DIABETES
What is Diabetes?

- Body does not make or properly use insulin
- No insulin production
- Insufficient insulin production
- Resistance to insulin’s effect
TYPE 1 DIABETES

- Auto immune disorder
- Daily insulin replacement necessary
- Usually childhood or young adult onset
- Most prevalent type of diabetes in children
- Type 1 Diabetes has a relatively quick onset
- **Symptom**: increased urination, tiredness, weight loss, increased thirst, hunger, blurred vision
- Cause is uncertain, likely both genetic and environmental factors come in play
Type 2 Diabetes

- Insulin resistance is the first step
- Most common in adults but is increasingly common in children due to inactivity and being overweight
- Type 2 Diabetes in children have a variable time frame
- **Symptoms**: tired, thirsty, hunger, and increased urination
- Some children show no symptoms at time of diagnosis
- Diabetes is managed but does not go away
- Diabetes management is 24/7
- The goal is to maintain target blood sugar
- There is a constant juggling between insulin/medication with exercise and food intake
HYPERGLYCEMIA AND HYPOGLYCEMIA

- Glucose- a simple sugar found in the blood, the fuel that all body cells need to function
- Hypoglycemia- a LOW level of glucose in the blood
- Quick-acting glucose- foods containing simple sugar that raise blood glucose levels
- Glucose tablets or gel- special products that deliver a pre-measured amount of pure glucose
- Glucagon- a hormone given by injection that raises the level of glucose in the blood
- Carbohydrate- source of energy for the body
Hypoglycemia

- Hypoglycemia is a LOW blood sugar.
- Onset is sudden and may progress to unconsciousness if not treated and can result in brain damage or death.
- Never leave a child alone if this is suspected.
RISK & COMPLICATIONS OF HYPOGLYCEMIA

- Greatest immediate danger
- Not always preventable
- Impairs cognitive and motor functioning
- Early detection and intervention can prevent an emergency
POSSIBLE CAUSES OF HYPOGLYCEMIA

- Too much insulin
- Too little food
- Extra physical activity
Hypoglycemia Signs and Symptoms

- **Mild symptoms**: hunger, shakiness, weakness, paleness, blurry vision, increased heart rate/palpitations, sleepiness, changed behavior, sweating, anxiety, dilated pupils

- **Moderate to Severe**: yawning, irritability/frustration, extreme tiredness/fatigue, inability to swallow, sudden crying, confusion, restlessness, dazed appearance, unconsciousness/coma, seizure
WHAT TO DO FOR MILD HYPOGLYCEMIA

- **Intervene promptly.** Follow Doctor’s and PLAN of action
- Verify with blood glucose test when available.
- When in doubt, always treat. If no meter is available, treat immediately
- **Mild hypoglycemia:** Have student eat or drink fast acting carbs (15g)
- Test blood glucose 10-15 minutes after treatment
- Repeat treatment if blood glucose remains low or if symptoms persist per Doctor Order’s and PLAN

- **Examples of quick acting glucose** (15g of Carbohydrates) are 4oz of fruit juice, 15gm glucose tablets (2-3 tablets), 1 tube of glucose gel, 1-2 tablespoons of honey, 6oz regular (not diet) soda
WHAT TO DO FOR SEVERE HYPOGLYCEMIA

- **Severe Hypoglycemia** is rare, but life threatening, if not treated promptly:
  - Place student on his or her side
  - Inject glucagon, per Doctor’s orders
  - Never leave child alone or put anything in students mouth
  - Call 911, then parent or guardian
  - Student should respond to treatment in 15 to 20 minutes
  - Remain with student until help arrives
Glucagon

- Is a natural hormone made in the pancreas
- A life saving, injectable hormone that raises blood glucose level
- Can save a life
- Can not harm a student
WHEN TO GIVE GLUCAGON

- Glucagon is ordered by the physician
- Student is unconscious, unresponsive, having convulsions or seizures, unable to eat or drink
- Never leave child unattended
- Call 911 and have someone notify parents

If you have an emergency, always CALL 9-1-1
Hypoglycemia: Prevention

- Keep a quick-acting sugar source
- Treat at onset of symptoms
- Eat, Insulin, Test, Exercise on time
- Ensure reliable insulin dosing, per Doctor’s Orders
- Ensure insulin dosing matches food eaten
- Consult with doctor and parents when snack, meal or exercise times are changed
- Monitor blood-glucose variations on days that include exercise, snack may be needed 1/2 hour before exercise. Consult physician
- A student should never be unattended when a low blood sugar is suspected
Hyperglycemia

- Hyperglycemia-too high a level of glucose in the blood
- Ketones- Chemicals that the body makes when there is not enough insulin in the body and the body must break down fat for its energy
- Ketone testing- a procedure for measuring the level of ketones in the urine or blood
- Diabetic Ketoacidosis (DKA)- the build up of Ketones in the body that can lead to serious illness or coma
- DKA is a medical emergency, call 911
- Child should never be left alone if suspected
In hyperglycemia there is too much sugar in the blood but the cells are starving.

