



# Insulin Pump Therapy: A Guide for School Nurses



# Table of Contents

<b>Introduction</b> .....	<b>1</b>
<b>About Insulin Pump Therapy</b> .....	<b>5</b>
<b>Success at School</b> .....	<b>7</b>
<b>Diabetes Care Plan Templates</b>	
Student Information and Emergency Contacts .....	11
Blood Glucose Monitoring and Management .....	12, 13
Insulin and Glucagon Administration .....	14
Skills Checklist and Supply List .....	15
5-Day Insulin Pump Log .....	16
<b>Appendix 1: Selected References and Resources</b> .....	<b>17</b>
<b>Appendix 2: Tips for Troubleshooting Hyperglycemia</b> .....	<b>19</b>

# Introduction

Diabetes is the third most common chronic disease in children below 20 years of age. Characterized by high blood glucose (BG) due to defective insulin production or use, diabetes is estimated to occur in 1 of every 400 children and adolescents. That equates to approximately 208,000 children currently living with diabetes in the United States.

Over time, high BG may contribute to serious health complications, including heart, kidney, eye, and nerve disease. Although there is no cure for diabetes, effective management may delay or prevent long-term complications from occurring and minimize acute problems related to fluctuations in BG levels. Successful management requires parents and caregivers to acquire significant knowledge about diabetes, and perform complex self-care skills on a daily basis. Since children spend many hours at school, collaboration among the family, the child’s healthcare team, and school personnel is essential.

Children with type 1 diabetes require insulin replacement for survival. Insulin may be delivered by syringe, insulin pen, or insulin pump. Studies have shown that, compared to standard injections, insulin pump therapy can provide clinical and lifestyle benefits. Clinical benefits include fewer episodes of low BG, and overall improved glycemic control as measured by HbA1C. Lifestyle benefits include increased flexibility in regard to meal times and food choices, not having to use syringes several times a day, and less disruption to daily schedules. Parents have reported less stress and greater social acceptance. However, insulin pump therapy is not without challenges, especially for children who may be self-conscious about wearing a medical device. Also, insulin pump therapy does not reduce the need for BG testing, which must continue to be done several times a day.

## About This Guide

This Guide is intended to provide school nurses and other school personnel with basic information about diabetes, and specific information about insulin pump therapy. We have also included a brief discussion about the legal rights of children with diabetes in the context of public school education, and have provided sample templates that may be used to document all or part of a diabetes care plan at school. In addition to the material provided here, many excellent print and online resources are available for those who want a broader knowledge of diabetes in school-aged children. Appendix 1 contains a list of selected references. Additional information about insulin pump therapy and the use of Animas® insulin pumps is also available online at our website, [www.animas.com](http://www.animas.com).

\*For detailed information about any specific type or brand of insulin, we recommend you refer to the package insert provided by the manufacturer.

## Diabetes Basics

**Type 1 diabetes** is the most common type of diabetes in children, accounting for approximately 80% of all newly diagnosed children and adolescents. Underlying causes are not fully understood, but genetic and environmental factors are believed to play a role, triggering an autoimmune response that destroys insulin-producing cells in the pancreas. Without sufficient insulin, blood glucose (BG) cannot be used for energy. Profound hyperglycemia results, and is a key finding at the time of diagnosis. Varying degrees of metabolic acidosis may also be present at diagnosis. Without the ability to make their own insulin, people with type 1 diabetes must receive exogenous insulin in order to survive. Since insulin cannot be taken orally (it is destroyed by the digestive process), it is given subcutaneously, either by syringe, insulin pen, or insulin pump. Insulin is a treatment that allows survival, but it is not a cure. To safely manage their child's type 1 diabetes, families must become highly educated about the disease and master the daily skills needed to maintain adequate BG control. Typically, those skills include how to test and respond to BG levels several times a day, calculate and deliver insulin doses based on the BG level and food intake, manage exercise and sick days to minimize related BG swings, and respond to potentially harmful changes in BG levels. Caring for a child with type 1 diabetes can be a constant challenge, and requires attention 24 hours a day, 7 days a week.

**Type 2 diabetes** is more common in adults, but may also occur in children, especially if they are overweight. Type 2 diabetes is initially characterized by insulin resistance, and may progress to a state of insulin deficiency over time. Risk factors for type 2 diabetes include being overweight and having a family member with type 2 diabetes. It is more prevalent in certain ethnic populations, as well. Treatment of type 2 diabetes focuses on healthy eating and lifestyle choices, BG monitoring, and sometimes the use of oral diabetes medications or insulin.

