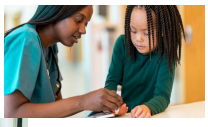
Delegated Care Aide Training

OSF Healthcare
Pediatric Diabetes Resource Center


Why do this training?

Care of Students with Diabetes Act, 2010 says

(1) Diabetes is a serious chronic disease
(2) Diabetes must be managed 24 hours a day
(3) Federal law affords people with diabetes specific rights
(4) Provide equal opportunities and a healthy safe environment
(5) School nurse may not be available
(6) Many students are capable of managing independently
(7) Appropriate and consistent diabetes care

Delegated care aide

This training will cover:

Basic information on diabetes
- blood sugar monitoring and injections
- carbohydrate counting
- calculation of insulin doses
- treatment of hypoglycemia
- treatment of hyperglycemia
- school law and paperwork
- psychosocial challenges
- pumps and sensors
- activity challenges

Pediatric Diabetes Care Team

Providers: Doctors (MD) and Advanced Practice Nurses (APRN)
- Dr. Valeria Benavides
- Dr. Liliana Burdea
- Dr. Kiran Choudhry
- Sarah Dominique, APRN, CDE
- Dr. Mark Miller
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- Dr. Michael Torchinsky
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Dieticians (RD)
- *Rebecca Mack, RD*
- *Jenni Newton, RD, CDE*

Front Desk
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- Lilliana Vargas

Nurses (RN)
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- *Michelle Kelly, RN*
- *Jolinda Rasmuson, RN, CDE*
- Julie Stear, RN, CDE

Clinical Social Workers (LCSW)
- *Alesia Haley, LSW*
- *Beth McGettrick, LCSW*

Medical Office Assistants (MOA)
- Nicole Bass
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No conflicts of interest to declare

Please do not replicate or distribute these materials or this training

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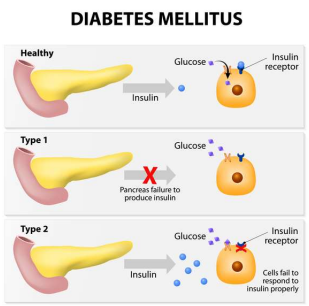
Basic Information on Diabetes

What is Diabetes?



Type 1 vs. Type 2 Diabetes

	Type 1	Type 2
Autoimmune	X	
Genetic	X	X
Lifestyle Choices		X
Obesity		X
Body completely stops making insulin	X	
Insulin is made but cannot be used properly		X
Occurs in children	X	X
Typically occurs in adults		X
Treated with oral medications/diet/exercise		X
Treated with insulin	Always	Sometimes

Symptoms of Diabetes

- Increased thirst
- Frequent urination
- Nausea
- Rapid weight loss
- Blurred vision
- Constant hunger
- Fatigue

Treatment for Diabetes

- If insulin is not made, it must be given: via injection or insulin pump

*There is currently NO CURE for Type 1 diabetes and giving insulin only helps to control it

Goals of Therapy

- Find a balance between food, activity, and insulin, in an attempt to maximize the time blood sugars are within their target range
- Incorporate medical management into daily routine

Juggling Act

Many factors that may affect blood sugar including:

-Exercise
-Illness or infection
-Mental or emotional stress
-Puberty
-Injury
-Growth Spurts

The Challenges

- No Cure
- Providing the child with just the right amount of insulin/energy is a constant juggling act 24 hours a day, 7 days a week
- Kids spend much of their time at school, daycare, and activities, so it takes many people besides parents to help with diabetes care

Blood Glucose Monitoring

Blood Glucose Monitoring

Standard times to check blood sugar:

- **Before meals at school:**
  For example: before breakfast (*if eaten at school) and lunch
- **As needed:**
  -symptoms of high or low blood sugar
  -for example: before and/or after PE, before bus ride
  *these would be more child specific requests made by parents (May also now involve monitoring a continuous sensor.)

