Diabetes School Resource: A Guide for School Personnel

Author: Kailee Gaffny, RN, BSN, CDE

Co-Authors and Editors:
Jennifer Baldwin, RN, BSN
Christine Hertler, RN, BSN, CDE
Katie Klier, RD, CDE
Mary McCarthy, RN, BSN, CDE
Cynthia E. Muñoz, Ph.D., MPH
Jennifer Raymond, MD, MCR
Maralyn Weaver, RN, MSN, CDE

Diabetes School Resource Guide

Table of Contents

Section 1

Type of Diabetes

Type 1 diabetes is an autoimmune condition, which occurs when the immune system mistakenly attacks a healthy part of the body. In type 1 diabetes, the cells in charge of producing insulin in the pancreas, called beta cells, are destroyed by the immune system. Type 1 diabetes is not the result of anything the family or child did. There is not an exact known cause of type 1 diabetes. While there might be a genetic predisposition, it is not a direct cause. For example: if a child has one parent with type 1 diabetes, their risk is increased by 5%. Some external conditions can also cause the immune system to trigger the attack on the beta cells. These can include viruses, food substances and other environmental factors. Type 1 diabetes is usually diagnosed in childhood, and often there is no family history of diabetes. The only treatment for type 1 diabetes is to take insulin.

Type 2 diabetes is due to insulin resistance or relative insulin deficiency. This means that type 2 diabetes is caused by a problem in the way the body makes or uses insulin. The cells in the pancreas are not completely destroyed; however, the cells are unable to make enough insulin or are unable to use the insulin properly. Type 2 diabetes is usually diagnosed in adults, but it is becoming more common in children. Increased risk factors for children developing type 2 diabetes are a strong family history (for example, the child's risk of developing as an adult is 10-15%, if one parent has type 2 diabetes). In addition to family history, risk factors include a sedentary lifestyle and overweight. Treatment can include one or more of the following: diet and exercise, oral medication and insulin. Type 2 diabetes is a chronic condition that will always require some form of treatment but treatment options might vary over time. The ADA (American Diabetes Association) standards for screening for type 2 diabetes are the presence of overweight plus one or more additional factors: 1. Family history of type 2 diabetes in 1st or 2nd degree relative. 2. Race/Ethnicity (i.e., African Americans, Mexican Americans, American Indians, Native Hawaiians, Pacific Islanders and Asian Americans have a higher risk) 3. Signs of insulin resistance or conditions associated with insulin resistance (e.g., acanthosis) 4. Maternal history of gestational diabetes.

Secondary diabetes is a form of insulin resistance or insulin deficiency. This means that the body does not respond as well to the insulin that the pancreas is making, and glucose has difficulty entering the cells. It can be caused by some medications or other health conditions. Medications called corticosteroids are a common type of medication that may cause insulin resistance. Treatment using insulin may be necessary at all times or only at certain times, depending on the cause of the insulin resistance.

Cystic fibrosis-related diabetes is a form of diabetes that is common in people with cystic fibrosis and is a result of insulin deficiency or resistance. This can be caused by any of the following: pancreatic scarring, infections, high levels of cortisol, and/or the use of corticosteroids. Insulin may be necessary at all times or only during times of infection or while steroids are being used.

Monogenic diabetes is a rare form of insulin resistance or insulin deficiency. There are two main forms of monogenic diabetes:

1. ***Maturity-onset diabetes of the young (MODY)*** is often diagnosed in children or teenagers and is genetically inherited. Treatment is either insulin or oral medications.

2. ***Neonatal diabetes*** is diagnosed in the first 6 months of life. This form of diabetes either resolves during infancy, with the possibility of returning later in life, or is a life-long condition. Depending on the form, treatment either involves oral medications or insulin therapy.

Section 2

Diabetes Language and Supplies

As caregivers to those living with diabetes, it is very important to be mindful of the language we use surrounding their daily care. Words are extremely powerful and can have direct impact on how someone manages their diabetes.

Words to avoid	Consider using
Diabetic	Person living with diabetes, person with diabetes
Disease	Condition
Testing	Checking
Control	Manage
Compliant/adherent	Use words that reflect collaborative adult/student goal setting
Sneaking	Eating food without insulin
Good or bad	In target (i.e., in target blood glucose level)

Diabetes Supplies:

The following is a list of possible supplies that students will need to have at school to manage their diabetes. The school orders will specify which supplies apply to the individual student. Throughout this resource guide, different supplies will be referenced.

- Blood glucose meter, test strips, lancets (store at room temperature)
- Insulin (vial and/or pen)
  Once opened, insulin can be stored at room temperature for 28 days, do not exceed 86 degrees and always check expiration date on vial or pen.
  Diluted Humalog Insulin expires after 14 days stored at room temperature or after 28 days in refrigerator.
  Diluted NovoLog Insulin expires after 28 days stored either at room temperature or in the refrigerator.
- Oral medication
- Syringes
- Pen needles
- Back-up insulin pump supplies
- Fast-acting sugar sources (e.g., glucose tablets, juice/soda, Starbursts, Skittles, Smarties, honey, sugar)
- Carbohydrate-containing snacks (e.g., granola bars, crackers)
- Glucagon (store at room temperature)
- Ketone strips (store at room temperature, expire 6 months after the date it was opened, for unopened strips, refer to the expiration date on the bottle)

Section 3

Level of Self-Care Abilities

Students, their parent/guardian and the diabetes health care team will identify the appropriate level of care needed during school hours. There are three levels of care: *Independent*, *Supervised* and *Total*. Please note that a student's age, how long they have lived with diabetes and/or demonstration of being capable of performing certain diabetes-related skills/tasks is not the sole reason to place a child in a level of care that allows for more independence. Diabetes requires attention and care 24 hours a day, and it is very important to give students the support they need so they can focus on developing social skills, as well as be successful in academics and extracurricular activities. It is very common for students to develop 'diabetes burn-out' and the support they receive at school can help prevent this. Support from school personnel is essential to help our students live fully with their diabetes. Discussing diabetes skills with the student as they are being completed offer invaluable learning opportunities.

Independent: A level of *Independent* indicates that a student may perform the identified diabetes task without adult supervision. In order to be able to carry out these tasks, the student will need to have access to their diabetes supplies at all times. It is appropriate and acceptable that students carry their blood glucose meter, insulin supplies, and low blood glucose treatment sources on them in order to facilitate this level of care.

Supervised: A level of *Supervised* indicates that a student requires a designated trained adult personnel to observe and assist with the identified diabetes task. The best practice of supervising a student does NOT include verbal report by the student of the task being completed. It is expected that the trained adult assigned to supervise is DIRECTLY observing and assisting the student. Examples of this include: observing the student check his/her blood glucose level after performing proper site preparation and then viewing the result on the meter screen, observing the student count carbohydrates and double checking that the count is accurate, observing that the student draws up or dials his/her insulin pen to the accurate insulin dose needed, observing and checking that the insulin pump plans to deliver the accurate insulin dose needed before selecting "administer", observing the student self-administer insulin to an appropriate site while ensuring that proper technique is followed and that all insulin is absorbed without leakage. Another very important example occurs in the event that ketones need to be checked. The student should always provide the trained adult personnel with a urine sample in a cup and the adult should observe as the child performs "the dip" and checks the results 15 seconds later.

Total Care: A level of *Total Care* indicates that a student requires the designated trained adult personnel to perform all aspects of the identified diabetes task for him/her. A student requiring total care will need the designated adult to be available at the times indicated on the school orders to receive diabetes care.

Section 4

Blood Glucose Target Range and Monitoring

Students will require blood glucose (BG) monitoring at various times of day and they will have varying BG target ranges. Target ranges are determined by the parent/guardians and the diabetes health care team and they are based on age, type of regimen (e.g., basal/bolus injection regimen, fixed insulin injection regimen, insulin pump), type of diabetes, and the student's ability to detect hypoglycemia symptoms.

The blood glucose target range will be identified in the orders as either a range or you may be directed to refer to the insulin injection/pump regimen order (refer to section 10: Guide to determining insulin dose using insulin pump and injection regimen orders).

Example of a range:

Blood Glucose Monitoring
Target Range of Blood Glucose: 70-150 mg/dL.

Example of referring to insulin injection regimen:

Blood Glucose Monitoring
Target Range of Blood Glucose: Refer to insulin injection regimen for target range.

Example of referring to insulin pump regimen:

Blood Glucose Monitoring
Target Range of Blood Glucose: Refer to insulin pump regimen for target range.

The goal of diabetes care at school is to maintain blood glucose levels in or near the target range as much as possible with priority being placed on the prevention of hypoglycemia in order to allow the student to be successful in academics and extracurricular activities. The diabetes health care team aims to coordinate each student's diabetes management needs with the school schedule to prevent the student from missing out on routine activities. Blood glucose monitoring is essential to safe diabetes management. As such, students need to have easy access to their diabetes supplies at all times, not just before or after mealtimes and/or physical activity, in the event that the student is symptomatic of hyper/hypoglycemia.

Please note, blood glucose levels will not always be in the target range, and it is very important that the designated adult does not react to these results by placing judgment or blame on the student. Blood glucose levels should not be viewed as "good" or "bad", but rather as information that requires a response. If a student is having a repeated pattern of high or low blood glucose levels at school, the blood glucose information should be provided to the parent/guardian, who should be instructed to contact their diabetes health care team for possible insulin dose adjustment.

Site Preparation and Location:
The student should always have clean and dry hands prior to checking his/her blood glucose level. Washing one's hands with soap and water at the sink or using an alcohol swab is acceptable. A student can use any finger to check, and the rotation of fingers used to check is encouraged. Lancing on the outside of the finger, not on the middle, is also encouraged. All lancing devices vary in depth ability but the goal is to use the smallest depth possible and to prepare the site well.

After cleansing the site, warm the finger by using pressure to get the blood to the end of the finger, lance the finger while applying pressure, then use firm pressure and push from the base of the finger down to the tip to get a solid blood sample. It is not necessary to wipe away the first drop of blood. We do not recommend checking blood glucose on other body parts because the blood circulation to these other areas takes longer than to the fingertips and the blood glucose level may not be as accurate. Lancets are one-time-use only and should be disposed of in a sharps container. Lancet devices are for one person only and should not be used to check someone else's blood glucose due to a risk of infection.

Storage and Supplies:

Blood glucose meters with supplies should be stored at room temperature.

It is the responsibility of the parent/guardian to provide the school with all needed supplies. Please note that some students have health insurance plans that will only allow supplies to be received at exactly one month increments. This can make it challenging for a parent/guardian to have a large amount of supplies at school at one time. One suggestion is to set up a plan with the parent/guardian regarding when and how often they will bring supplies to school.

*Refer to “Diabetes Supplies” on page 3 for additional storage information.

Section 5

Continuous Glucose Monitors (CGM)

A continuous glucose monitor (CGM) is a device that is placed in the subcutaneous tissue every 6 or 7 days. It transmits glucose levels from the interstitial fluid. The results can be viewed on an insulin pump, receiver, and/or a cell phone.

On the CGM, the glucose level is accompanied by an arrow that shows the direction of the blood glucose pattern and the rate of change:

Vertical arrow: stable
Arrow slightly upward: gradually rising up
Arrow directly upward: rising upward at a faster rate
Arrow slightly downward: gradually decreasing
Arrow directly downward: falling at a faster rate

Different CGM models are available and they may vary in type of arrow display and rate of change. Depending on which device the student is using to view results, parent/guardians may also be able to view their child's glucose levels while their child is at school. There is also the option to set alerts for certain target glucose levels (both low and high thresholds). In the event of an alert, a finger stick should be used to confirm the blood glucose level. As such, students who use CGMs will need to have access to their blood glucose meter to confirm the alert from the CGM with a finger stick. If a student is receiving several alerts and/or the finger stick results are not consistent with the CGM, one should check that the CGM is properly connected to the body. It is also critical to note that treatment should ALWAYS be based on finger stick values in the event that CGM results are not consistent with finger stick values.

