



## Section 6: Diabetes Emergencies

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### General Overview

Diabetes emergencies<sup>5</sup> can happen at school in students with type 1 diabetes and type 2 diabetes. Preventing these emergencies is ideal, but not always possible. Four common diabetes emergencies may occur at school:

- Low blood glucose (hypoglycemia)
- Severe low blood glucose, requiring Glucagon administration
- High blood glucose (hyperglycemia)
- Diabetic ketoacidosis (DKA)

These diabetes emergencies occur more often in students with type 1 diabetes. However, emergencies may occur in students with type 2 diabetes on oral medication and/or using insulin. Blood glucose levels can change quickly (especially in younger students), resulting in either low or high blood glucose levels. Many factors can cause high or low blood glucose level, including:

- Insulin action time (how fast insulin works)
- Time of insulin injection
- Type, amount, and time that food is eaten
- Activity level
- Illness and/or injury
- Climate changes
- Hormonal changes
- Growth and development
- Stress

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<sup>5</sup> School personnel should use sound professional judgement in deciding whether to call 9-1-1. This should be based on all relevant facts and circumstances.

# Diabetes Emergencies

As part of the school's emergency policies and guidelines, procedures must be established to ensure the implementation of medical accommodations, educational aids, and services during a diabetes emergency. Sole reliance on 9-1-1 and other emergency medical personnel are not a substitute for providing diabetes care as set forth therein.<sup>6</sup> The development of an Emergency Action Plan ensures appropriate action steps are in place to assist school personnel in knowing how to help a student during a diabetes emergency. Emergency medical alert bracelets or necklaces also help ensure people will know the student has diabetes and/or know how to assist during an emergency situation. *Section 10: Life at School* provides additional information on the Emergency Action Plan.

## Low Blood Glucose (Hypoglycemia)

Low blood glucose (also called hypoglycemia or insulin reaction) occurs when a blood glucose level drops below 70 mg/dL.<sup>7</sup> **Low blood glucose episodes may happen in spite of strict attention to controlling blood glucose levels.** Low blood glucose can occur at any time a student takes insulin and/or oral medication.

Sometimes symptoms of low blood glucose are mistaken for misbehavior. Unusual behavior, mood changes, or odd physical characteristics may indicate low blood glucose. **If a student with diabetes has a sudden change in behavior or is behaving differently than usual, treat the situation as a low blood glucose (hypoglycemic) emergency.** Some students may not recognize the signs and symptoms of low blood glucose. This can occur if the student is very young, was more recently diagnosed, or has hypoglycemia unawareness. Information contained in the Diabetes Medical Management Plan (DMMP) lists a student's most common or usual symptoms of low blood glucose.

Low blood glucose is a dangerous, life-threatening complication of diabetes. Low blood glucose is a complication of diabetes and often happens suddenly. If low blood glucose is suspected, it is important to treat immediately. If the blood glucose level cannot be checked, treat the student's symptoms as low blood glucose. **A student having a low blood glucose or suspected of having a low blood glucose must never be left alone or sent alone to another location, as a student who is experiencing symptoms and is unaccompanied is in a potentially dangerous situation. Symptoms of low blood glucose (e.g., shaky, weak, dizzy, confused) may cause a student to pass out/fall, causing a preventable injury. A student should always be accompanied, as the accompanying person would be able to get help for the student, leading to a quicker response to the emergency.**

Treat a low blood glucose that is mild or moderate with a fast-acting carbohydrate (e.g., milk, fruit juice, glucose gel, glucose tablets). The student's family typically provides the school with fast-acting carbohydrates that a student will use to treat low blood glucose levels. Keep fast-acting carbohydrates in several convenient locations (e.g., classrooms, locker, health office, physical education office, physical education teacher's clipboard, and school bus) and/or have fast-acting carbohydrates accessible at all times for students taking insulin.

Students with type 2 diabetes may also be at risk for low blood glucose (hypoglycemia) if they take oral medication and/or insulin. Medication and/or insulin may need adjusting to prevent low blood glucose if these students:

- Incorporate daily physical activity
- Reduce amount of food eaten and/or eat healthier foods consistently
- Are successful at losing > 5% of body weight if overweight

For more information on low blood glucose (hypoglycemia), including the symptoms and actions to take, refer to the tip sheet "Low Blood Glucose (Hypoglycemia) Action Plan" in *Section 2: Quick Tip Sheets*.

<sup>6</sup> See *Silsbee Independent School Dist.*, 25 IDELR 1023 (Tex. SEA 1997).

