes health care team, **it is medically preferable to permit students to check blood glucose levels and respond to the results in the classroom, at every campus location, or at any school activity.** When in doubt, taking immediate action is important to prevent symptoms of severe hypoglycemia such as coma or seizures and to prevent the student from missing class time.

Advantages of Checking Blood Glucose Levels Any Time and Any Place

- The student can confirm a low blood glucose level immediately. As a result, the student is less likely to develop seizures or a coma.
- The student is safer when he or she does not have to go to a designated place and does not have to delay treatment for low or high blood glucose levels.
- The student spends less time out of class.
- The student gains independence in diabetes management when the blood glucose meter is easily accessible and monitoring can be conducted as needed.
- The student can achieve better blood glucose control to prevent onset of severe symptoms of high and low blood glucose levels and decrease the risk of long-term complications of diabetes.
- When the student can check at any time and in any place, blood glucose monitoring is handled as a normal part of the school day.

Students Usually Check Their Blood Glucose:

- Before and after eating snacks and meals
- Before and after physical activity
- When they have symptoms of low or high blood glucose levels

Planning for Disposal of Sharps and Materials That Come Into Contact With Blood

Checking blood glucose does not present a danger to other students or staff members when there is a plan for proper disposal of lancets and other materials that come into contact with blood. The school health team should agree on the plan, which should be consistent with standard precautions and local waste-disposal laws.

Disposal of sharp objects such as lancets and needles may be in a heavy-duty plastic or metal container with a tight-fitting lid that may be kept at school or in the student's personal container. Some students may leave the lancet in their lancet device and bring it home for disposal. These arrangements should be agreed upon in advance by the school health team. Used blood glucose

test strips and other materials may be discarded in the regular trash. Check with the local health department about health and safety requirements in your area.

Hypoglycemia means LOW blood glucose.

Recognizing and Treating Hypoglycemia (Low Blood Glucose)

Hypoglycemia, also called "low blood glucose" or "low blood sugar," is a serious condition associated with diabetes that can happen very suddenly and requires immediate treatment. Hypoglycemia can impair a student's cognitive abilities and adversely affect academic performance. Sometimes, its symptoms are mistaken for misbehavior.

Hypoglycemia occurs when a student's blood glucose level falls too low, usually as a result of too much insulin, missing or delaying meals or snacks, not eating enough food (carbohydrates), or participating in extra, intense, or unplanned physical activity. Low blood glucose levels are more likely to occur before lunch, at the end of the school day, during or after physical education classes, or in the event of unanticipated physical activities. Hypoglycemia may occur due to illness, particularly gastrointestinal illness, or it may occur for no obvious reason.

Hypoglycemia occurs when a student's blood glucose level falls too low, usually as a result of:

- Too much insulin
- Missing or delaying meals or snacks
- Not eating enough food (carbohydrates)
- Getting extra, intense, or unplanned physical activity
- Being ill, particularly with gastrointestinal illness

Hypoglycemia, which is not always preventable, is the greatest immediate danger to students with diabetes.

Hypoglycemia usually can be treated easily and effectively. If it is not treated promptly, however, hypoglycemia can lead to loss of consciousness and seizures and can be life threatening.

Early recognition of hypoglycemia symptoms and prompt treatment, in accordance with the student's DMMP, are necessary to prevent the onset of severe symptoms that may place the student in danger. **This information, contained in the student's Hypoglycemia Emergency Care Plan, should be provided to all school personnel who have responsibility for the student with diabetes during the school day.** (See sample plan on page 109.)

Not all students, especially young children, will recognize hypoglycemia symptoms with every episode. Some older children and adolescents may have "hypoglycemia unawareness." In other words, they do not experience early physical warning signs such as shaking or jitteriness, or sweating, and the only clue that their blood glucose levels are low is sudden behavior change. Even students who usually recognize when their blood glucose is low may sometimes have a sudden "low" without symptoms. Although symptoms of hypoglycemia may vary from student to student, each student will tend to have the same symptoms each time hypoglycemia occurs. **Therefore, all school personnel should know how to recognize hypoglycemia and know what to do if they observe its onset.**

The student should never be left alone or sent to another location alone or with another student when experiencing hypoglycemia.

When in doubt, always treat for hypoglycemia.

In the event of suspected or actual hypoglycemia, treat the student immediately, and do not leave the student alone or send the student to another location. No student should ever be charged with accompanying another student who is experiencing hypoglycemia to another location.

As soon as the student exhibits symptoms (see chart on the following page), treat the situation as a hypoglycemic emergency as outlined in the student's Hypoglycemia Emergency Care Plan. Immediately contact the school nurse or trained diabetes personnel who will check the student's blood glucose level and treat the student for hypoglycemia. If the school nurse or trained diabetes personnel are not available, or if the blood glucose level cannot be checked, school personnel should treat the student for hypoglycemia as outlined in the Emergency Care Plan. Symptoms will progress if not treated immediately. When in doubt, always treat for hypoglycemia.

