

P.E.D.S.SM
Pediatric Education for Diabetes in Schools



The Diabetes School Resource Guide

A guide for managing students
with diabetes at school

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A guide for managing students with diabetes at school.

**Written by Mary Zombek, RN, MS, CPNP in partnership
with the California Department of Education and the PADRE Foundation**



The Diabetes School Resource Guide is designed to work in conjunction with the "P.E.D.S. A Curriculum for Diabetes Care in Schools" a comprehensive training binder for schools. For a copy of the full curriculum, contact PADRE Foundation at 714/532-8330 or log on to the web site at www.pedsonline.org.

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About the Author



Mary Zombek, R.N., M.S., C.P.N.P

Mary is a Certified Pediatric Nurse Practitioner and has been employed by the Orange County Department of Education as a School Nurse in Special Education since 1987. Prior to this she worked at Children's Hospital of Orange County, California as an Endocrine Nurse Practitioner. She has had Type 1 diabetes since 1970 and has been on insulin pump therapy since 1983. She is a diabetes consultant for the Orange County Department of Education and the PADRE Foundation and has provided numerous lectures over the years as well as fielding phone calls from educators, parents, and school nurses.

Mary started in school nursing in 1987. That year she conducted her thesis research which involved diabetes inservice education for non-nursing school personnel and it's effect on hypoglycemic episodes of school-aged diabetics. That same year she co-founded the "Family Retreat"; a weekend of education, counseling, and fun for children with diabetes and their families, sponsored by the American Diabetes Association and the PADRE Foundation. In 1990 she developed a protocol for "B-STATS" (blood sugar testing at school) program and obtained a donation of 300 blood sugar testing meters for use at schools. She developed the diabetes procedures for both California State Department of Education's and the Orange County Department of Education's Specialized Physical Health Care Procedures manuals.

Mary has always been active in the field of diabetes. She has shared her diabetes expertise at several local, state and national school nursing conferences. She provides inservices for local school districts. She has provided seminars for the PADRE Foundation on school issues and private consultations at school for students who need encouragement. She has served on the Board of Directors for the American Diabetes Association and was the Chairperson of Youth Services. She continues to be an active member and keeps current in the latest diabetes research and technology.

In addition to her work in the field of diabetes, Mary has been active in her local, state and national school nursing organizations. Professional affiliations include Orange County School Nurses Organization, California School Nurses Organization, National Association of School Nurses, American Academy of Pediatrics, School Health Committee, Kappa Delta Pi, an international honor society in education, Advisory Board for the Diabetes Education Program at Children's Hospital of Orange County, Professional Sector of the American Diabetes Association and the National Parent Teacher Association. She has received the Carl W. Bull Award for Excellence in Nursing, Orange County School Nurses Organization's School Nurse of the Year Award, Educator of the Year Award for California School Nurses Organization, Southern Section, and American School Health Association's Outstanding School Nurse Achievement Award.

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After the initial draft which was then titled, "Guidelines for Diabetes Care at Schools" was completed, the Recommendations were presented to various community agencies. The following professionals and/or groups signed a letter of support in 1997:

**American Academy of Pediatrics,
Orange County Chapter**

Paul Qaqundah, MD,
Chair of School Health

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Department of Endocrinology
Alan Cortez, MD

**Juvenile Diabetes Foundation,
Orange County Chapter**

Bob Boragno, President

**Pediatric Adolescent Diabetes
Research and Education (PADRE)
Parent Support Group**

CHOC and Mission Viejo Hospital

**Team of Advocates for Special
Kids (TASK)**

Marta Anchondo,
Deputy Program Director

In 1997, I presented these Recommendations to the Orange County school nurses and at the PADRE parent support group meetings as recognized guidelines of care for schools. In the summer of 1998, I presented the Recommendations at the National Association of School Nurses Conference in San Diego, California, so school nurses across the nation could see what was working in Orange County for students with diabetes.

In February, 1999 Children's Hospital of Orange County (CHOC) initiated an Advisory Committee for ADA Recognition of their Diabetes Self Management Education Program. I was invited to serve on the committee as a representative from the schools. Community outreach was a component for ADA recognition and I suggested to the committee that the Recommendations for schools could be a part of this outreach. The committee agreed and Jackie Teichmann, Executive Director of the PADRE Foundation, orchestrated the public relations needed to achieve the final product; a curriculum that schools, parents, and healthcare providers can use to support the provisions of diabetes care in the schools.

Thank you Susan Lordi, my school nursing instructor, who told me in

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Research Coordinator

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A great deal of time and effort was given in reviewing the revised edition of the PEDS Curriculum (Spring 2001). This was done by Dr. Alan Cortez, Area Pediatric Endocrinologist, Kaiser-Permanente, Orange County,

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Stephen E. Gitelman, M.D., Associate
Professor, Department of Pediatrics,
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I thank them, and the other prominent pediatric endocrinologists who took their time to review the manual and provide feedback on the curriculum. Their input is extremely valuable as it is important for schools to work closely with healthcare providers to ensure the best advocacy for children with diabetes.

I hope you find this manual and the Recommendations helpful. Together we can achieve a safer place, a better world, and a brighter future for the children with diabetes.

