

# QUICK TIP GUIDE: DIABETES

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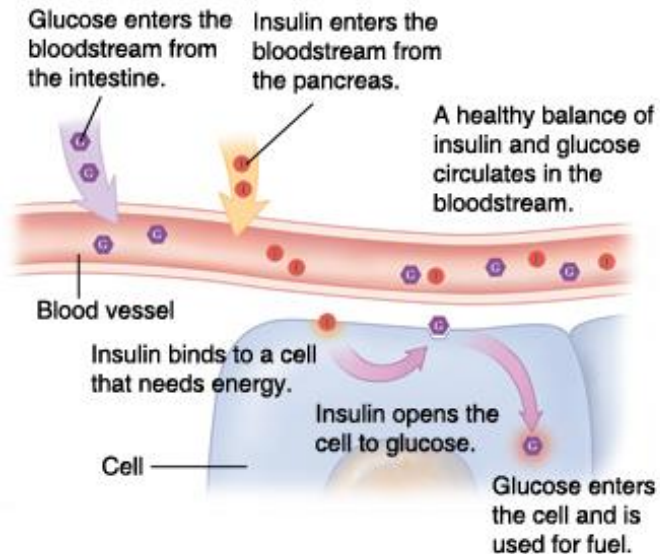
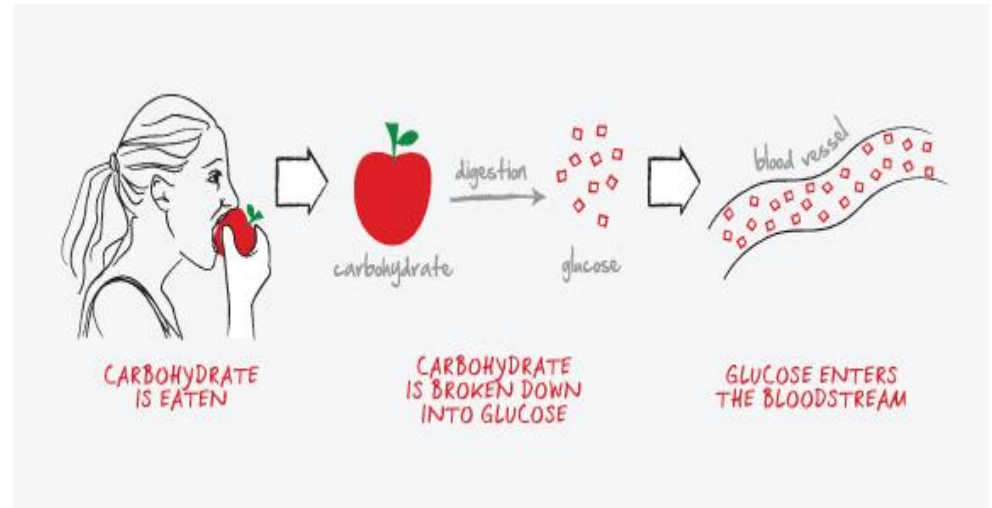


## The body

The digestive tract breaks down carbs into glucose.

Glucose is a form of sugar that enters the bloodstream.

Insulin, a hormone, then helps cells in the body to absorb this glucose and use it for energy.



## What is diabetes?

- A chronic disease in which blood glucose levels are above normal rates.
- A disorder of metabolism; the way the body uses digested food for energy.
- The body doesn't produce enough insulin or insulin doesn't work properly.

# The Basics

- Insulin
  - A hormone produced by the pancreas that is responsible for regulating blood glucose levels.
  - The “key” in allowing glucose to move from blood into the cells
  - So what’s the problem?
    - In diabetes, the body makes too little/no insulin or the body doesn’t use the insulin properly.