Hypoglycemia Symptoms		
Mild to Moderate		Severe
• Shaky or jittery • Sweaty • Hungry • Pale • Headache • Blurry vision • Sleepy • Dizzy • Confused • Disoriented • Uncoordinated	• Irritable or nervous • Argumentative • Combative • Changed personality • Changed behavior • Inability to concentrate • Weak • Lethargic	• Inability to eat or drink • Unconsciousness • Unresponsiveness • Seizure activity or convulsions (jerking movements)

Treatment for Mild to Moderate Hypoglycemia

For mild to moderate hypoglycemia symptoms, or for a blood glucose level less than the level indicated on the Hypoglycemia Emergency Care Plan (usually 70–80 mg/dL), give the student a quick-acting glucose (sugar) product equal to 15 grams of carbohydrate (or the amount specified in the Emergency Care Plan) such as:

- 3 or 4 glucose tablets or
- 1 tube of glucose gel or
- 4 ounces of fruit juice (not low-calorie or reduced sugar) or
- 6 ounces (half a can) of soda (not low-calorie or reduced sugar)

Wait 10 to 15 minutes. The school nurse, trained diabetes personnel, or student should recheck the blood glucose level. Repeat treatment if the blood glucose level is still below the blood glucose level indicated in the Hypoglycemia Emergency Care Plan. Contact the student's parents/guardian.

Treatment for Mild to Moderate Hypoglycemia Symptoms Checklist

- ☐ As soon as symptoms are observed, notify the school nurse or trained diabetes personnel. Check the student's blood glucose level to determine if it is low.
- ☐ If the blood glucose level is below the level in the Hypoglycemia Emergency Care Plan or if the student has symptoms, give the student a quick-acting glucose product equal to 15 grams of carbohydrate (or the amount specified in the Emergency Care Plan) such as:
  - ○ 3 or 4 glucose tablets or
  - ○ 1 tube of glucose gel or
  - ○ 4 ounces of fruit juice (not low-calorie or reduced sugar) or
  - ○ 6 ounces (half a can) of soda (not low-calorie or reduced sugar)
- ☐ Wait 10 to 15 minutes.
- ☐ Recheck the blood glucose level.
- ☐ Repeat the quick-acting glucose product if the blood glucose level is below the level indicated in the Hypoglycemia Emergency Care Plan.
- ☐ Contact the student's parents/guardian.

Treatment for Severe Hypoglycemia

Severe hypoglycemia is rare at school and generally can be prevented with prompt treatment of mild to moderate symptoms of low blood glucose. When hypoglycemia symptoms are severe, the school nurse or trained diabetes personnel must be notified and must respond immediately.

Symptoms of severe hypoglycemia may include inability to eat food or drink fluids, unconsciousness, unresponsiveness, and seizure activity or convulsions (jerking movements). At this point, school personnel should never attempt to give the student food or a drink or to put anything in the mouth because it could cause choking.

Severe hypoglycemia is treated by administering glucagon by injection. Glucagon is a hormone that raises blood glucose levels by causing the release of glycogen (a form of stored carbohydrate) from the liver. In schools, glucagon is given by the school nurse or trained diabetes personnel. Although it may cause nausea and vomiting when the student regains consciousness, **glucagon is a potentially life-saving treatment that cannot harm a student.**

When a student has severe hypoglycemia, school personnel should position the student on his or her side to prevent choking. Immediately contact the school nurse or trained diabetes personnel who will administer an injection of glucagon, as indicated in the student's Hypoglycemia Emergency Care Plan. While the glucagon is being administered, another school staff member should call for emergency medical assistance (911) and notify the parents/guardian. If administration of glucagon is not authorized by the student's Diabetes Medical Management Plan or Emergency Care Plan, or it is not available, staff should call 911 immediately.

Treatment for Severe Hypoglycemia Checklist

- ☐ Position the student on his or her side to prevent choking.
- ☐ Contact the school nurse or trained diabetes personnel immediately.
- ☐ Don't attempt to give anything by mouth.
- ☐ School nurse or trained diabetes personnel should administer glucagon, as prescribed.
- ☐ Call 911 (Emergency Medical Services).
- ☐ Call the student's parents/guardian.
- ☐ Stay with the student until emergency medical services arrive.
- ☐ Notify the student's personal diabetes health care team.

Glucagon Emergency Kit

The parents/guardian should supply the school with a glucagon emergency kit. The kit usually contains a bottle (vial) of glucagon in powder form and a prefilled syringe with special liquid; the two ingredients should only be mixed just before a glucagon injection is given. The glucagon emergency kit may be stored at room temperature.

The school nurse and/or trained diabetes personnel must know where the kit is stored and have access to it at all times. They also should be aware of the expiration date on the kit and notify the student's parents/guardian when a new kit is needed.

Recognizing and Treating Hyperglycemia (High Blood Glucose)

Hyperglycemia means HIGH blood glucose.

