



DIABETES MANAGEMENT IN THE SCHOOL SETTING Amy Moffett, MSN, RN, CPNP Katy Simms, RN, BSN









The presentation and diabetes education provided today is based on care provided at Nationwide Children's Hospital.

If the patient with diabetes is not a patient at NCH, please consult their physician or institution for specifics to diabetes care.



Disclosures

Successful Completion Criteria

- 100% attendance of the program
- Completion of evaluation form

The Planning Committee and Faculty of this program have no declared Conflicts of Interest.

Nationwide Children's Hospital (OH-033, 10/1/17) is an approved provider of continuing nursing education by the Ohio Nurses Association (OBN-001-91), an accredited approver by the American Nurses Credentialing Center's Commission on Accreditation



Outcome

Nurses and childcare or school staff will be able to apply appropriate care for the pediatric patients with Type 1 and Type 2 Diabetes in the school setting and / or outpatient clinical setting



Objectives

By the end of this session you will develop an understanding of:

- How and when to check blood sugar.
- How and when to give insulin.
- What to do if blood sugar is high or low.
- Advances in diabetes technology

We will:

• Provide resources for future reference.









Truth Or Myth?

- You can catch diabetes from someone else.
- Diabetes is caused by eating too much sugar.
- People with diabetes are more likely to get colds and other illnesses.
- Healthy foods won't raise your blood glucose.
- Someone who follows their treatment plan will never have high blood sugars.



Truth Or Myth?

- People with diabetes can't get tattoos
- People with diabetes can always feel when their blood glucose is low
- It's possible to have "just a touch" or "a little" diabetes
- Diabetes is not a serious disease



Pathophysiology

Chronic condition Type 1: insulin deficiency Type 2: resistance to insulin

- 1. Carbohydrates are broken down into glucose
- 2. Insulin allows glucose to enter cells to be used for energy
- 3. If not enough glucose enters cells to meet energy needs, fat breakdown occurs
- 4. Byproduct of fat breakdown are ketones
- 5. Ketones in blood lead to ketoacidosis



Pathophysiology



Normal physiology



Insulin deficiency

Insulin resistance



Blood Glucose Monitoring



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- Check before bed
 - Check before, during, after exercise
 - Check before driving















Checking Blood Sugar

- Clean hands with soap and water or alcohol swab
- Use sides of finger, not pad of finger or tip of finger
- Need drop on top of finger
- Hold to edge of test strip
- Blood sugar result will appear on screen





Accuracy Of Blood Glucose Monitoring

Inaccurate results usually result of technique rather than glucose meter

- Are hands washed?
- Good drop of blood?
- Error message?
- Test strips need to be replaced after 90 days?







CGMS (Continuous Glucose Monitors)





CGM vs BG Checking



CGMs are becoming standard of care and improve clinical outcomes.



CGM Troubleshooting

CGM reading differently than meter?

FDA says that all meters/CGM's must be within 20% of a blood draw. This leaves quite a bit of room for differences even with both of them being accurate.Because the blood glucose reading is "right now" and not delayed, when in doubt, use this reading.

CGM is reading HI/HIGH

When the CGM reads high, this means that the blood glucose is >400. It would be best to do a fingerstick at this time as the blood glucose meters read to 500 or 600.

Student is saying CGM is not staying on

The CGM companies have tips and tricks on their website to help it stay on better. If they are at school and it is coming off, you can use medical tape to hold it in place, or if they have extra adhesives at school, you can put that on.



Target blood glucose level

Blood glucose goal based on age (treat lows under 70 mg/dl)

NCH standards by age

Age	Blood Glucose mg/dl
0-5y	100-180
6y-9y	80-140
10y+	70-120



Medication Management

Intensive Therapy

- Multiple daily injections
- Insulin pump therapy



Multiple Daily Injections (MDI)

• Basal/Bolus regimen



Medication Management

Insulin Pump Therapy

- Uses rapid acting insulin only such as Humalog, Novolog
- Basal insulin is continuous infusion which is preprogrammed; there may be different rates at different times
- Bolus insulin; user activated based on carbohydrates and/or blood glucose level



Insulin Pump Therapy

Omnipod/Omnipod DASH

Tandem T:slim

Medtronic





Why isn't everyone a "pump candidate"

- Once a patient starts using an insulin pump, they are no longer getting their long acting insulin via an injection.
- This means, if the pump site kinks or something happens to the pump, the individual has NO INSULIN at all in their body which can make DKA more likely.
- Prior to prescribing an insulin pump, we need to ensure that the patient has a decent understanding of technology and is able to troubleshoot issues should they arise. We also make sure that they are doing daily diabetes tasks such as checking their blood sugar, so they would quickly be able to tell if something isn't working.

With closed-loop technology coming out, these criteria may change in the coming years.



