

What is Diabetes?

- Diabetes is an autoimmune disease in which the body does not produce or properly use insulin. This results in high blood glucose levels.
- Two Types
 - ✦ Type 1 Diabetes (T1DM) (insulin destruction)
 - ✦ Type 2 Diabetes (T2DM) (Insulin overproduction leading to insulin deficiency)

Type 1 Diabetes

- Auto-immune process
- Treatment:
 - Requires insulin
 - No sugary drinks; otherwise no diet restrictions; we do encourage healthy food choices and foods in moderation but not restricting carbs.
- Beta cells in the pancreas no longer produce insulin
- Honeymoon phase shortly after diagnosis with the introduction of insulin (the diabetic's own ability to produce insulin improves)
- There is nothing they did to cause this/ nothing that could have been done to prevent it.

Type 2 Diabetes

- Insulin resistant
- The body still produces insulin but does not work effectively
- Treatment:
 - Oral/IM medication (metformin, Victoza, Liraglutide, etc)
 - May or may not be on insulin depending on how well blood glucose is managed.
- Lifestyle modifications such as carb restriction and exercise are primary treatment modalities-weight loss highly encouraged.

Insulin

- Insulin is the "key" to unlocking the cell; allowing glucose to enter and be used as energy
- Without enough insulin, the glucose cannot enter the cells to be used for energy, resulting in hyperglycemia. If untreated can result in DKA
- Methods of getting insulin:
 - Insulin pen (MDI)
 - Syringe & vial
 - Insulin pump
(continuous subcutaneous insulin infusion)



Types of Insulin

- **Rapid acting (Meal time)– Novolog, Humalog, Apidra, or Fiasp**
 - Onset of action is 15 minutes (Fiasp onset is within 5 minutes)
 - Peaks in 1-2 hours
 - Lasts 3-5 hours
 - Given for carbohydrate intake using insulin:carbohydrate ratio (ICR)
 - Used for hyperglycemia and ketone corrections
 - Used in insulin pumps for both basal and bolus

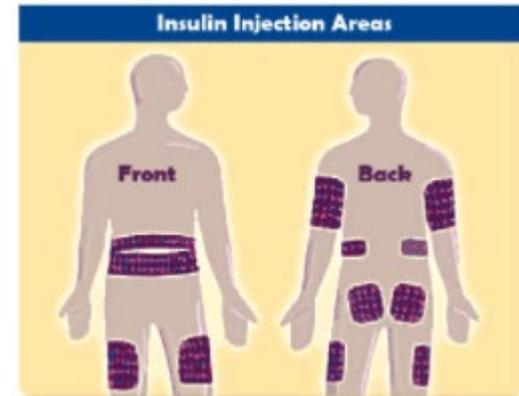
Types of Insulin

Long Acting – Lantus or Levemir or Tresiba or Basaglar

- Usually given once/day (Levemir given BID)
- Onset of action is 1-2 hours
- Does not have a peak ("background insulin")
- Lasts about 24 hours
- If missed, can result in hyperglycemia for the next 24 hours.
- Do not mix with other insulin; but can be given at the same time when bolusing for meal dose

Injection & Infusion Sites

- Use an area of the body with adequate subcutaneous tissue (fat) to assure proper absorption.
- ***Rotation of sites** is important in preventing lipohypertrophy/fatty scar tissue. If site is hard/lumpy it will not absorb insulin properly.
 - Back of arms
 - Sides of legs
 - Hips/buttocks
 - Flank area
 - Abdomen staying 1-2 inches away from navel.



Insulin Facts

- Opened Insulin does not need to be refrigerated
- Do not freeze or allow above 85 degrees
- Opened insulin should be discarded in 30 days
- Write the opened date on the vial/pen
- Unopened insulin is good in the refrigerator until the listed expiration date
- If traveling or if insulin will be out of room temperature environment for extended time, use insulated gel pack to keep insulin cool.
- Where you are comfortable, your insulin is comfortable.