## Treatment Goals and Management Tools

BG levels for people without diabetes usually run between 70–140 mg/dL. The American Diabetes Association has recommended target BG goals for children across all age groups of 90–130 mg/dL before meals, and 90–150 mg/dL overnight. However, these goals should be individualized based on the unique situation of each child. Although it is not possible for BG values to always fall within target range, the goal of treatment is to minimize time spent either below or above the target.

Low BG, or hypoglycemia, is a common risk and side effect of insulin use. It is an urgent medical condition that requires immediate treatment. The child may display difficulty thinking and paying attention, and may become unconscious or have a seizure if left untreated. Symptoms may include hunger, drowsiness, mood swings, sweating, headache, or confusion. Immediate treatment in alignment with the child's plan of care is required.

High BG, or hyperglycemia, is likely to be experienced by almost all children with diabetes at some point during the school day. Elevations above the target range may be of short duration, or may be more serious. For children using insulin pumps, it is important to follow guidelines specified in the child's medical management plan to rule out any problem with insulin delivery. Refer to Page 5 and Appendix 2 for more information about high BG and insulin pump therapy.

To successfully manage diabetes at school, it is important to understand three key elements that directly influence BG: medication (insulin), food, and physical activity. Other factors, such as stress, illness, and growth, may also have some impact on BG levels.

## Medication

Insulin is the only medication currently used for children with type 1 diabetes. There are many different types of insulin, and many different ways to deliver and dose insulin.\* Current insulin regimens often involve the use of long-acting and rapid-acting insulin given by injection; or only rapid-acting insulin if using insulin pump therapy.

- *Long-acting insulin* is typically injected once, sometimes twice, per day and provides *basal* insulin. Basal insulin is needed to maintain steady blood glucose control between meals and overnight. Long-acting insulin is slowly absorbed and its effect on BG may last approximately 24 hours, depending upon the specific type and brand.
- *Rapid-acting insulin* is used for *bolus* insulin delivery. It is given to compensate for food, or to lower a high blood glucose (BG). Rapid-acting insulin works more quickly and for a shorter period of time compared to long-acting insulin. After delivery, the onset of action is 15–30 minutes, with a peak effect between 30–90 minutes, and an overall duration of 3–5 hours.

Though life-saving, insulin is not a cure for diabetes. It does not correct or prevent the underlying causes of diabetes, and may also cause hypoglycemia (low BG) when not balanced with food or physical activity.

## Food

Food provides three major nutrients from which we get calories: protein, fat, and carbohydrate. Carbohydrate (carb) is the nutrient that raises BG the most and the fastest. In fact, almost all of the carbs we eat are converted to glucose in our bloodstream within approximately 1 to 1 ½ hours. Many foods such as breads, cereals, rice, pasta, fruits, milk, yogurt, starchy vegetables, and sweets contain carb. People with diabetes often learn to "count" the grams of carb in their meal, and then calculate their insulin dose to match or "cover" that amount of carb. This method, called "carb counting," allows a great deal of flexibility in regard to meal times and food choices. Insulin doses are calculated using an insulin:carbohydrate ratio (I:C ratio), which is expressed as 1 unit: X grams of carb. For example, if your I:C ratio is 1:10, you would take 1 unit of insulin for every 10 grams of carb consumed.

## Introduction (cont.)

### Activity

Physical activity and exercise are important for everyone, including children with diabetes. However, activity does impact blood glucose (BG), and some adjustments may need to be made. For example, exercise often lowers BG, requiring additional food or a reduction in insulin in order to avoid low BG. However, in some cases, stress hormones released during intense activity may work in the opposite way, increasing the BG. This is another challenge for children living with diabetes, and they and their caregivers need to learn how different types of activities affect them. A plan for exercise should be incorporated into the child's school plan.

To summarize, three key treatment elements have a direct impact on BG levels:

- Insulin lowers BG
- Food raises BG
- Activity may lower or raise BG

## About Insulin Pump Therapy

Compared to standard injection therapy or multiple daily injections, children using insulin pump therapy may achieve improved glycemic control and experience fewer episodes of hypoglycemia, while enjoying greater flexibility regarding meal times and food choices.