The following are CGM settings that could possibly be included in school orders but are not mandatory:

Low glucose alert: This will have a blood glucose level associated with it and will alert the student when they reach that level.

High glucose alert: This will have a blood glucose level associated with it and will alert the student when they reach that level.

Suspend before low: This is an advanced feature where the insulin pump suspends delivery of basal insulin in anticipation of the student having a low blood glucose level in the near future. No action is required if the pump suspends because it will auto resume when the blood glucose level rises.

Suspend on low: This is an advanced feature where the insulin pump suspends delivery of basal insulin once the student has reached a certain low threshold. This alert can be cleared and discontinued. Alternatively, the insulin pump will continue to suspend basal insulin delivery for 2 hours or until the alert is cleared if no action is taken after the alert.

Threshold suspend: This is an advanced feature where the insulin pump suspends delivery of basal insulin once the student has reached a certain low threshold. This alert can be cleared and discontinued. Alternatively, the insulin pump will continue to suspend basal insulin delivery for 2 hours or until the alert is cleared if no action is taken after the alert. If the insulin pump suspends, confirm the blood glucose level with a finger stick and treat hypoglycemia as per orders. Once the blood glucose level rises above 70 mg/dL, (per finger stick), resume basal rate. Call parent/guardian for further directions if appropriate.

If the aforementioned alert information is included in the student's orders, the settings will be available. Refer to online resources or inquire with the parent/guardian for guidance on the specifics of the student's device as there are several options available. Please note, the insulin pump and/or CGM will always direct the user of the device with clear step by step instructions on the screen. These instructions help reduce error or anxiety related to alerts. Any changes or modifications to these settings/orders can be updated for reference by school personnel by the parent/guardian. A school order by the diabetes team is not required.

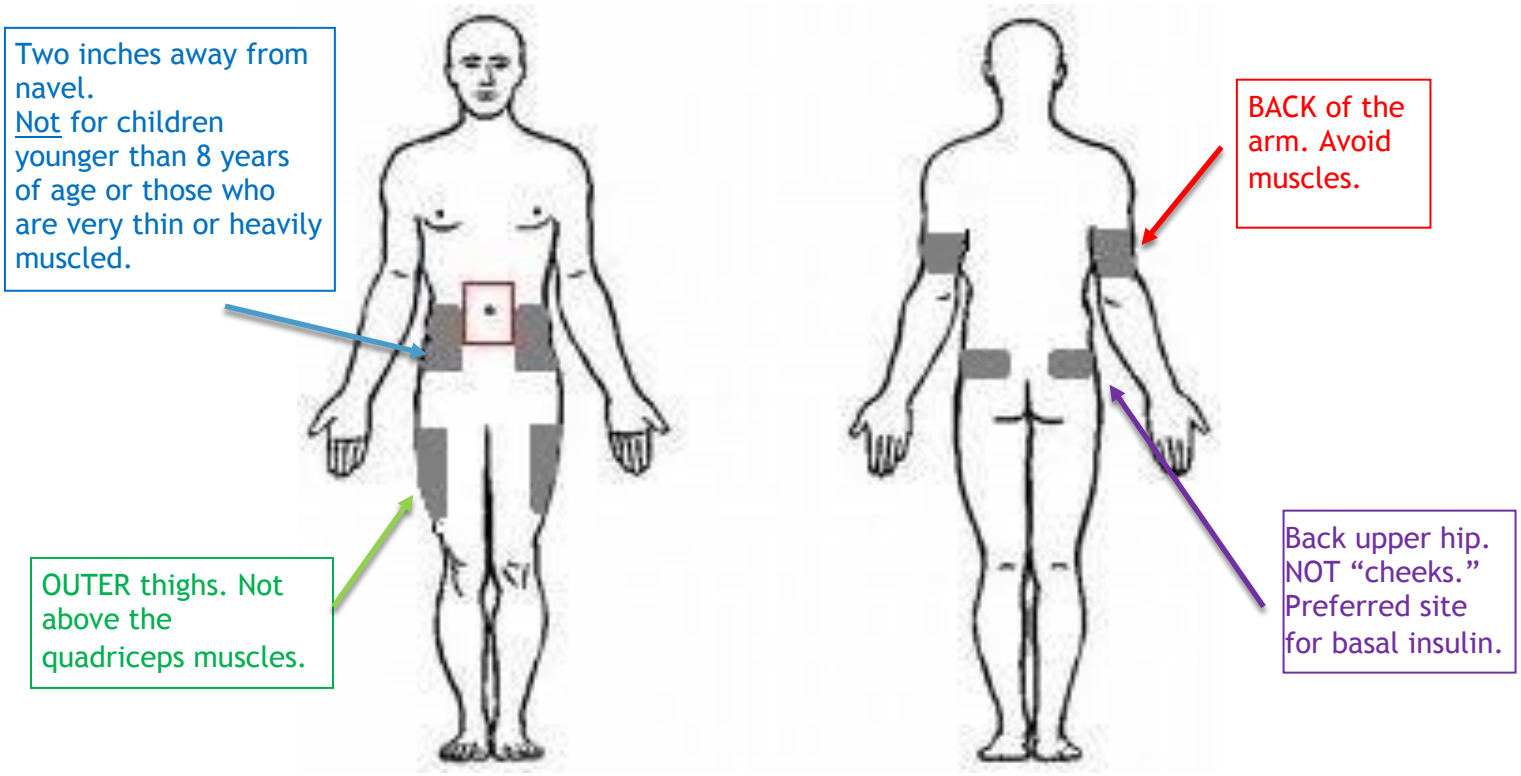
Section 6

Insulin Injection Sites

Insulin is given by a subcutaneous injection. This means it is injected in the fat layer beneath the skin. Insulin can be administered by a syringe (insulin is drawn from a vial), an insulin pen, or by an insulin pump.

- There are four choices for where to give insulin: back of the arms, abdomen, outer legs, and back upper hip.
- The abdomen is usually avoided in young children under 8 years old and in those who are very thin or have large amounts of muscle.
- It is important to rotate between injection sites to prevent lipohypertrophy (fatty tissue growths) under the skin caused by the accumulation of extra fat. Insulin is not absorbed well into the body when this occurs.
- The age at which children develop the dexterity to administer their own insulin injection is generally between 8 and 12 years old. Please note, the development of this skill is extremely variable and depends on the child's level of maturity and ability to perform the task. This does not imply that children should be required or asked to perform this task; it is merely stating that the physical skills could be present by this age.
- Refer to the site location and specifics below. Each of the 4 sites could be used for rapid acting insulin. The administration of basal insulin in the back upper hip or abdomen is recommended.

Injection site locations



Instructions for Subcutaneous Insulin Administration

Using a Syringe:

1) Wash hands with soap and water or use hand sanitizer.
2) Use an alcohol swab to rough scrub the top of the vial for 20 seconds. Allow to air dry for 10 seconds.
3) Use an alcohol swab to clean the skin in the area to be injected. Allow to air dry.
4) Inject air into the vial of the amount of insulin to be administered to the patient.
5) Draw about 5 units of insulin and inject it back into the vial forcefully to remove air bubbles.
6) Draw up dose of insulin indicated on school order into the syringe.
7) Pinch 1”-2” of the subcutaneous skin at the cleaned site of injection.
8) Insert the needle at the cleaned site of injection using a steady pace and at a 90-degree angle.
9) Administer insulin.
10) While needle is still in the skin, release the pinched subcutaneous skin and count to 3 seconds before removing the needle.
11) Remove needle and dispose of syringe in appropriate container.

Using an Insulin Pen:

1) Wash hands with soap and water or use hand sanitizer.
2) Use an alcohol swab to rough scrub the top of the pen for 20 seconds. Allow to air dry for 10 seconds.
3) Use an alcohol swab to clean the skin in the area to be injected. Allow to air dry.
4) When using a new pen, prime the device with 5 units or until insulin is seen exiting needle.
5) Prior to each injection, prime the pen device with 2 units of insulin
6) When priming, hold pen upward at a 90-degree angle.
7) Dial pen to dose of insulin indicated on school order.
8) Insert the needle at the cleaned site of injection using a steady pace and at a 90-degree angle.

   NOTE: If less than 6 years of age, very lean or heavily muscled and/or if using a needle larger than 4mm, pinch 1”-2” of the subcutaneous skin.
9) Administer insulin.
10) If the subcutaneous skin is pinched, release the skin.
11) Count to 8-10 seconds while needle is still in the skin/before removing the needle.
12) Remove needle and place the clear plastic cap on the pen needle to unscrew the pen needle and dispose of in appropriate container. (Never leave a pen needle attached to an insulin pen after use.)

No additional steps are necessary (i.e. rubbing with alcohol, gauze, covering with a Band-Aid).
There should be no leakage of insulin. The presence of blood is rare, but is not of concern. If a bruise forms, avoid administering insulin in the bruised area until resolved.

Syringes and pen needles are one-time use only. Insulin pens are for one student only. NEVER share an insulin pen between students.

Section 7

Medication Regimen Terminology

A students' medication regimen will vary based on type of diabetes and individual goals and ability. It is important to understand the insulin mechanism of action and dosing terminology to provide safe/appropriate care.

Terminology	Daily injections	Insulin pump
Basal insulin: Insulin must be available 24 hours a day to allow glucose to enter the cells and provide the body with energy. Basal insulin is produced between meals and during sleep to allow glucose released from the liver to move into the cells.	Basal Dose Insulin given once every 24 hours (some students require every 12 hours) *Example:* Basaglar/Lantus/Levemir/ Tresiba	Basal Rate The amount of insulin automatically given by the pump per hour using rapid-acting insulin. Different basal rates can be set for different times of day *Example:* MN-6AM = 0.225, 6AM-9AM = 0.200
Bolus Insulin: Larger, faster acting insulin used to prevent high glucose levels from food or to correct high glucose levels.	Apidra, Humalog, or NovoLog Onset: 5-15 minutes Peak: 1 hour Duration: 2-3 hours	Apridra, Humalog, or NovoLog Onset: 5-15 minutes Peak: 1 hour Duration: 2-3 hours
Insulin to Carbohydrate Ratio (I:CR): The number of grams of carbohydrate that are covered by 1 unit of insulin. Use rounding rules as per orders to dose to the most accurate half/whole number. Different ratios can be set for different times of day. Insulin is needed **every** time CHO's are eaten.	*Example: Breakfast= 1: 8* 1 unit of insulin for every 8 grams of carbohydrates *Example: Lunch= 1: 10* 1 unit of insulin for every 10 grams of carbohydrates.	*Example: Midnight-6AM= 1:15* 1 unit of insulin for every 15 grams of carbohydrates from MN to 6AM *Example: 6AM-12PM= 1:8* 1 unit of insulin for every 8 grams of carbohydrates from 6AM to12PM
Insulin Sensitivity Factor (ISF): The amount 1 unit of insulin should lower your blood glucose level. Different sensitivities can be set for different times of day. *****Refer below for details on calculation *****	*Example: Mid-AM= 0.5:100>150 mg/dL* *Example: Lunch= 1:50>150 mg/dL*	*Example: MN-6AM= **100*** 1 unit of insulin will decrease BG by 100 mg/dL *Example: 6AM-12PM= **50*** 1 unit of insulin will decrease BG by 50 mg/dL
Blood Glucose Target: Correct to a specific number or in the middle of a range. Different targets can be set for different times of day.	*Example:* *Mid-AM= 200 mg/dL* *Example: Lunch=150* mg/dL	*Example:*MN-6AM= 80-120 mg/dL = 100 +/- 20 or 100 mg/dL *Example:* 6AM-12PM = 70-100 mg/dL= or 85 +/- 15 or 85 mg/dL
Active Insulin, Insulin on Board or Insulin Action (IOB): The time that a bolus is considered to be actively working in the body. The time can vary depending on the individual patient needs.	*Example:* Do not give correction for a high blood glucose level more often than every 2 hours since food consumed or bolus insulin administered.	*Example: Active Insulin Time = 2 hours.* The pump will not deliver a full correction dose if within 2 hours since last bolus. The insulin pump might recommend a small correction based on the IOB.