Mary Zombek, RN, MS, CPNP

The P.E.D.S. Program



P.E.D.S. (Pediatric Education for Diabetes in Schools) addresses school based issues regarding current trends in diabetes care for children and adolescents. This *School Resource Guide* works in conjunction with the other PEDS materials as each is intended for specific audiences.

P.E.D.S. provides resources, training materials and technical assistance to members of the school community involved in the care of children with diabetes including school nurses, school administrators, teachers, unlicensed assistive personnel, parents, health care providers and diabetes educators.

The P.E.D.S. program consists of a web site (www.pedsonline.org); e-mail address (peds@padrefoundation.org) for questions and answers related to diabetes care at school; *A Parent and Health Care Provider Guide*, *A School Resource Guide* and *A Curriculum for Diabetes Care in Schools* training binder.

The P.E.D.S. training binder, *A Curriculum for Diabetes Care in Schools*, is a comprehensive training resource for schools. The binder was designed to train school nurses who in turn will train other audiences regarding proper care for the student with diabetes. PADRE Foundation worked in partnership with the California State Department of Education. They provided ten statewide training sessions for school nurses on this curriculum from January to May of 2001.

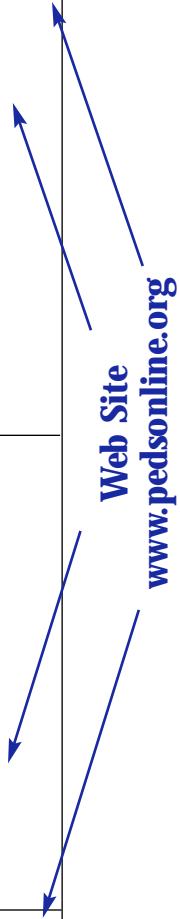
Diabetes Care at School, A Parent and Health Care Provide Guide: provides the Recommendations for diabetes care at school, procedures for care and other paperwork necessary for parents and health care providers.

Federal and state regulations require that school districts provide health care services necessary for students to receive their education in the least restrictive environment. To assist school districts in this effort, *The Diabetes School Resource Guide* was developed. Like *The Parent and Health Care Provider Guide*, this guide provides the Recommendations for Diabetes Care at School, procedures for care and other paperwork necessary proper implementation of health care services at school. Basic information on diabetes is also included to enhance knowledge and understanding of the disease.

The desired outcome of the P.E.D.S. program is to provide the best possible health care for the student with diabetes to optimize his or her learning experience at school. Educating all members involved in care of the student with diabetes is necessary for consistency and contributes towards a healthier, happier environment for all.

Pediatric Education for Diabetes in Schools Resource Materials and Tools by Audience

Parents	Health care Providers	Unlicensed School Personnel	School Nurses and CDEs
<p>Diabetes Care At School Guide A parent and healthcare provider guide for managing diabetes at school</p> <ul style="list-style-type: none"> - Recommendations for Diabetes Care at School - Individualized School Healthcare Plan (ISHP) - Procedures - 504/IEP - Satisfaction Surveys - Community and National Resources - Glossary 	<p>Diabetes Care At School Guide A parent and healthcare provider guide for managing diabetes at school</p> <ul style="list-style-type: none"> - Recommendations for Diabetes Care at School - Individualized School Healthcare Plan (ISHP) - Procedures -504/IEP 	<p>The Diabetes School Resource Guide A guide for managing students with diabetes at school</p> <ul style="list-style-type: none"> - Recommendations for Diabetes Care at School - General Information on Diabetes - Tools for Schools <ul style="list-style-type: none"> • Individualized School Healthcare Plan (ISHP) • Procedures • Disaster Preparedness • School Staff Action Tools • Records & Logs • Contracts • 504/IEP • Glossary 	<p>A Curriculum For Diabetes Care At School A resource for schools and communities</p> <ul style="list-style-type: none"> - Training of Trainers - Recommendations for Diabetes Care at School Training Program - Diabetes Basics Training Program - CD ROM Presentation and Handouts - Individualized School Healthcare Plan (ISHP) - Procedures - Disaster Preparedness - Tools for Schools <ul style="list-style-type: none"> • Individualized School Healthcare Plan (ISHP) • Procedures • Disaster Preparedness • School Staff Action Tools • Records & Logs • Contracts • 504/IEP • Glossary
			<p>Community & Nat'l Resources</p>



Web Site
www.pedsonline.org

Diabetes General Information

Overview



Diabetes is a condition that occurs when there is not enough insulin produced by the body. Insulin is a hormone that allows cells to utilize the glucose (sugar) in the blood creating energy for the body's needs.

There are several theories as to why someone gets diabetes. Diabetes is considered a multifactorial disease meaning it is caused by multiple factors.

The causes of Type 1 & 2 diabetes are completely different:

- environmental factors - poor diet habits and inactivity contribute to the increase in type 2 diabetes.
- auto-immune conditions - the triggers are unknown, but could be a virus enters the body and in response, the body not only attacks the virus but also the beta cells that produce insulin (Type 1).
- genetic factors - there are genetic markers for Type 1 diabetes on the white blood cell that increase the possibility that autoimmunity will occur thus there is a "genetic predisposition" to the disease. Only 1 in 5 persons with Type 1 diabetes has a close family member with Type 1 diabetes. By contrast, most people with Type 2 diabetes have a close family member with Type 2 diabetes.