Insulin pumps are small, battery-operated, computerized devices that continuously infuse rapid-acting insulin into subcutaneous tissue. Insulin pump therapy replaces the need for multiple daily injections of insulin. Most current insulin pump systems are composed of a durable insulin pump, a cartridge of insulin, and an infusion set. The infusion set delivers the insulin into the subcutaneous tissue via a small flexible cannula or steel needle.

Insulin pumps deliver rapid-acting insulin in two ways—basal and bolus:

### About Basal Insulin

- A continuous flow of insulin that is pre-programmed and automatic.
- Basal insulin replaces the need for injections of long-acting insulin.
- The specific dose of basal insulin is expressed as an hourly rate; for example, "0.525 units/hour."
- Several changes to the hourly basal rate may be pre-programmed to occur throughout the day.
- Supports the body's basic metabolic requirement, and is not strictly dependent upon food intake.

### About Bolus Insulin

- Delivered on-demand, as needed throughout the day. Boluses provide additional insulin required for food or to correct a high blood glucose (BG).
- Bolus doses for food are based upon the user's individual insulin:carbohydrate ratio (I:C ratio). For example, 1:10 refers to needing 1 unit of insulin per every 10 grams of carb eaten.
- Bolus doses for correcting high BG are based on the user's specific "insulin sensitivity factor" (ISF). The ISF refers to how an individual's BG level responds to 1 unit of insulin. For example, if the insulin sensitivity factor is 50, it means that 1 unit of rapid-acting insulin can be expected to reduce the BG by 50 mg/dL.
- Bolus settings for I:C ratio and ISF, along with an individual BG target range, are pre-set in the insulin pump and may vary by time of day.

### Important Additional Information About Diabetes and Insulin Pump Therapy

- Rapid-acting U100 insulin is currently used in insulin pumps. Onset of action is 15 minutes after injecting, with a peak effect occurring at 30–90 minutes. The duration of action is generally 3–5 hours.
- If insulin cannot be delivered due to a mechanical issue or other problem related to insulin delivery through the insulin pump, the insulin pump user may rapidly develop high BG (hyperglycemia).
- A serious acidotic state, diabetic ketoacidosis (DKA), may develop if replacement insulin is not provided in a timely manner. A backup plan and supplies for delivering insulin via injection, rather than the insulin pump, must be in place. The student's Diabetes Medical Management Plan should include specific treatment guidelines to address hyperglycemia and to avoid onset of DKA due to lack of insulin.
- Refer to Appendix 2, Troubleshooting Hyperglycemia on Insulin Pump Therapy, for additional information on this important topic.

**Hyperglycemia with large ketones is an urgent medical problem and requires immediate attention!**



## Success at School

Several federal statutes protect the educational rights of children with special needs, such as diabetes. These laws require public schools to provide equal opportunities for education, as well as access to appropriate medical care. The American Diabetes Association, among other groups, recommends a written plan of care for all students with diabetes to ensure that families and school personnel clearly understand their roles and responsibilities. In general, an effective care plan contributes to the student's immediate safety and long-term health, promotes readiness to learn, and helps minimize disruption in the classroom.

Most schools provide diabetes care according to the student's Diabetes Medical Management Plan (DMMP). The DMMP is obtained or based upon signed orders from the child's healthcare team. Information usually includes date of diagnosis, current health status, specific guidelines for insulin administration and use of the insulin pump, BG testing guidelines, how to treat low and high BG, and a back-up plan in case the insulin pump becomes inoperable.

The school nurse may also create an Individual Health Plan (IHP) to define how the DMMP orders are to be carried out, and who will carry them out. The IHP may contain information such as where supplies will be kept, plans for students to have free access to the restroom and water, provision for snacks and meals, supervision during field trips and sports activities, and best ways to communicate with family and their healthcare team.

Often, families request further accommodations in the form of a Section 504 Plan. Based on the Rehabilitation Act of 1973, a 504 Plan assures that the student is able to fully access all educational activities. Some examples of specific accommodations include: alternative testing dates if experiencing low or high BG during standardized testing or routine school exams, specific self-care actions that the student is allowed to perform independently in class or on campus, and identifies alternate care providers and the scope of their responsibilities if/when a school nurse is not available.

### School Nurse/Other School Personnel

The school nurse is in the best position to understand and implement the student's care plan. However, many other adults in the school have contact with the student and will need to learn to recognize and respond to certain situations that impact the safety and wellbeing of the child. Examples of school personnel who may have a role in caring for the student with diabetes include: teachers, bus drivers, coaches, lunchroom personnel, substitute teachers, front office staff, and administrators.