Section 8

Guide to Determine Doses using Insulin Injection or Insulin Pump Orders

Please note: In the event the student has a meter reading of "HI", to determine insulin dose, first identify the appropriate blood glucose level.

A. If the student is using a FreeStyle brand meter or OmniPod insulin pump PDM/meter; "HI" is a value of over 500 mg/dL. A blood glucose level of 500 mg/dL should be used.

i. If the order set advises to calculate insulin sensitivity factor, the current blood glucose value of 500 mg/dL will be used to determine the dose needed.

ii. If the order set advises to use a scale, follow the scale as per orders using a current blood glucose value of 500 mg/dL.

B. If the student if using any other brand meter, "HI" is a value of over 600 mg/dL. A blood glucose level of 600 mg/dL should be used.

i. If the order set advises to calculate insulin sensitivity factor, the current blood glucose value of 600 mg/dL will be used to determine the dose needed.

ii. If the order set advises to use a scale, follow the scale as per orders using a current blood glucose value of 600 mg/dL.

iii. In the event the scale stops at a blood glucose level of 500 mg/dL, then calculations need to be done to determine the insulin dose needed for a value of 600 mg/dL.

Example: 151-200 mg/dL = 1 (this is equal to 1 unit for every 50 mg/dL over 150)
201-250 mg/dL = 2
251-300 mg/dL = 3
301-350 mg/dL = 4
351-400 mg/dL = 5
401-450 mg/dL = 6
451-500 mg/dL = 7
501-550 mg/dL **= 8**
551-600 mg/dL **= 9** (9 units of insulin would be administered for a blood glucose of "HI")

Injection Regimen Orders:

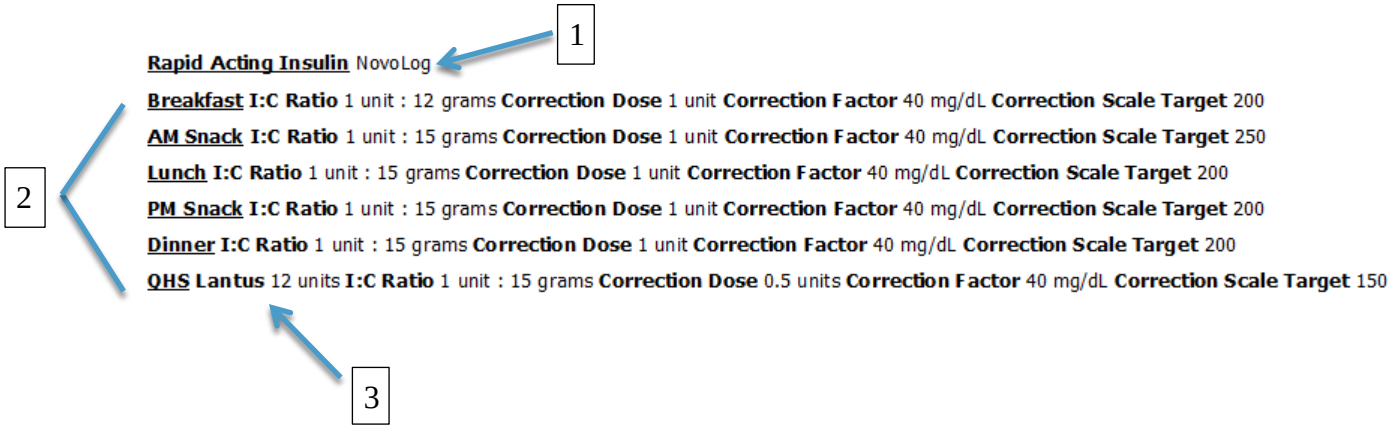
1. Type of rapid-acting insulin is listed.

2. Carbohydrate ratios, insulin dose for correction of hyperglycemia and blood glucose target scale indicated for each time of day. Please note: the form specifically identifies breakfast, AM snack, Lunch, PM Snack, Dinner, QHS (bedtime). Utilize the general time frame to match with corresponding school-based time frames.

> Example: If student requires correction insulin during mid-morning, but does not eat a snack, the correction factor and target range refers to "mid-morning".
>
> Example: If student requires correction insulin after P.E/exercise and P.E/exercise is in the afternoon, the correction factor and target range refers to "PM Snack".

3. Type of basal insulin is listed with current dose. Please note: most students take basal insulin one time a day at home near bedtime. Basal doses will not be adjusted at school and the designated trained adult is not required to verify these settings. If the basal dose is being administered at school, it is the responsibility of the parent/guardian to provide updates for dosing as they occur. Below are some scenarios that are less common, but might occur.

> Example: Basal dose one time a day in the morning
>
> Example: Basal dose two times a day, in the morning and evening (about 12 hours apart)
>
> Example: Basal dose to be taken during school hours, in the morning or at lunch



Example of a student on a Fixed Regimen:

1. Type of rapid-acting insulin is listed.

    Example: used for correction of hyperglycemia or fixed carbohydrate dose

2. Type of intermediate acting insulin is listed with current dose.

    Example: Taken twice a day, at home and in the morning. This requires a student to have fixed CHO snacks at designated times.

3. Fixed CHO amount is listed.

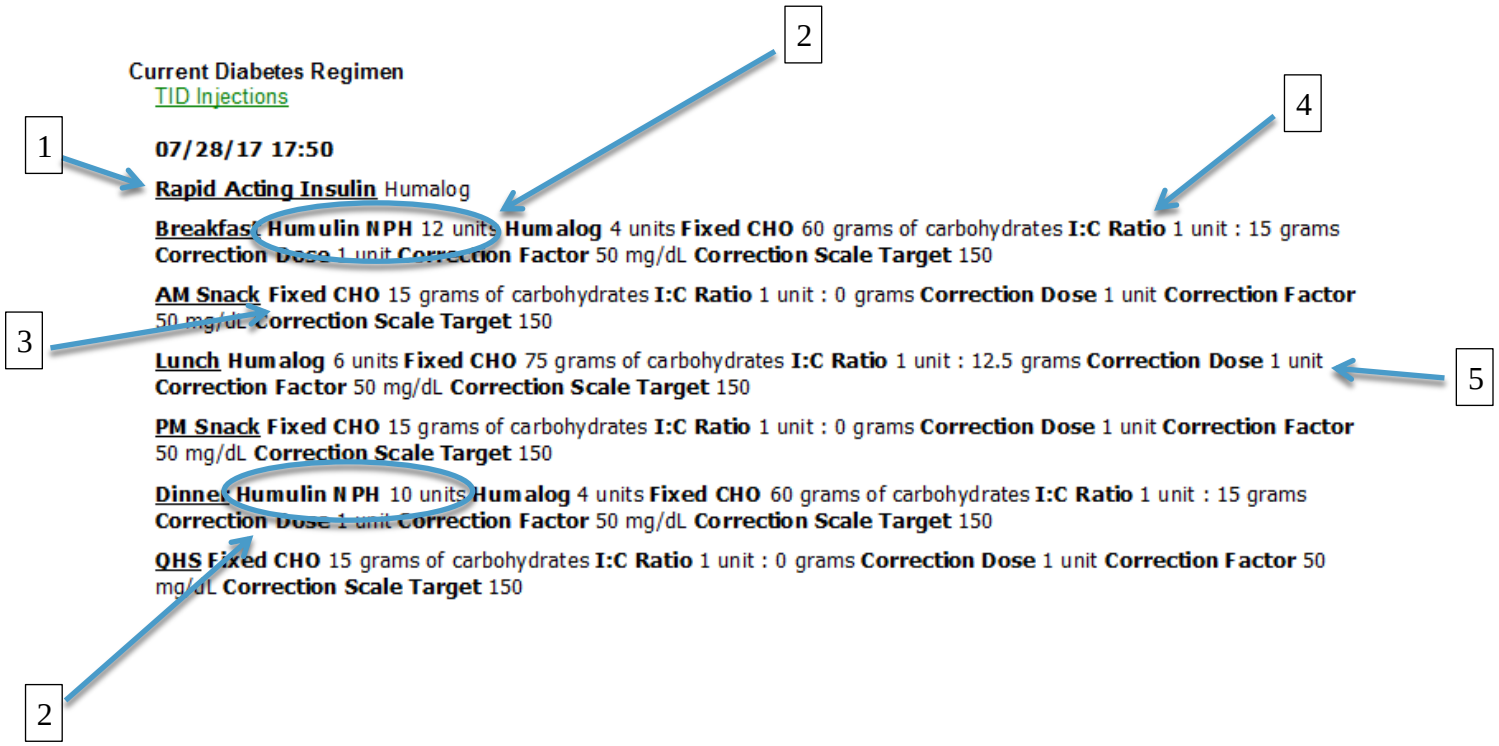
    Example: Identify any fixed CHO amounts for school hours

4. Carbohydrate ratio that matches fixed regimen dose.

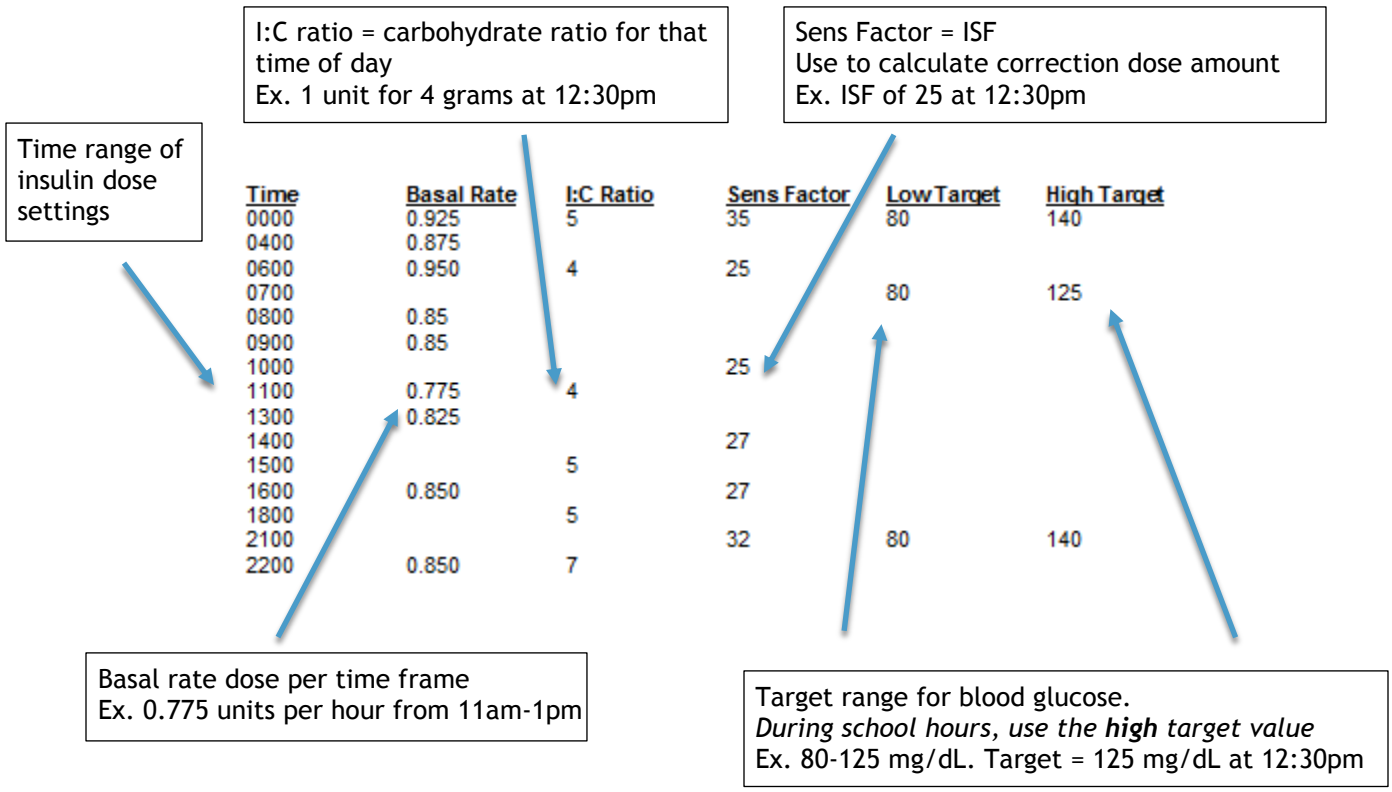
    Example: Carbohydrate ratio to match the amount of insulin for the fixed CHO amount. Some students might use a carbohydrate ratio when eating more carbohydrates than planned for.