Lack of insulin

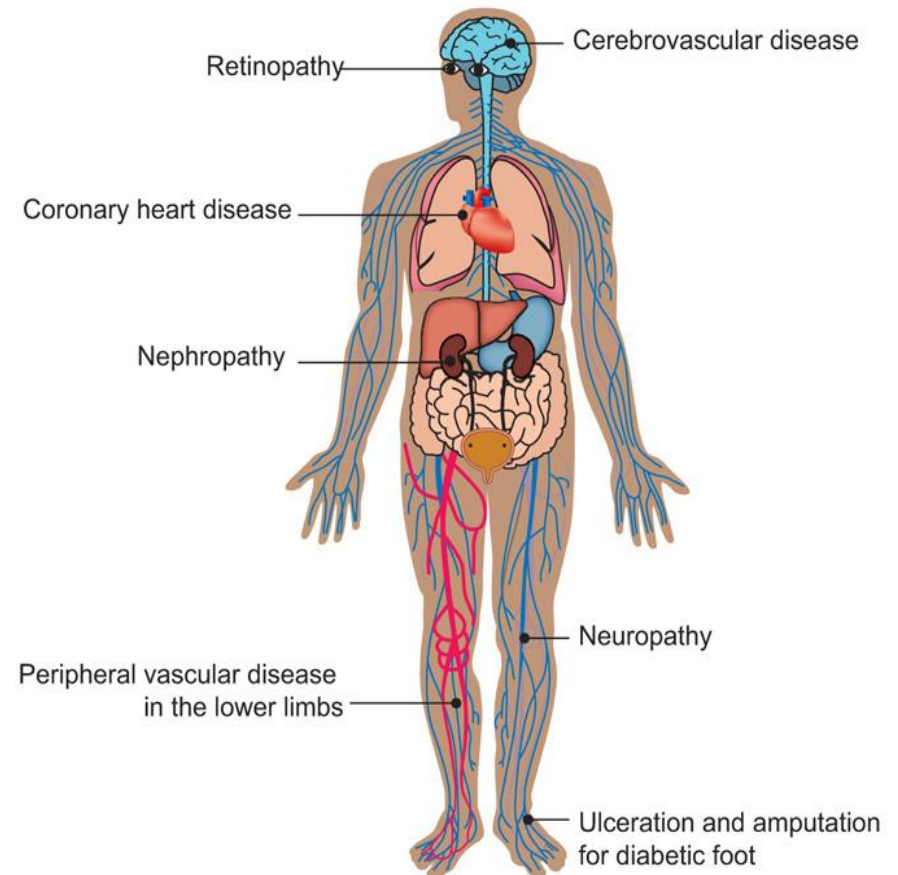


Increase in Glucose

# The Basics

- **Complications**
  - High blood glucose can damage nerves and blood vessels causing heart disease, stroke, kidney problems, blindness, and amputations.
  - Others issues include susceptibility to other disease, loss of mobility, depression and pregnancy complications.

## Major diabetes complications



# The Basics

- Type 1 Diabetes
  - An auto-immune disease where the body's immune system attacks and destroys the body's insulin producing cells (also known as beta cells in pancreas).
    - Could be caused by a genetic predisposition or inherited factor, and
    - Individuals could be “genetically sensitive” to environmental triggers like viruses, food or toxins that make them at risk.
  - The pancreas then produces little or no insulin.
  - “Insulin-dependent” diabetic that now must take insulin everyday.
  - Cannot be prevented or cured.
  - Usually occurs in children and requires lifelong management.

# The Basics

- Type 2 Diabetes
  - The most common form of diabetes.
  - A progressive disease that usually begins with insulin resistance because the body doesn't use insulin properly.
  - The body needs more and more insulin to control blood glucose and the pancreas cannot keep up with the production needs .
  - Physical inactivity and obesity are strongly associated with development of type 2 diabetes. Other screening criteria include:
    - Family history of T2DM
    - High risk ethnicity
    - Maternal history of gestational diabetes
    - Age > 10 years, and
    - Puberty

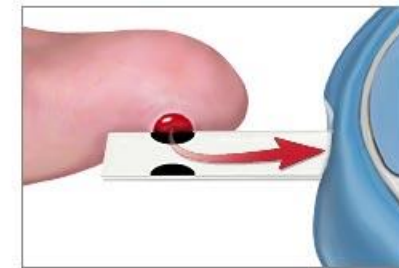
# The Basics

- Gestational Diabetes

- Develops during pregnancy when the body fails to produce enough insulin.
- Hormones produced by the placenta contribute to insulin resistance.
- Usually goes away after the baby is born, but the woman can be at increased risk for developing diabetes.
- The newborn baby is also at increased risk for obesity and developing T2DM.

# The Basics

- Blood glucose monitoring
  - BG levels measured in mg/dL.
  - Provider order should state method and time for checking blood glucose.
  - Times could include before meals/snacks, before physical activity, and when symptomatic of low or high sugar.
  - Insulin dosing will be based on these results.
- Insulin delivery methods
  - Syringe
  - Pen
  - Pump





# BGM Equipment

- Lancing device
- Lancets
- Blood glucose monitor and test strips
- Sharps disposal method
- Labels with student's name on all equipment



A lancet can be used to obtain blood from your finger

ADAM.