Closed Loop Pumps

- Closed loop insulin pumps are systems which work with a CGM to automatically adjust the basal or background insulin according to the blood glucose.
- If the blood glucose starts rising, insulin increases. If the blood glucose starts falling, insulin decreases.
 - With all closed loop systems, patients must still enter in their boluses for food and high blood sugar. They are still the brains behind the operation



Basal/bolus regimen

Basal insulin; long acting insulin: Lantus, Basaglar, Levemir, Tresiba

Usually given once daily but may be given twice daily (not common anymore)

Ok to give at the same time as a short acting dose!

Give consistent dose at the same time(s); usually evening but can be any time of day as long as it is consistent

Begins to work in 2 to 4 hours; lasts up to 24 hours; no peak





Basal/Bolus regimen

Bolus Insulin; Rapid Acting Insulin Humalog, Novolog, or Apidra Ultra Rapid Acting- Fiasp, Lyumjev

Rapid acting begins to work within 15 minutes; peaks in 1 to 2 hours; lasts 4 to 5 hours Usually given 3 to 4 times daily

Given to cover snacks or meals containing carbohydrates; times may vary

Given to cover high blood glucose

Goal is to give BEFORE eating- even 5-10 minutes prior when possible

If very young or unable to reliably predict how much they will eat, afterwards is acceptable but must be within 30 minutes of starting to eat





Bolus Insulin



- May use a set dose of insulin; with a set number of carbohydrates
- May use insulin carbohydrate ratio; number of carbohydrates covered by 1 unit of short acting insulin
- May have different dose or different ratio at different meals







Example



Ratio is 1 unit for every 10 grams carbohydrates (1:10)

Turkey sandwich	30 grams
Chips	10 grams
Granola Bar	22 grams
Total # grams	62 grams

Give 6 units Humalog/Novolog for meal





High blood glucose correction

Do not correct high blood glucose if any of the following are true

- It has been less than 3 hours since the last dose of Humalog / Novolog
- A low blood glucose has been treated in the last 3 hours
- It has been less than 1 hour since there has been vigorous exercise









High blood glucose correction

- Purpose is to bring high blood glucose back to target range
- Often added to meal bolus; given as 1 injection
- Calculation



To determine high blood glucose correction Example

- Correction Factor 1:50
 - 1 unit of bolus insulin will decrease the blood glucose by 50 points.
 - This number is determined by the provider
- Target blood glucose 120 mg/dl
 - This is the number we want the child's blood glucose to be
 - This number is determined by the child's age



Example

1 unit for every 50 points blood glucose is higher than 120 mg/dl

Blood glucose 182 mg/dl





To determine total dose





Rounding rules

Rounding rules for $\frac{1}{2}$ unit:

0.1 - 0.3= round down to whole unit 0.4 - 0.7= round to $\frac{1}{2}$ unit 0.8 - 0.9= round to whole unit

Rounding rules for whole unit:

0.1 - 0.4= round down to whole unit 0.5 - 0.9= round up to whole unit

Always round at the end



Insulin dose

- Carbohydrates counted correctly
- Measure food correctly
- Accurate blood glucose
- Give insulin before meal
- Accurate calculation
- Prime the insulin pen needle
- Adult supervision
- Insulin stored appropriately
- Insulin replaced after 28 days (Tresiba lasts 8 weeks)



Injections

- Given in arms, legs, abdomen, and hips
- Need to rotate sites within each area
- Can use syringe and vial or insulin pen



- Disposable Humalog (insulin lispro) and Novolog (insulin aspart) insulin pens or cartridges can deliver half or whole units
- Prime needle with insulin pen
 - 1. Dial to 2 units
 - 2. Prime insulin pen holding upright and see stream of fluid
 - 3. Dial insulin dose



Insulin pens













See why FlexPen® is the world's #1 selling prefilled insulin pen.1





Injection Technique

- Appropriate sites used
- Rotate sites frequently
- Avoid scar tissue
- Leak-out
- Direct adult supervision





Hypoglycemia (Low Blood Glucose)

<u>Reasons</u> for hypoglycemia Too much insulin Not enough carbohydrates Increase in exercise

<u>Symptoms</u> of hypoglycemia Mild; shaky, sweaty, hungry, tired, pale Moderate; confused, disoriented, lack of focus Severe; unconscious, seizure



Hypoglycemia

- Treat if blood glucose less than 70 using the 15/15 rule
 - 1. Give 15 gram carbohydrate snack
 - 2. Wait 15 minutes, then recheck blood glucose
 - 3. Repeat if blood glucose remains less than 70
 - 4. If more than 2 hours until next meal; follow up with a 15 g complex carbohydrate
- Use simple fast acting carbohydrates
 - 4 oz. juice
 - 6 to 7 lifesavers
 - Fruit roll up
- Fast acting carbohydrates should be easily available
- Can be tempting to mix with a complex carbohydrate but this slows absorption





Severe Hypoglycemia



Give Glucagon; give if unsafe to swallow

Safe medication; hormone produced by body in response to low blood glucose

Less than 45 pounds; give 0.5 mg

More than 45 pounds; give 1 mg

Inject diluting solution into vial with powder; mix; withdraw to 0.5 mg or 1 mg Give SQ or IM

Turn child to side after giving (side effect is vomiting)

Severe Hypoglycemia

Other forms of Glucagon

There are two alternatives to the Glucagon Kit

Baqsimi is a powder in a nasal spray. It is approved for children over 4 years old

Gvoke is pre mixed and comes in a prefilled syringe or pen for injection. It is approved for children over 2 years old.