About 1 in 300-600 children under the age of 21 develop Type 1 diabetes. Studies are currently being conducted to assist in determining who may be at a higher risk (HLA typing and Diabetes Prevention Trials). At this time there are no proven methods to prevent or delay Type 1 diabetes.

Type 1 diabetes is also referred to as diabetes mellitus. Diabetes is a Greek word meaning "to run through." Mellitus is a Latin word meaning "honeyed." Translation implies the meaning of excessive sweet urine.

Diabetes is a chronic disease and is considered a handicapping condition under the Americans with Disabilities Act. This prevents discrimination in the work place as well as in schools. Reasonable accommodations needed for the student with diabetes will be discussed throughout this training program as well as a federally mandated plan to ensure these accommodations.

Type 1 or Insulin Dependent Diabetes Mellitus (IDDM) and Type 2 or Non-Insulin Dependent Diabetes Mellitus (NIDDM) are two types of diabetes. It is very important that Type 1 is not confused with Type 2.

Diabetes General Information

Types of Diabetes



Type 1 (Insulin Dependent Diabetes Mellitus)

Type 1 diabetes used to be known as juvenile onset or Insulin Dependent Diabetes Mellitus (IDDM); the American Diabetes Association changed the terminology to provide more consistency i.e. there are people with Type 1 diabetes that are not juveniles and there are juveniles that have Type 2 diabetes.

Type I diabetes occurs more often in children and young adults. As discussed earlier, there may be an auto-immune component. Eventually there is a total lack of insulin which is considered to be a defect in carbohydrate metabolism. The damage to the cells that make insulin is permanent. Since the body cannot make its own insulin then injections of insulin must be taken.

Type 1 diabetes cannot be prevented.

Gestational Diabetes

This type of diabetes can only occur during pregnancy and can be a condition that is diet controlled or may require insulin to keep the blood glucose under control, (CDC, 1999). It is very important for the person with gestational diabetes to maintain good control of the glucose levels as this can affect the health of the fetus. For school issues, it is important to support and encourage a pregnant adolescent who has gestational diabetes and ensure proper medical care is received.

Type 2 (Non Insulin Dependent Diabetes Mellitus)

This type of diabetes was more commonly known as adult onset diabetes because it mainly occurs in middle-aged or older adults who are overweight. There is usually an excess of insulin produced at first and the cells are resistant in using the insulin. Medication, diet and exercise can be used to manage a person with Type 2 diabetes who produces enough insulin. Eventually the pancreas may not be able to make enough or be effective enough for the overweight body and insulin injections are required.

Today more and more youth are being diagnosed with Type 2 diabetes. They are usually over the age of 10 years. At this time, the only FDA approved treatment for Type 2 diabetes in children is insulin however, these students may take an oral agent called glucophage. This makes the cells more sensitive to using its own insulin. Having a sensible meal plan and exercise also assists the body in better using its own supply of insulin.

Diabetes General Information

Types of Diabetes (continued)

High risk factors for Type 2 diabetes include the following:]

- overweight (greater than 85th% for height /weight ratio); 85% of Type 2 adults are overweight. Physical inactivity has contributed greatly to childhood obesity.
- family history of Type 2 diabetes (these children are at high risk for developing long-term complications).
- race (Native American, African American, Hispanic, Asian American and Pacific Islander).

The following conditions are linked to higher than normal insulin concentrations in the bloodstream (also referred to as insulin resistance):

- acanthosis nigricans- skin that is coarse, thickened and black or darkened; has a velvety texture and appears on the nape of the neck, knuckles, elbow, axillae, knees, abdomen, thighs and soles of the feet.
- hypertension- high blood pressure; usually occurs early adulthood.
- dyslipidemia- elevated or abnormal blood fats (cholesterol, triglycerides).
- polycystic ovary syndrome-amenorrhea, facial hair, severe acne, enlarged ovaries, and obesity (females only).
- excessive drinking and urination
- obesity

Once the insulin concentrations are normalized, these conditions will dissipate.

The risk of getting Type 2 diabetes can be decreased by avoiding obesity through healthy diet and plenty of exercise.

Diabetes General Information

Diabetes Complications and Control Trials



The Diabetes Control and Complications Trial (DCCT) ended in 1993 after 8 years. It compared standard treatment (two to three insulin injections a day) with intensive treatment (more than 3 injections each day or an insulin pump). The goal for both groups was to keep their blood glucose as close to normal as possible.

People in the intensive treatment group achieved better blood sugar control than the standard treatment group. Side effects of better control however, included more episodes of hypoglycemia and a modest degree of weight gain. Of note, no one died or suffered brain damage due to the higher risk of hypoglycemia during the study.

This study proved that it is important for the diabetic to maintain a balance of diet, exercise, and insulin for a long and healthy life. The goal is to keep glucose levels in as near a normal range as possible. This is called "tight control". Low blood glucose can occasionally occur when tight control is maintained.

If tight control is not achieved then there are complications that eventually develop. These complications involve damage to the eyes, kidneys, nerves, heart, blood vessels and joints. The Centers for Disease Control compiled the following statistics (1999) on the complications of diabetes:

- leading cause of new blindness (12-24,000/year)
- cardiac disease is 2-4x higher
- 60-70% develop mild-severe neuropathy
- leading cause of end stage kidney disease.