ADAM.

- The BGM Device features:
  - Small amount of blood needed for reading
  - Quick results
  - History can be downloaded

# BGM Results

- Know the “high” and “low” range for device.
- Use appropriate strips for meter.
- Check strip expiration dates and code (if applicable):
  - Usually good for 3 months once opened, and
  - Code on strips must match device.
- Monitor storage temperature for test strips per manufacturer instruction:
  - Usually not recommended to be placed where temperature greater than 85° or less than 35° (think about field trips).
- Meter should only be used to read blood from sites designed for its use. The meter must be designated if alternative test site is applicable. (Forearm is usually the most popular alternate site)
- The testing site should be clear, dry and warm. Use the side of finger while avoiding the tip or pad. Avoid site with bruising or injury. Do not “over-milk” the site while waiting for blood flow. This can skew the result.

# BGM Results

- BGM supplies should be readily accessible at all times. It is best to have supplies WITH the student if able.
- Examples of times when testing may occur more frequently include in event of:
  - Illness
  - Changes in behavior
  - Symptoms
  - New diagnosis
  - Menstrual cycle
  - Recent changes in treatment plan, and
  - Prior to critical tasks like driving, testing



# Target Blood Glucose Ranges

Values by age	Before meals	Bedtime-Overnight
< 6 years	100-180	110-200
6-12 years	90-180	100-180
13-19 years	90-130	90-150

(ADA, 2014)

# Insulin administration at school

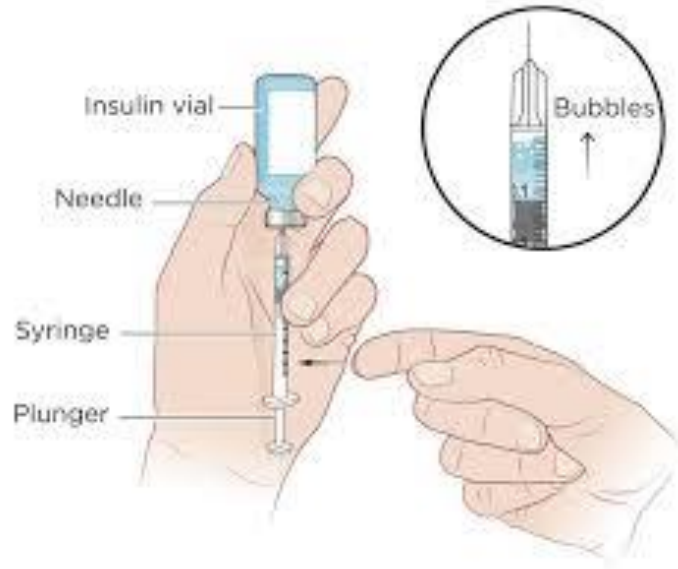
- Meal bolus
  - A meal bolus of insulin will need to be delivered to cover carbohydrate intake at meals or snacks.
  - The ordered dose will be determined by the insulin to carb ratio.
- Correction bolus
  - A insulin dose that is ordered to correct high BG.
  - Dose determined by correction factor or sliding scale.
  - This dose may be added to the meal bolus.
- Correction factor
  - The amount that one unit of insulin will lower the BG.

$$\frac{\text{Actual BG} - \text{Target BG}}{\text{Correction Factor}} = \text{Correction Dose (in units)}$$

# Determining a Bolus & Correction factor

## 5 Questions

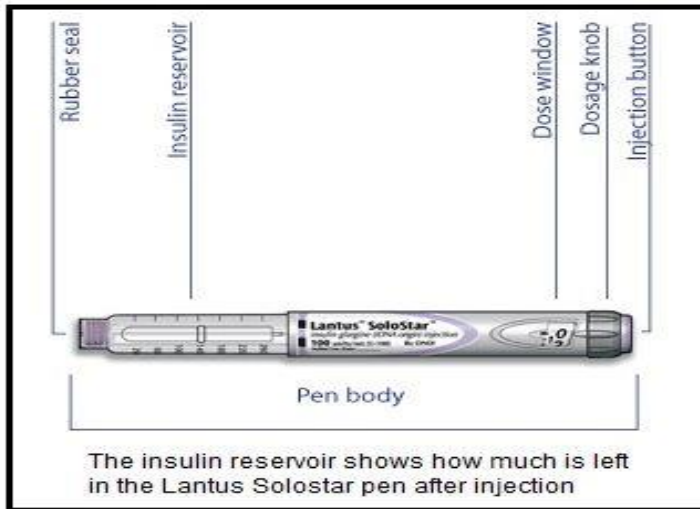
1. What is the blood glucose level now?
2. How much carbs will be eaten?
3. What is the insulin dose for this amount of carbs?
4. Should the insulin be lowered because of the upcoming activity?
5. What has happened previously under these circumstances?