Methods of Glucose Monitoring

- Glucose Meter
- Flash Glucose Monitor
  - Libre®
- Continuous Glucose Monitor
  - Dexcom®

Blood Glucose Meters

- Make sure hands are clean as this can lead to inaccurate numbers
- Be sure a **new** lancet is used **every time**!!!
- All meters available have passed FDA regulations and are accurate

How to Check Blood Sugar

- Make sure hands are clean and dry
  - If using an alcohol wipe: make sure skin is dry, poke finger and the first drop of blood is wiped away. Use second blood drop for sample.
- Insert a strip into the meter
- Poke finger with a new lancet
- Get blood sample on to the meter strip
- Wait to see the reading on the meter

Flash Glucose Monitor

Abbott's Freestyle Libre

Continuous Glucose Monitoring

Counting Carbohydrates and Calculating Insulin Doses

Target Blood Sugar

- Target blood sugar has a range
  - Ex: 70-120 or 80-150
- High end of target used to calculate correction dose
- High end of target often based on age of child

Evaluate Blood Sugar

- If blood sugar is **above** target, extra insulin will be needed to correct the blood sugar to return it to target
- If blood sugar is **within** target, insulin will be needed for the food which will be eaten
- If blood sugar is **below** target, treat the low and give insulin for the food which will be eaten

Correction Factor

- Used to bring blood sugars above target back down to the target range
- It is figured by taking the high blood sugar and subtracting the child's target blood sugar. This number is then divided by the child's correction factor.

Correction Factor (cont.)

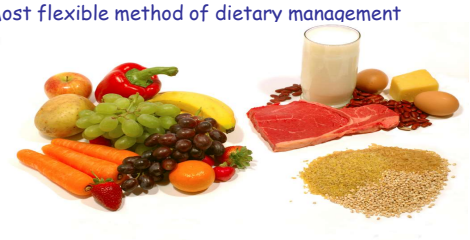
- Example: 1 unit for every 75 points when the blood sugar is over target of 120
- Current blood sugar is 236
- 236 – 120 = 116 116 ÷ 75 = 1.5 units
- 1.5 units of rapid acting insulin would be added to the meal insulin

Joey's DMMP says:
Carb ratio: 18
Correction factor: 75
Target 120

Carbohydrate Counting

Carbohydrate Counting

- Used to determine the amount of insulin needed to cover the food eaten
- Most flexible method of dietary management



What is a Carbohydrate?

- Starch and sugar found in foods
  - *Starch: breads, pasta, cereals, potatoes,*
  - *Natural Sugar: fruits, fruit juice, milk, yogurt, and vegetables, honey*
  - *Added Sugar: desserts, candy, soda, jams, and syrups*
- Carbohydrate is our main source of energy (45-60% of our daily total calories)

Carbohydrate Facts

- Carbohydrates break down into sugar (glucose) that travels in your bloodstream
- It is the nutrient in food that raises the blood sugar the most
- *Begins to raise the blood sugar within 15 minutes of eating*

What about Protein and Fat?

- *Protein: very little effect on blood sugar. May cause slight increase in blood sugar 30 minutes to 3 hours after eating*
- *Fat: slows digestion; may cause delayed rise in blood sugar when combined with carbohydrate in a meal*

Carbohydrate Counting is….

- Calculating the number of grams of carbohydrate in the foods and beverages the student consumes
- Knowing the exact amount of carbohydrate grams for each food in the meal/snack

Obtaining Carbohydrates for School Menus

- Speak with the Food Service Director
- Often nurses or Delegated Care Aid keep list of carbohydrates for each item served on the menu
- Look up food items when information not available

Meals Packed From Home

- Parents are encouraged to send a list including:
  - Food item
  - Serving size or quantity sent
  - Carbohydrate grams for each food / beverage item

Carbohydrate Counting is…

- Understanding that the total amount of carbohydrate eaten at one time is the focus, not the source of carbohydrate (healthy carb is important, but an occasional "treat" is ok)

Where to find carbohydrate content of foods…

- Nutrition Facts label
- School food service/food vendors
- The Calorie King Calorie Fat & Carbohydrate Counter by Allan Borushek
- 'Food Lists" in OmniPod Insulin Pump
- www.CalorieKing.com
- www.Nutritiondata.com
- www.Sparkrecipes.com
- www.myfitnesspal.com

How do I count carbohydrates?

- Nutrition Facts Label
  - Serving Size
  - Total Carbohydrate

Let's practice…..

Nutrition Facts

8 servings per container

Serving size 2/3 cup (55g)

Amount per serving

Calories 230

	% Daily Value*
Total Fat 8g	10%
Saturated Fat 1g	5%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 160mg	7%
Total Carbohydrate 37g	13%
Dietary Fiber 4g	14%
Total Sugars 12g	
Includes 10g Added Sugars	20%
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	6%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Let's practice….