Onset is usually slow to develop but can be rapid with pumps.

Hyperglycemia if left untreated may lead to DKA.

Hyperglycemia possible causes are too little insulin, expired insulin, food not covered by insulin, decreased physical activity, illness, injury, stress, other hormones, menstrual periods.
HYPERGLYCEMIA POSSIBLE SIGNS & SYMPTOMS

- **Mild symptoms**: lack of concentration, frequent urination, flushing of the skin, sweet fruity breath, fatigue, sleepiness, pains, thirst, blurred vision, increased hunger, increased weight

- **Moderate hyperglycemia signs & symptoms**: dry mouth, stomach cramps, vomiting, nausea

- **Severe hyperglycemia signs & symptoms**: labored breathing, very weak, confused, unconscious
WHAT TO DO FOR HYPERGLYCEMIA

- The goal is to lower the blood sugar to the target range
- Verify blood sugar with blood sugar test
- Check ketones as per doctor’s orders
- Use of bathroom and access to water
- Administer insulin as per recheck blood sugar glucose as per doctor’s orders
How to Prevent Hyperglycemia

- Eat, Insulin, Test, Exercise on time
- Reliable insulin dosing as per doctor’s orders
- Make sure that food eaten matches insulin dosing (monitor food intake)
- Teacher consult nurse prior to snack
- Take appropriate action if a missed dose of insulin is suspected or if an insulin pump malfunctions
- Avoid over treating low blood sugar reactions
**Insulin**

- A hormone produced in the pancreas that regulates the amount of glucose in the blood. The lack of Insulin causes a form of diabetes.
TYPES OF INSULIN

- Rapid-acting: Humalog, Novolog
- Short-acting: Regular
- Intermediate: Lente, NPH
- Long-acting: Ultralente, Glargine (Lantus)
INSULIN STORAGE

- Insulin can be stored in the refrigerator or at room temperature as specified by doctor’s orders.
- Insulin can be administered by insulin syringe, insulin pen, insulin pump, or jet injector.
WHEN TO GIVE INSULIN

- Insulin is to be given as per doctor's orders

- Insulin is generally ordered by a physician before meals, for blood glucose levels above target range, for increase ketones
URINE KETONE TESTING

- Ketones can build up and result in diabetic ketoacidosis (DKA)
- If blood sugar is high (as specified on doctor’s orders) check urine for ketones with ketone test strips
- Call Doctor with result of test
What is DKA?

- Acids that build up in the body and cause student to feel ill
- This is an Emergency, can lead to coma or death
- **Common symptoms**: fruity odor to breath, nausea, vomiting, drowsiness
Carbohydrate Counting

- Calories come from carbohydrates, proteins, and fat
- Each nutrient affects blood sugar differently
- Carbohydrate has the biggest effect on blood sugar
- Total carbohydrate matters more than the source (sugar or starch)
- The insulin-to-carb ratio: varies from student to student, is determined by the doctor’s orders
Carbohydrate Counting Example

Carb Ratio = 1:8
Blood Glucose = 65
Carbs consuming = 56
Student is going to lunch now and has a Humalog pen.

Option 1 = Give the student 15 free carbs and cover as normal = 56 ÷ 8 = 7 units

Option 2 = Subtract 15 carbs from the lunch to cover the low 56 - 15 = 41 than 41 ÷ 8 = 5 units
Carbohydrate Counting Example

Carb Ratio = 1:12
Blood Glucose = 300  Ketones = negative
Sliding Scale = 200-250 1 unit
   251-300 1.5 units
   301-350 2 units
Carbs consuming = 30
Student is going to lunch now and uses insulin syringe.