## Insulin by syringe

- Traditional method of vial and syringe.
- Insulin specific syringe must be used. Sizes include:
  - 100 units (equal to 1 cc)
  - 50 units
  - 30 units
- Syringes also available in  $\frac{1}{2}$  units
- The backup method to be used in event of pump failure.

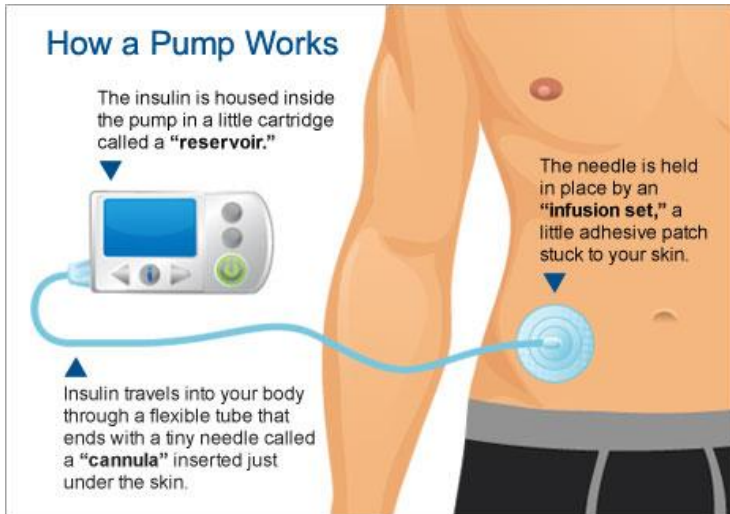
# Insulin Pens



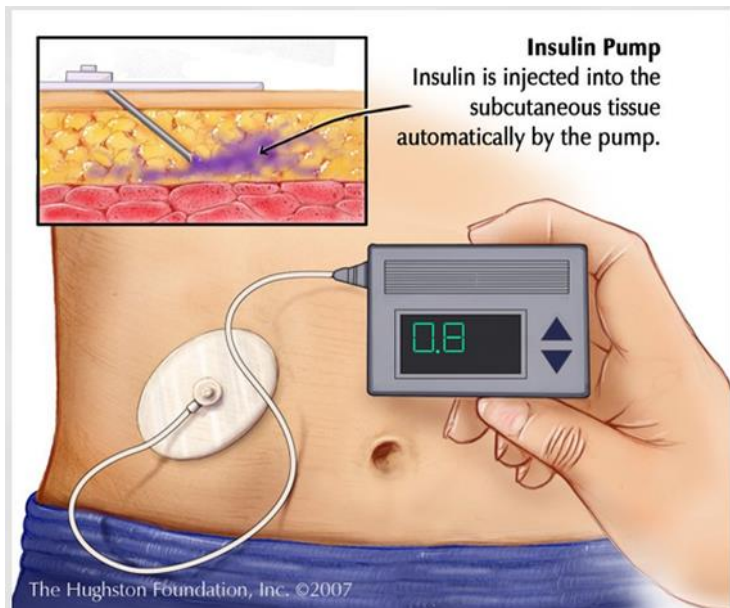
- 2 types available
  - Pre-filled disposable pen
  - Permanent pen with replacement cartridge
- The type/brand of pen must match the orders.
- Allows a person to dial the dose of insulin needed.
- All pens use a replaceable needle changed with each dose.
- The needle must be primed to clear air from needle-shaft.
- You will dial in the desired insulin dose. Pens usually dial by  $\frac{1}{2}$  unit, 1 unit or 2 unit increments.
- Must ensure there is enough insulin remaining in the cartridge for a complete, accurate dose.
- Verify/label expiration date (can range from 10-42 days after opening, depending on brand).