The DCCT revealed the following results:

- intensive therapy decreased glycohemoglobin (HbA1C) by an average of 2%. Hemoglobin A1C is a lab value that reveals measurement of diabetes control over the past 2-3 months. Glucose (glyco) attaches to the protein (hemoglobin) on the red blood cell. These cells completely turnover about every 120 days. Depending on the laboratory used, normal levels vary from 4% to 6%.
- intensive therapy reduces risk of non-cardiac long term complications by as much as 76%.

(Source: Diabetes Forecast, September, 1993)

Diabetes General Information

Understanding Diabetes



The pancreas makes enzymes and insulin. Insulin is a hormone secreted by the beta cell in the pancreas. Insulin goes straight into the blood and enables glucose to enter other cells of the body. Enzymes help digest or breakdown the food into glucose. Glucose is a simple sugar that is present in the blood and is used by the body for energy.

When someone has diabetes, the pancreas doesn't make enough insulin. When there is not enough insulin, the body cannot move glucose into the cells.

Body cells need to have glucose to provide the energy we need to live. Cells use glucose from all the foods we eat.

When glucose cannot be used for energy the level of glucose builds up in the bloodstream.

When excess glucose builds up in the blood, the kidneys filter it out into the urine. In the process the body uses a lot of water. This causes increased thirst.

Hunger is another symptom of diabetes caused by the body losing calories as a result of its inability to utilize the glucose from food that is consumed. This leads to weight loss and fatigue.

When the body can't use glucose, it uses its own fat and muscle tissue for energy. **Ketones** are acids that are left in the blood when fat is used for energy. Symptoms of nausea, vomiting and eventually coma occur. This is called diabetic ketoacidosis.

The body will try to get rid of ketones through the kidneys and lungs. The ketones will show up in the urine and will also cause the breath to smell fruity.

All of the above symptoms are due to high blood glucose, also referred to as hyperglycemia.

Diabetes General Information

Understanding Diabetes (continued)

Achievement of Tight Control

A balance of the following helps keep the diabetes in tight control:

- 1. Insulin**- this is administered by injecting it just beneath the skin. A calculated amount is given and this is why the diet also must be calculated to match the amount of insulin given. Most children receive two to four shots a day of combined insulin types (short and long acting) or receive insulin via a pump that is worn continuously.
- 2. Exercise** - is important for everyone but it can help improve diabetes control. Exercise lowers blood glucose levels. It causes the body to use more glucose for the energy needed to exercise and also makes the cells more efficient in using insulin. Insulin is still always needed for glucose to enter into the cells of the body. Together, exercise and insulin improve blood sugar levels.
- 3. Meal plan** - having a plan for food consumption helps keep blood glucose levels in the target range. It is very important to eat the right amounts of food at the right times to balance with the insulin. Insulin works even when the food is not eaten. One key to balancing food and insulin is keeping track of carbohydrates. The most common method of measuring carbohydrates is called Carbohydrate Counting, also known as "Carb Counting".

Diabetes General Information

Nutrition



The main nutrient in food that affects blood glucose levels is carbohydrate. Carbohydrates come in two forms: simple and complex. Starches are considered complex carbohydrates and sugars are considered simple carbohydrates. Examples of complex carbohydrates include bread, rice, cereals, pasta and milk. Simple carbohydrates include soda, fruit, and even candy. Simple carbohydrates are digested faster and complex carbohydrates are digested at a slower rate. Eventually all carbohydrates are digested in to a simple form of sugar called glucose. Glucose is what cells use for energy. Even sugar-free foods and sugar-substituted foods may contain carbohydrates. The FDA has a specific definition of "sugar-free" which can be misleading for people with diabetes because some sugar-free foods contain fructose that are digested to glucose.

Both complex and simple carbohydrates can be part of a healthy meal plan. Carb counting is the newest method for matching the insulin dose with the grams of carbohydrate eaten. This allows for a flexible meal plan with allowances for occasional treats and sweets.

A good meal plan also includes an appropriate amount of proteins. Protein foods include meat, fish, cheese, and eggs. Protein will usually not raise blood glucose levels so it is not included in carb counting. However, eating large amounts of protein at one time can affect blood glucose so insulin adjustments may be needed.

Fats are also included in a meal plan. Fat sources include salad dressings, butter, margarine, gravies, sauces, nuts and dips. Fats do not raise the blood glucose level but are the most concentrated source of calories, so limited amounts are recommended to avoid excessive weight gain.

While protein and fat may not directly affect blood glucose values much, they can alter the speed at which carbohydrates are digested to glucose and therefore have a significant effect on blood glucose levels.

Diabetes General Information

Nutrition (continued)

Important Nutrition Accommodations for School

Although students with diabetes have the same nutritional needs as other students, there are special considerations for the school setting.

Structured meals and snacks contribute to optimal glucose control and assist in preventing hypoglycemia. Timing of snacks is critical based on peak insulin action times (when the insulin is most effective in lowering the blood glucose). Therefore, snacks must be allowed in the classroom according to pre-scheduled daily snacks and/or for treatment of hypoglycemia.

Some students may require modifications in the school meal menu. Simple sugars and sweets may need to be limited or omitted or pre-planning may allow for these items.

Parents should be notified ahead of time to accommodate for school parties or special events:

It is important for the teacher of the student with diabetes to realize that any food eaten that contains carbohydrate must be worked into the meal plan, even if it is labeled "sugar free." Also some sugar substitutes add carbohydrates. These can make blood sugar rise if they are not eaten as part of a meal plan.