Generally, school personnel need to learn:

- Basic information about diabetes and insulin pump therapy
- Accommodations specified in a Section 504 Plan or IHP that are pertinent to their role
- Causes, signs, symptoms, prevention, and treatment of low BG
- Causes, signs, symptoms, prevention, and treatment of very high BG
- When to seek medical assistance

In addition, one or more non-medical staff members may be voluntarily trained to provide additional care to assist with BG testing, treat hyperglycemia, administer glucagon, supervise or assist with insulin pump bolus delivery, or accompany the child on field trips and school sports events. Assignment of diabetes care tasks must take into account relevant state laws and restrictions regarding non-medical personnel.

### Parental/Guardian Responsibilities

Parents/guardians are the primary resource for teaching the school nurse about basic insulin pump operations and functions that will be used at school. Another option is to arrange for part or all of the initial insulin pump training to be done at school. This provides the school nurse with an opportunity to participate and learn along with the family.

Parents/guardians should ensure that the school nurse has received all required medical orders for the Diabetes Medical Management Plan (DMMP). Medical orders should include a specific back-up plan in case of a problem with insulin delivery through the insulin pump during school.

After follow-up visits with their child's diabetes care team, changes in dosing or other aspects of diabetes management during school hours should be communicated to the school nurse.

It is important for parents/guardians to provide the school with all supplies that may be needed to manage the child's diabetes during the day. This includes snacks, supplies for BG testing, extra supplies for insulin pump, and alternate insulin delivery devices; ensuring the insulin pump contains enough insulin to last until the child returns home and that the battery is adequately charged.

### Student Responsibilities

Many school-aged children appear to have adequate or even advanced skill manipulating their insulin pump and checking their BG; however, most younger children will not have the judgment necessary to make important treatment decisions.

Older children, on the other hand, may have the knowledge and skills necessary to take care of their diabetes independently throughout the school day. The DMMP or 504 Plan may be used to specify the scope of self-care that will be extended to the student.

### A Word About Continuous Glucose Monitors

Continuous glucose monitoring (CGM) provides a way to continuously track patterns and changes in glucose levels over time, and may be used in conjunction with, but not as a substitution for, standard fingerstick blood glucose (BG) testing.

CGM devices do not directly measure BG; instead, they measure the amount of glucose in interstitial fluid. Interstitial glucose and BG levels do not match exactly, since the interstitial glucose lags behind BG by about 10 minutes.

No CGM device has been approved to replace fingerstick BG readings. Fingersticks provide immediate information about a single moment in time; CGM provides continuous trending information over a period of time and can be very helpful for some individuals.

CGM devices consist of three parts:

- A small sensor, placed into subcutaneous tissue, to measure the interstitial glucose
- A transmitter, attached to the sensor, that wirelessly transmits the readings
- A receiver, where results are received and viewed

Sensors may stay in place for up to 7 days, depending upon the specific type of device being worn. The receiver may be a stand-alone receiving device, or may be integrated with some types of insulin pumps.

The CGM receiver displays trending data and glucose readings, and may be set to sound an alarm or alert if the student's BG level drops too low or rises too high.

If a student wears a CGM device in school, their DMMP will need to include information on how to respond to any alerts or alarms that occur during the school day. As with insulin pumps, having the parent/guardian train the nurse on how to view and respond to CGM information is important, and should not be overlooked.

### Summary

Wearing an insulin pump or a CGM device can be challenging for the student and these technologies are not for everyone. Not all youngsters want to be connected to technical devices and not all children have the support outside of school necessary to be successful with insulin pump therapy or the use of CGM. No matter what method your students use to manage their diabetes, the support and understanding of their school community is vital to their success.

# Diabetes Care Plan Templates

While many schools or healthcare providers use their own documents, the following templates may be freely used to develop and record a Diabetes Medical Management Plan (DMMP). They may also be included in an Individual Health Plan (IHP) or Section 504 Plan. Samples of DMMPs, IHPs, and 504 Plans can be viewed or obtained from websites of organizations such as the American Diabetes Association, Juvenile Diabetes Foundation, and others. Many of these resources are listed in Appendix 1 (Selected Resources and References).