Hypoglycemia

- Blood glucose values <70
- Can occur if too much insulin is given or if not enough food is eaten
- Can be a dangerous condition because glucose is the major energy/fuel source for the brain
- NEVER leave a child experiencing hypoglycemia alone; have student escorted to health room, or school nurse should go to student



Hypoglycemia- 15/15 Rule

- Give 15 grams of fast acting carbohydrate (without insulin). Wait 15 minutes, then recheck BG. If BG still under 70, repeat 15/15 rule
- If the child is refusing to eat, administer one packet of glucose gel or cake icing orally in cheek and rub in to absorb quickly.
- If the child is unconscious or having a seizure, turn child to the side to maintain an open airway and administer glucagon if ordered (Call 911/parents)
 - If Glucagon is given will need to be conservative with corrections doses for the next 24 hours.
- When in doubt; treat as a low BG; always have snacks available



Hypoglycemia snacks

- 15 grams of simple carbohydrates without giving insulin
 - 4 ounces of juice (sugary liquids work the quickest)
 - 15 skittles, 2 rolls of Smarties, 4 starburst
 - 4 glucose tablets
 - 4 ounces of regular soda
 - fruit snacks (1 packet Welch's is 16 carbs)
 - cake gel/honey packet
- May need a follow up snack if it will be >30 minutes until next meal.
 - 15 gram snack containing fat without giving insulin; such as crackers and cheese or peanut butter, chocolate milk, ice cream, yogurt, etc.

Types of Hypoglycemia

Mild:

- Shaky
- Weak
- Tired
- Hungry
- Irritable
- Unable to think clearly

Treatment:

15 grams of fast acting carbohydrate

Moderate:

- Pale
- Needing help treating low blood glucose
- Difficulty concentrating or following conversation
- Seems “distant” or confused
- Poor coordination (legs feel weak, difficulty walking)
- Slurred speech, difficulty cooperating

Treatment:

Glucose gel, cake gel

Severe:

- Seizure
- Become semiconscious or unconscious
- Have altered mental status

Treatment:

Glucagon, Call 911



Treating Severe Low Blood Glucose

****Administer only if seizing, unconscious, or if directed by endocrinologist****

Glucagon:

1. combine liquid from syringe into powder vial
2. Mix thoroughly
3. Draw Solution into Syringe
4. Administer into muscle (top of leg or buttocks)



Baqsimi:

1. Hold Device between fingers and thumb. do not push plunger yet.
2. Insert tip gently into one nostril until fingers touch the outside of the nose
3. Push Plunger firmly all the way in. Dose is complete when green line disappears



Gvoke:

- Administer into subcutaneous tissue



Hyperglycemia

- Blood glucose level >240mg/dl
- Check for ketones (blood or urine)
- Administer additional insulin as ordered –refer to school orders for dosing
- Make sure the child is well hydrated. Give sugar free fluid (water is preferred)
- Contact parents/legal guardians if **moderate or large** ketones are present
- If unable to reach parent/guardian call CMH diabetes team (get ROI from parents at the start of the school year or at diagnosis) 816-960-8803 and press urgent option.
- Recommended to have back up option of short acting insulin refrigerated for student in case of pump failure.



Treating Hyperglycemia

- Refer to the school orders to see if the student has an ISF (Correction factor) or if they are using a chart for corrections (such as newly diagnosed patients)
- If BG is > 240 check ketones.
- If ketones are negative, trace, or small give extra insulin before meals, by **adding correction dose (using ISF) to your meal dose**
- Make sure it has been AT LEAST 3 hours since your last insulin injection before giving a correction.
- If on insulin pump, enter BG (and carb count if they are going to eat) into pump and pump will calculate correction dose

Treating Hyperglycemia:

New diagnosed patient chart

- Blood glucose is over 200 and ketones are **negative, trace, or small**
- Give extra insulin before meals, by adding correction dose to your meal dose
- Make sure it has been AT LEAST 3 hours since your last insulin injection before giving a correction

Toddler Age

Blood sugar (mg/dL)	Insulin (units)
225-299	0.5
300-374	1
375-449	1.5
450+	2

School Age (5-10 years of age)

Blood sugar (mg/dL)	Insulin (units)
225-299	1
300-374	2
375-449	3
450 and above	4

Adolescents (11 and up)