All nutrition related accommodations could be detailed in the student's ISHP.

Diabetes General Information

Exercise



Exercise assists in lowering the blood glucose levels. General guidelines for blood glucose levels before exercise should be over 100 and under 250. When the blood glucose level is over 300, a test for ketones should be done (if authorized by the physician) before exercising. **If ketones are positive the student should not exercise!**

Sometimes the blood glucose is tested before and after exercise to know how to adjust the insulin dose and food. If exercise lasts more than 1 hour, the blood glucose should be tested during the activity. School accommodations for blood glucose testing can be detailed in the student's ISHP.

If the student with diabetes is exercising around the time of a meal or snack, it may be best to eat first. It is best to exercise or take P.E. 30 to 60 minutes after a meal to allow time for food to be absorbed. **A person with diabetes always needs to carry a fast acting sugar and a complex carbohydrate for treatment of low blood sugar.**

The student's ISHP will address how many extra carbs should be consumed with exercise. Usually, an extra snack of about 15 grams of carbohydrate may be needed for each 30-60 minutes of exercise. If blood glucose is low before exercise, treat according to the standard Procedure for Mild or Moderate Low Blood Glucose. When the blood glucose is within the target range for exercise, exercise should be safe.

Exercise increases the flow of blood in general but especially to the muscles that are being used the most. Insulin is absorbed faster when there is increased blood flow to the exercising muscles. For example, if the insulin is injected in the arm before a run or swim, it may cause a low blood sugar.

Muscles use stored sugar while exercising. After exercise, the muscles need to replace this stored sugar. They do this by taking glucose out of the blood. This may continue for up to 12 hours after exercise is over.

Coaches must be trained to take care of diabetes emergencies and provide accommodations for exercise and team sports.

Medical ID tags should always be worn when exercising. In most sports a necklace is best. It might help to safety pin it to clothing.

Schools must offer students with diabetes full participation in physical activities and field trips and follow instructions on the ISHP with regards to exercise.

Diabetes General Information

Blood Glucose Testing



Some people may feel blood glucose testing at school poses a risk. Actually, there is no reason for concern due to self retracting lancets, absorbing pads on testing strips, the small amount of blood needed to perform a test, and implementation of Universal Precautions.

One of the main goals of treating diabetes is to keep blood glucose levels as close as possible to those of people without diabetes. Blood glucose levels that remain high for a number of years can cause serious problems. These may include problems with the eyes, kidneys, or blood vessels.

Testing blood glucose levels will reveal how close they are to the target range. This information is needed in order to manage the blood glucose levels.

Blood glucose levels for people who do not have diabetes are usually less than 150, no matter how much they eat and less than 100 if they are fasting.

The blood glucose level goes up after a person eats a meal. By the time a person without diabetes is ready to eat again, the blood glucose level has gone down.

Balancing a meal plan, insulin, and exercise can be difficult at times. It is not a perfect science and bodies react differently.

This balance can be very hard to achieve for some babies, young children, or adolescents who have diabetes. Babies and young children don't always eat and exercise in the same way or at the same time each day. The adolescent has to deal with hormones that can create unstable blood glucose levels. Moreover, many adolescents with diabetes are not concerned about future complications and do not pay attention to the details needed to manage diabetes effectively. Therefore, one goal of diabetes management in schools must be to make it as "convenient" as possible.

The student's ISHP will define the target range for blood glucose levels. It will also establish the level of assistance needed by the student.

Student's need to have convenient access to testing at all times and be provided designated areas to perform the tests. Some students will prefer privacy while others may need to do it discretely at their desk. Ideally the student should have the meter "on person" in order to check their glucose at any time.

Diabetes General Information

Blood Glucose Testing (continued)

Blood tests provide instant feedback and can sometimes be discouraging if they are not always in the target range. A diabetic in great control is only able to achieve about half the numbers in the target range. Avoid placing any judgement value on the numbers and treat the situation matter-of-factly with proper care. Provide encouragement and support for the student.

Many children test either before the morning snack or at lunchtime when they are in school.

If a child with diabetes feels bad or is sick at school, the blood glucose should be tested.

Blood glucose testing should also be done when someone with diabetes feels ill or has signs of a low blood glucose level.

The student's personal meter can be used or a school meter can be made available. If the student is performing their own test they can use their own personal lancing device. If the school is performing the test then disposable, single use, self-retracting lancing devices must be used.

Quality control checks should be routinely performed at school if the meter stays at school. This helps ensure accurate readings. A control solution is used and recorded on a quality control log.

Make sure that strips are not expired. Once a package is opened the date should be written on the packaging. They are usually good for 4 months after opening the vial unless individual packaging is used.

The meter should also be cleaned according to manufacturer instructions. The student or student's family is responsible for cleaning their own meter at home. If the school uses a meter for multiple students, the school is responsible for cleaning and maintenance. **NOTE: Only meters that meet OSHA requirements can be used for multiple student use.**

If any problems arise with the meter then a technical assistance number (usually listed on the package or meter) can be called for help or to get a replacement meter.

There is no national consensus on blood glucose goals for children and adolescents. The following chart can be a useful guideline.