The documents on the next few pages include templates for the following content:

- Student Information and Emergency Contacts
- Blood Glucose Monitoring and Management
- Insulin and Glucagon Administration
- Skills Checklist
- Supply List
- 5-Day Insulin Pump Log



## Diabetes Care Plan: Student Information and Emergency Contacts

Student Information					
Name: _____ DOB: _____ School Year: _____ - _____					
Name of School: _____ School Nurse: _____					
Diabetes Healthcare Provider Name: _____ Telephone: _____					
Emergency Contacts: Family and Others					
Name	Relationship to Patient			Telephone and Email	
Emergency Contacts: Approved Alternate Care Providers if School Nurse Not Available					
School Nurse has trained the individuals listed below to perform specific skills, as documented by Training Date	Supervise/test blood glucose (Blood glucose)	Supervise/give insulin by pump or injection	Supervise ketone testing	Treat hypoglycemia	Give glucagon
Name:					
Location in school:	Training date: _____	Training date: _____	Training date: _____	Training date: _____	Training date: _____
Name:					
Location in school:	Training date: _____	Training date: _____	Training date: _____	Training date: _____	Training date: _____
Name:					
Location in school:	Training date: _____	Training date: _____	Training date: _____	Training date: _____	Training date: _____

## Diabetes Care Plan: Blood Glucose Monitoring and Management - Page 1

Student: _____ School Year: _____	
Target blood glucose (BG) range at school: 90–150 mg/dL based on ADA recommendations or: _____ mg/dL	Test times are checked off below: <input type="checkbox"/> Before lunch <input type="checkbox"/> Before sports or PE class <input type="checkbox"/> Before boarding school bus or driving a car <input type="checkbox"/> As needed if symptoms of low or high BG <input type="checkbox"/> As needed if symptoms of illness <input type="checkbox"/> _____ hours after giving a correction bolus <input type="checkbox"/> Other: _____
Treat mild hypoglycemia, BG= 50–70 mg/dL or: _____ mg/dL	Give 15 grams of fast-acting carbohydrate by mouth immediately, such as: <ul style="list-style-type: none"> <li>• 3–4 glucose tablets</li> <li>• 4 oz juice</li> <li>• 6 oz skim milk</li> <li>• 6 oz regular soda</li> <li>• Other snacks provided by parent/guardian:</li> </ul> Recheck BG every 15 minutes and repeat treatment as needed until BG >70 mg/dL or _____ mg/dL. <b>Do not leave child unattended.</b>
Treat moderate hypoglycemia, BG <50 mg/dL or: _____ mg/dL	Give 30 grams of fast-acting carbohydrate by mouth immediately. Recheck BG and repeat treatment every 15 minutes until BG >70 mg/dL or _____ mg/dL. <b>Do not leave child unattended.</b>
Treat severe hypoglycemia: unconscious or seizing, unable to swallow or cooperate	Authorized diabetes care provider: <b>Immediately</b> administer glucagon injection (1 mg/cc) according to instructions. <b>Position child on side</b> to prevent aspiration in case of nausea/vomiting. <b>Call 9-1-1</b> or other local emergency service number, and then call parent/guardian. <b>Give nothing by mouth</b> until student is awake and able to cooperate/swallow. <b>Do not leave child</b> unless it is unavoidable in order to get help.
Treat hyperglycemia BG >250 mg/dL or: _____ mg/dL	<b>General guidelines for hyperglycemia on insulin pump:</b> <ul style="list-style-type: none"> <li>• Check ketones using blood or urine ketone strips provided by parent/guardian and follow guidelines below based on ketone results.</li> <li>• Encourage drinking of water or other calorie-free fluids, 8 oz every hour if ketones are present, until resolution of situation.</li> <li>• Allow free access to bathroom and water; do not withhold normal food/meals.</li> <li>• Inspect pump and tubing for signs of problems, such as disconnected infusion set or pump alarm or message on screen. Call parent/guardian as needed for guidance.</li> </ul>
Treat hyperglycemia with negative ketones:	<b>Administer correction bolus via pump and recheck BG and ketones in 1–2 hours.</b> <ul style="list-style-type: none"> <li>• If ketones remain negative, may give an additional bolus via pump if necessary.</li> <li>• If BG is still not improving after two correction doses, may require insulin by injection. Contact parent/guardian.</li> </ul>
Treat hyperglycemia with trace ketones:	<b>Follow guidelines for negative ketones, but only one correction dose may be given.</b> <ul style="list-style-type: none"> <li>• After initial correction, if no improvement after 1–2 hours, contact parent/guardian.</li> </ul>
Treat hyperglycemia with small to large ketones:	<b>Notify parent. This is a medically urgent situation, do not delay treatment.</b> <ul style="list-style-type: none"> <li>• <b>Do not give bolus by insulin pump.</b> Give correction dose of insulin via syringe or pen.</li> <li>• Change infusion set and cartridge if possible.</li> <li>• Child will need insulin throughout the day, so if new infusion set is not available, contact parent/guardian or healthcare provider for specific orders regarding insulin replacement throughout the school day.</li> </ul>