5. Insulin dose for correction of hyperglycemia.

    Example: correction dose provided to treat for hyperglycemia.



Insulin Pump Orders:



Example for the determination of insulin dose using insulin pump order above:

Lunch time at 12:30pm: current blood glucose is 200 mg/dL and carbohydrates to be consumed are 55 grams.

To determine doses (in times of dosing via syringe/pen r/t insulin pump or site failure or ketones):

1. Identify the time of day on the left and scroll to the right to determine other doses.

2. I:CR (insulin to carbohydrate ratio) = 4 (1 unit for every 4 grams of carbohydrates)

3. Sens Factor (insulin sensitivity factor) = 25 (1 unit of insulin will lower blood glucose by 25 mg/dL)

4. High Target = 125 mg/dL

5. Calculating insulin dose:

    a. Correction for high blood glucose level:
    200 mg/dL (current BG level)-125 mg/dL (target goal) = 75 ÷ 25 (insulin sensitivity factor) = 3 units

    b. Insulin for carbohydrates to be consumed:
    55 grams ÷ 4 (I:CR) = 13.75

    c. Total dose:
    3 units (insulin for correction) + 13.75 units (insulin for carbs) = **16.75 units (round up to 17)**
    total insulin dose to be administered = 17 units

Section 9

Calculating Insulin Doses

Calculating Insulin Sensitivity Factor (ISF)

Insulin Sensitivity Factor is how much 1 unit of insulin will lower a blood glucose level.

Instructions on how to calculate the insulin sensitivity factor (ISF) can be written in different ways.

Example dose of 1:50>150 mg/dL:

Example 1:

Subtract target BG level (correction scale target) from current BG reading and divide by sensitivity factor.
275 – 150 = 125, 125 ÷ 50 = 2.5

Example 2:

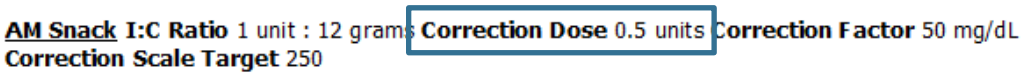
(current BG) – (target BG level/correction scale target) = _____ number of units of insulin to be given
(sensitivity factor)

(275 mg/dL) – (150 mg/dL) = 2.5 units (number of units of insulin to be given)
(50)

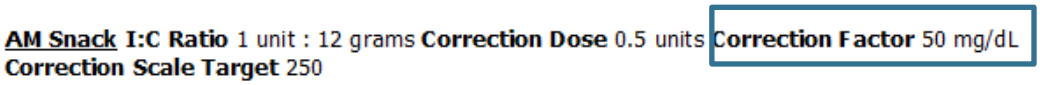
**** When insulin correction dose is an increment other than 1 unit, the first step is to convert your correction dose to an ISF that equals a 1 unit increment. Refer to the steps below and the following pages on how determine the insulin sensitivity factor (ISF). ****

To determine the insulin sensitivity factor (ISF):

1. Look at student's insulin dose regimen
2. Identify the correction dose



3. Identify the correction factor



   A. Refer to chart on page 17 if Correction Factor 50 mg/dL.

   B. Refer to chart on page 19 if Correction Factor 100 mg/dL.

Converting Correction Dose that is NOT 1 unit and has a Correction Factor of 50 mg/dL

Correction Dose: Correction Factor	Converted to 1 unit Correction Dose: Correction Factor = ISF
0.25 units: 50 mg/dL	1 unit:**200**
0.5 units: 50 mg/dL	1 unit:**100**
1 unit: 50 mg/dL	1 unit:**50**
1.5 units: 50 mg/dL	1 unit:**33**
2 units: 50 mg/dL	1 unit:**25**
2.5 units: 50 mg/dL	1 unit:**20**
3 units: 50 mg/dL	1 unit:**16**
3.5 units: 50 mg/dL	1 unit:**14**
4 units: 50 mg/dL	1 unit:**12**

Example of a student order for AM snack. Student is in the office for AM snack and BG level is **402 mg/dL**.

AM Snack I:C Ratio 1 unit : 12 grams **Correction Dose** 0.5 units **Correction Factor** 50 mg/dL
Correction Scale Target 250

Correction Dose	Correction Factor	Correction Scale Target	Correction Dose converted to 1 unit	Correction Factor converted to match 1 unit (ISF)	Calculation example current BG - correction scale target ÷ correction factor = dose
0.5 units	50 mg/dL	250	1	100	402 – 250 ÷ 100 = 1.52 (1.5 units rounding to a half unit) or (2 units rounding to a whole unit)

Example of student order for lunch. Student is in the office for lunch and BG level is **201 mg/dL**.

Lunch I:C Ratio 1 unit : 15 grams **Correction Dose** 1.5 units **Correction Factor** 50 mg/dL
Correction Scale Target 200

Correction Dose	Correction Factor	Correction Scale Target	Correction Dose converted to 1 unit	Correction Factor converted to match 1 unit (ISF)	Calculation example current BG - correction scale target ÷ correction factor = dose
1.5 units	50 mg/dL	200	1	33	201 – 200 ÷ 33 = 0.03 (0 units)

Continued examples of converting and calculating Correction Dose that is NOT 1 unit and has a Correction Factor of 50 mg/dL

**Correction Scale Targets will vary; i.e 100, 120, 150, 200, 250, etc. **

Correction Dose	Correction Factor	Correction Scale Target	Correction Dose Converted to 1 unit	Correction Factor Converted to match 1 unit (ISF)	Calculation Example current BG - correction scale target ÷ correction factor = dose
0.25 units	50 mg/dL	150	1	200	355 – 150 ÷ 200 = 1.025 (1 unit)
0.5 units	50 mg/dL	200	1	100	402 – 200 ÷ 100= 2.02 (2 units)
1 units	50 mg/dL	150	1	50	201 – 150 ÷ 50= 1.02 (1 unit)
1.5 units	50 mg/dL	150	1	33	272 – 150 ÷ 33= 3.69 (3.5 units rounding to half units or 4 units rounding to whole units)
2 units	50 mg/dL	150	1	25	189 – 150 ÷ 25= 1.56 (1.5 units rounding to half units or 2 units rounding to whole units)
2.5 units	50 mg/dL	150	1	20	222 – 150 ÷ 20= 3.6 (3.5 units rounding to half units or 4 units rounding to whole units)
3 units	50 mg/dL	150	1	16	178 – 150 ÷ 16= 1.75 (2 units)
3.5 units	50 mg/dL	150	1	14	305 – 150 ÷ 14= 11.07 (11 units)
4 units	50 mg/dL	150	1	12	210 – 150 ÷ 12= 5 units

Converting Correction Dose that is NOT 1 unit and has a Correction Factor of 100 mg/dL

Correction Dose: Correction Factor	Converted to 1 unit Correction Dose: Correction Factor = ISF
0.25 units: 100 mg/dL	1 unit:**400**
0.5 units: 100 mg/dL	1 unit:**200**
1 unit: 100 mg/dL	1 unit:**100**
1.5 units: 100 mg/dL	1 unit:**66**
2 units: 100 mg/dL	1 unit:**50**
2.5 units: 100 mg/dL	1 unit:**40**
3 units: 100 mg/dL	1 unit:**32**
3.5 units: 100 mg/dL	1 unit:**28**
4 units: 100 mg/dL	1 unit:**25**

Example of a student order for AM snack. Student is in the office for AM snack and BG level is **402 mg/dL**.

AM Snack I:C Ratio 1 unit : 12 grams **Correction Dose** 0.25 units **Correction Factor** 100 mg/dL
Correction Scale Target 200

Correction Dose	Correction Factor	Correction Scale Target	Correction Dose converted to 1 unit	Correction Factor converted to match 1 unit (ISF)	Calculation example current BG - correction scale target ÷ correction factor = dose
0.25 units	100 mg/dL	200	1	400	402 - 200 ÷ 400 = 0.505 (0.5 units)

Example of student order for lunch. Student is in the office for lunch and BG level is **201 mg/dL**.

Lunch I:C Ratio 1 unit : 15 grams **Correction Dose** 0.5 units **Correction Factor** 100 mg/dL
Correction Scale Target 150

Correction Dose	Correction Factor	Correction Scale Target	Correction Dose converted to 1 unit	Correction Factor converted to match 1 unit (ISF)	Calculation example current BG - correction scale target ÷ correction factor = dose
0.5 units	100 mg/dL	150	1	200	201 - 150 ÷ 200 = 0.25 (0.25 or 0.0 units)

Continued examples of converting and calculating Correction Dose that is NOT 1 unit and has a Correction Factor of 100 mg/dL

**Correction Scale Targets will vary; i.e 100, 120, 150, 200, 250, etc. **

Correction Dose	Converted Factor	Correction Scale Target	Correction Dose Converted to 1 unit	Correction Factor Converted to match 1 unit (ISF)	Calculation Example current BG - correction scale target ÷ correction factor = dose
0.25 units	100 mg/dL	150	1	400	355 – 150 ÷ 400 = 0.51 (0.5 units)
0.5 units	100 mg/dL	200	1	200	402 – 200 ÷ 200 = 1.01 (1 unit)
1 units	100 mg/dL	150	1	100	201 – 150 ÷ 100 = 0.51 (0.5 units)
1.5 units	100 mg/dL	150	1	66	272 – 150 ÷ 66 = 2 units
2 units	100 mg/dL	150	1	50	189 – 150 ÷ 50 = 0.78 (1 unit)
2.5 units	100 mg/dL	150	1	40	222 – 150 ÷ 40 = 1.8 (2 units)
3 units	100 mg/dL	150	1	32	178 – 150 ÷ 32 = 0.875 (1 unit)
3.5 units	100 mg/dL	150	1	28	305 – 150 ÷ 28 = 5.53 (5.5 units rounding to half units or 6 units rounding to whole units)
4 units	100 mg/dL	150	1	25	210 – 150 ÷ 25 = 2.4 (2.5 units rounding to half units or 2 units rounding to whole units)

Calculating Carbohydrate Ratio and Total Insulin Dose

It is important to be as specific and as accurate as possible when calculating insulin doses.

There are 3 possible insulin doses that will be calculated:

1. ***Insulin to carbohydrate ratio*** (Insulin coverage dose for carbohydrates to be consumed. Insulin is to be given EVERY time carbohydrates are eaten unless otherwise specified)

2. ***Insulin Sensitivity Factor*** =***ISF*** (Insulin correction dose needed to lower a high blood glucose level to the target range. This is used when indicated in the order)

3. ***Total dose*** (When insulin to carbohydrate ratio and insulin sensitivity factor are required at the same time)

For ALL of these areas, it is important to round to the nearest half or whole unit depending on the syringe or insulin pen capability.