Hyperglycemia means blood glucose levels are above the target range, as specified in the student's DMMP. Almost all children with diabetes will experience blood glucose levels above their target range at times throughout the day. For many children, these elevations in blood glucose will be only minimally above the target range (less than 250 mg/dL) and are short in duration. Other children may experience daily spikes of the blood glucose level that are high (in excess of 250 mg/dL) and of longer duration.

Hyperglycemia may be caused by too little insulin or other glucose-lowering medications, food intake that has not been covered by insulin, or decreased physical activity. Other causes include illness, infection, injury, or severe physical or emotional stress. Onset of hyperglycemia may occur over several hours or days.

Symptoms of hyperglycemia include increased thirst, dry mouth, frequent or increased urination, change in appetite and nausea, blurry vision, and fatigue. In the short term, hyperglycemia can impair cognitive abilities and adversely affect academic performance. **In the long term, moderately high blood glucose levels can increase risk for serious complications such as heart disease, stroke, blindness, kidney failure, nerve disease, gum disease, and amputations.**

Hyperglycemia needs to be recognized and treated in accordance with the student's DMMP. **All school personnel who have responsibility for the student with diabetes should receive a copy of the Hyperglycemia Emergency Care Plan and be prepared to recognize and respond to the signs and symptoms of hyperglycemia.** (See sample plan on page 111.)

Hyperglycemia Symptoms

- Increased thirst and/or dry mouth
- Frequent or increased urination
- Change in appetite and nausea
- Blurry vision
- Fatigue

Hyperglycemia Treatment

As soon as symptoms of hyperglycemia are recognized, notify the school nurse or trained diabetes personnel. Treatment of hyperglycemia begins with checking the student's blood glucose level to determine if it is above the target range.

In accordance with the DMMP, the student's urine or blood should be checked for ketones, the chemicals the body makes when there is not enough insulin in the blood and the body must break down fat for energy. The **urine ketone test** involves dipping a special strip into the urine, waiting for a specified amount of time, and then comparing the resulting color to a color chart. The **blood ketone test** is done with a finger stick using a special meter and a test strip, similar to blood glucose monitoring with a blood glucose meter. If the test indicates ketones are present, notify the parents/guardian.

Administer supplemental insulin in accordance with the DMMP or Hyperglycemia Emergency Care Plan and give the student extra water or non-sugar-containing drinks (no fruit juices) slowly, but steadily. Allow free and unrestricted access to the restroom and to liquids, as high blood glucose levels can cause increased urination and may lead to dehydration if the student

cannot replace the fluids. If insulin is administered, recheck the blood glucose in 2 hours. If the student uses an insulin pump, check to see if it is connected and functioning properly and still delivering insulin.

Physical activity should be modified, as indicated in the student's DMMP. If the student is not nauseous or vomiting and ketones are not present, increasing physical activity might help to lower the blood glucose level. However, if moderate to large ketones are present, and the blood glucose is above the level specified in the DMMP (usually >250 or 300 mg/dL), the student should avoid exercise.

Treatment for Hyperglycemia Checklist

- ☐ Check the student's blood glucose level.
- ☐ Check the student's urine or blood for ketones.
- ☐ If the student uses an insulin pump, check the pump to see if it is connected and functioning properly.
- ☐ Administer supplemental insulin to bring down the blood glucose.
- ☐ Give the student extra water or non-sugar-containing drinks.
- ☐ Provide free and unrestricted access to the restroom.
- ☐ Modify physical activity, as specified in the Diabetes Medical Management Plan.
- ☐ Notify the parents/guardian if ketones are present.

Ketones and Diabetic Ketoacidosis

Hyperglycemia does not usually result in a medical emergency. The following situations, however, may lead to a breakdown of fat causing ketones to form along with the hyperglycemia:

- Significant or prolonged insulin deficiency from failure to take any insulin or the correct amount of insulin
- A pump malfunction causing an interruption in insulin delivery

- Physical or emotional stress that causes the insulin not to work effectively

Ketones are usually associated with high blood glucose, but also may occur when a student is ill and blood glucose levels fall below the student's target range. At first, ketones will be cleared by the kidneys into the urine but as their production increases, they build up in the bloodstream causing diabetic ketoacidosis (DKA), a potential medical emergency.

Diabetic ketoacidosis develops over hours to days and is associated with hyperglycemia, a buildup of ketones (ketosis) in the blood, and dehydration. As a result of these conditions, the classic signs of diabetic ketoacidosis include severe abdominal pain with vomiting, dry mouth and extreme thirst, fruity breath, heavy breathing and shortness of breath, chest pain, increasing sleepiness or lethargy, and depressed level of consciousness. As soon as these symptoms are observed, the school nurse or trained diabetes personnel should call 911, the parents/guardian, and the student's health care provider.

Administering Insulin

Students with type 1 diabetes, and some students with type 2 diabetes, need to administer or be given insulin at regular times during the school day. Students may need to take insulin to cover meals and/or snacks and may need additional or corrective dosages of insulin to treat hyperglycemia or to cover a rise in blood glucose levels. It is medically preferable that the student be allowed to self-administer insulin in the classroom, at every campus location, or at any school activity, if indicated in the DMMP.