(Continued on next page)

This information is provided for educational purposes only and is not intended to replace your healthcare provider's diabetes treatment plan. Only specific, signed orders from the child's medical care provider should be used when administering treatment.

## Diabetes Care Plan: Blood Glucose Monitoring and Management - Page 2

Student: _____ School Year: _____	
Hyperglycemia with small to large ketones: (continued from previous page)	<ul style="list-style-type: none"> <li>• Student may return to class if no complaints/symptoms of nausea, vomiting, stomach pain or other physical or cognitive problem.</li> <li>• Student may not participate in gym class or sports until ketones are negative.</li> <li>• If student is ill, parent/guardian should pick up child from school.</li> <li>• If student stays in school, recheck blood glucose (BG) and ketones prior to boarding school bus.</li> <li>• If ketones are small to large with elevated BG, parent/guardian must be notified and child should not board the bus.</li> </ul>
Actions for sports/PE class participation:	<ul style="list-style-type: none"> <li>• School nurse or other Authorized Diabetes Care Provider (ADCP) must be present on campus during PE class and after-school sports.</li> <li>• BG must be at least _____ mg/dL before child participates in physical activities.</li> <li>• If BG is below target, treat with carbohydrate until BG is within range.</li> <li>• If BG is above 250 mg/dL or _____ mg/dL <b>without ketones</b>, child may participate in sports/PE class. <b>Give correction insulin bolus as indicated:</b>  <input type="checkbox"/> Give half the calculated correction bolus. OR  <input type="checkbox"/> Do not give any correction bolus.</li> <li>• If BG is above 250 mg/dL or _____ mg/dL with ketones, child may NOT participate in sports/PE class. Follow hyperglycemia guidelines.</li> <li>• Be sure student stays hydrated during sports activities:               <ul style="list-style-type: none"> <li>• _____ oz. of water or sugar-free fluids every hour</li> </ul> </li> </ul>
Actions for extracurricular activities off campus:	<ul style="list-style-type: none"> <li>• School nurse or other Authorized Diabetes Care Provider (ADCP) must be present on bus and on-site during field trips.</li> <li>• Follow standard BG testing guidelines and insulin administration plan during field trips and other off-campus activities.</li> <li>• If field trip entails prolonged physical activity, such as hiking, recheck BG every 1–2 hours or if student has symptoms of hypoglycemia.</li> </ul>
<p><b>If child exhibits symptoms of severe diabetic ketoacidosis (DKA), call 9-1-1 immediately, and notify parent/guardian. Symptoms of serious DKA that indicate the need for emergency services include:</b></p> <ul style="list-style-type: none"> <li>• Loss of consciousness</li> <li>• Difficulty breathing, gasping for air</li> </ul>	
<p><b>For assistance troubleshooting technical issues with an Animas® insulin pump, you may contact Animas Customer Support toll-free at: 1-877-937-7867</b></p>	
Healthcare Provider Name: _____	Telephone: _____
Healthcare Provider Signature: _____	Date: _____

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## Diabetes Care Plan: Insulin and Glucagon Administration

**DIABETES CARE PLAN: Authorization for Insulin and Glucagon Administration**

STUDENT: \_\_\_\_\_ School Year: \_\_\_\_\_

Type of Insulin in Pump: \_\_\_\_\_ Type of Infusion Set: \_\_\_\_\_

**INSULIN BY INSULIN PUMP: Calculate and deliver dose using insulin pump programs. Insulin pump is programmed to calculate dose based on the following settings:**

Basal Rates		Insulin:Carbohydrate Ratio		Insulin Sensitivity Factor		Blood Glucose Target	
Time	Rate (Units/hour)	Time	1 Unit:___ grams	Time	1 Unit:___ mg/dL	Time	Pump Setting

**INSULIN BY INJECTION IN CASE OF PUMP MALFUNCTION:**

Rapid-acting insulin should be given by syringe or insulin pen at meals, snacks, and to correct high blood glucose (BG). Use the following guidelines:

- For food/snacks, give 1 unit insulin per \_\_\_\_\_ grams of carbohydrate
- For BG correction:
  - Give correction before lunch if BG is > \_\_\_\_\_mg/dL
  - To calculate dose, use formula below:  

$$\frac{\text{BG} - \text{Target BG}}{\text{Insulin sensitivity factor (ISF)}} = \text{units of rapid-acting insulin to be given}$$
 in addition to insulin given for food
- Do not give BG correction dose more often than every 4 hours or \_\_\_\_\_

**GLUCAGON ADMINISTRATION INFORMATION:**

**\*\*Follow glucagon administration guidelines specified in Diabetes Care Plan: Blood Glucose Testing and Management\*\***

Glucagon 1 mg intramuscular will be administered in case of severe hypoglycemia by authorized staff who have been appropriately trained:

Name: \_\_\_\_\_ Location or phone ext: \_\_\_\_\_

Name: \_\_\_\_\_ Location or phone ext: \_\_\_\_\_

Name: \_\_\_\_\_ Location or phone ext: \_\_\_\_\_

HEALTHCARE PROVIDER NAME: \_\_\_\_\_

TELEPHONE: \_\_\_\_\_

HEALTHCARE PROVIDER SIGNATURE: \_\_\_\_\_


DATE: \_\_\_\_\_

## Diabetes Care Plan: Skills Checklist and Supply List

Student: \_\_\_\_\_ School Year: \_\_\_\_\_

Checklist of Activity/Skill to Be Performed:	Student Is Independent	School Assistance or Supervision Needed	Parental Support Needed
Routine blood glucose (BG) monitoring:	<input type="checkbox"/> Student still needs to see nurse at least once a day to verify glucose status, OR <input type="checkbox"/> Student does not need to check in with nurse		
Select snacks/meals			
Carbohydrate counting of meals/snacks			
Enter data into pump			
Deliver insulin after calculating dose on pump			
Change infusion set/cartridge if required			
Calculate insulin injection if pump not available			
Deliver insulin via pen or syringe if necessary			
Treat mild to moderate hypoglycemia			
Check ketones			
Treat hyperglycemia			
Disconnect infusion set from site			
Insulin pump management for PE class or sports			
Other:			
Supplies Required at School	Student-held	Kept in Health Office	
Glucose meter, strips, and lancing device			
Skin prep supplies (alcohol/IV prep, etc)			
Glucose tabs or other fast-acting carbohydrate snack			
Glucagon emergency kit			
Ketone strips for urine <b>OR</b> meter/kit for checking blood ketones			
User manual for insulin pump			
Extra pump or meter supplies: <ul style="list-style-type: none"> <li>Batteries</li> <li>Infusion sets</li> <li>Pump insulin cartridge</li> </ul>			
<b>Required for backup plan in case of insulin pump malfunction:</b> <ul style="list-style-type: none"> <li>Insulin syringes and vial of rapid-acting insulin <b>OR</b></li> <li>Insulin pen and pen needles</li> </ul>			
Other:			

## Diabetes Care Plan: 5-Day Insulin Pump Log

 <b>5-Day School Insulin Pump Record</b>														
Date Range:		Student Name:								DOB:				
School Nurse:														
Monday	6AM	7AM	8AM	9AM	10AM	11AM	12PM	1PM	2PM	3PM	4PM	5PM	6PM	Comments
Blood Glucose														
Carb Grams														
Carb Bolus														
Blood glucose Bolus														
IOB														
Total Bolus														
													Recorded By	
Tuesday	6AM	7AM	8AM	9AM	10AM	11AM	12PM	1PM	2PM	3PM	4PM	5PM	6PM	Comments
Blood Glucose														
Carb Grams														
Carb Bolus														
Blood glucose Bolus														
IOB														
Total Bolus														
													Recorded By	
Wednesday	6AM	7AM	8AM	9AM	10AM	11AM	12PM	1PM	2PM	3PM	4PM	5PM	6PM	Comments
Blood Glucose														
Carb Grams														
Carb Bolus														
Blood glucose Bolus														
IOB														
Total Bolus														
													Recorded By	
Thursday	6AM	7AM	8AM	9AM	10AM	11AM	12PM	1PM	2PM	3PM	4PM	5PM	6PM	Comments
Blood Glucose														
Carb Grams														
Carb Bolus														
Blood glucose Bolus														
IOB														
Total Bolus														
													Recorded By	
Friday	6AM	7AM	8AM	9AM	10AM	11AM	12PM	1PM	2PM	3PM	4PM	5PM	6PM	Comments
Blood Glucose														
Carb Grams														
Carb Bolus														
Blood glucose Bolus														
IOB														
Total Bolus														
													Recorded By	