Example:

1. ***Insulin to carbohydrate ratio*** (when dosing alone)

   Order: 1 unit for every 12 grams (same as 0.5 units for every 6 grams)

   Carbohydrate total: 31 grams

   Calculation: 31 grams divided by 12 = 2.58 (always divide by a 1 unit carbohydrate ratio)

   Dose to be given: 2.5 units (rounding to half unit) or 3 units (rounding to whole unit)

2. ***Insulin sensitivity factor = ISF*** (when dosing alone)

   Order: 0.5 units: 50 mg/dL > 150 mg/dL

   Current blood glucose: 321 mg/dL

   Calculation: Determine ISF by referring to conversion chart. 321 mg/dL subtract 150 mg/dL = 171

   divided by 100 (ISF) = 1.71

   Dose to be given: 1.5 units (rounding to half unit) or 2 units (rounding to whole unit)

3. ***Total Dose*** (insulin to carbohydrate ratio and insulin sensitivity factor at the same time)

   Calculation of both doses: 2.58 + 1.71 = 4.29

   Dose to be given: 4.5 units (rounding to half unit) or 4 units (rounding to whole unit)

Rounding Rules:

Rounding to the nearest half unit:
If using a syringe (whole or half unit markings) or an insulin pen with half dose unit ability, 0.0-0.24 round down, 0.25-0.74 round to half, 0.75 and above, round up to the next whole number.

Rounding to the nearest whole unit:
If using a syringe or an insulin pen with whole dose unit ability, 0.0-0.49 round down, 0.50-0.99 round up to the next whole number.

Section 10

Diabetes Medication Regimens

Basal/Bolus MDI Regimen

Using basal and bolus insulin with multiple daily injections is one of the most common regimens. The goal of this regimen is to closely mimic the body that does not have diabetes by allowing a student to incorporate diabetes into their life, as opposed to revolving their life around diabetes. Students using this regimen do not have to eat at specific times or eat certain amounts of food. The student usually takes basal insulin (Basaglar, Lantus, Levemir,Tresiba) at home, at night or in the morning. It is rare, but there are occurrences in which the school order includes the administration of basal insulin at school. The school orders will include this insulin dose for the trained adults' knowledge and for reference in the event of a disaster/lock down.

Basal insulin works for 24 hours (for some students it does not last this long and it is administered every 12 hours) and the purpose is to provide a steady amount of insulin "in the background" at all times. This type of insulin does not lower high blood glucose levels that result from eating food or other factors. It is essential that the student takes basal insulin within the same hour every day (e.g., at 8:00pm or within one hour of 8:00pm every day).

Bolus insulin (Apidra, Humalog, NovoLog) is rapid-acting insulin that is taken for planned carbohydrate consumption and high blood glucose levels. Bolus insulin starts to take action in 5-15 minutes, peaks at 1 hour and is done working in 2-3 hours. Ideally, bolus insulin is administered prior to eating in order to allow it time to start working prior to the effect of carbohydrates on blood glucose levels. Some students are not predictable eaters, cannot verbalize how much food they plan to eat, and/or cannot follow commands to finish eating all planned carbohydrates; therefore, they might require the administration of insulin immediately after eating. The goal is to consume carbohydrates within 20-30 minutes of insulin intake.

Bolus insulin consists of two separate insulin doses: one dose for matching carbohydrates and one dose for correcting high blood glucose. This means that **insulin for carbohydrate intake needs to be taken EVERY time carbohydrates are to be eaten**, despite when insulin was last given (unless otherwise specified in the order, e.g., P.E/exercise guidelines). Students with diabetes should not be left out of special occasions/celebrations at school that involves food; however, they will need access to their diabetes supplies to allow for blood glucose checks and the administration of insulin. It is helpful for these special events to be communicated to the designated trained adult, especially for students requiring total or supervised care, so the adult is available to assist the student and to minimize disruption in the student's participation.

The insulin dose for correction of high blood glucose can only be administered once every 2 hours since the last food was eaten or rapid-acting insulin was administered. Every time bolus insulin is administered, the insulin action time is re-started; therefore, if it is administered for a high blood glucose level within the 2-hour time frame, the student may experience hypoglycemia as the previous insulin dose was still actively working.

Insulin Pump Regimen

An insulin pump is a device that uses bolus/rapid-acting insulin only. The insulin pump is designed to administer a small amount of insulin every hour to provide basal insulin. Basal rates will not be adjusted at school and the designated trained adult is not required to verify these settings. The student/designated trained adult is required to check blood glucose levels, count carbohydrates and enter these values into the pump. Similarly, if the student has elevated blood glucose and requires a correction, the student/designated trained adult, is responsible for checking the blood glucose level, entering the value into the pump, and following the prompts to deliver the correction dose.

To determine the dose needed, insulin pumps have a built-in calculator and individual settings for carbohydrate ratio, insulin sensitivity factor, active insulin time, and blood glucose target levels. The school orders will include all insulin pump doses and can be used to double check insulin doses as well as to calculate insulin doses manually in the event of pump failure or the presence of moderate/large ketones.

In the event of pump malfunction, there are 24-hour help lines available for all insulin pump devices. The corresponding insulin pump company can help trouble shoot and determine if anything can be fixed over the phone. If the insulin pump cannot be fixed after trouble shooting by telephone, call the parent/guardian to inform them of the event. The parent/guardian will need to call the 24-hour help-line to get a replacement pump as soon as possible.

In the event that a student's insulin pump cannot be used (due to moderate to large ketones, failed site or due to mechanical failure), the student will need insulin to be administered by syringe or insulin pen to prevent hyperglycemia. The insulin pump regimen includes the doses for insulin to carbohydrate ratio, the insulin sensitivity and the blood glucose target. These doses can be used to determine what insulin the student needs.

If the student has more than 2 hours remaining in their school day, and they are unable to use their pump or to replace their pump site, then they will need to administer insulin by syringe or pen every 2 hours for correction of hyperglycemia and for any carbohydrates to be eaten. Two hours is the maximum recommended amount of time that a student can be "off" their insulin pump (i.e., not receiving insulin). If the pump is "off" for more than two hours, there is an increased risk of ketosis. The parent/guardian is responsible for providing the school with syringes or an insulin pen for subcutaneous injection in the event of insulin pump site failure or malfunction. Each insulin pump has the 24-hour help-line information on the device, and they are included here for reference:

- ACCU-CHEK (800) 688-4578
- Animas (877) 937-7867
- Medtronic (800) 646-4633
- OmniPod (800) 591-3455
- t:slim (877) 801-6901

Special consideration:

Medtronic 670G: This model of insulin pump has an advanced feature called "Auto Mode". In this mode, the insulin pump is adjusting basal rates in the background to keep the student at a target blood glucose range of 120 mg/dL. In order to adjust the insulin doses, the insulin pump works in tandem with the Guardian 3 Continuous Glucose Monitor. Auto Mode is indicated by a blue shield on the insulin pump main screen. At school, the same steps that students using any other insulin pump take need to be followed (e.g., check blood glucose level, enter the blood glucose level and carbohydrates to be eaten into the pump, follow insulin pump recommendation for insulin dose to be given). If Auto Mode is exited for any reason, read the message on the screen for any special instructions and notify the student's parent/guardian for further advice. Continue to check blood glucose as per orders and give insulin for carbohydrates and hyperglycemia as needed.

Fixed Insulin Regimen

A fixed insulin regimen involves a very structured daily routine where two or three types of insulin are administered at set times. The student is required to consume a similar number of carbohydrates (e.g., consuming similar foods and quantities) at similar times of the day. Rapid or short-acting insulin is given to cover food and intermediate insulin is given to keep blood glucose levels down between meals. Three injections are given throughout the day. This regimen is not used very often, but might be used with students who have certain limitations or those students with tube feedings.

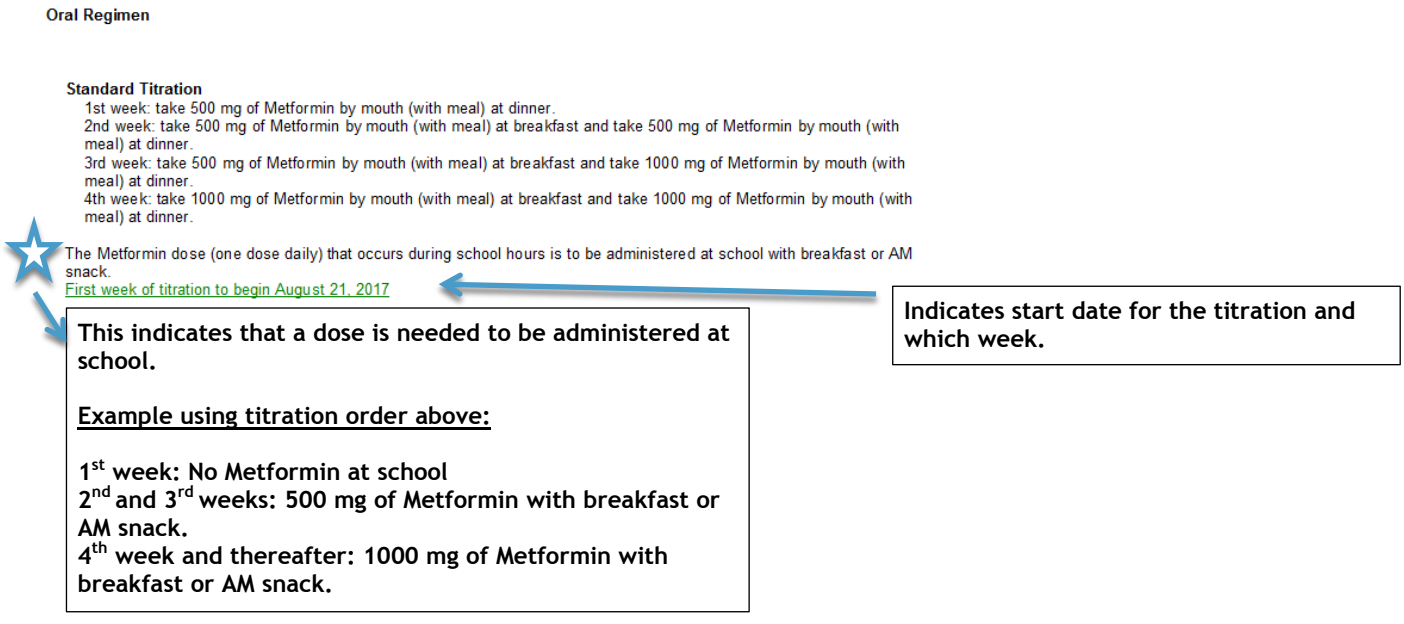
Diluted or Special Strength Insulin

A student's insulin regimen might include using Diluted U-10, U-25 or U-50 or increased strength of U-500. If the student administers insulin via injections, a U-100 syringe is used to administer this insulin. The same type of syringe is used for U-100 Apidra, Humalog, NovoLog, and for any basal insulin. The designated trained adult is not responsible for making any additional calculations prior to administering insulin because the insulin doses are determined by the provider using the diluted or special strength insulin. The steps are the same as when using U-100 strength insulin. NOTE: It is always important to verify that the student is receiving the correct ***type*** of insulin.