The DMMP, which will be different for each student, specifies the dosage, delivery system, and schedule for insulin administration. The Individualized Health Care Plan and the student's education plan, based on the DMMP, should specify who will administer prescribed insulin and under what circumstances.

Today, new types of insulin and new delivery systems help keep blood glucose levels within the target range. These options,

however, require more frequent blood glucose monitoring and more assistance for the student with diabetes.

Insulin is classified in four types by how it works:

- Rapid-acting
- Short-acting
- Intermediate-acting
- Long-acting

Insulin has three characteristics:

- **Onset** is the length of time before insulin reaches the blood-stream and begins lowering blood glucose levels.
- **Peak** is the time at which insulin is at its maximum strength in terms of lowering blood glucose levels.
- **Duration** is the number of hours insulin continues to lower blood glucose levels.

Insulin has three characteristics:

- Onset of effect
- Peak time of effect
- Duration of effect

Basal/Bolus Insulin Plan (Adjustable Insulin Therapy)

Most students with type 1 diabetes use a basal/bolus insulin plan. This type of insulin plan, sometimes referred to as adjustable insulin therapy, reproduces or mimics the way a normally functioning pancreas produces insulin.

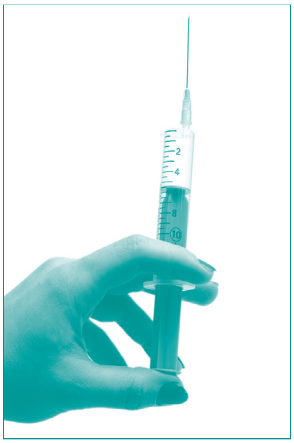
A coordinated combination of different types of insulin is used to achieve target blood glucose levels at meals, snacks, during periods of physical activity, and through the night.

- **Basal insulin is long-acting or intermediate-acting insulin** delivered once or twice a day. This type of insulin is used to control blood glucose levels overnight and between meals.
- **Bolus insulin refers to a dose of rapid-acting or short-acting insulin** that is given to cover the carbohydrate in a meal or snack and to lower blood glucose levels that are above target.

Students using a basal/bolus insulin plan require multiple injections during the school day, or they receive their insulin through a programmable insulin pump.

The three most common ways to administer insulin:

- Insulin syringe
- Insulin pen
- Insulin pump



Insulin syringe

Insulin pen

Fixed Insulin Therapy

Other students may take the same dose of insulin each day with rapid-acting or short-acting insulin and intermediate-acting insulin. This type of plan is sometimes referred to as fixed insulin therapy.

Insulin Storage

The shelf life of insulin after opening varies according to the type of insulin, the type of container (vial or cartridge), and how insulin is administered (through a syringe, a pen, or a pump). Review the product storage instructions on the manufacturer's package insert and check the expiration date.

In general, most opened vials of insulin may be left at room temperature (below 86 degrees Fahrenheit) for 30 days and then discarded. Most opened disposable pens or pen cartridges may be left at room temperature for less than 30 days, depending on the type of insulin and the type of pen or cartridge. Unopened vials should be stored in a refrigerator. They may be used until their expiration date and then must be discarded.

Insulin Delivery

The three most common ways to administer insulin are with a syringe, an insulin pen, or an insulin pump. The manufacturers of insulin, insulin syringes, insulin pens, and insulin pumps have websites where school personnel can learn more about these products.

Insulin syringes, available in several sizes, make it easy to draw up the proper dosage. Shorter, smaller needles make injections easy and relatively painless.

An **insulin pen** holds a cartridge of insulin. A needle is screwed onto its tip just before use. The user dials the pen to the prescribed dose and injects the insulin. Insulin pens are convenient and appropriate when children need a single type of insulin. During the school day, pens are used most often with rapid-acting insulin to cover a meal or to treat a high blood glucose level.

An **insulin pump** is a computerized device that is programmed to deliver small, steady doses of insulin throughout the day; additional doses are given to cover food intake and to lower high blood glucose levels. Pump users must test their blood glucose frequently to figure out the dose they need.

Rapid-acting insulin is used in the insulin pump. Students using the insulin pump will not be taking any long-acting insulin. Therefore, a pump malfunction or extended disconnection from the pump (longer than 2 hours) increases the student's risk of developing DKA much more quickly. The parents/guardian should provide the school with a backup supply of syringes and rapid-acting insulin or insulin pens in the event of a pump failure. Keep supplies in a secure location.

There are two types of insulin pumps:

- **The first type of pump looks like a pager,** and students usually wear it on their waistband, belt, or in their pocket. The pump holds a reservoir of insulin attached to an infusion set that leaves a very small needle or plastic cannula (a tiny, flexible plastic tube) under the skin. Infusion sets are started with a guide needle, then the cannula is left in place, taped with dressing, and the needle is removed. The cannula usually is changed every 2 or 3 days or when blood glucose levels remain above the target range or ketones are present. Routine site changes are a responsibility of the family and generally are done at home.
- **The second type of pump, the pod or patch,** is attached directly to the skin and a guide needle inserts the cannula under the skin automatically. The student usually wears the pod on his or her abdomen, buttocks, leg, or arm. The pod contains the insulin (there is no tubing). The pod type pump is controlled by a small hand-held computer device that is kept nearby. This type of insulin pump needs to be changed every 2 to 3 days.