Diabetes General Information

Blood Glucose Testing (continued)

Blood Glucose Levels:

	IDEAL	GOOD	FAIR	POOR
FASTING BLOOD GLUCOSE	70-120	120-160	160-200	OVER 200
TWO HOURS AFTER A MEAL	LESS THAN 160	160-180	180-249	OVER 240

These are generalized categories of blood glucose readings. Younger children may have a broader acceptable range of blood glucose readings. With diabetes, the body can't make insulin. When insulin is administered with a syringe, the body can't add more or make less. Sometimes blood glucose can go out of balance. The goal is to keep the average blood glucose readings in the "Ideal" to "Good" range.

A fasting blood glucose is done first thing in the morning after "fasting" since midnight. This level is valuable because it can reflect what was going on during the night as well as early morning.

Sometimes a blood glucose is checked two hours after a meal to see how effective the insulin dose was. If it is too high, food consumption may be delayed or the types of food eaten may be changed.

Refer to Blood Glucose Algorithms (the last page of the Procedure for Blood Glucose Testing) as a reference for blood glucose testing results. These algorithms are used specifically for school:

- if 70 or above and feeling "low" retest to verify results
- if 80 or less after retest and feeling "low", treat for hypoglycemia
- if 81 or above after retest, test again in 10 minutes. If results are unchanged immediately consult with the school nurse.
- if 70-240 and feeling OK, no treatment is needed
- if 240 or above, treat for hyperglycemia.

For the student's safety, it is recommended that schools re-check a blood glucose test 10 minutes after a hypoglycemic episode to ensure that the glucose is rising after treatment is given or if the original test result is questionable. A person with diabetes may not always re-check their blood glucose at home.

Diabetes General Information

Hypoglycemia



Definition of Hypoglycemia

Hypoglycemia means low blood sugar. "Hypo" means too little, and "glycemia" refers to blood glucose or sugar. A low blood sugar level means that the amount of insulin and the amount of sugar in the body are out of balance. In other words, there is too much insulin for the amount of sugar in the blood. That is why it is sometimes called an insulin reaction.

A blood glucose test can reveal if someone has a low blood glucose. Treatment for hypoglycemia must always be given for blood glucose under 70.

People may or may not have symptoms when they have a low blood glucose. In other words, they may or may not feel low. The blood glucose level at which a person feels low varies from person to person.

Causes of Hypoglycemia

The causes of hypoglycemia include:

- too much insulin
- not enough food
- exercise without taking extra carbohydrates
- illness causing lack of appetite or inability to retain food.

Some medications such as aspirin or other salicylates, blood thinning medications, and MAO inhibitors (a type of antidepressant not frequently used) can exacerbate hypoglycemia.

Signs and Symptoms of Hypoglycemia

Signs and symptoms can vary depending on the person and the severity of the insulin reaction. Initially the diabetic may experience shakiness, sweating, irritability, paleness, weakness, stomachache, blurred vision, numbness of the lips and tongue, and headache. If untreated, symptoms may progress to slurred speech, erratic behavior, unconsciousness and convulsions.

If someone has these signs, the blood glucose should be tested right away if possible. If a test is not possible then treatment should be given immediately.

Sometimes, a low blood glucose happens without any of these signs and the person may not even feel low. Eventually the student may pass out or have a seizure. This is called hypoglycemic unawareness. Frequent blood glucose testing can assist in identifying hypoglycemia and hopefully prevent

Diabetes General Information

Hypoglycemia (continued)

severe symptoms of hypoglycemia. Hypoglycemic unawareness should be identified in the student's ISHP and also address how this condition is handled.

Treatment for Hypoglycemia

Always treat for Hypoglycemia if the blood glucose test is below 70 or the student has signs of low blood glucose and cannot test.

Always treat the student immediately. Never send the student anywhere until treatment is initiated. Assistance can be requested from the health office. A wheelchair can be used to take the student back to the office, if necessary, for further observation and treatment if hypoglycemia occurs in the classroom.

Again, without glucose for the cells, the body cannot survive so immediate treatment is absolutely necessary. The recommended treatment is a 15 grams of a quick acting source of sugar . A specific amount of sugar is recommended so that the glucose level is not pushed too high. Sugar has to be broken down to glucose before it can be used by the cells, therefore a pure glucose product, such as glucose tablets, Monogel, or Insta-glucose, is absorbed more readily and is highly recommended for school use. Other sources of glucose include:

- 1/3 cup regular sugared soda
- 1/2 tube gel Cake Mate
- 1/2 cup apple juice
- 3 teaspoons sugar
- 1/2 cup orange juice
- 1/2 cup grape juice

It is important to wait before giving food because this may actually slow absorption of the fast acting carbohydrate. It will take 5 to 15 minutes for the glucose source to work.

With severe low blood glucose, a person may become unconscious or have convulsions. Severe low blood glucose means the blood glucose level is so low (less than 50 usually) that someone can no longer eat or drink. When eating or drinking is **not possible**, send someone to call 911 and immediately treat for "severe hypoglycemia" per the physician's authorization (glucose gel in the cheek pouch or glucagon administration).

If the student is having a seizure their head must be protected to avoid injury (if they are on a floor, put padding under their head; if they are on the asphalt, use clothing to pad the head or move them to the grass) and maintain an open airway (keep them on their side).

It is advisable that the School Administration check with local paramedic services to find out how long will it take for services to arrive.