Oral Medications

Metformin is the most commonly used oral medication to treat students under 18 years old with type 2 diabetes. In some cases, Metformin is used to treat students with type 1 diabetes in addition to insulin, if they are overweight or obese as well as experiencing extreme resistance to their insulin therapy. Most often, Metformin is taken at home, but in some cases the school orders will state that Metformin is to be taken at school. In order to reduce GI (gastrointestinal) side effects to this medication, it is best taken with food. For students who eat breakfast at school, it is best to take Metformin at school with their meal. At the initiation of Metformin it is often prescribed as a titration. This titration helps the student adjust to the medication and it minimizes side effects. The school order will include the current Metformin dose the student is on or it might include instructions for the titration. If the school order indicates that the student should take Metformin at school, the dose should be applied as per the order (titration or a standard dose) at the time indicated. The student will only receive one dose during school hours, given with a meal or snack. Student's treating diabetes with oral medications only often do not need to check blood glucose levels at school routinely. Their order will call for checking for any symptoms of hyperglycemia or hypoglycemia. Metformin alone rarely causes hypoglycemia; therefore Glucagon would not be required. If a student is on a different oral medication than Metformin and requires a different treatment plan, it will be indicated on the orders.

Example of Oral Regimen Order:



Section 11

Carbohydrate Counting and Healthy Eating

Balanced nutrition is very important for growth and development. Children need to eat a variety of foods from all food groups to promote adequate nutrition and maximize growth. Children with diabetes are HEALTHY and do not need to be on a special diet or eat special foods. A healthy diet for a person with diabetes is a healthy diet for anyone. Some students might have nutritional goals related to weight or cholesterol management. Other students who are living with Celiac disease will require a gluten-free diet. If this is the case, specific instructions will be included in the order. Students' food choices can be influenced by available food options as well as the desire to eat food similar to their peers. Encouraging healthy eating for all students, with diabetes or not, is always important, but the goal is not to limit or restrict students with diabetes. Again, if a student has a carbohydrate limit or special dietary instruction, it will be included in their order.

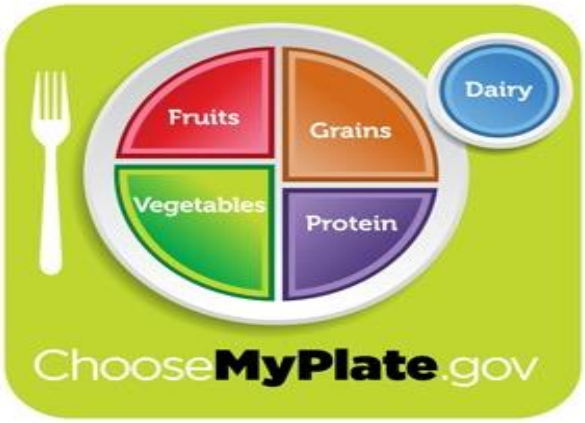
All the essential nutrients are found in the five basic food groups. It is important to eat the appropriate size food portions from each food group.

The five basic food groups are:

1. Grains
2. Fruits
3. Vegetables
4. Dairy
5. Protein

We recommend that meals include foods from at least three or four of the food groups above. Try to fill half of the plate with non-starchy vegetables, a quarter with grain and a quarter with lean meats or proteins. Focus on incorporating more whole grains to increase fiber intake, and low-fat milk for heart health.

The MyPlate visual is a good reminder of how to prepare a balanced meal.



One of the most basic and important changes in managing a student's diabetes is to check all beverages for sugar content. **We ask that all drinks for students with diabetes be carbohydrate-free (with the exception of milk).** Fruit juice should be reserved only for treating a low blood glucose level (under 70 mg/dL). All other drinks should contain 0 grams of carbohydrate. Remember, even 100-percent pure juice contains sugar or carbohydrates, and should be avoided except to treat low blood glucose.

Water is the best choice for all students. Below are a few other options that are carbohydrate-free:

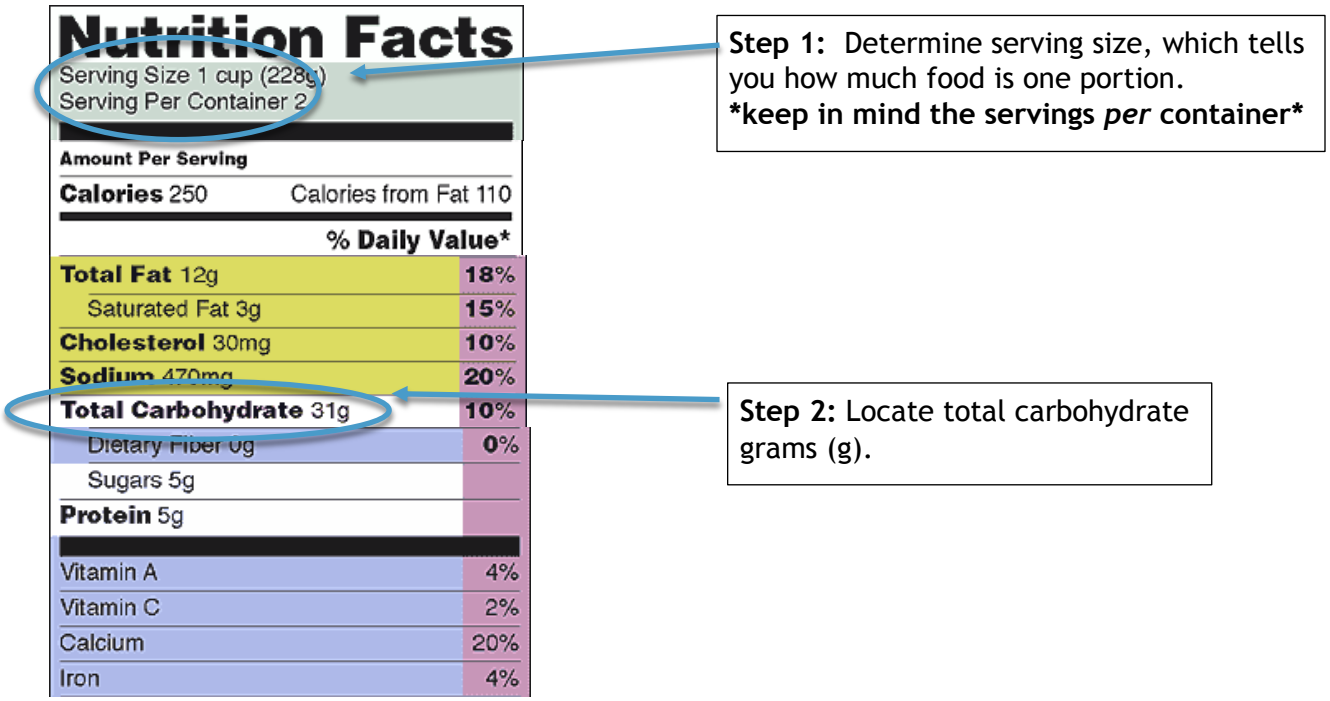
- Water
- Crystal light
- Mio/Dasani Liquid Water Enhancer Drops
- Skinny water
- Sparkling water (plain or flavored)
- Naturally flavored waters (Hint, Dasani natural)
- Powerade Zero
- Propel Zero
- Diet soda
- Fruit$_2$O

Carbohydrates (CHO) are foods that contain natural or added sugars. Carbohydrates turn into glucose in the body. Insulin then moves the glucose from the bloodstream into cells for energy. To manage blood glucose levels, insulin is given to match the amount of carbohydrate eaten at snacks and meals. It is important to understand which foods contain carbohydrate, and to be able to determine how much carbohydrate is in a specific food or meal.

Carbohydrates are not bad for people with diabetes; they are a very important source of energy and nutrition and should not be avoided. They will, however, turn into glucose in the body and must be balanced with the correct amount of insulin to help keep blood glucose levels in target range. For students on an insulin regimen, insulin needs to be administered for all carbohydrates consumed unless the student's order specifically allows for carbohydrates without insulin (such as with exercise).

Carbohydrate needs will vary based on age, energy needs and weight goals. If a student has a specific carbohydrate guideline, this will be included in their physician order.

Label Reading



- Carbohydrate can be hidden in the "extras"
  - Ketchup = 4 g/packet
  - BBQ sauce = 7-9 g/Tbsp.
  - ½ avocado = 7 g
  - Non-starchy vegetables = 5 g (1 cup raw or ½ cup cooked)

Advanced Carbohydrate Counting Rules

Please note that not all families use advanced carbohydrate counting rules and it is not expected that school personnel follow them. They are, however, available in the event a parent/guardian asks for these rules to be followed.

- Fiber Rule
  - If ≥ 5 grams fiber per serving, ½ of the total fiber can be subtracted from Total Carbohydrate

  Example: *La Tortilla Factory high fiber tortilla*

  Serving Size: 1 tortilla
  Total Carbohydrate: 11 grams
  Dietary Fiber: 8 grams (8 ÷ 2 = 4)
  Count as: (11-4) = 7 grams carb

- Sugar Alcohol Rule:
  - ½ of all sugar alcohols are absorbed and can affect BG levels
  - It is best to avoid these foods

  Example:
  Serving Size: 1 bar
  Total Carbohydrate: 15 grams
  Fiber: 3 grams
  Sugar Alcohol: 10 grams (10 ÷ 2 = 5)
  Count as: (15-5) =10 grams Carb

Carbohydrate counting websites and phone apps (e.g., Calorie King, Go Meals, Figwee) can be used when a nutrition label is not available.

When parent/guardians send their child to school with a homemade meal, it is suggested that they include the carbohydrate count for each item.

Section 12

Hyperglycemia (high blood glucose)

Causes for hyperglycemia might include:

- Not enough insulin (e.g., in need of dose adjustment, growth spurt)
- Missed dose of insulin (food without insulin, omitted correction dose, missed basal insulin)
- Miscalculated carbohydrate amount
- Decreased activity or exercise
- Infection, colds or flu
- Stress or emotional upset
- Expired insulin (stable at room temperature for 28 days once opened)
- End of Honeymoon period
- Improper hand washing (may cause false result)
- Improper re-connection to insulin pump. Always check to ensure the insulin pump is connected.
- Infusion site issue/kinked catheter. Check site for signs that insulin is leaking or not absorbing (e.g., redness/irritation around the site, smell of insulin at the site, site not properly adhered to skin).

Common symptoms of hyperglycemia:

Increased thirst, increased urination, blurred vision, hunger, dry skin, weakness, tiredness and irritability. Please note that each individual has different symptoms at different glucose values; this is a result of an individual's average glucose level. For example, a student who has an average glucose level of 300 mg/dL might not experience these symptoms at all or not until 400-500 mg/dL, where as a student who has an average glucose level of 120 mg/dL, may start experiencing these symptoms at 180-200 mg/dL. Students living with diabetes have different experiences of hyperglycemia at various times; it will not always be the same for all students with diabetes or consistent for the individual.

Students living with diabetes will experience hyperglycemia as a result of the various factors that can increase blood glucose level. These factors are often out of the student's control. It is important to stay calm in response to a student's blood glucose level and to follow the physician orders to lower the glucose level. A blood glucose reading alone is not a reason to send a student home from school. In the event that ketones need to be checked (when a student has a blood glucose level >300 mg/dL, vomits, has nausea or abdominal pain), the student should provide a urine sample in a cup. The designated adult should either observe the student dip the keto stick and/or perform the ketone check. If the student is displaying signs of ketones (as noted below) then the parent/guardian should be asked to pick up the student. If the student is asymptomatic, however, the student may be sent back to class or to resume his/her regular routine after administering insulin, if applicable. A student should not exercise if ketones are present. If a student has moderate to large ketones, consider limiting or reducing carbohydrate intake until the blood glucose is less than 250 mg/dL and ketones are small or less.

Ketoacidosis:
Ketoacidosis occurs when the body does not have enough insulin or does not have enough carbohydrates. If the glucose is unable to enter the cell to be used for energy, the body uses fat for energy instead. The breakdown of fat results in ketone formation, a chemical that appears in the urine and blood.

Signs of early Ketoacidosis: Abdominal pain, nausea, vomiting, sunken eyes, weight loss, chest pain from muscle fatigue.

