DIABETES: LEVEL 1
BASICS

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DISCLOSURE

Planner, Presenter, Author Disclosures

Jacqueline McManemin

I/we disclose the absence of personal financial relationships with commercial interests relevant to this educational activity within the past 12 months
Participants will:

1. Be able to describe the difference between type 1 and type 2 diabetes and the differences in care in the school system

2. Be able to describe the proper treatment for both hypoglycemia and hyperglycemia in the school setting

3. Be able to verbalize various resources available to assist in the care of diabetes in the school setting, including care plans
30.3 million Americans have Diabetes (9.4% of US population) – 2015

1.5 million new case each year

7.2 million Americans are undiagnosed

7th Leading Cause of Death

Increasing rates of Type 2 among American children

Estimated cost of diabetes is $245 billion
Diabetes is a chronic disease in which blood glucose (sugar) levels are above normal.

People develop diabetes because the pancreas produces little or no insulin or because the cells in the muscles, liver, and fat do not use insulin properly.
NORMAL PANCREATIC FUNCTION

(UC Barbara Davis)
DIABETES

UC Barbara Davis
Diabetes is a chronic illness. There are 3 main types:

- **Type 1**: pancreas does not make insulin
- **Type 2**: pancreas does not make enough insulin and/or body does not use insulin properly (insulin resistance)
- **Gestational Diabetes**: develops during pregnancy where the hormones cause insulin resistance
TYPE 1 DIABETES

One of the most common chronic disorders in childhood

**Etiology:** Beta cell function destroyed, pancreas no longer produces insulin, body cannot process carbs/sugar

**Onset:** gradual; can occur at any age but typically occurs in children under the age of 10
TYPE 1 DIABETES

(UC Barbara Davis)
TYPE 1 DIABETES

**Causes/Risk Factors:**
- Genetic factors
- Autoimmunity
- Environmental damage

**Symptoms:**
- Increased thirst and urination
- Weight loss
- Blurred vision
- Lethargy, feeling tired all the time
TYPE 1 DIABETES

**Diagnosis**

- Hemoglobin A1C (>6.5%)
- Random blood sugar (>200)
- Fasting blood sugar (>126)

**Treatment**

- Insulin via injections or pump
- Carbohydrate counting
- Frequent blood sugar monitoring
- Exercising regularly and maintaining a healthy weight
TYPE 2 DIABETES

- Often referred to adult-onset diabetes
- **Etiology:** Often begins with *insulin resistance*
- **Onset:** gradual, due to loss of beta cell function
- **Causes/risk factors:** overweight, fat distribution, physical inactivity, family history, race, age, untreated prediabetes, gestational diabetes, polycystic ovarian syndrome
- **Symptoms:** sometimes none, increased urination, increased thirst, weight loss (variable), fatigue, slow wound healing
TYPE 2 DIABETES

Glucose enters the bloodstream.

Insulin enters the bloodstream.

With insulin resistance, glucose can’t enter cells efficiently, so too much of it circulates in the bloodstream.

Blood Vessel

The cell doesn’t respond to insulin.

Cell

The cell can’t open for glucose to enter and be used for fuel.
TYPE 2 DIABETES

**Diagnosis**
A1C test: 5.7-6.4% is prediabetes, >6.5 diabetes
Fasting plasma glucose (FPG) test: >126
Oral glucose tolerance test (OGTT): >200

**Treatment**
Lifestyle changes – weight loss, diet/nutrition, exercise, education
Oral medications
Injectable medications
Insulin

**Considerations for School**
Often no management needed at school
WHAT IS THE DIFFERENCE?

**Type 1**
- No Insulin
- Insulin Deficient
- Meal Planning
- Exogenous Insulin

**Type 2**
- Some Insulin
- Insulin Resistance
- Dietary Changes
- Oral Meds
A DAY IN THE LIFE

What is it like to have type 1 diabetes?