Blood sugar (mg/dL)	Insulin (units)
200-249	1
249-299	2
300-349	3
350-399	4
400-449	5
450-499	6
500 and above	7

Moderate or Large Ketones at School

- Reasons for ketones:
 - Missed doses (not enough insulin, bad/failed pump site, missing long acting insulin-(was this taken at home last night?))
 - Illness/going long periods without eating or not eating carbs- causing starvation ketones
- Additional rapid acting insulin is required; check school orders for ketone dose. (DO NOT USE REGULAR CORRECTION CHART: this is used only for negative/trace/small ketones)
- If student is eating, dose for carbs in addition to the moderate or large ketone dose.
- If student is on an insulin pump, **moderate or large ketone dose must be given as a SQ injection and pump site must be changed**



Moderate or large ketones: What to do

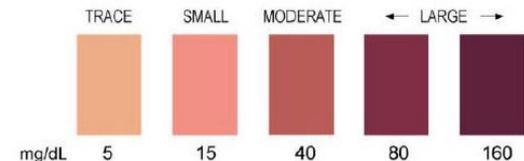
- Student needs 8 oz. of sugar free fluids every hour; water is best
- **Recheck BG and ketones every 2 hours** until ketones resolve.
- If Ketones are not improving or getting worse; call parents/may need to send home or parents may decide to take to ED.
- Students with moderate/large ketones should not participate in physical activity
- Student may remain at school with ketones unless he/she is vomiting or ill.
- If unable to reach parents and have ROI on file, call CMH Diabetes team



Insulin is required to get rid of ketones

- Small or Trace Ketones
 - Give correction using ISF or chart and push fluids
- Moderate Ketones
 - Give 10% of Total Daily Dose as an injection. Change the pump site and push fluids. Recheck ketones and BG in 2 hours.
- Large Ketones
 - Give 20% of Total Daily Dose as an injection. Change the pump site and push fluids. Recheck ketones and BG in 2 hours.

****Total Daily Dose** = all insulin taken in 1 day (rapid acting + long acting)



CHECK KETONES IF:

Blood glucose (BG) is higher than 240, or
you feel sick, with any fever, stomachache, vomiting, diarrhea no matter what your blood glucose number is.

BG 70 – 130 Ketones: Negative, trace, or small amounts	BG higher than 130 Ketones: Negative, trace, or small amounts	BG less than 240 Ketones: Moderate or large	BG higher than 240 Ketones: Moderate or large
No action needed now. Drink sugar-free fluids. Monitor ketones and BG every 2 hours if you still feel sick.	Give a correction dose if it has been more than 3 hours since last dose of fast-acting insulin. (This can be given via pump.) (BG-120)/Insulin sensitivity factor (ISF)	Follow 15/15 rule to get BG above 240. Once BG is higher than 240, recheck ketones. Go back to top of chart and follow directions. Drink sugar-free fluids.	Give dose based on Total Daily Dose (TDD). See calculations in blue box below. Drink sugar-free fluids. **If on a pump, change pump site and inject insulin dose.

Ketone Dosing **Moderate or large ketone doses must be given via injection – not through insulin pump.**

Calculate Total Daily Dose:

Breakfast _____ units
Lunch _____ units
Dinner _____ units
Basal dose _____ units
Total _____ units

Moderate Ketones:

Give 10% of Total Daily Dose: _____ units fast-acting insulin (Humalog, Novolog, lispro, aspart, other _____)

Large Ketones:

Give 20% of Total Daily Dose: _____ units fast-acting insulin (Humalog, Novolog, lispro, aspart, other _____)

After Dosing:

- Start back at the top of this page.
- Recheck BG and ketones every 2 hours.
- Drink at least 8 ounces of water or sugar-free fluids per hour.

If ketones have not cleared after 4 hours, call the Diabetes Team.

Diabetes Team

Monday – Friday, 8 a.m. to 4:30 p.m. Call (816) 960-8803 (Option 2 “Diabetes” > Option 2 “Urgent”)
After hours, weekends and holidays Call (816) 234-3188

DISCLAIMER: The content contained herein is meant to promote the general understanding of ketone dosing and is for informational purposes only. Such information does not serve as a substitute for a health care professional's clinical training, experience, or judgment. Individuals and their families should not use such information as a substitute for professional medical, therapeutic, or health care advice and counseling. NO WARRANTY WHATSOEVER, WHETHER EXPRESS OR IMPLIED BY LAW, IS MADE WITH RESPECT TO THE CONTENT.