Serious Ketoacidosis: Shortness of breath, difficulty keeping awake, coma (unconscious).

Ketone management with insulin pump therapy:

There are specific instructions regarding the management of ketones when using an insulin pump. If a student has moderate to large ketones, this indicates that the insulin pump has likely not been delivering the insulin needed for both basal and bolus insulin needs, or the student has not been receiving bolus insulin, as needed, for several hours. Because the body has been without insulin for several hours and the insulin pump has now been disconnected, it is safe to administer insulin by syringe or pen.

In the event of moderate to large ketones, encourage water, disconnect the student's insulin pump, give an extra 50% recommended correction using an insulin syringe or pen and inform the student's parent/guardian. If more than 2 hours are remaining in the school day, the student will need a new pump site placed or insulin for correction of hyperglycemia every 2 hours with a syringe or pen.

To clarify these instructions: Determine the amount of correction insulin needed by reviewing settings on the insulin pump or using your insulin pump regimen (refer to page 14 to determine insulin doses using insulin pump regimen).

- –Example of calculating an extra 50%:
  - Correction dose is 3.5 units
  - 3.5 divided by 2 = 1.75
  - 3.5 units + 1.75 units = 5.25 (correction increased by 50% to be given by syringe/pen)
    - –Round to 5.5 units if rounding to the nearest half unit or
    - –Round to 5 units if rounding to the nearest whole unit

Insulin pump site or mechanical failure: It is possible that a student's insulin pump site could become disconnected or an insulin pump could have a mechanical error and stop working. The student might not have hyperglycemia at the time of this event. If the proper steps aren't taken to continue insulin therapy, however, this will lead to hyperglycemia. In the event of insulin pump site or mechanical failure, disconnect the insulin pump and give the recommended insulin for correction and/or carbohydrate coverage using an insulin syringe or pen. In the event of insulin pump mechanical failure, use the insulin pump regimen doses to determine how many units the student needs. If there are more than 2 hours remaining in the school day, the student will need a new pump site placed. In the event of mechanical failure, the student will need continued insulin for correction every 2 hours if hyperglycemic. (Refer to page 14 to determine insulin doses using insulin pump regimen).

Section 13

Hypoglycemia (low blood glucose)

For someone with diabetes, hypoglycemia is defined as a blood glucose level less than 70 mg/dL. It is important to recognize the signs and symptoms of low blood glucose and treat immediately. Students should not be asked to walk alone to the designated care area in the event of hypoglycemia.

Mild signs and symptoms of hypoglycemia are due to the body's normal response to dropping blood glucose levels. These include headache, shakiness, increased heart rate, paleness, clammy skin, sweating, hunger, nausea, and dizziness.

Moderate signs and symptoms occur when the brain does not receive enough glucose. These symptoms may include yawning, irritability, frustration, sudden crying, extreme tiredness, confusion, restlessness, blurred vision and unusual behavior.

Students who are 6 years old and younger are often "hypoglycemic unaware" and will not display common symptoms. Always check blood glucose with any suspicion or unusual behavior, such as, frequent yawning, hunger/tiredness at unusual time of day, slurring of speech, endorsed feelings of leg pain, and per parent report, the child gets their diabetes supplies indicating that they need help.

Please note that each individual experiences different symptoms at different glucose values; this is a result of an individual's average glucose level. For example, a student who averages a glucose level of 120 mg/dL might not experiencing hypoglycemia symptoms until he/she has a glucose level of 50-80 mg/dL, where-as a student who averages a glucose level of 300 mg/dL, may report symptoms of hypoglycemia when his/her glucose level is at 80-100 mg/dL. Treatment is to be given when glucose level is 70 mg/dL or below. Students living with diabetes have different experiences of hypoglycemia at various times; it will not always be the same for all students with diabetes or consistent for the individual

Treatment of Low Blood Glucose When Student is Alert and Able to Swallow:

1. If symptoms are present, check the student's blood glucose immediately.

2. If blood glucose result is less than 70 mg/dL, give the student a sugar source (refer to chart on next page). **NEVER** treat hypoglycemia with a food product like fruit, crackers, chocolate, etc.

3. Re-check blood glucose 15 minutes after the student takes a sugar source.

4. If blood glucose result remains less than 70 mg/dL, repeat steps 2 and 3 above.

5. If blood glucose result is now above 70 mg/dL, the low blood glucose has been treated effectively.
    a. In the event that the sugar source brings the blood glucose level above the target goal, correction with insulin is not advised. If the student will consume a meal/snack following treatment of hypoglycemia, insulin should only be given for carbohydrates to be consumed.

The school order might include additional instructions. For example, the order may indicate that the student should be given an 8 gram CHO choice per family (e.g., carbohydrate snack provided to the school by the parent/guardian), if the student's lunch or snack is greater than 1 hour away. This 8 gram CHO should be a complex carbohydrate that will help maintain the blood glucose level until the next meal/snack. This is often suggested at school due to the increased demands for physical and mental energy.

Included are examples of sugar sources for treating hypoglycemia. Students' reactions to low blood glucose sources at different blood glucose ranges vary; therefore, different amounts of sugar source might be more or less depending on individual needs. In general, 15 grams for children 4 years and older is appropriate.

Sugar Source Chart

15 grams of sugar

Choose 1:

- 4 ounces of juice
- 4 ounces of regular soda
- 3-4 glucose tablets
- 15 Skittles
- 2½ rolls of Smarties
- 3-4 Starbursts
- 1 small tube of cake decorating gel
- 1 tablespoon of honey or sugar

Sugar Source Chart

8 grams of sugar

Choose 1:

- 2 ounces of juice
- 2 ounces of regular soda
- 2 glucose tablets
- 8 Skittles
- 1 roll of Smarties
- 2 Starbursts
- ½ small tube of cake decorating gel
- ½ tablespoon of jam/ honey/sugar or jelly

Severe Low Blood Glucose Event (Glucagon)

A severe low blood glucose event is rare, but it is important to be prepared in case of an emergency. A severe low blood glucose event occurs when the student is unable to take a source of sugar or is not able to swallow due to, for example, loss of consciousness.

Signs and symptoms are: unusual behavior, dazed appearance, fainting, unconsciousness, and seizures. In this event, glucagon must be administered. If glucagon is not available, call 911. A student is not required to have Glucagon available at school in order to attend school.

Glucagon (brand name: GlucaGen) is available in the form of a kit. Keep glucagon kits at room temperature and always verify that the kit is not expired. Inform parent/guardian at least 1 month prior to kit expiring in order for them to order and receive a refill.

What Is Glucagon? (Additional information/demonstration available on "Glucagon App" and enclosed insert inside of kit)

Glucagon is a hormone that is normally made in the pancreas. Glucagon raises blood glucose by sending a signal to the liver and muscles (where the body naturally stores glucose) to release glucose.

Where to administer glucagon:

Glucagon should be administered in the muscle (intramuscularly or "IM")— top middle thigh (quadriceps) or arm (triceps)

How to administer glucagon:

1. Remove the plastic cap on the vial of powder.
2. Inject all the liquid from the pre-filled syringe into the vial.
3. Gently swirl the vial until the powder is dissolved into a clear liquid and of a water-like consistency. The mixed glucagon solution should be used immediately.

4. Draw up the dose of glucagon (per orders) in the same syringe.

	Under 4 years old	4-10 years old	Over 10 years old
Glucagon dose (with provided syringe)	0.25 mg	0.50 mg	1.0 mg

5. Give the injection into the muscle at a 90-degree angle.
    a. You can give the injection through clothes, if necessary. Injections given into the muscle work faster than if given into fatty tissue. The preferred location is the quadriceps muscle (the top middle of the thigh) or the triceps muscle (arm).
    b. Note: For children under 4 years old, only insert half the glucagon needle into skin, or use an insulin syringe (dose of 25 units).
6. After administering the glucagon, turn the student on his or her side as the student may vomit. The student should become alert and responsive within 5-15 minutes. If NOT, call 911.
    a. Discard any unused mixed glucagon solution or immediately store it in the refrigerator for a maximum of 24 hours.
7. After the student is alert and responsive, check his/her blood glucose again. If blood glucose is less than 70 mg/dL and the student is able to chew and swallow, treat with 8 to 15 grams (depending on provider order) of fast-acting sugar. Once blood glucose is above 70 mg/dL, give him/her 7-8 grams of complex carbohydrates.
8. Call the parent/guardian for follow-up care.

If glucagon is used, the parent/guardian needs to call the diabetes team and the pharmacy for a refill as soon as possible.

Low Dose Glucagon: While rare, there can be a need for low dose glucagon. This may be needed when a student is alert, but has experienced persistent hypoglycemia despite treatment sources or in the event of vomiting. If a student has received 3 treatment sources in 15 minute intervals and the student's blood glucose level is not rising to 70 mg/dL or above, further intervention is needed. Call the parent/guardian while preparing low dose glucagon. The order includes instructions to mix the Glucagon, set the IM needle aside, and use an insulin syringe. Then draw up 1 unit per year of life (maximum dose of 15 units) and inject it into the subcutaneous tissue. Re-check the blood glucose in 15 minutes to evaluate.

Examples of dosing:
8-year-old student = 8 units of glucagon on insulin syringe
16-year-old student = 15 units of glucagon on insulin syringe

The glucagon solution can be stored in the refrigerator for up to 24 hours and the dose can be given up to 2 times in 15 minute increments. Contact the diabetes health care team if blood glucose is not rising despite the intervention of low dose glucagon.

Section 14

Exercise

School orders will include specific activity/exercise recommendations to meet the individual needs of each student. Different types of activities will affect blood glucose levels differently. School has several challenges in that the activity planned for the day is not always known or consistent. The goal at school is to prevent hypoglycemia from activity/exercise; therefore orders will be in place to accomplish this.

Each student's blood glucose will react differently to activity/exercise but in general;

A. Aerobic activities (over longer periods of time) lead to lower blood glucose levels in a shorter period of time. Examples: jogging, swimming, dancing

B. Anaerobic activities (short bursts of activity) can possibly lead to an initial increase in blood glucose level but help to lower blood glucose levels over time. Examples: sprinting, weight lifting and jumping

Blood glucose monitoring: student needs will vary and the goal is to coordinate blood glucose checks with the school schedule. Blood glucose checks can be ordered to be done before or after exercise. If a snack or meal time is prior to or immediately following activity/exercise, then the pre or post activity/exercise check will be included at this time. This indicates that the activity/exercise guidelines need to be included at that time.

Below are some examples of exercise guidelines/recommendations that will be included in the school orders: (***please note, students will have individual needs that vary from this***)

BG level	Immediate actions	Carbohydrates (CHO) without insulin	Insulin for correction
Less than 70 mg/dL	Treat low BG (no exercise until >70 mg/dL), next steps below when BG in target range	N/A	N/A
70-150 mg/dL	N/A	Ages < 7yrs: 5-8 gms Ages > 8-10yrs: 8-10 gms Ages >10yrs: 10-15 gms	No insulin for correction
151-250 mg/dL	N/A	No CHO without insulin. Give insulin for carbohydrates desired.	No insulin for correction or a reduced correction or insulin per correction doses.
Above 251 mg/dL	If BG >300 mg/dL check urine for ketones (no exercise with positive ketones)	No CHO without insulin. Give insulin for CHO desired.	Reduced correction or insulin per correction doses.

*Carbohydrates for exercise should be complex; complex carbohydrates are a long lasting source of energy. Examples include, but are not limited to: granola bar or crackers with or without peanut butter or cheese.

Students on insulin pumps: orders from providers might be more specific or use advanced features on an insulin pump. Students using an insulin pump might use the 'temporary basal rate' feature. This setting will decrease the amount of basal insulin the student receives by a certain percentage for a specific length of time to prevent hypoglycemia during or after the activity/exercise. Depending on the type of activity, the student might disconnect their insulin pump for the activity/exercise (do not exceed 2 hours). This is a safe practice and is connected after.