<sup>7</sup> Some organizations will use a higher number to define low blood glucose (i.e., 80 mg/dL); however, for purposes of this document, consensus determined low blood glucose to be defined as < 70 mg/dL.

# Diabetes Emergencies

## Glucagon

Glucagon is a hormone that causes the liver to release stored glucose into the bloodstream. Glucagon is used to raise blood glucose quickly in someone with diabetes who is found unconscious and/or unresponsive. Glucagon is only administered by injection. Glucagon is a life-saving treatment for severe hypoglycemia. **An injection of Glucagon cannot harm a student.** In Wisconsin, (non-health care) school personnel can give Glucagon.<sup>8</sup> If Glucagon is given, 9-1-1 must be called as indicated by school district policies and procedures. Give Glucagon if student is:

- Unable to take liquids or solids by mouth safely
- Confused or unable to follow commands or directions
- Unresponsive or unconsciousness (cannot wake up or arouse)
- Having a seizure or convulsion

According to the Wisconsin Good Samaritan Law, “any person who renders emergency care at the scene of any emergency or accident in good faith shall be immune from civil liability for his or her acts or omissions in rendering such emergency care.”<sup>9</sup> School personnel must know what a Glucagon kit looks like, where the kit is kept, and when and how to give Glucagon. A Glucagon kit contains 1 mg of freeze-dried Glucagon (in a vial) and 1 ml of water (in syringe) to combine with the Glucagon before use. The two companies that supply Glucagon kits are Novo Nordisk and Eli Lilly. Figure 6 shows the two Glucagon kits available in the United States.

**Figure 6: Glucagon Kit Examples**



*Glucagon Emergency Kit – Eli Lilly*

Source: [www.ChildrenWithDiabetes.com](http://www.ChildrenWithDiabetes.com)



*GlucaGen® HypoKit® – Novo Nordisk*

Designated school personnel should be trained to give Glucagon in case of a severe low blood glucose (hypoglycemic) emergency. For more information on Glucagon administration, refer to the tip sheet titled “Steps for Giving Glucagon,” in *Section 2: Quick Tip Sheets*. There is also an educational webcast on Glucagon injection, available at: <http://media2.wi.gov/DPI/Viewer/?peid=c5642169-b6e9-4452-a64f-d0ccfa60dfed>. A “Delegating Glucagon Administration” form is available in *Section 14: Tools*.

<sup>8</sup> Wis. Stat. §118.29(2)(a)(2r).

<sup>9</sup> Wisconsin Good Samaritan Law, §895.48(1)

## High Blood Glucose (Hyperglycemia)

Hyperglycemia is a high blood glucose level, typically defined as a blood glucose  $> 250$  mg/dL. Students may have symptoms of high blood glucose (e.g., thirst, tiredness, headache), but they may also have no symptoms. Blood glucose levels change frequently; however, when blood glucose levels are consistently  $> 250$  mg/dL, there is cause for concern. High blood sugars can be caused by:

- Inadequate insulin/oral medication
- Stress
- Illness/sickness
- Certain behaviors (e.g., poor self-management due to rebellion/defiance)

Regardless of the cause of high blood glucose, action is required (e.g., checking for ketones). High blood glucose resulting from lack of insulin can lead to diabetic ketoacidosis (DKA), a life threatening complication of diabetes. Persistent high blood glucose levels can lead to short-term concerns for students (e.g., growth and development), as well as long-term diabetes complications (e.g., eye, nerve, and kidney problems). Both short- and long-term complications could affect a student's ability to learn and benefit from education.

The most common immediate treatment of a high blood glucose level is a supplemental dose of rapid-acting insulin. This supplemental insulin is usually called a correction bolus or correction dose of insulin. A student's Diabetes Medical Management Plan (DMMP) should indicate whether supplemental insulin injection or bolus between meals will be needed during school for students with type 1 diabetes and students with type 2 diabetes taking insulin.

Concerns of persistent high blood glucose should be shared with parents/guardians so adjustments to a student's treatment regimen can be made. For more information on high blood glucose (hyperglycemia), refer to the tip sheet "High Blood Glucose (Hyperglycemia) Action Plan" in *Section 2: Quick Tip Sheets*.