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School Nurse algorithm page to customize to your T1D student:

- Fillable areas for:
 - ICR
 - Total daily dose
 - Enter BG and calculate correction dose for negative/trace/small ketones
 - Calculate correction dose for moderate/large ketones based on TDD
 - QR code can be used to create insulin dose chart for student.
 - Enter ICR
 - Enter target
 - Enter ISF

To access this document, go to <https://documentcloud.adobe.com/link/track?uri=urn:aaid:scds:US:28bf36d8-cdb9-4c59-a75d-4f67595bab1d>

By connecting, we're protecting our T1D students!



Name of T1D student: DOB:

Insulin to carb ratio:

Breakfast:

Lunch:

PM snack:

(Add all carbs and divide by ratio= # units insulin)

BG checks:

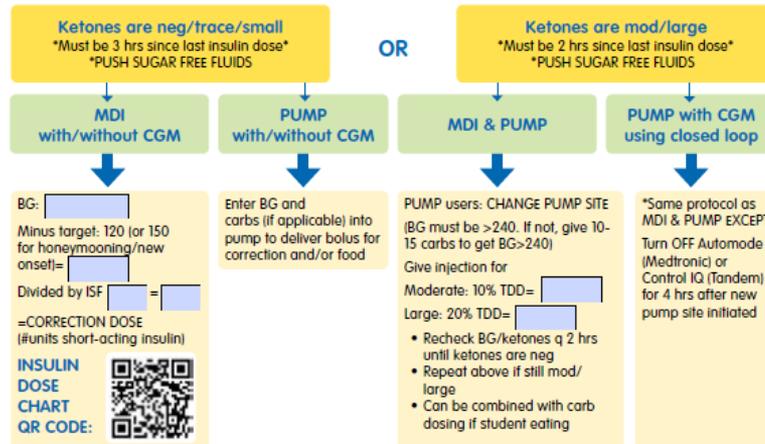
- Before all meals/snacks
- 2-3 hrs. post meal
- Before activity and every 30-45 min during activity
- Symptomatic of low

HYPOGLYCEMIA? (BG<70)

- Give 15 short acting carbs
- Recheck BG in 15 min/ repeat if <70
- If >30 min until next meal, give 15 g. complex carbs without dosing

**HYPERGLYCEMIA/DOING CORRECTIONS:
*** CHECK KETONES WHEN BG>240 or ILL *****

KNOW TOTAL DAILY DOSE: (please refer to school orders for complete details)
MDI USERS:
 Avg # units short-acting insulin for all meals +# units long acting insulin daily = TDD
PUMP USERS:
 (Go to history and take total amount of insulin delivered daily in last 3 days and average these)



Reviewing blood glucose

- Review blood glucoses regularly (such as weekly)
- Look for patterns; is there a pattern after 3-5 days
 - what time of day is the pattern occurring?
 - Is it related to PE, recess, food choices, stress, anxiety, etc.?
 - Inform the parent and or CMH CDE if you are seeing patterns at school; may need insulin adjustments
- Do adjustments need to be made to the insulin regimen or to self-management behaviors; such as dosing before instead of after meal, does the student need supervision with injections, are they entering BG and carb counts into the pump correctly?



Insulin adjustments

- Generally make 1 adjustment at a time then wait 3-5 days to re-evaluate
- Start with reviewing the before breakfast BG/fasting
 - If morning BG is above or below target; changes are made to Lantus dose (if on MDI or to basal dose if on pump)
- Next compare the pre and post meal numbers to assess the ICR
 - If BG drops or rises more than 40mg/dl 2-3 hours after the meal from premeal BG, then ICR would need to be changed. (higher ICR = less insulin given; lower ICR = more insulin)
- Correction factor is adjusted when
 - multiple corrections are needed to bring BG into target (decrease ISF)



Goals of Diabetes Management

- Keep blood glucose in target range (70-130) 70% of the time
- Minimize fluctuation in blood glucose readings
- Hemoglobin A1C 7.5% or less (7.0% or less for >age 18)
- Prevention of long term complications
- Ensure optimal growth and development
- Maximize quality of life and independence
- Teach self-management of diabetes care. Parents are able to make insulin adjustments on their own.