- Joey is in 3rd grade. He is eating the school lunch: chicken patty on bun, tater tots, cucumber slices, apple, white milk.
- What is his total carbohydrate for lunch?

Joey's DMMP says:
Carb ratio: 18
Correction factor: 75
Target 120

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Let's practice….

• Chicken patty	16 grams
• Bun	27 grams
• 12 tater tots	29 grams
• 1 packet ketchup	3 grams
• ½ cup cucumber slices	2 grams
• Small apple	14 grams
• 1 cup white milk:	+ 12 grams
	103 grams

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Insulin to Carbohydrate Ratio (I:C)

- Defined as the number of carbohydrate grams covered by one unit of insulin. Example of 1:18 means 1 unit of insulin per 18 grams of carbohydrate.
- The insulin dose is calculated to match the amount of carbohydrate to be eaten (before the meal).
- It is calculated by dividing the total number of carbohydrates by the student's insulin to carbohydrate ratio.
- The insulin used for food is rapid-acting insulin.

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Joey's Meal Insulin

• Chicken patty	16 grams
• Bun	27 grams
• 12 tator tots	29 grams
• 1 packet ketchup	3 grams
• ½ cup cucumber slices	2 grams
• Small apple	14 grams
• 1 cup white milk:	+ 12 grams
	103 grams

Insulin to Carb Ratio is 1 unit insulin: 18 grams

Insulin dose = 103 grams ÷ 18 = 5.7 units

Joey's DMMP says:
Carb ratio: 18
Correction factor: 75
Target 120

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Calculating the total dose

- Correction insulin is 1.5 units
- Joey's meal insulin was 5.7 units

1.5 units
+ 5.7 units
7.2 units = 7 units to be given

*Round dose to the nearest half unit

Joey's DMMP says:
Carb ratio: 18
Correction factor: 75
Target 120

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Rounding Insulin Doses

- Half Units
  - 0.1 – 0.2 = Round down
  - 0.3 – 0.7 = Round to the nearest HALF unit
  - 0.8 – 0.9 = Round up
- Whole Units
  - 0.1 – 0.4 = Round down
  - 0.5 – 0.9 = Round up

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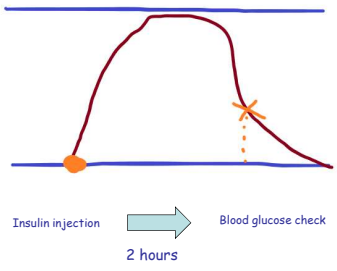
When should insulin be given?

- First best / ideal: insulin is given 15-20 minutes before meals
- Second best / acceptable: insulin is given at the start of the meal
- Third best / least desired: insulin is given within 20 minutes of the first bite of food

Timing of blood sugar checks

- At least a 2 hour window of time is needed between taking insulin and checking a blood sugar.
  Why? Rapid acting insulin does most of its' work in the first 2 hours after being administered. If you check blood sugars too soon you will likely see a high blood sugar. Correcting this number will give too much insulin leading to low blood sugars.

2 hour window



Snacks

- Snacks are not required just because a child has diabetes
- Timing of snack in relation to pre-lunch blood sugar check is important
- Special occasions/birthday parties: child specific
- For kids taking injects, snack may or may not require insulin depending on the amount of carbohydrate in the snack.
- For kids on an insulin pump, all snacks should be entered into the pump

Healthy Eating

- Encouraged for all kids – not just kids with diabetes

Insulin Delivery

Methods of Insulin Delivery

- Insulin Syringe

- Insulin Pen

- Insulin Pump

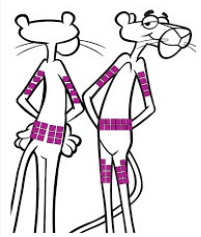
Types of Insulin

- **Rapid-acting:**
  Humalog®, lispro, Novolog®, aspart, Apidra®, Admelog®, Fiasp®
  - Starts working in 5-15 min. lasts 2-3 hours
  - Used in all pumps
  - Used to cover food and lower blood sugar
- **Long-acting:**
  Lantus®, Basaglar®, Semglee®,Tresiba®, Toujeo®
  - Used only if on injections
  - Usually given once daily at the same time each day- lasts 24 hours

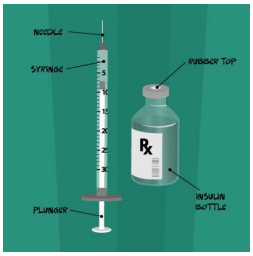
  Levemir®
  - Used only if on injections
  - Usually given two times daily at the same time each day