# Insulin Pumps

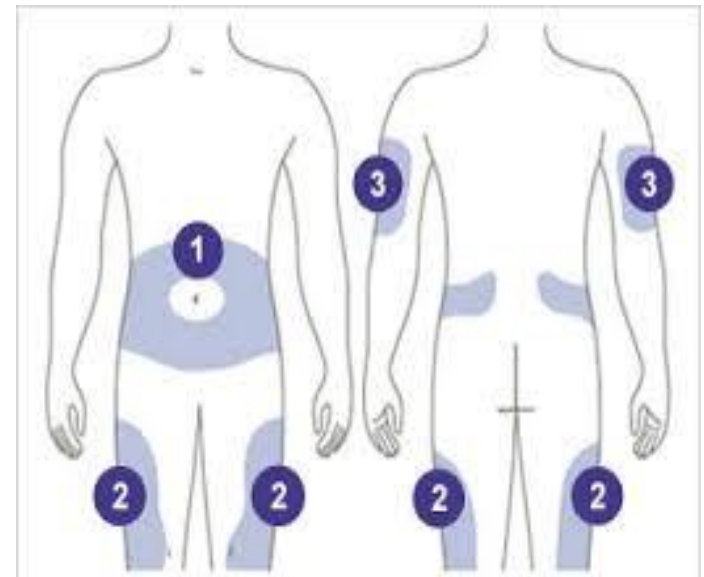
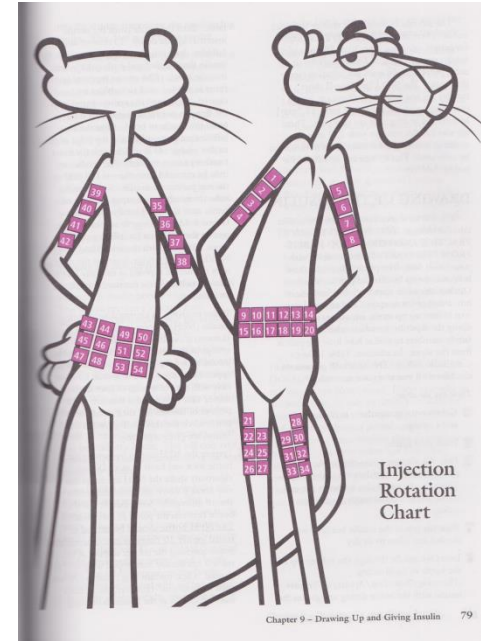


- A computerized device that delivers a continuous pulse of insulin.
- The pump is programmed to deliver a "basal" rate of insulin throughout the day; a constant steady dose.
- "Boluses" are delivered as needed for meals and when blood sugar is high.
- The healthcare plan should specify alternate means of insulin administration in the event of pump failure.
- Staff should know how to suspend or disconnect the pump in the event the student becomes unconscious or has a seizure.
- Staff should be educated on pump alarms.



# Injection technique

- Rotate sites for best absorption.
- Change needle with each injection.
- Sub Q not IM injection (too fast absorption).
- Use distraction methods.
- Allow topical alcohol to evaporate before injection.
- Apply pressure for about 5-8 seconds after the injection, without rubbing.



# POTENTIAL SCHOOL EMERGENCIES

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# Potential school emergencies

- Low blood glucose (hypoglycemia),
- Severe low blood glucose (requires Glucagon administration),
- High blood glucose (hyperglycemia), and
- Diabetic ketoacidosis (DKA).

# Hypoglycemia: Low blood glucose

- Greatest immediate threat to student with diabetes.
- BG below 70 mg/dL.
- Low blood sugar can occur within minutes and requires immediate action.
- Causes: too much insulin, skipping meals, not eating enough to cover amount of insulin given, miscalculated carb intake, exercise or increased activity without eating, increased emotions, hormone fluctuations.
- Prevention: test BG routinely per orders, testing in classroom, eating at regular times, rotate insulin injection sites.
- Effects on learning: cannot focus, may not return to normal cognitive and motor function for an hour, attention and memory issues.
- KNOW STUDENT SPECIFIC SYMPTOMS.
- WHEN IN DOUBT, TREAT.

# Low Blood Glucose- Hypoglycemia Action Plan

Mild

Moderate

Severe

Hungry, shaky, weak, dizzy, headache, blurred vision, sweaty, clammy, tired, flushed, hot, fast heartbeat

Mild symptoms plus behavior/mood changes, anxious, irritable, spacing out, poor coordination, tingly around lips

Mild and moderate symptoms plus inability to swallow, confused, can't follow directions, inability to wake up, loss of consciousness, seizures, convulsions.