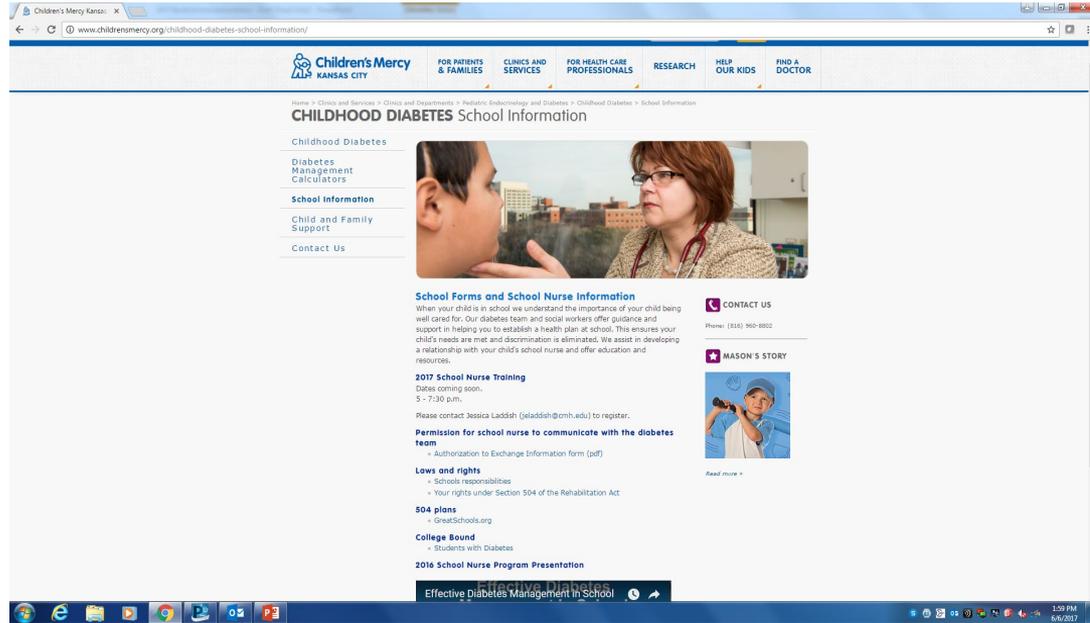


School Orders

- Questions about school orders?
- They will include;
 - Type of therapy; injections or pump
 - ICR (insulin to carb ratio)
 - Type of insulin
 - ISF (correction factor and instructions on how to use)
 - Ketone management, including doses for moderate and large ketones
 - TDD (total daily dose)
 - Hyperglycemia and hypoglycemia treatment (action plan)
 - ROI on the last page; have parent/legal guardian sign and faxed back to CMH
Diabetes team