Administering Insulin during the School Day

Some students who need insulin during the school day are able to administer it on their own, others will need supervision, and yet others will need someone to administer the insulin for them. The school nurse and/or trained diabetes personnel should assist with insulin administration in accordance with the student's health care plans and education plans.

Trained diabetes personnel who assist with the student's diabetes care tasks should be knowledgeable about and trained in using and operating each student's insulin delivery system in the event that a school nurse is not available to administer insulin.

Why Do Many Children Like Insulin Pump Therapy?

- Users are freed from multiple daily insulin injections.
- The pump delivers insulin in a way that is similar to what the body does naturally.
- Users may achieve improved blood glucose control.
- The pump uses frequent pulses of rapid-acting insulin, allowing for more consistent action on blood glucose than with intermediate- or long-acting insulin.
- The pump gives users more flexibility about when and what they eat.
- Users may be able to participate in unplanned physical activity without eating extra food.
- The pump is durable and contains many child safeguards.
- The pump can be preprogrammed with insulin-to-carbohydrate ratios and blood glucose correction factors (see page 52 for more information).
- When additional insulin, called a bolus, is needed to balance the carbohydrates in a meal or snack, or when blood glucose levels are high, the pump calculates the bolus dosage after the student enters the number of grams of carbohydrate to be eaten and his or her blood glucose level (see page 52 for more information).

A diabetes-trained health care professional such as the school nurse or a certified diabetes educator should teach, monitor, and supervise trained diabetes personnel to administer insulin. Assignment of diabetes care tasks, however, must take into account State laws that may be relevant in determining which tasks may be performed by trained diabetes personnel. (See the Resources section for organizations that offer diabetes management training for school personnel.)

Planning for Disasters and Emergencies

The parents/guardian must provide an emergency supply kit for use in the event of natural disasters or emergencies when students need to stay at school. This kit should contain enough supplies for at least 72 hours to carry out the medical orders in the DMMP.

Disaster or Emergency Supply Kit

- Blood glucose meter, testing strips, lancets, and batteries for the meter
- Urine and/or blood ketone test strips and meter
- Insulin, syringes, and/or insulin pens and supplies
- Insulin pump and supplies, including syringes, pens, and insulin in case of pump failure
- Other medications
- Antiseptic wipes or wet wipes
- Quick-acting source of glucose
- Water
- Carbohydrate-containing snacks with protein
- Hypoglycemia treatment supplies (enough for three episodes): quick-acting glucose and carbohydrate snacks with protein
- Glucagon emergency kit

Following an Individualized Meal Plan

In the past, meal planning for diabetes was much less flexible. Students often were prescribed a rigid meal plan using "exchange lists" to match insulin dosing. Current nutrition recommendations for children with diabetes are designed to provide maximum flexibility to meet each child's nutritional needs, appetite, eating habits, and schedules. Insulin regimens are then individualized to fit each child's lifestyle. The student's diabetes care plan, as set out in the written health care plans, must be followed to avoid hypoglycemia or hyperglycemia.

All students need a variety of healthy foods.

The nutritional needs of students with diabetes do not differ from the needs of students without diabetes. **All students need a variety of healthy foods to maintain normal growth and development. The meal plan recommended for students with diabetes is usually healthy for everyone.** The major difference is that the timing, amount, and content of the food that students with diabetes eat, especially the carbohydrates (or carbs), are carefully matched to balance the action of the insulin and other medications that they take.

Although there usually are no forbidden foods for people with diabetes, students are advised to avoid "liquid carbs" such as sugar-containing soda and juices (including 100 percent fruit juice) and regular pancake syrup. The "liquid carbs" raise blood glucose rapidly, contain large amounts of carbs in small volumes, are hard to balance with insulin, and provide little or no nutrition. (Sugar-containing drinks are used, however, in treating hypoglycemia as explained on page 38.)

Many children with type 2 diabetes follow a meal plan designed to help them achieve a healthy weight. These students may be prescribed a calorie target for the day as well as consistent carb amounts to aim for at each meal and snack to help control their weight and blood glucose. Assuring that healthy foods such as whole grains, low-fat protein and dairy, fruits, and vegetables are available is critical to their diabetes management.

Meal Planning Approaches for Children and Youth

Most students with diabetes have an individualized meal plan using a method of carbohydrate counting. The meal plan takes into account the student's nutritional needs, insulin plan, oral medications, and physical activity level.

The nutritional needs of students with diabetes do not differ from the needs of students without diabetes.