Injection Sites

- **Appropriate places to give an injection:**
  - Arms
  - Abdomen
  - Legs (thigh area)
  - Hip area
  - Buttocks
- **Make sure to rotate sites for the best insulin absorption.**



How to Give an Insulin Injection



How to Give an Insulin Injection

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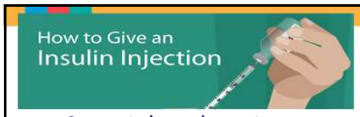
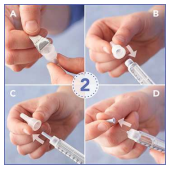


- Get vial and syringe
- Ensure top of insulin vial is clean
- Draw up amount to be given in air
- Inject the air into the vial
- Draw up insulin dose
- Inject insulin (refer to slide for appropriate sites for injections)

Insulin Pen

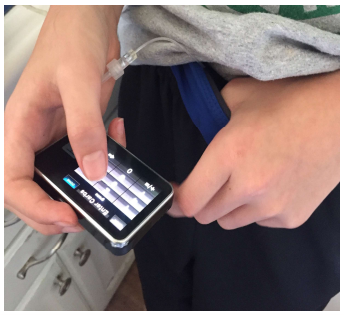
- Remove Pen Cap
- Prepare needle on pen
- Prime the Pen
  - Dial 2 units, push the injector completely, repeat as needed until insulin is seen at the needle tip
  - Dial should be at zero after priming
- Dial insulin dose
- Inject into body at 90 degree angle
- Inject dose
- Hold for 5 seconds
- Withdraw pen from body

Insulin Pen



Injection of Insulin Pen

If using an insulin pump to provide insulin dose: enter blood sugar and carbohydrates into the pump for insulin to be given. Follow pump screen instructions.



Hypoglycemia and Glucagon Administration

Hypoglycemia (low blood sugar)

- American Diabetes Association: <70mg/dl
- The emergency most likely to occur at school
- Causes: too much insulin, exercise, stress

Signs of Hypoglycemia

- Pale/sweaty/dizzy
- Shaky
- Hungry
- Headache
- Confused or unable to follow directions
- Slurred speech
- Change in behavior
- Combative

Actions for Hypoglycemia

- Rule of 15
- Glucose gel
- Glucagon

The Rule of 15 for those not using integrated technology

If the child exhibits mild symptoms and is able to safely swallow, use the "Rule of 15"……

1. Give 15 grams of quick-acting carbohydrate (3-4 glucose tabs or ½ cup juice)
2. Recheck blood sugar in 15 minutes
3. If blood sugar is still low (a blood sugar of 70 or 80 depending on the child's DMMP) give another 15 grams of carbohydrate

Other sources of quick-acting carbohydrate……

- ½ cup regular soda (1/3 of the can)
- 4 teaspoons of sugar
- 3 teaspoons of honey (do not use if child is less than 2 years old)
- 2 packages of Smarties
- 2 Tablespoons of raisins

All have 12 – 16 grams of carbohydrate

Hypoglycemia treatment with use of integrated technology speak to family for plan.

Glucose Gel

- Glucose gel should be used if the child is refusing to eat or drink and it is evident that they cannot safely swallow
- Place glucose gel or cake decorating gel along gum line or in cheeks of the mouth.
- Recheck blood sugar
- in 15 minutes

Glucose Gel (cont.)

- If blood sugar is still low, but child can swallow, give 15 grams of quick-acting carb (juice, tabs, etc.)
- If blood sugar is still low, but child cannot swallow or is unconscious, inject glucagon.

Glucagon

What? – Hormone that signals liver to dump sugar into the blood stream

When? – The student with diabetes becomes unable to suck, swallow, or chew, has a seizure or becomes unconscious due to a low blood sugar

Who? – The trained school personnel (Delegated Care Aid)

Injectable Glucagon

Intramuscular Inject **Subcutaneous Inject**

Nasal Glucagon Baqsimi

Glucagon

- Child may feel nauseous after receiving glucagon. Lie on side to prevent choking if child vomits.
- Once conscious and able to swallow, offer carbohydrate such as juice, crackers, regular soda, etc.
- Monitor blood sugars frequently after a severe low.