Diabetes General Information

Hypoglycemia (continued)

If approved by a authorized health care provider, a glucagon injection is to be given when the person with diabetes exhibits severe symptoms: combativeness, inability to swallow, seizures or unconsciousness.

Glucagon is a hormone that will raise the blood glucose level. It stimulates the liver to release stored glucose (providing that stores of glucose are available in the liver). The blood glucose level will usually go up within 15 minutes after giving the glucagon. Paramedics should arrive within this time to administer intravenous glucose if needed. Nausea and vomiting may occur up to 2 hours after getting glucagon. Provide sugared soda and crackers if the person should awaken prior to the paramedics arriving.

Make sure the Glucagon Emergency Kit is replaced prior to the expiration date.

Treatment for hypoglycemia and severe hypoglycemia is part of the student's ISHP and a copy of this must be given to the teacher(s) and trained staff.

School Accommodations for Hypoglycemia

School accommodations for hypoglycemia include the following:

- trained staff must always be available.
- glucose source should always be carried with the student who has diabetes.
- always treat "on-the-spot", never send the student somewhere to seek treatment.
- never send student anywhere alone after treatment for hypoglycemia
- treat episodes in a calm, professional manner.
- adjust class schedule to avoid exercise periods just before or after lunch.

Diabetes General Information

Hyperglycemia



Definition of Hyperglycemia

Hyperglycemia means high blood glucose. "Hyper" means high and "glycemia" refers to the glucose in the blood.

Hyperglycemia is another problem that can occur with even well controlled diabetes.

Causes of Hyperglycemia

When not enough insulin is given the result is hyperglycemia. There are several factors that can contribute to hyperglycemia: the consumption of too much food or sweets, illness, stress, and decreased activity. During growth periods of adolescence as well as during times of stress, injury and/or illness, hormones are released that can cause insulin resistance and resulting hyperglycemia.

Steroids, estrogens, thiazide diuretics, and medications like Sudafed can also cause the blood glucose to increase.

Usually hyperglycemia is asymptomatic. Some people with hyperglycemia may develop headache, nausea or mild malaise. If there has been hyperglycemia for an extended period of time with significantly elevated glucose levels (400 to 600 mg/dl) then the symptoms are the same as when the person was first diagnosed with diabetes (increased thirst, increased urination, increased hunger). Additional symptoms in some children may include behavioral changes such as hyperactivity and/or defiance. Efforts should be made to consider diabetes control when addressing behavioral concerns in the child with diabetes.

Communication between the school, parent and healthcare provider is essential when addressing these concerns.

Treatment of Hyperglycemia

Elevated glucose levels may occasionally occur and require balancing the food, insulin or exercise. Immediate treatment for hyperglycemia is usually not warranted unless the student feels ill or is thirsty. If the student feels ill then they should be sent home. If the student is thirsty then fluids must be provided, as they are important for hydration. Treatment for hyperglycemia as well as when the physician and parent wish to be notified of hyperglycemia should be addressed in the ISHP.

Treatment for hyperglycemia may include an extra dose of insulin. This can be given by school personnel (in accordance with state law) as

Diabetes General Information

Hyperglycemia (continued)

authorized by the healthcare provider. Extra insulin is typically given when the blood glucose is 240 and above either before a meal or 2 hours after a meal. Students on insulin pumps may take extra insulin for milder elevations in the blood glucose level. More insulin may be required during illness or times of stress. More insulin is required as the child grows.

Exercise may assist in lowering the blood glucose but provisions for added exercise must be discussed with the student, parent and healthcare provider and addressed in the IHSP. The time for exercise takes away from educational time and immediate treatment for hyperglycemia may not be necessary. If ketones are present or if the blood glucose is over 240-300, exercise may increase the blood glucose and increase the production of ketones. Again, when to exercise must be addressed with the student, parent and healthcare provider.

Communication with the parent and healthcare provider regarding hyperglycemia is essential to the management plan as changes in the insulin dose may be required. The school nurse should be responsible for this communication and must be notified by school personnel as outlined in the IHSP.

Ketosis/Ketoacidosis

Chronic hyperglycemia is not considered an emergency medical situation unless symptoms of ketoacidosis develop. However, chronic hyperglycemia must be addressed with the parents and healthcare provider because poor control may contribute to poor school performance and definitely contributes to the long-term complications of diabetes.

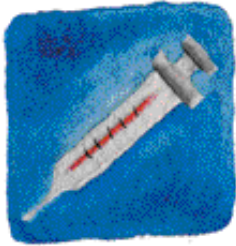
With untreated hyperglycemia, the body cannot use its glucose due to a lack of insulin and fat and muscle tissues are broken down as fuel sources. Ketones and acids build up in the blood and urine when this alternate fuel source is used and eventually causes a condition called ketosis. In most cases, ketosis does not occur suddenly and symptoms may gradually occur over days or weeks.

The body attempts to balance the excess acids with progressively deeper breathing. The ketones cause the breath to smell fruity. Abdominal pain, nausea, and vomiting also occur. These symptoms are called ketoacidosis. Eventually the body can no longer handle the buildup of ketones, causing increasing lethargy and finally coma.

Ketoacidosis (deep breathing, abdominal pain, nausea, and vomiting) is a medical emergency.

Diabetes General Information

Hyperglycemia (continued)



Treatment for hyperglycemia is part of the student's ISHP and a copy of this must be given to the teacher(s) and trained staff.