## Mild to moderate low blood sugar

- Notify school nurse
- Check BG
- Follow plan/EAP
- When in doubt, TREAT.

### Take Action:

- Give \_\_\_\_ grams carbs (usually 15g carbs)
  - \_\_\_\_ oz fruit juice
  - \_\_\_\_ oz milk
  - \_\_\_\_ grams glucose gel
  - \_\_\_\_ glucose tabs
- Recheck BG in 15 minutes
- If BG less than \_\_\_\_ mg/dL, give another \_\_\_\_ grams of carb

## Severe low blood sugar

- Do not give anything by mouth
- Give Glucagon per IHP and ECP
  - 0.5 mg
  - OR
  - 1.0 mg
- Position student on side; risk for vomiting
- Stay with student
- Call 911 (person should be previously designated)

# Glucagon

- A life saving treatment for severe hypoglycemia.
- An injectable hormone that forces the liver to release stored glucose into bloodstream and raise BG within 5-15 minutes.
- Generally, if student weighs >45 lbs, the fill vial (1cc) may be injected. If the child weighs <45 lbs, half the dose (0.5cc) may be given.
- Cannot harm, cannot overdose.
- When possible, expose the site to be given. However, can be administered through clothing. Treat on the spot in classroom.
- Storage location should be noted in student's IHP and must be accessible. Considerations include:
  - Storing at room temperature
  - Monitoring expiration date
  - Marking dose on outside of box, and
  - Replacing after use.
- If given, 911 MUST be called.



# Hyperglycemia: High blood glucose

- NOT considered a medical emergency but important to treat immediately before DKA occurs (will be reviewed next).
- BG above 240 mg/dL.
- Can result in poor academic performance by interfering with ability to concentrate, nausea, vomiting, fatigue.
- Causes: Taking too little insulin, eating food not covered by insulin, decreasing exercise, having an illness or injury, stress, hormone fluctuations with menstruation, stress, medications, insulin resistance.
- Prevention: Eat on time, medications on time, check BG per schedule, exercise on time.



# Diabetic ketoacidosis

- A dangerous, life-threatening condition when BG levels are high and ketones are detected.
  - Ketones form when there is not enough insulin. The body starts to break down fat for energy. Ketones are then detected in blood or urine as a by-product.
- BG usually in excess of 250.
- Usually caused by not taking any/enough insulin.
- A medical emergency!
- Perform ketone testing according to IHP and ECP:
  - BG > 240mg/dL two times in a row, or nausea or vomiting

# High Blood Glucose- Hyperglycemia Action Plan

Mild



Moderate



Severe

Thirsty, dry mouth, frequent urination, tired, hungry, blurred vision, fruity breath, flushed, lack of coordination

Mild symptoms plus nausea, vomiting, stomach pain, dry itchy skin, unusual weight loss

Mild and moderate symptoms plus labored breathing, weakness, confusion, unconscious

## Mild to moderate high blood sugar

- Notify school nurse
- Check BG
- Follow plan/EAP
  - Encourage water
  - Supplemental insulin
- Test urine for ketones
- Free use of bathroom
- Limit activity

## Severe high blood sugar

- Consider DKA
- Do not leave student alone
- Prompt notification if ketones present
- Monitor alteration in respiratory status
- Encourage water and other sugar-free liquids
- Encourage use of bathroom
- Call 911

- Type 1 Diabetes
  - Insulin administered to cover BG level and carbs eaten
  - May also require oral medication
- Type 2 Diabetes
  - Lifestyle change
  - Oral medication



Types of Insulin	Brand
Rapid acting <ul style="list-style-type: none"> <li>• Bolus insulin, peaks within 10-15 minutes</li> <li>• Used to treat high BG, to “cover” an increase in BG before/after meals</li> </ul>	Humalog, Novolog, Apidra
Short acting <ul style="list-style-type: none"> <li>• Similar to rapid, but peak is delayed and duration is longer</li> </ul>	Regular
Intermediate acting <ul style="list-style-type: none"> <li>• Basal insulin, coverage between meals, overnight</li> </ul>	NPH
Long acting <ul style="list-style-type: none"> <li>• Basal insulin, coverage between meals, overnight</li> </ul>	Lantus, Levemir

# Nutrition and meal planning

- Healthy meal plan includes balancing carbs.
- Carbs are main energy source and will cause blood glucose to quickly rise; carbs are main focus of meal planning.
- Carb counting is used to match amount of insulin to control BG levels.
- Carbs found in: dairy, starchy vegetables, grains, fruits, juice, sweets, condiments, sauces, dressings.
- Meal planning for student should include:
  - Time,
  - Amount, and
  - Content of food matched to insulin needs.