Glucagon

- Follow district 911 policy if glucagon has been given
- If recovery has not started within 15 minutes, call 911 or take child to the emergency room.

Glucagon Kit Storage

As designated in the student's Diabetes Medical Management Plan, the kit should be:

- With child at all times and accessible to trained personnel
- stored at room temperature
- monitored for expiration date

Emergency Kit Contents:

1 mg of freeze-dried glucagon (Vial)
1 ml of water for reconstitution (Syringe)

Glucagon - Lilly

GlucaGen – Novo Nordisk

Combine glucagon and water immediately before use and discard any unused portion after injection.

How to administer Gvoke Glucagon

1. Pull off Red Cap

2. Push yellow end against exposed skin for 5 seconds. Window will turn red.

How to give Baqsimi Nasal Glucagon

Activity

Activity

All children should be encouraged to participate fully in physical education classes and activities

Physical Activity

- Hypoglycemia (low blood sugars) can occur during, immediately after, or many hours (6 to 24 hours) after physical activity
- You may also see a rise in blood sugars due to increased adrenaline associated with competitive activities (gym class, recess, sporting events, marching band competition, video gaming)
- Practice session blood sugars may be very different than game blood sugars

Physical Activity

- Prior to and during activity:
  - Check student's blood glucose level before activity as long as it has been more than 2 hours since last meal
  - Student may need a carbohydrate snack depending on activity and blood glucose level
  - If necessary, adjust insulin dose depending on blood glucose level. Check blood glucose levels more frequently while engaging in activity.

Activity Preparedness

Prior to activity ensure the following:

- Source of quick-acting glucose such as glucose tabs, juice or regular sports drink are within reach
- Ability to monitor glucose during activity
- Glucagon emergency kit is accessible
- Adequate hydration, just like all other activity participants. May need both water and carbohydrate containing beverages to use depending on blood sugar levels during activity.

Hyperglycemia and Ketones

Hyperglycemia (high blood sugar)

- Blood sugar that is over the student's individualized target blood sugar
- Causes: not enough insulin, miscounting carbs, stress, illness, pump site issue, timing of testing blood sugar
- It must be > 2 hours since last meal/snack and/or insulin
- Otherwise – False High

Hyperglycemia (cont.)

- Signs of hyperglycemia:
  - Increased thirst
  - Increased urination
  - Individual symptoms

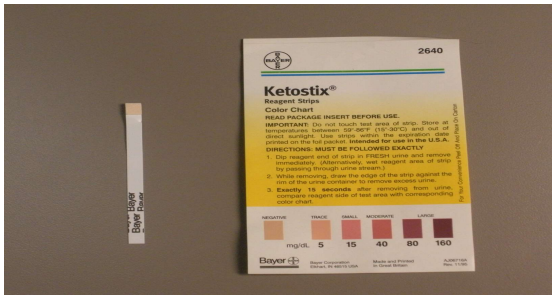
What are Ketones?

- In the absence of insulin, sugar cannot be used as the body's main energy source
- Fat is then broken down and used for energy
- Ketones result from fat breakdown
- Too many ketones = buildup of acid (acidosis) or DKA- diabetic ketoacidosis

Hyperglycemia and Ketones

When to check for Ketones:

1. If BS >250-300
2. If headache, stomachache, nausea, vomiting
3. Antibiotics and Steroids increase insulin resistance



Ketone Treatment

- Trace and Small – Treat with Correction Dose
- Moderate -Treat with the Correction Dose X 1.5
- Large – Treat with Correction Dose x 2
- Push fluids 8-12 ozs. Every 30-60 min (water is most effective)
- Check blood sugar and ketones every 2 hours

For Moderate – Large Ketones

- If unable to calculate a Correction Dose, push rapid acting carbohydrate fluids and recheck blood sugar in 15-20 minutes
- Use this blood sugar for the Correction Factor calculation

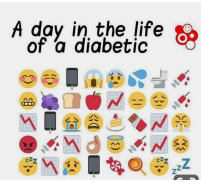
EXTRA INSULIN AND FLUIDS ARE THE ONLY WAY TO GET RID OF KETONES!!

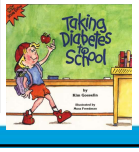
Hyperglycemia and Ketones

- No physical activity if ketones are present
- Any change in breathing (rate/depth) is an automatic call for Emergency Services (911)
- Pump users need an injection by syringe and a pump site change

Diabetes in School and Psychosocial Aspects

- Paperwork
- Planning
- School law
- Psychosocial aspects
- Ideas for support





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What paperwork is involved?