Example 1 = \( \frac{30}{12} = 2.5 \) units and add 1.5 units for elevated sugar = 4 units
EXAMPLES OF DIABETIC FORMULAS

Blood sugar - (target number) =X
X÷ (Insulin Sensitivity) = Correction Dose of insulin
OR
Blood Glucose Minus Target
Divided by Insulin Sensitivity
Equals = #units of insulin

Example:
Student has glucose reading of 250.
Target Number = 100
Insulin Sensitivity = 30

250-100=150
150÷ 30= 5 units of insulin for elevated coverage
DIABETIC MONITORING

- **Goal:** maintain blood glucose within target range

- **Immediate benefit:** maximize learning and participation by preventing low and high blood sugars

- **Long term benefit:** decrease risk of long term complications to student’s health
Dexcom Policy

Policy:

1. All students with the Dexcom CGM System (Model 4 or 5) must have a Physicians’ order on file with both the School District and the Schools’ Clinic. The orders must state that interventions are to be based on the Dexom CGM results.¹
2. The student’s 504 plan or IEP will include directives for the use of the Dexcom CGM at school and will address the use of smart or android device while in the school setting and must include alternative plans for utilization with nurse’s who either do not have or do not wish to use their private smart phone. If the parent elects to utilize the school’s Wi-Fi to transmit Dexcom Share it will need to be included in the 504 / IEP.²
3. Each staff member having involvement with student will be informed of his/her condition by the school nurse and/or parent.
4. All school support staff, including: secretaries, cafeteria staff, custodians and bus drivers (if needed) will be made aware of the use of the Dexcom CGS by the school administrator, who will provide written literature that provides basic instructions on emergency procedures.
5. All Direct staff and personnel (Administrator/Teacher/Teaching aide) will be encouraged to contact Integrity Health School supervisor to be educated on the needs of a diabetic student and how to recognize the signs of hypoglycemia (low blood sugar) and hyperglycemia (high blood sugar).
6. Each child with a Dexcom will need accommodations implemented by the teacher to monitor beeps/vibrations when child is out of target or going out of target range so that nurse can be notified.
7. Parents will be instructed to contact the school administration if they get a reading that needs nursing attention, so that the nurse can focus on the child.

¹ Some physicians and parents may want to opt to depend totally on the Dexcom CGM readings and not utilized fingers sticks. This will need to be clearly stated in the physician orders, the 504/ IEP, and the parental consent forms.
9. A School Nurse must be available on campus, at all times that a Miami-Dade County designated Dexcom dependent student is present, in the event of an alert requiring immediate nurse assessment.

10. The Dexcom CGM must be calibrated and verified every 12 hours to ensure accuracy as per the manufacturers’ recommendation. This should be done in the morning and evening in the students own home.

11. The Dexcom CGM System may be used to provide physician ordered actions, if stated in the physicians’ orders (e.g. Fluids, insulin, glucose) unless:

   - If acetaminophen (Tylenol) has been ingested in the past 12 to 24 hours.
   - With critical values
   - If the student has been out of the reception area of the receiver
   - At least 2 hours after calibration
   - If the reading does not have an arrow next to the number

12. If student states he/she is not feeling well, check their Dexcom CGM receiver to see his/her glucose trend and if his/her glucose is falling or rising. Student should be accompanied by a companion if he/she needs to go to the nurse’s location when not feeling well or (if necessary) check their blood glucose with a blood glucose meter. Staff will notify School Nurse that he/she is not feeling well and is on his/her way to the nurse location.\(^3\)

13. A Blood Glucose Monitor and recording charts will be kept in the in the Integrity Health Services binder. He/she is permitted to test at any time anywhere on school grounds. If his/her result is outside of the predetermined individualized “target” range, he/she must
14. The Dexcom CGM System is to be worn continuously in the classroom and throughout the school day. The Dexcom CGM system will have audible alerts to notify the student, the teacher and school staff if his/her glucose is above or below their glucose targets, as well as if there have been any sudden changes.

15. Alert levels are student-by-student specific and can be managed on the CGM device for day use, night use, or based on trends. It is suggested that the Physicians’ orders include the parameters for the alerts to be utilized while on campus.
   - The Nurse must verify and document alert settings upon student arrival to school each day and MUST be made aware if any acetaminophen products have been used in the past 24 hours.

16. The Dexcom CGM receiver will transmit alerts on the student’s smartphone or the receiver. When the student arrives at school and checks in with the nurse, the alerts may be set to be transmitted to the school nurses’ personal cell phone or tablet using HIPAA protected identifiers such as student initials or student ID number. Alternative plans for utilization, with nurse’s who either do not have or do not wish to use their private smart phone will be initiated as per the 504/IEP.

17. If a student who is ordered to have a Dexcom CGM System arrives at school without the device, the parents of said student will be notified. The Student may be allowed to remain at school and receive blood glucose checks (finger sticks) as per orders. If the student arrives without Blood Glucose Check device, the parent must be asked to bring it in.

18. If a student’s Dexcom CGM Systems’ sensor is dislocated or not functional, the sensor will be left intact and or secured to prevent being lost or misplaced. The parents and the school administrator will be notified. Sensors will NOT be replaced during school hours.
BIBLIOGRAPHY

- http://www.mayoclinic.org/diseases-conditions/diabetes/basics/definition/con-20033091