## Diabetic Ketoacidosis

Diabetic ketoacidosis (DKA) is a dangerous life-threatening condition that may occur when **blood glucose levels are high or persistently high (usually  $\geq 250$  mg/dL) and ketones are present**. A **single** high blood glucose reading of  $\geq 250$  mg/dL **without** the presence of ketones should be monitored and rechecked in 2 hours to assess if the condition is worsening and/or to ensure blood glucose level is improving. **DKA is a medical emergency**. A common cause of DKA is not taking enough insulin. Illness can also increase the risk of DKA. DKA can also occur with late diagnosis of type 1 diabetes (and in rare occasions, type 2 diabetes). With not enough insulin to help the body use glucose, the body uses fat as a source of energy. When the body uses fat for energy, toxic by-products called ketones are released. Buildup of ketones in the body can lead to DKA. Common symptoms associated with DKA include:

- Nausea and/or vomiting
- Stomach cramps/pain
- Sweet/fruity odor to breath
- Sleepiness and/or lethargy, weakness
- Confusion, inattentiveness, or other behavior change
- Dehydration
- Thirst/dry mouth
- Deep, fast, labored breathing

# Diabetes Emergencies

The risk of DKA is high if the student has a blood glucose level of  $\geq 250$  mg/dL<sup>10</sup> and/or moderate to large ketones; therefore, school personnel must follow the student's Diabetes Medical Management Plan and contact the parent/guardian to arrange for the student to go home and/or seek medical attention. Students with DKA appear very ill and frequently require hospitalization. School personnel should use sound professional judgement in deciding whether to call 9-1-1. This should be based on all relevant facts and circumstances.

DKA is not a common condition for students with type 2 diabetes, but it can occur. DKA may be more likely to occur in a student with type 2 diabetes when the student:

- Is ill
- Has an infection
- Was recently diagnosed with diabetes

Another potential complication for students with type 2 diabetes is Hyperosmolar Hyperglycemic Nonketotic Coma. This condition occurs less frequently than DKA and typically occurs in people with type 2 diabetes over age 50; however, it can occur in children and adolescents. Infection and poorly-controlled diabetes are the most common causes.

## Monitoring Ketones

Testing for ketones is recommended during periods of illness, infections, injury, or when blood glucose levels are  $\geq 250$  mg/dL.<sup>9</sup> High blood glucose levels with positive ketones can lead to diabetic ketoacidosis (DKA). Checking for ketones can assist with early detection of DKA. Ketones are produced when the body burns fat for energy due to lack of insulin. A lack of insulin may lead to the breakdown of fat. When this occurs, ketones form and can be detected in the blood and the urine.

Checking for ketones is done one of two ways: a simple urine test using a special strip or by obtaining a blood sample from a fingerstick. (A special monitor is needed to test for ketones in the blood.) There are several products available for urine ketone testing and they can be obtained at any pharmacy without a prescription (e.g., Ketostix). A ketone test result will be either negative or positive. Positive results can range from small to moderate to large amounts of ketones. Students with high blood glucose and moderate to large ketones should have their parents/guardians called and arrangements made to be excused from school. Schools are not positioned to manage this pending diabetes emergency situation.

The Quick Tip Sheet "Checking for Urine Ketones and Tips for Understanding Results" provides information on ketones and action steps to consider and is found in *Section 2: Quick Tip Sheets*. Situations do occur when a student may have positive ketones but does not have a high blood glucose level and other situations when a student has a high blood glucose level but negative ketones. The presence of ketones could mean:

- Not enough insulin was taken
- Insulin delivery was interrupted
- Student requires more insulin
- Illness, infection, or injury
- Weight loss is occurring

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<sup>10</sup> This level may be different for a particular student. Refer to the student's Diabetes Medical Management Plan for additional information.

## Emergency Medical Services for Children Program

The Emergency Medical Services for Children (EMSC) Program is focused on improving the quality of emergency care for children in Wisconsin by ensuring the availability of appropriate resources and trained school personnel to effectively meet the emergency care needs of a critically ill and injured child. Children have special needs and require a different approach to care than adults. The EMSC Program goals are to:

- 1.** Ensure the availability of state-of-the-art emergency medical care for an ill or injured child and adolescent when needed
- 2.** Ensure pediatric services are well integrated into the existing state emergency medical services (EMS) system and backed by optimal resources
- 3.** Ensure emergency services include primary prevention of illness and injury, acute care, and rehabilitation, to children and adolescents at the same level as adults

Maintaining medical records and emergency information forms are essential for ensuring care coordination for students with special health care needs. The Emergency Information Form for Children with Special Needs can assist with coordination of care. A copy of this form is available in *Section 14: Tools* and is at: [http://www.medicalhomeinfo.org/tools/emmer\\_med.html](http://www.medicalhomeinfo.org/tools/emmer_med.html). For more information on emergency services, refer to *Section 15: Resources*.