<b>Nutrition Facts</b>	
Serving Size 1 Cake (43g) Servings Per Container 5	
<b>Amount Per Serving</b>	
<b>Calories</b> 200 Calories from Fat 90	
% Daily Value*	
<b>Total Fat</b> 10g	<b>15%</b>
Saturated Fat 5g	<b>25%</b>
Trans Fat 0g	
<b>Cholesterol</b> 0mg	<b>0%</b>
<b>Sodium</b> 100mg	<b>4%</b>
<b>Total Carbohydrate</b> 26g	<b>9%</b>
Dietary Fiber 0g	<b>0%</b>
Sugars 19g	
<b>Protein</b> 1g	
Vitamin A 0%	• Vitamin C 0%
Calcium 0%	• Iron 2%
* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:	
	Calories: 2,000 2,500
Total Fat	Less than 65g 80g
Sat. Fat	Less than 20g 25g
Cholesterol	Less than 300mg 300mg
Sodium	Less than 2,400mg 2,400mg
Total Carbohydrate	300g 375g
Dietary Fiber	25g 30g

# INDIVIDUAL DIABETIC MANAGEMENT PLANS

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# Management at school

- Monitor BG levels.
- Individualized BG target range per provider orders,
- Recognizing and treating hypo/hyperglycemia,
- Administering insulin,
- Administering Glucagon,
- Carb counting,
- Plans for disasters and emergencies,
- Planning for field trips and activities, and
- Social, emotional and academic issues.

# Management at school

- Parents are responsible for providing medications and supplies which can include:
  - Insulin
  - Syringes
  - Lancing device, lancets, alcohol swabs
  - BG monitor and testing strips
  - Ketone testing strips
  - Hypoglycemia treatment supplies
  - Glucagon emergency kit

# Management at school

- Physical activity guidelines
  - Adjustments may need to be considered for insulin and/or food intake and BG levels may need to be checked. Consider the following:
    - BG levels before exercise should be over 100 and under 250. *Provider orders should state acceptable parameters for student.*
    - Students should eat prior to exercising if it has been more than 2 hours since last intake.
    - Always have water, a fast-acting sugar and complex carb available in case of low blood sugar treatment.
    - PE instructors and coaches should have copy of student's EAP and should be knowledgeable of S/S of emergencies and treatment.



# Emergency Plan Overview

- Each diabetic student should have emergency care plan. The plan should be shared with all the non-licensed school personnel who have responsibility for the student during the school day.
  - Emergency contact information,
  - Signs/symptoms to identify the situation as a crisis, and
  - Step by step actions in event of health crisis.

# Emergency Kit

- Kit should be stored in secured location.
- Kit must accompany student off campus on trips.
- Should be properly labeled with student's name.
- Examples of what should be included in kit:
  - BG meter with testing strips,
  - Lancets,
  - Batteries,
  - Insulin and supplies including syringes, pump, etc.,
  - Fast-acting glucose (gel),
  - Carb containing snack (cheese or PB crackers), and
  - Hypoglycemia food supplies (quick sugar, carb snack, protein snack).

# Resources

American Diabetes Association

<http://www.diabetes.org/>

H.A.N.D.S. Helping Administer to the Needs of the Student with Diabetes in School

<http://www.nasn.org/ContinuingEducation/LiveContinuingEducationPrograms/HANDSDiabetesProgram>

NIH- National Diabetes Education Program

<https://www.niddk.nih.gov/health-information/health-communication-programs/ndep/Pages/index.aspx>

Nurse Files- Colorado Kids with Diabetes

<http://www.coloradokidswithdiabetes.org/nurse-files/>

Project Wishes- Safe Administration of Glucagon Policy and Procedure

<http://www.wishesproject.org/>

Safe at School: American Diabetes Association

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

Students with Diabetes – A Resource Guide for Wisconsin Schools and Families

<https://www.dhs.wisconsin.gov/diabetes/students.htm>