1. Diabetes Medical Management Plan (DMMP)
   - Also referred to as a 'Diabetes Care Plan' or 'School Plan'
   - Our PDRC clinic and parents complete and sign
2. 504 plans
   - We do not provide a form or template. We do not sign.
   - We are happy to provide ideas and resources if requested.
3. Medication Authorization Forms
   - We do not provide these forms
   - Individual schools provide and we will sign if needed.

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504 topics

- Trained diabetes personnel
- Other trained staff
- Needs and abilities
- The right to carry
- Tests and injections
- Snack time
- Fitness
- Extracurricular activities
- Education/tests
- Communication
- Student preferences
- Non-routine activities

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Federal law

Schools should provide the following:

- Trained staff to monitor blood sugar levels and administer insulin and glucagon
- Trained staff to provide diabetes care during field trips, extracurricular events and all school-sponsored activities
- Capable students permitted to self-manage their diabetes anytime, anywhere

Schools should not:

- Make family members go to school to care for a student's diabetes
- Transfer students to a different school to get needed diabetes care
- Prevent students with diabetes from participating in field trips, sports and other school-sponsored activities

American Diabetes Association. Safe at School

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Delegated Care Aide

- Training to manage diabetes with individual student
- Initial training by healthcare provider w/ expertise in diabetes, or certified diabetic educator
- Individualized by a student's parent / guardian
- When care plan changes, at least annually

All Other Staff

In schools that have a student with diabetes, all school employees shall receive training in the basics of diabetes care, how to identify when a student with diabetes needs immediate or emergency medical attention, and whom to contact in the case of an emergency

Bus Info Sheet

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Supplies

- To be kept with child
- Quantity set by insurance
- Undesignated glucagon
- Medical ID

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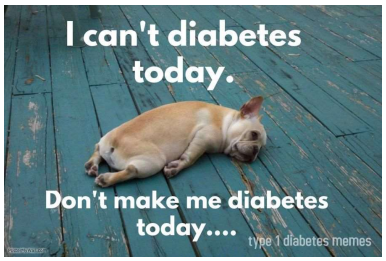
Psychosocial Emotional Aspects



- Frustration
- Anxiety
- Anger
- Stress
- Depression
- Denial
- Guilt
- Burnout
- Extra
- Different

Particular Challenges of Diabetes

- Blood sugars can affect children physically and emotionally.
- Diabetes can be scary.
- Diabetes can be unpredictable.
- Diabetes requires 24/7 attention.
- A diabetes diagnosis can involve grief and loss.
- Diabetes care requires daily balancing act.
- Fear of long-term and short-term complications can be overwhelming.
- Diabetes care can feel like a constant evaluation.
- Diabetes care involves particular attention to food.
- Diabetes technology can require technology troubleshooting.

Ideas for School Support

Parents get belly tattoos to support son on insulin pump for Type 1 diabetes

Support Idea: Showing awareness of complexity of diabetes

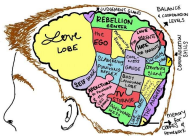
- Being intentional about words and responses
- Incorporate feelings into the discussion

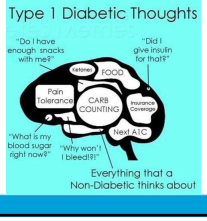
Support Idea: Promoting Flexibility

- Person-centered, individual care
- Creativity and collaboration
- Question what is the goal

Support idea: Shared Responsibility

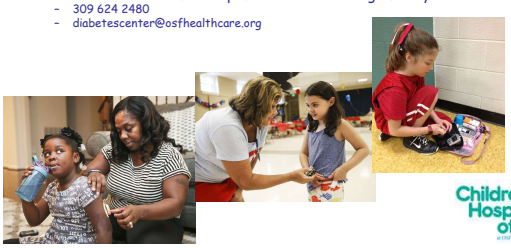
- Trying to mimic a pancreas is no easy feat
- Shared decision-making
- Supervision





Support Idea: Encourage extra help

- Unique role
- Problem-solve with family
- Use other resources in school
- Reach out to PDRC for help if needed. Encourage family to do so too.
  - 309 624 2480
  - diabetescenter@osfhealthcare.org