School Accommodations for Hyperglycemia

School accommodations for hyperglycemia include the following:

- access to fluids
- access to restrooms
- provision for insulin administration if physician authorized
- prompt parental notification with student illness.

Diabetes General Information

Insulin Administration

Accommodations for insulin administration must be made when it is a medical management component for the student.

Insulin Pens

Insulin pens are preferred over an insulin syringe for insulin administration at school due to the pen's simplicity and accuracy. However, they are more expensive and not always covered by medical insurance plans.

An insulin pen is an insulin delivery system that has the visual appearance of a writing pen. There are currently 5 manufacturers of insulin pens.

Some pens can be purchased with the insulin cartridge already in place (these are considered "disposable pens") and other pens require "loading" of a specific insulin cartridge.

Storage of cartridges may or may not require refrigeration. Specific manufacturer's instructions regarding handling and storage of insulin cartridges must be followed.

There are multiple companies that manufacture insulin pens. A specific brand of insulin cartridge is prescribed by the student's physician.

The advantages of insulin pens include the following:

- do not need to use a syringe to draw up dose
- simple & accurate measurement with a twist & click; number of units appears in a "window"
- great for disaster preparedness and younger children.

Insulin Pumps

Insulin Pump Therapy is also referred to as Continuous Subcutaneous Insulin Infusion (CSII). The pump is worn outside the body and is about the size and weight of a pager. It holds a reservoir of insulin inside the pump and is programmed to deliver the insulin through a thin plastic tube called an infusion set. The infusion set is inserted via a needle that is covered by a cannula just below the skin. Once inserted, the needle is removed and the cannula stays in place for two to three days. When it is time to change the infusion set, a new infusion set is inserted into a different site.

The goal of Insulin Pump Therapy is to achieve near normal blood glucose levels over 24 hours per day. The use of CSII has been shown to decrease the incidence of hypoglycemia, and decrease the incidence of long term diabetes complications.

Diabetes General Information

Insulin Administration (continued)

Pump therapy requires specific agreements between the school, parent, and student. The school nurse will facilitate these agreements and appropriate training will then be provided to additional school personnel based on those agreements or contracts.

Advantages of insulin pump therapy include a tight control and lifestyle flexibility.

Prefilled Insulin Syringes

Another alternative for a student who has difficulty drawing up their own insulin is using prefilled insulin syringes. Insulin syringes are prefilled by the school nurse. The syringes can be stored in a container made specifically for prefilled syringes and are labeled by the school nurse for the student to use.

Automatic Injector Aids

There are several aids available to assist children with independently injecting their insulin.

The Autoject II is loaded with a filled syringe. A button is pushed and the needle is automatically inserted and a spring pushes the plunger of the syringe down to inject the insulin.

Other devices assist with needle insertion such as the Inject-ease and EZ ject).

The school nurse must ensure that the student is competent in using these tools.

Correction Dose

A correction dose of insulin ordered by an authorized health care provider must be given within 30 minutes of the time prescribed to maintain proper control of the blood glucose levels.

When a correction dose is administered, the blood glucose should be checked afterwards (30 minutes to 2 hours) to ensure that the blood glucose is dropping and also to make sure that it is not dropping too low. It may be necessary to continue checking the blood glucose after this time. This issue should be addressed in the student's ISHP as well as all pertinent information regarding insulin administration.

Diabetes General Information

Insulin Administration (continued)

Insulin Action Times

The chart below provides a range of when the insulin's are working. Peak action times are when the student usually requires a snack or meal.

TYPE	NAME OF INSULIN	ONSET OF ACTION (hours) How long before it starts to work	PEAK ACTION (hours) When the insulin has the strongest effect	DURATION OF ACTION (hours) How long the insulin usually lasts
RAPID-ACTING	LISPRO	5-15 minutes	0.5-1.5 HRS	3-4 HRS
	ASPART	5-15 minutes	1-3 HRS	3-4 HRS
SHORT-ACTING	REGULAR	30 MINUTES TO 1 HOUR	2-3 HRS	3-4 HRS
INTERMEDIATE-ACTING	NPH	2-4 HRS	6-10 HRS	10-18 HRS
	LENTE	3-4 HRS	6-12 HRS	12-20 HRS
LONG-ACTING	ULTRALENTE	6-10 HRS	10-16 HRS	18-24 HRS
	LANTUS	2 HRS	PEAKLESS	24 HRS

Psychosocial Issues



It is not easy to have to care for a chronic condition such as diabetes. It requires day to day management, dedication and discipline. Life and human nature in general is not always conducive to such regimens. Lots of support and encouragement is needed for young children and adol-escents. Our primary goal is to support their growth towards successful independent management of their disease while ensuring their safety and well being.

Remember, a diabetic is a person first and a person with diabetes second. Adolescents in particular want to fit in with their peers and don't want to be different. Diabetes should not prevent participation in sports, going to parties, or having social relationships.

Treat problems matter of factly. Avoid accusations and judgements. Do not panic or draw excessive attention to situations. Remain calm, recognize that there is a problem, secure appropriate help and provide reassurance to the diabetic. Sometimes the person with diabetes may feel a loss of control or sense of helplessness so this reassurance can be very supportive.

Try to empower those students with diabetes so they can feel a sense of control over their lives. This will help them take charge of their diabetes and lead towards more successful independent management.