Exercise

May cause low blood glucose:

- During exercise
- After exercise
- Delayed; middle of the night; next morning

Test blood glucose

- Before exercise
- Every hour during exercise
- May need to test overnight

If blood glucose <100 mg/dl; eat a 15 gram complex carbohydrate snack then exercise If blood glucose <70 mg/dl; treat; exercise once >100 mg/dl

Prevention of low blood glucose with exercise

Decrease meal insulin dose prior to exercise Talk to family or diabetes team for suggested adjustments

Eat extra CHO snacks during exercise Begin with 15 grams CHO for every 30 to 60

minutes exercise

Adjust amount CHO based on blood glucose levels

Hyperglycemia

Causes

Not enough insulin Too many carbs Stress or illness

Symptoms of high blood glucose Increased thirst, increased urination

Symptoms of ketones

Nausea, vomiting

Test urine or blood for ketones if Blood glucose higher than 300 mg/dl and when ill

Ketones

Occur when not enough glucose is available to cells in the body to provide energy, can be either:

glucose

Fat/muscle cells

Diminished glucose uptake

Fat/muscle cells

Ketone results

- Urine ketone testing
 - Large
 - Moderate
 - Small
 - Trace
 - Negative

NEGATIVE	TRACE	SMALL	MODERATE	LARGE	
		-	Page 1		
		45	40	00	100
mg/d	L 5	15	40	80	160

If the child has ketones, please call the parent or guardian for further instructions. Updated NCH school orders may have ketone correction amounts.

Sick day

Always need to take long acting insulin

Should try to eat meals; take rapid acting insulin; may be applesauce, popsicles etc.

If not able to eat; still correct for high blood glucose

Encourage CHO free fluids; goal is 8 ounces every 30 to 60 minutes

When to contact endocrinology

Signs of diabetic ketoacidosis Prolonged vomiting Rapid shallow breathing Extremely tired

Call 911 or go to the nearest ED

IF NCH patient: Monday-Friday 8:00-4:30pm Call **614-722-4425**

After hours, weekends or holidays: Call **614-722-2000** and ask for the Endocrinologist on call

What is DASH?

- Nationwide Children's Hospital Diabetes and School Health-DASH
- Enhanced care coordination program that works to provide the best diabetes care through direct oversight, education and support to students, families and school.
- Provide additional access and care to students with Type 1 diabetes by offering ongoing education and on-site clinical care along with delivery of medication and supplies to school and home
- Pilot year- goal is to enroll 50-75 students with plans for expansion
- Clinical team consists of a nurse practitioner and diabetes educator for first year

DASH-lessons learned

- As of 11/2/2021 we have been to 25 schools within multiple districts in the Columbus and surrounding areas
- School staff are invested in their students with diabetes and are integral in helping to facilitate their diabetes care
- Care of students with diabetes takes a large portion of nurse/school staff time and resources
- Important for students to have all necessary supplies at school especially emergency medication (glucagon) and ketone strips
- Important to have updated insulin doses and orders
- Important to thoroughly read orders and ask if there are questions about plan
- Directly visualize meter reading (and ensure it is the correct reading for that day/time). Sometimes students are afraid they will get in trouble and may report a false number or may even report a low reading in order to get a snack.
- Directly visualize insulin injection. Work with student to maintain privacy but also ensure dose is given.

NCH Diabetes Center resources

Go to nationwidechildrens.org

- Our Services Endocrinology, Metabolism, and Diabetes
- Diabetes Center
- Resources
- Diabetes Resources for Parents and Teachers

For NCH Resources:

<u>https://www.nationwidechildrens.org/specialties/di</u> <u>abetes-clinic/resources-for-parents-and-teachers</u>

Call Endocrinology at 614-722-4425 to speak to Diabetes Educator

Websites for additional information

American Association of Diabetes Educators www.diabetes educator.org

> American Diabetes Association www.diabetes.org

Clinical Practice Guidelines Barbara Davis Center www.barbaradaviscenter.org

Pink Panther books online

Children with diabetes www.childrenwithdiabetes.com

Diabetes is a marathon not a sprint

Our job, as a team that cares about a child with diabetes, is to empower that child and their family to keep moving forward one step at a time