Resources

- Dexcom: dexcom.com/training/resources
- Freestyle Libre myfreestyle.com
- Medtronic insulin pump: medtronicdiabetes.com/services/training-education
- Omnipod insulin pump myomnipod.com/podder-support
- T-slim insulin pump: tandemdiabetes.com
- JDRF (Juvenile Diabetes Research Foundation) School Advisory Toolkit
- Jdrf.org/t1d-resources/living-with-t1d/SCHOOL
- American Diabetes Association diabetes.org including Safe at School, training curriculum
- Beyond Type 1: beyondtype1.org/school including gpresentation for kids
- icsaanswerstofaqsoncsda.pdf (iasb.com) Illinois Council of School Attorneys
- T1D Nurses Squad www.t1d.modsquad.org/get-support A place for School Nurses to talk about Type 1 Diabetes and get the resources they need to help their T1D students succeed.
- Helping the Student with Diabetes Succeed NIDDK nih.gov
- Joslin school nurse training and pump training joslin.org

Introduction to Insulin Pump Therapy

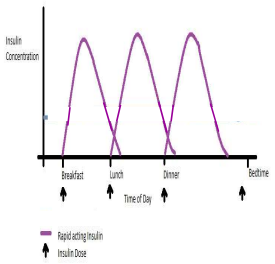
Insulin Pumps

Insulin Pump Basics

- Pager sized
- Pre-programmed insulin delivery
- Uses a cartridge or reservoir (to hold insulin) and infusion set (inserted into the body) or Pod
- Rapid-acting insulin only (Humalog®,lispro, Novolog®, aspart, Apidra®, Admelog®)
- Tubing or no Tubing
- No surgery necessary

Insulin Pump Definitions

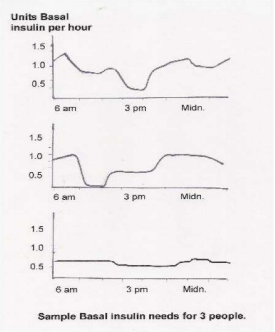
- Bolus:
  - Delivered as needed for all carbohydrate intake
  - Used for correction of a high blood glucose level
  - Amounts/Doses will vary



Extended Bolus:
- Give bolus over an extended period of time. Example over 4 hour time frame

Pump Definitions

- Basal Rate:
  - Continuous delivery of pre-programmed insulin amounts to meet metabolic needs when not eating
  - Rates will vary during the day. These rates are individualized
  - Rates will change periodically based on patient needs



What are some benefits of an insulin pump?

- A tool to help normalize blood sugar levels – offers more options
- More flexibility in lifestyle
- More precise/flexible dosing

What are some drawbacks of the pump?

- The pump is simply a tool – it is only as good as its user
- Something attached to you at all times – visible sign of diabetes
- It is a mechanical device and it may fail – need to have a back up plan

What are some drawbacks of the pump?

- Something new to learn. More education
- Ketoacidosis – only rapid acting insulin is used. If insulin delivery is interrupted for any reason, blood sugars can rise quickly. Good rule to remember is 2 unexplained high blood sugars in a row…change the insertion site. Follow DKA protocol if needed

Insulin Pump Use at School

- Bolus History – How and why to use at school
- Still need to be observed to make sure all insulin is being delivered
- Pump will figure out dose to be given. It is important to use that amount, do not overrule the pump
- Bolus is given for all food eaten. No free snacking
- Encouraged to stay connected to pump at all times

Pump Sites

- Subcutaneous skin layer
- Rotated every 2-3 days
- Can be put anywhere an injection can be given.
- Always have extra supplies available, as pump sites can come out, or pump could malfunction

Continuous Glucose Monitoring




Continuous Glucose Monitoring (CGM)

- "Real-time" glucose readings and trends in glucose levels
- Readings appear every 5 minutes
- Single point data vs. trend information

Single Point Glucose Testing

Time	Blood Sugar
6:00	105
11:45	111
5:00	125
8:00	145

Trend Information

CGM Components

- Consists of a small sensor inserted under the skin to measure glucose in interstitial fluid


Medtronic Gardian


Freestyle Libre


Dexcom

CGM Components

- Transmitter sends glucose readings to a receiver (small hand held device that shows glucose trend information and can alert during glycemic excursions) or directly to an i-phone and can be shared with 5 people
- System integrates with insulin pump for automatic dosage

CGM Components

- Transmitter and receiver/phone have to be within 20 feet of each other
- Alarms for high and low glucose
- If bothersome contact parents to change settings
- Sensor readings most likely will not match glucose meter reading
  - Glucose meters measure whole blood

Why use CGM?