Access to diabetes team-CMH website

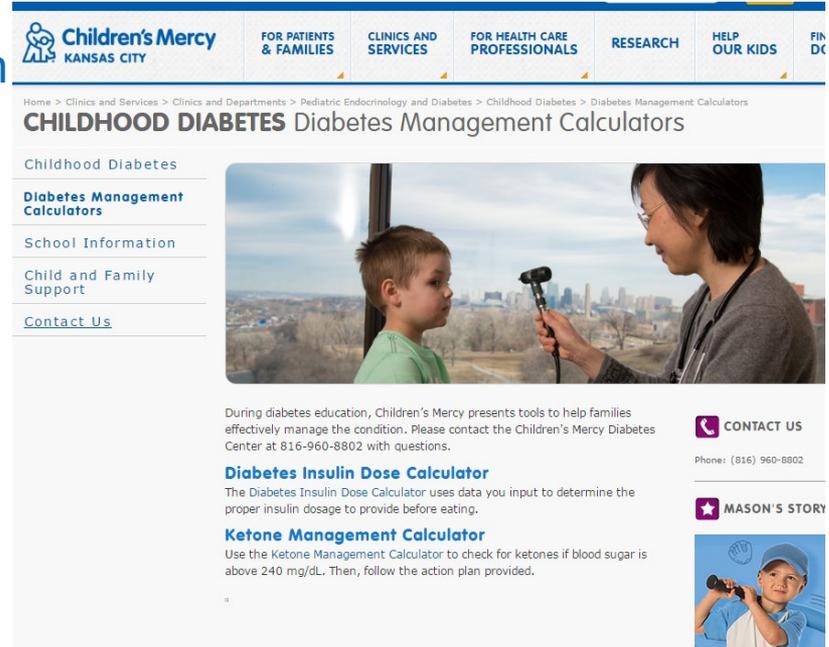


The screenshot shows a web browser window displaying the website for Children's Mercy Kansas City. The page is titled "CHILDHOOD DIABETES School Information". The navigation menu includes "FOR PATIENTS & FAMILIES", "CLINICS AND SERVICES", "FOR HEALTH CARE PROFESSIONALS", "RESEARCH", "HELP OUR KIDS", and "FIND A DOCTOR". The main content area features a sidebar with links for "Childhood Diabetes", "Diabetes Management Calculators", "School Information", "Child and Family Support", and "Contact Us". The main content includes a photo of a doctor talking to a child, and several sections of text: "School Forms and School Nurse Information", "2017 School Nurse Training", "Permission for school nurse to communicate with the diabetes team", "Laws and rights", "504 plans", "College Bound", and "2016 School Nurse Program Presentation". There are also "CONTACT US" and "MASON'S STORY" sections.

Childrensmercy.org-> search for endocrine/diabetes->childhood diabetes center->school information->2021 back to school workshop

What's online?

- [Diabetes team website:](#)
- Blood glucose monitoring instruction video
- Diabetes management calculators
 - Insulin Dose Calculator
 - Ketone Management Calculator
- School information
- Child and Family Support
- Contact Us



The screenshot shows the website for Children's Mercy Kansas City, specifically the "CHILDHOOD DIABETES Diabetes Management Calculators" page. The page features a navigation menu with categories like "FOR PATIENTS & FAMILIES", "CLINICS AND SERVICES", "FOR HEALTH CARE PROFESSIONALS", "RESEARCH", and "HELP OUR KIDS". A breadcrumb trail indicates the path: Home > Clinics and Services > Clinics and Departments > Pediatric Endocrinology and Diabetes > Childhood Diabetes > Diabetes Management Calculators. The main heading is "CHILDHOOD DIABETES Diabetes Management Calculators". A sidebar on the left lists "Diabetes Management Calculators", "School Information", "Child and Family Support", and "Contact Us". The main content area includes a photo of a doctor examining a child's ear. Below the photo, text explains that during diabetes education, Children's Mercy provides tools to help families manage the condition. It lists two calculators: "Diabetes Insulin Dose Calculator" and "Ketone Management Calculator", each with a brief description of their use. A "CONTACT US" button and phone number (816) 960-8802 are also visible, along with a "MASON'S STORY" section featuring a photo of a child with a telescope.

CMH Patient Portal

- For parents/caregivers
- View lab results
- Send messages to the Diabetes team or doctor
- View clinic notes
- View upcoming appointments
- Parents can print school orders or we can fax directly to school nurse.
- Parents can request to join portal by emailing ROI@cmh.edu

Where to find more information

www.diabetes.org

www.childrenwithdiabetes.com

www.jdrf.org



CMH CDE's: phone: 816-960-8803/ fax:816-302-9906

- Option 2: non urgent
- Option 3: urgent (student is vomiting/has moderate or large ketones, or has low blood glucose not responding to treatment.

Resources

- Children's Diabetes Center

<http://www.childrensmercy.org/> Search Diabetes>Endocrinology and Diabetes>Clinical Services>Diabetes Team

- American Diabetes Association Safe at School Campaign

<http://www.diabetes.org/living-with-diabetes/parents-and-kids/diabetes-care-at-school/>

- National Diabetes Education Program

<http://ndep.nih.gov/publications/PublicationDetail.aspx?PubId=97#main>