Carbohydrate Counting

Carbohydrate (carb) counting is the most popular meal planning approach for children and youth. It involves calculating the number of grams of carbohydrate, or choices of carbohydrate, the student eats. One carb choice equals 15 grams of carbohydrate. Sources of carbs include starches (breads, crackers, cereal, pasta, rice), fruits and vegetables, dried beans and peas, milk, yogurt and sweets.

The food service manager or staff and/or the school nurse should provide the carb content of foods to the parents/guardian and the student. If the food service manager or the school district does not have this information, the school can identify a registered dietitian through the state or local chapter of the American Dietetic Association who can work with the food service staff to make this information available.

There are two methods of meal planning using carb counting: following a consistent carb intake meal plan and adjusting insulin for changing carb intake. This information will be provided in the student's DMMP.

Method 1—Following a Consistent Carb Intake Meal Plan. Students who follow a consistent carb meal plan aim for a set amount of carb grams at each meal and snack and do not adjust their mealtime insulin for the amount of carb intake (e.g., 60 grams of carbs at each lunch). The student's personal diabetes health care team helps determine the amount of carbs that is right for each child at each meal. This method of meal planning is

often used by students who take an intermediate-acting insulin in the morning or students who receive a preset amount of rapid- or short-acting insulin at lunch.

Students who follow a consistent carb meal plan need to maintain consistency in the timing and content of meals and snacks. The student should eat lunch at the same time each day. Snacks often are necessary to achieve a balance with the peak times of insulin action and with physical activity.

Method 2—Adjusting Insulin for Changing Carb Intake. Students who use multiple daily injections or an insulin pump usually use this method of meal planning. This method requires adjusting insulin doses to cover the amount of carbs consumed using an **insulin-to-carb ratio. The insulin-to-carb ratio is used to determine the number of units of insulin needed to cover the number of grams of carb in the food the student plans to eat.**

In addition to the amount of insulin needed to cover the carbs (called the carb dosage), extra insulin might be needed if the student's blood glucose is above the target range before a meal or snack. **The blood glucose correction factor—also known as the insulin sensitivity factor—is used to determine the amount of insulin the student needs to lower blood glucose to target level.** See the example on the next page for instructions on how to compute the insulin dose using a student's insulin-to-carb ratio and blood glucose correction factor.

The insulin-to-carb ratio and the blood glucose correction factor are individualized and determined by the student's personal diabetes health care team. This information should be included in the student's DMMP.

Other Dietary-Related Medical Conditions

A small percentage of children with diabetes may have other medical conditions that require dietary restrictions. For example, **about 8 percent of children with type 1 diabetes have a condition called celiac disease.** They should not eat any food products

Use this Three-Step Process To Compute the Insulin Dose Using an Insulin-to-Carb Ratio and Blood Glucose Correction Factor

All values are provided only for example.*

EXAMPLE:

- **Insulin-to-Carb Ratio** = 1 unit of rapid-acting insulin for each **15 grams** of carb*
- **Blood glucose correction factor** = 1 unit of rapid-acting insulin for each **50 mg/dL** that the blood glucose level is over target of 150 mg/dL*

Step 1: Insulin-to-carb ratio

- Determine how much rapid-acting insulin is needed for carbs.
  EXAMPLE: Meal carbs = 60 grams
- Divide the total number of grams of carbs in the meal by the insulin-to-carb ratio:
  EXAMPLE: 60 grams divided by 15 grams = 4 units

Step 2: Blood Glucose Correction Factor

- Determine how much rapid-acting insulin is needed to lower blood glucose to target level.
  EXAMPLE: Pre-meal blood glucose = 250 mg/dL and target blood glucose = 150 mg/dL
- Subtract the target blood glucose of 150 from the pre-meal blood glucose of 250. Then divide by the blood glucose correction factor of 50.
  EXAMPLE: 250 mg/dL (pre-meal blood glucose) - 150 mg/dL (target) = 100
  EXAMPLE: 100 divided by 50 (blood glucose correction factor) = 2 units

Step 3: Total Dose

- Add the number of units from **Step 1** + **Step 2** together to get the total dose.
  EXAMPLE: Total Dose = 4 + 2 = 6 units (Amount of rapid-acting insulin needed for carbs plus high blood glucose)

* The insulin-to-carb ratio and blood glucose correction factor values in this chart are for example only and are not a recommendation for dosing. Insulin-to-carb ratios and blood glucose correction factors are individualized by the student's personal diabetes health care team for each student and specified in the Diabetes Medical Management Plan.

that contain gluten or that have been prepared in a gluten-contaminated environment. Gluten is found in many grains, including wheat, rye, and barley, which are found in many pastas, cereals, and processed foods. These dietary restrictions should be outlined in the student's DMMP.

Getting Regular Physical Activity

Physical activity is a critical element of effective diabetes management. Everyone can benefit from regular physical activity, but it is even more important for students with diabetes. In addition to maintaining cardiovascular fitness and controlling weight, physical activity can help to lower blood glucose levels.