Example: 1 hour prior to P.E. set a temporary basal rate of decreased 10% for 2 hours.

Example of activity/exercise order:

Check BG prior to P.E, if BG is <120 mg/dL, give 10 grams of carbohydrates without insulin.
Correct BG as per order if BG is >251 mg/dL. (1 unit: 50>150 mg/dL).

Ex 1: student is checking BG prior to snack time when P.E follow and the student plans to eat 40 grams of CHO. If BG is <120 mg/dL, give insulin for 30 grams of CHO's---accommodating for the 10 grams without insulin.

Ex 2: student is checking BG prior to P.E and BG level is 275 mg/dL. Do not provide carbohydrates without insulin. If student is hungry, give insulin for carbohydrates desired. Using dose of 1 unit: 50>150 mg/dL, perform calculation with the target goal of 250 mg/dL.

275 – 250 = 25 ÷ 50 = 0.5 units of insulin to be administered for correction.

Section 15

Disaster/Lock Down Protocol

In the rare event that a school experiences a disaster or lock down, a student with diabetes will need continued blood glucose monitoring and insulin administration. Included in the diabetes school orders are orders for managing the student's diabetes in the event of a disaster or lock down. In this situation, there will no longer be designated times of day to check blood glucose levels or administer correction; therefore, performing these tasks every 2-3 hours will keep the student out of ketoacidosis.

Order for Insulin Injection Regimen:

Disaster/Lock down protocol: Check blood glucose every 2-3 hours, correct for hyperglycemia and cover carbohydrates eaten. For students on a fixed regimen using NPH, correct for hyperglycemia every 2-3 hours once NPH insulin is no longer active.

Order for Insulin Pump Regimen:

Disaster/Lock down protocol: Maintain basal rates, check blood glucose every 2-3 hours, correct for hyperglycemia, and cover carbohydrates eaten.

Section 16

Accommodations/Rights/504 plan/IEP

The health care team at Children's Hospital Los Angeles recommends that all students with diabetes have a 504 Plan. Of note, a student will have either a 504 Plan (modifications/accommodations; *not* Special Education) *or* an IEP (modifications/accommodations and interventions; Special Education), at any given time, *not both*. If the student is attending a school (that does not receive federal funding), we encourage and appreciate that the school personnel adhere to and support the following accommodations.

> The American Diabetes Association recommends that all students with diabetes have a 504 Plan. However, an IEP may be appropriate if any factors, diabetes-related or not, are significantly impacting the students functioning and ability to learn in school. In some cases, diabetes-related factors may significantly and negatively impact a student's mood, concentration, energy level, and/or motivation. If non-diabetes-related factors are negatively impacting a child's performance in school, diabetes-specific accommodations/modifications should still be added to the plan. (www.diabetes.org for additional information on school rights)

Accommodations through a 504 Plan or IEP are extremely helpful in promoting the success of a student with diabetes. Some examples of common accommodations are:

1. Access to water and the bathroom as needed (as mentioned above, symptoms of hyperglycemia may include increased thirst and urination)
2. An individual should be assigned to escort the student with diabetes to a designated care area in the event that the student is experiencing symptoms of hypoglycemia.
3. In the event of a tardy or absence related to diabetes care, it will not count against the student's attendance record and they will be given the resources they need to make up the material
4. Extra time for a quiz/test will be given in the event that student needs to treat hypoglycemia or hyperglycemia (as mentioned above, hypoglycemia treatment and recovery can take up to 15-30 minutes and the symptoms the student experiences will prevent them from optimally attending to the task at hand. Some students have trouble focusing and concentrating in times of hyperglycemia). They may also experience a decrease in levels of energy and motivation.
5. Students with diabetes should not be excluded from field trips or extra-curricular activities. It is the responsibility of the school to provide a designated trained adult to accompany the student on field trips to provide the care outlined in the orders (school personnel may not mandate the parent/guardian to accompany the student). The same applies to after school programs and/or any other school-sponsored activities; any program provided by the school must afford the student the same right of having their medical needs met.
6. Allowed to be the first in line at meal times. Since the student is requiring extra time to check blood glucose levels, calculate insulin doses, and to administer insulin doses, it is very helpful for students to have quick access to food. Permission to accommodate this need by allowing the student ready access to their meal will also allow them time to return and participate in the lunch routine with their peers.
7. Permission to leave class early or arrive late. Depending on the student's schedule and/or location of the student's classes, extra time to go to the designated care area to check blood glucose, calculate insulin doses, receive a snack, and/or receive insulin is sometimes needed. Priority registration which allows students with diabetes to enroll in classes that are located closer to designated care area and/or to schedule classes that require more/less effort during times of day during which they feel better is also helpful.
8. Access to cellular phone device. As mentioned above, some continuous glucose monitors transmit data through cellular phone apps; therefore, a student requires this to be on their person at all times. Also, some students may use their cell phones to communicate with their parent/guardian regarding their care and well-being throughout the day.

Section 17

Children's Hospital Los Angeles Standards

The following are Children's Hospital Los Angeles' (CHLA) school form protocol and policy standards of care.

1. School orders are valid for 12 months from the date the orders were signed. For example, a school form provided that was signed on 05/05/17 is valid until 05/05/18. It is the parent/guardian responsibility to provide the school with an updated order, if there has been a change in the diabetes care plan.

2. The CHLA school form is the only form that will be signed and it replaces all other (non-CHLA) school diabetes instructions. The school orders provided by CHLA include all necessary instructions and orders, additional forms are not necessary.

3. The CHLA school form serves as authorization for the school and the designated trained adult personnel to have and receive medication.

4. Medications may be adjusted throughout the year. Updated medication orders will be provided to the school by the parent/guardian (following clinic visits) or will be sent to the school by CHLA diabetes clinic staff. When a student attends a clinic visit and an insulin dose and/or other medication dose is adjusted the adjustment will be reflected on the students' depart summary. The depart summary form will be provided to the school. School personnel can then attach this updated medication regimen to the current school order. The student will only receive a completed full school order when adjustments are made between visits or if an update is needed (other than medication regimen updated). (Refer to section 16: Depart Summary)

5. Utilization of the CHLA Diabetes Hotline (Phone: 323-361-2311, Fax: 323-361-8152). Please refer to this Guide first if questions arise - unless it is an urgent issue. If the response to a question cannot be found in this Guide, the Diabetes Hotline can serve as another resource. When you call the Diabetes Hotline, you will reach a voicemail. A live person will not answer the phone call; however, nurses are continually triaging calls. Please leave a message and include the following:

- Student's name and date of birth
- Your name and your contact information
- The reason for the call

For urgent matters, your call will be returned within the same business day (based on level of urgency). For routine questions/concerns, your call will be returned within 48 hours.

6. The Diabetes School Resource Guide can be found on the Children's Hospital Los Angeles' website on the Diabetes and Obesity Program page under the Resources section or directly at https://www.chla.org/DiabetesResourceGuide

7. If a student is having continued high or low blood glucose levels, provide the parent/guardian with school logs and ask them to contact the diabetes team.

8. Providers may add special instructions to school forms to meet individual student needs.

Section 18

Depart Summary

Below is an example of both an injection and insulin pump regimen "Depart Summary". This is provided to the parent/guardian after each clinic visit and the parent/guardian is responsible for providing this document to the school. New medication orders (with provider completion and date and student name and medical record number) will be included in the depart summary and the school can then attach this updated medication regimen to the current school order.

Depart Summary/Insulin Doses for Injection Regimen

Diabetes Regimen - Injections for School
Breakfast **I:C Ratio** 1 unit : 5 grams
AM Snack **I:C Ratio** 1 unit : 5 grams
Lunch **I:C Ratio** 1 unit : 5 grams
PM Snack **I:C Ratio** 1 unit : 5 grams
Dinner **I:C Ratio** 1 unit : 5 grams
Bedtime 21:00 **Lantus** 32 units **I:C Ratio** 1 unit : 5 grams

Indicates doses for school

VERY IMPORTANT: Give correction only if it has been **more than 2 hours** since last food intake or insulin injection.
For Blood Glucose **Correction** breakfast, AM snack, lunch, PM snack, dinner:

Blood Glucose	101-150	151-200	201-250	251-300	301-350	351-400	401-450	451-500
Units of Rapid Acting Insulin	2	4	6	8	10	12	14	16

Insulin doses for correction (ISF) will be provided in a scale format. **It is important to note what time of day the correction dose is for.**

Ex: Scale reflects breakfast, AM snack, lunch, PM snack and dinner doses. Order will further state **WHEN** correction can be given.

For Blood Glucose **Correction** at bedtime:

Blood Glucose	151-200	201-250	251-300	301-350	351-400	401-450	451-500
Units of Rapid Acting Insulin	1	2	3	4	5	6	7

Ex: Scale reflects correction dose at bedtime. This is **NOT** during school hours and will not be required to reference.

Completed By: Raymond (Attending) ,Jennifer K on:08/01/2017 08:36

Indicates provider completion with date

Depart Summary/Insulin Doses for Insulin Pump Regimen

Diabetes Regimen - Insulin Pump for School

Indicates doses for school

Insulin Pump Type: Medtronic Revel
Insulin Pump Infusion Set Type: quickcath
Diluted Insulin: No
Insulin Type for Pump: Humalog
Active Insulin Time: 2
Insulin Pump Start Date: 10/28/2011

Time	Basal Rate	I:C Ratio	Sensitivity Factor 1 unit	Low Target	High Target
00:00	1.1	8	25	80	120
03:00	1.1		35		
07:00	0.95	5		70	100
09:00	0.725				
10:00		6			
11:00	0.75		30		
14:00			30		
15:00	0.725				
16:00	0.85	6			
17:00	0.9		25		
21:00	1.05	5		80	120

Completed By: Raymond (Attending) ,Jennifer K on:08/01/2017 12:27

Indicates provider completion with date

Section 19

FAQ's
(Frequently Asked Questions)

This is a list of frequently asked questions/scenarios by school personnel and the appropriate corresponding answers.

1. Rapid-acting insulin was given at 10:30am and the student is back in the office at 12:00pm with a high glucose level and their lunch, can I give the student rapid-acting insulin again?

    A. Yes, you can administer the rapid-acting insulin for the carbohydrate amount, but NOT for the correction of high blood glucose because 2 hours have not passed since the last dose was given.

2. The student's blood glucose reading is "HI", the student is not reporting any symptoms and the student's ketones are small. The student was sent home.

    A. The student should NOT be sent home. Insulin as per orders should be given, if applicable, and you may encourage water intake. Then allow the student to resume his/her normal routine and inform parent/guardian of result of your efforts.

3. The student does not have a Glucagon Kit, so we advised the parent/guardian that the student cannot start school until they bring one to school.

    A. A Glucagon Kit is NOT required for a student to be in school. The parent/guardian should provide it as soon as possible but until then, call 911 in the event of severe low blood glucose.

4. The student is using an insulin pump, has large ketones, and a blood glucose level of 325 mg/dL. Is it safe to give insulin by syringe or pen if they were just connected to their pump and now they are disconnected?

    A. Yes, it is safe and necessary to give insulin by syringe or pen to prevent the student from entering DKA. If a student has large ketones, it is likely that the insulin pump was not delivering bolus or basal insulin, therefore the student has not been receiving insulin for several hours.

5. School personnel were alerted that a student ate carbohydrates more than 30 minutes ago without receiving insulin. Is it safe to give insulin for the carbohydrates consumed?

    A. No, the carbohydrates were consumed more than 30 minutes ago. It is not safe to give insulin at this time. This is related to the breakdown of carbohydrates and the insulin action time. Wait 2 hours from the time the carbohydrates were eaten, then check blood glucose level and correct for hyperglycemia.