- Ability to be proactive
  - Significant impact on daily decision making
  - Try to prevent high and/or low readings
  - Less time out of class
  - Ability to monitor trend before/during an exam
  - Alarms can be changed – discuss with parents
- Minimize wide glucose fluctuations
- Identifies reasons for glucose excursions
  - Stress, hormone surges, meal composition

Why use CGM?

- Assist with pattern management
  - Increases confidence making adjustments in insulin dosing
  - Corrections too strong/weak
  - Basal testing overnight
  - Carb ratios on target
- Insight into the effects of physical activity

Why use CGM?

- Hypoglycemic unawareness
  - "Fall alert" feature
    - Gives more time to be proactive and helps prevent impending hypoglycemia
  - Reassurance for caregivers/patients who are fearful of nighttime hypoglycemia
- Catch missed boluses
- Dose timing

Rate & Direction of Change

» Rising fast at 3 mg/dL per minute or more

» Rising at 2 mg/dL per minute or more

» Steady

» Falling at 2 mg/dL per minute or more

» Falling fast at 3 mg/dL per minute or more

Drawbacks

- Overly aggressive correction of elevated glucose levels
- For pump users, having a second site
- Managing emotions around glycemic excursions, including alarm fatigue
- Skin irritation
- Cost
- Data overload
- Avoid injecting insulin or placing an insulin pump infusion set within 3 inches of sensor

School Basics Review

Process at Breakfast or Lunch:

1. What is the current blood sugar?
2. Calculate for insulin dose
3. Administer insulin

School Basics Review

Child doesn't feel well:

1. What is the blood sugar?

Low blood sugar – give rapid acting carbohydrates

High blood sugar – check ketones and follow sick day guidelines

Tandem Control IQ

Tandem Control IQ

- Adjusts insulin delivery to help prevent high blood sugars (automated partial corrections and increased basal insulin)
- Adjusts insulin delivery to help prevent lows (temp basal suspensions)
- Still requires the user to manually bolus for carbohydrates

Tandem Control IQ

Control-IQ Technology Pump Icons

Symbol	Meaning
	Control-IQ technology is on but not actively increasing or decreasing basal insulin delivery.
	Control-IQ technology is increasing basal insulin delivery.
	Control-IQ technology is decreasing basal insulin delivery.
	Control-IQ technology has stopped basal insulin delivery.
	Control-IQ technology is delivering an automatic correction bolus[1] (or an automatic bolus).
	The Sleep Activity is enabled.

Symbol	Meaning
B	Control-IQ technology is delivering the normal Personal Profile basal rate.
B	Control-IQ technology is increasing basal insulin delivery.
B	Control-IQ technology is decreasing the basal insulin delivery.
	Basal insulin delivery is stopped and a basal rate of 0 u/hr is active.
	Control-IQ technology is delivering an automatic correction bolus.
	The Exercise Activity is enabled.

Tandem Control IQ

Top of the Diamond is blue with "B" and "droplet" boxes indicates: pump increases the basal rate and delivering a bolus to decrease the blood sugar

Tandem Control IQ

Bottom of the Diamond is yellow with a "B" in the Yellow box indicates: pump is decreasing the basal rate to keep blood sugar in target range

Tandem Control IQ

- Managing Low Blood Sugars using Control IQ:
  - Treat low blood sugars with 7-8 grams of carbohydrates instead of treating with 15 carbohydrates. This is because the pump is treating the low blood sugars by stopping the basal rate.

Tandem Control IQ

- Insulin On Board

  Insulin on board (IOB) refers to **insulin that is still active in your body from previous bolus doses**. All insulin pumps have an IOB feature that allows the pump to calculate any remaining insulin in the body from recent boluses.

Tandem Control IQ

- Exercise Activity Mode
  - mode with higher target before exercise starts.
  - How far in advance and when to stop that higher target will depend on the individual, the activity, the duration and past experience.
  - Remember that if someone is starting exercise with a higher glucose reading, this is not a protecting factor as Control IQ will still modulate basal rates and give partial correction doses to address this.

Tandem Control IQ

- Information given regarding Tandem Control IQ is from Tandem's website:
- https://www.diabeteseducatorscalgary.ca/devices/insulin-pumps/tandem.html