Students with diabetes should participate fully in physical education classes and team or individual sports. To maintain blood glucose levels within the target range during extra physical activity, students will need to adjust their insulin and food intake. To prevent hypoglycemia, they also may need to check their blood glucose levels more frequently while engaging in physical activity. The student's DMMP should specify when physical activity should be restricted because the blood glucose level is either too high or too low or if ketones are present.

Physical education teachers and sports coaches must be able to recognize the symptoms of hypoglycemia and be prepared to call for help with a hypoglycemia emergency. The student's Emergency Care Plans, a quick-acting source of glucose (see page xx), and the student's blood glucose meter should always be available, along with plenty of water.

Students using pager-type pumps may disconnect from the pump for sports activities; the pod type pump remains attached. If students keep the pump on, they may set a temporary, reduced insulin delivery rate or suspend use of insulin while they are playing. School personnel should provide the student with a safe location for storing the pump when the student does not wear it. The student's written health care plans should include specific instructions for pump use during physical activity.

Students with diabetes should participate fully in physical education classes and team or individual sports. Having diabetes does not excuse a student from physical education classes unless this is indicated in the student's DMMP.

Maintaining a Healthy Weight

Maintaining a healthy weight is very important for students with diabetes to help them improve their blood glucose control and to teach them habits that will allow them to control their weight as they grow older. Students with diabetes who need to lose weight or maintain a healthy weight need to be active every day. They also must consume fewer calories by eating smaller amounts of healthy foods for meals and snacks.

More children and adolescents in the U.S. are either overweight or obese than ever before. School personnel can help all students reach and maintain a healthy weight by encouraging them to make healthful lifestyle choices while they are young. They also can provide nonfood rewards and encourage healthy foods for class parties. Working with the school wellness

committee and the school-parents organization [e.g., Parent Teacher Association (PTA)/Parent Teacher Organization (PTO)], the parents/guardian can help by encouraging schools to offer healthy food choices at breakfast and lunch and in vending machines, to sell nonfood items for school fundraisers, and to include physical education in the school curriculum.

See the Resources section for organizations that offer information and education related to healthy eating and physical activity for youth.

Tips for Helping Students Reach and Maintain a Healthy Weight

Students with diabetes who need to lose weight can be encouraged to:

- ❑ **Be active every day for at least 60 minutes.** Students do not have to join a gym or be on a sports team to stay active. Dancing, riding a bike, walking the dog, or doing any physical activity they enjoy for at least 60 minutes a day will work. Activity can be broken up into three 20-minute sessions or whatever works for the student. Limit TV and computer time to 1 to 2 hours per day.
- ❑ **Cut some calories.** Encourage students to read food labels to learn about the number of calories in the foods and beverages they consume. Some healthy ways to cut calories include drinking water instead of sweetened fruit drinks or soda, eating fruit instead of chips or candy, eating a small serving of french fries or sharing a large serving, and measuring snacks in small portions instead of grazing.
- ❑ **Eat a healthy breakfast.** Eating breakfast will help students stay focused during the day and help to control their blood glucose.
- ❑ **Lose weight slowly.** One or 2 pounds of weight loss per month are recommended because students are still growing. Losing weight slowly may help students keep it off.

Planning for Special Events, Field Trips, and Extracurricular Activities

Meeting the needs of students with diabetes requires advance planning for special events such as classroom parties, field trips, and school-sponsored extracurricular activities held before or after school. With proper planning for coverage by the school nurse or trained diabetes personnel and possible adjustments to insulin dosage and meal plans, students with diabetes can participate fully in all school-related activities.

With proper planning, students with diabetes can participate fully in all school-related activities.

Although there usually are no forbidden foods in a meal plan for students with diabetes, school parties often include foods high in carbohydrates and fats. Serving more nutritious snacks will be healthier for all students and will encourage good eating habits. The parents/guardian should decide whether the student with diabetes should be served the same food as other students or food provided by the parents/guardian. If possible, give the parents/guardian advance notice about parties so they can incorporate special foods in the student's meal plan or adjust the insulin dosage.

Students often view field trips among the most interesting and exciting activities of the school year. Students with diabetes must be allowed to have these school-related experiences. **Although it is not unusual to invite the parents/guardian to chaperone field trips, parental attendance should never be a prerequisite for participation by students with diabetes.**

The school nurse or trained diabetes personnel should accompany the student with diabetes on field trips. They should ensure that all of the student's snacks and supplies for checking blood glucose, administering insulin, and treating hypoglycemia are packed and taken on the trip. Diabetes management strategies for school-sponsored field trips should be included in the student's health care and education plans.

The plan for coverage and care during school-sponsored extra-curricular activities and field trips that take place outside of school hours also should be carefully noted in the student's health care and education plans. As with field trips, the school nurse or trained diabetes personnel must be available at these activities.

Dealing with Emotional and Social Issues

Students with diabetes must not only deal with the usual developmental issues of growing up but also with learning to manage this complex chronic disease. **Diabetes can affect every facet of life, complicating the task of mastering normal developmental challenges.**

For the most part, children do not want to be singled out or made to feel different from their peers. Diabetes care tasks, however, can set them apart and make them feel angry or resentful about having diabetes.