## Appendix 1: Selected References and Resources

### For School Nurses and School Personnel

Helping the Student with Diabetes Succeed: A Guide for School Personnel (PDF): [http://ndep.nih.gov/media/NDEP61\\_SchoolGuide\\_4c\\_508.pdf](http://ndep.nih.gov/media/NDEP61_SchoolGuide_4c_508.pdf)

The American Diabetes Association (ADA): [www.diabetes.org](http://www.diabetes.org)

Juvenile Diabetes Research Foundation: [www.jdrf.org](http://www.jdrf.org)

National Association of School Nurses: [www.nasn.org](http://www.nasn.org)

The Center for Disease Control (Fact sheets, statistics and publications): [www.cdc.gov/diabetes](http://www.cdc.gov/diabetes)

Animas Corporation: [www.animas.com](http://www.animas.com)

### For Families and Children

#### Books:

Lara Takes Charge: Helping Kids Understand Diabetes, by Rocky Lang and Sally Huss

Taking Diabetes to School, by Kim Gosselin

Even Superheroes Get Diabetes, by Sue Ganz-Schmitt

Raising Teens with Diabetes: A Survival Guide for Parents, by Moira McCarthy

Understanding Diabetes: A handbook for people who are living with diabetes, 12th Edition, H Peter Chase, MD & David M Maas, MD, PhD

#### Websites:

[www.childrenwithdiabetes.org](http://www.childrenwithdiabetes.org)

[www.Kidsrpumping.com](http://www.Kidsrpumping.com)

[www.jdrf.org](http://www.jdrf.org): Website for the Juvenile Diabetes Research Foundation, contains many resources including the JDRF School Advisory Toolkit for Families.

### Books About Insulin Pump Therapy

Smart Pumping, Harold Wolpert MD

Understanding Insulin Pumps and Continuous Glucose Monitors, 2nd Edition, H Peter Chase, MD

# Selected References and Resources (cont.)

## Clothing and Accessories for Insulin Pump Users

[www.Pumpwearinc.com](http://www.Pumpwearinc.com)

[www.angelbearpumpstuff.com](http://www.angelbearpumpstuff.com)

[www.laurenshope.com](http://www.laurenshope.com)

[www.fifty50pharmacy.com/kidscorner](http://www.fifty50pharmacy.com/kidscorner)

[www.lifetag.com](http://www.lifetag.com)

[www.diabete-ezy.com](http://www.diabete-ezy.com)

Animas does not control the content of the websites listed and is not responsible for information provided. Always consult your healthcare provider for information specific to your or your child's needs.



# Appendix 2: Tips for Troubleshooting Hyperglycemia on Insulin Pump Therapy

**Always disconnect the pump from the student before troubleshooting to avoid inadvertent insulin delivery!**

## Check the Site and Tubing

- Is the end of the infusion set still adhering to body?
- Is the cannula obviously dislodged or kinked?
- Is there redness at the site?
- Is there discomfort at the site?
- Is there blood on/at the site?
- Is there air in the tubing?
- Is the tubing connected to the cartridge?

## Check the Cartridge

- Is the tubing connected tightly to the cartridge?
- Do you see insulin leaking at the connection site between tubing and cartridge?
- Is the cartridge empty?

## Check the Insulin Pump

- Is the time on the pump screen correct?
- Is there an alarm or warning message on the screen?  
(Call parent or pump manufacturer Customer Technical Support for assistance as needed).
- In History: Bolus: check for date/time of last bolus.

## Check the Insulin:

- Is it cloudy or clumped?
- Was the insulin exposed to extreme temperatures (freezing or direct sunlight)?

## Follow Medical Care Plan to Administer Correction Bolus if No Obvious Mechanical Issues are Present:

- Adhere to child's medical and diabetes care plans.
- Contact parent/guardian/healthcare provider as needed to resolve issues or clarify care plan.

NOTE: Any combination of redness, pain, fever, discomfort or heat at the site may indicate local site infection. Call parent/guardian so child may receive medical attention.

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