Children react differently to having diabetes. They may be accepting, resentful, open to discussing it, or attempt to hide it. Often, the same child will experience all of these feelings over time. School personnel should be aware of the student's feelings about having diabetes and identify ways to ensure the student is treated the same as others.

Sometimes, children and teens feel pressured to please their care providers, but cannot always comply with their requests. To appease their parents/guardian or members of their personal diabetes health care team, some children report fictitious glucose levels. On the other hand, some children use their diabetes to assert their independence and control and do not comply with their diabetes care plan.

Still others are afraid or embarrassed by the potential for hypoglycemia and do not take all their insulin to avoid a low blood glucose. If this is a concern, the parents/guardian and the student's personal diabetes health care team can check the information in the memory of the blood glucose meter or the insulin pump for problems or inconsistencies.

Diabetes can be a focal point for conflict within families. One of the biggest tasks for children and adolescents is to become increasingly independent from their parents/guardian. Yet, diabetes may compromise independence because the parents/guardian are concerned about their children's ability to perform self-care tasks and take responsibility for their diabetes.

Diabetes care tasks can set children and teens apart from their peers and make them feel resentful or angry about having diabetes.

The parents/guardian, who are ultimately responsible for their child's well-being, may be reluctant to allow normal independence in children or teens who have not been able to take care of themselves properly. This parental concern can lead to increasing struggles with dependence, oppositional behavior, and rebellion.

Children with type 2 diabetes may be struggling with maintaining a healthy weight. The parents/guardian and school personnel can help by encouraging them to make healthy food choices and to get more physical activity.

Increasingly, depression is being recognized as quite common among children and teens, and even more so in those with diabetes. The student's personal diabetes health care team and school health team must be aware of emotional and behavioral issues and refer students with diabetes and their families for counseling and support as needed.

See the National Diabetes Education Program Resources listing for **"Transitions From Pediatric to Adult Care"** and **"Tips for Teens With Diabetes: Dealing With the Ups and Downs of Diabetes."**

Why Is Diabetes Self-Management Important?

The student's personal diabetes health care team and school health team must be aware of emotional and behavioral issues and refer students with diabetes and their families for counseling and support as needed.

Diabetes care depends upon self-management. The students' competence and capability for performing diabetes-related care tasks should be specified in the Diabetes Medical Management Plan and then applied to the school setting by the school health team, as outlined in the student's Individualized Health Care Plan and any education plan.

Although students must receive assistance with and supervision of their diabetes care when needed, it is equally important to enable students to take on the responsibility of diabetes self-management with ongoing guidance and support from the parents/guardian, the student's personal diabetes care team, and the school health team. The age for transfer of responsibility from caregiver to child varies from student to student and from task to task because children develop and mature at different rates.

Students' abilities to participate in self-care also depend upon their willingness to do so. It is medically preferable that students be permitted to perform diabetes care tasks in the classroom, at every campus location, or at any school activity.

Although the ages at which children are able to perform diabetes care tasks are highly individualized and differ for each child, their ability and levels of self-care generally occur as follows:

- **Toddlers and preschool-aged children** are unable to perform diabetes care tasks independently and will need an adult to provide all aspects of diabetes care. Many of these young children will have difficulty recognizing hypoglycemia, so it is important that the caregiver be able to recognize and provide prompt treatment. Children in this age range, however, usually can determine which finger to prick, choose an injection site, and are generally cooperative.

- **Elementary school-aged children** often are able to perform their own blood glucose monitoring, but usually will require supervision. Older elementary school-aged children are beginning to self-administer insulin with supervision and understand the impact of insulin, physical activity, and nutrition on blood glucose levels. Unless children have hypoglycemic unawareness (inability to tell when their blood glucose level is low), most should be able to let an adult know when they are experiencing hypoglycemia.
- **Middle- and high school-aged children** should be able to provide self-care depending upon the length of time since diagnosis and level of maturity, but they always will need help when experiencing hypoglycemia. As older children mature, they should be encouraged and empowered to perform diabetes care tasks on their own.

Ultimately, each person with diabetes becomes responsible for all aspects of self-care, including blood glucose monitoring and insulin administration. Regardless of their level of self-management, however, all students with diabetes may require assistance when blood glucose levels are out of the target range. Regardless of their age, there are times when all children who have diabetes need someone else to share in their diabetes care tasks.

Note: Students with diabetes may be in a research study that could require medication administration at school, a change in their blood glucose monitoring schedule, or more frequent medical visits. The school should be aware of student participation in research and discuss with the student and family how to address any additional requirements.

Where Can I Learn More About Diabetes?

The Resources section, beginning on page 119, lists the major diabetes and other health care and education organizations (and their websites) that offer related information, resources, and training on children and diabetes and effective diabetes management at school.

To obtain additional copies of the School Guide and other information about diabetes and youth

Call the National Diabetes Education Program

1-888-693-6337

Visit the program's website

www.YourDiabetesInfo.org