• Frequent blood sugar checking – sometimes 4+ times per day

• Counting carbohydrates before each meal

• Taking multiple injections per day

• Recognizing/Treating high and low blood sugars

• Managing exercise
BLOOD GLUCOSE MONITORING

- Before meals/anytime dosing insulin
- Symptoms of low blood glucose (hypoglycemia)
- Symptoms of high blood glucose (hyperglycemia)
- Before/after physical activity
- Or any other time requested by parent/guardian
According to the American Diabetes Association (ADA):

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before meals</td>
<td>90-130 mg/dL</td>
</tr>
<tr>
<td>Bedtime/Overnight</td>
<td>90-150 mg/dL</td>
</tr>
<tr>
<td>A1C</td>
<td>less than 7%</td>
</tr>
</tbody>
</table>
FOOD MANAGEMENT

- Carbohydrate Counting
  - Meal planning technique for managing blood glucose levels
  - Count total number of carbs in a meal and divide by carb ratio
  - Carb ratio is the units of insulin needed to cover grams of carbs consumed.
    Refer to DMMP/healthcare provider orders

- Fixed Carbohydrate Regimen
  - Insulin dose based on eating a fixed amount of carbs at each meal
What foods have carbs?
- Grains, like rice, oatmeal, barley
- Grain-based foods like bread, cereal, pasta and crackers
- Starchy vegetables like potatoes, peas, corn
- Fruit and juice
- Milk and yogurt
- Beans
- Sweets and snack foods like sodas, cookies, chips, candy, cake
HOW TO USE FOOD LABELS TO COUNT CARBS

When food labels are available:
- Serving size
- Total grams of carbohydrates (not just sugars)
  - Includes sugars, starch and fiber

When food labels are not available:
- Reputable websites, such as calorieking.com
- Smart phone apps
## Insulin Activities

<table>
<thead>
<tr>
<th>Type of Insulin</th>
<th>Begins Working</th>
<th>Main Effect</th>
<th>All Gone</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RAPID-ACTING and REGULAR</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humalog/NovoLog/Apidra</td>
<td>10-15 minutes</td>
<td>30-90 minutes</td>
<td>3-4 hours</td>
</tr>
<tr>
<td>Regular</td>
<td>30-60 minutes</td>
<td>2-4 hours</td>
<td>6-9 hours</td>
</tr>
<tr>
<td><strong>INTERMEDIATE-ACTING</strong> (lasts 10-20 hours)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPH</td>
<td>1-2 hours</td>
<td>3-8 hours</td>
<td>12-15 hours</td>
</tr>
<tr>
<td><strong>LONG-ACTING/BASAL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lantus (Insulin Glargine)</td>
<td>1-2 hours</td>
<td>2-22 hours</td>
<td>24 hours</td>
</tr>
</tbody>
</table>
INSULIN ADMINISTRATION

Insulin is delivered subcutaneously (into the fatty tissue just under the skin)

Syringe and Vial

Insulin Pen

Insulin Pump
**Hypoglycemia**
*Low Blood Glucose Level*

**Causes:**
- Too little food or skip a meal;
- too much Insulin or Diabetes Pills;
- more active than usual

**Onset:** Often sudden; may pass if untreated

**Symptoms**
- Shaky
- Fast Heartbeat
- Sweating
- Dizzy
- Anxious
- Hungry
- Blurry Vision
- Weakness or Fatigue
- Headache
- Irritable

**What Can You Do?**
- Check: your blood glucose right away. If you can’t check, treat anyway.
- Treat: By eating 3 to 4 glucose tablets or 3 to 5 hard candies; you can chew quickly (such as peppermints) or by drinking 4 ounces of Fruit Juice; or 1/2 can of regular soda pop.
- Check your blood glucose level again after 15 minutes. If it still low, treat again. If symptoms don’t stop, call your health care provider.
HYPOGLYCEMIA - <70 MG/DL

Causes of Hypoglycemia:
- Insulin dose is too high
- Skipping or delaying meals/snacks
- Exercising longer or harder than planned
- Insulin dose peaking at a different time than usual
- Combination of the above factors
HYPOGLYCEMIA

Considerations for School:

• Never leave a student alone or send them away when experiencing hypoglycemia. Treat on the spot.
• More likely to occur before lunch, at end of school day or during/after PE
SEVERE HYPOGLYCEMIA

Glucagon is a hormone made in the pancreas that raises blood sugar levels.

Glucagon/Glucagen is a rescue medication used in the event of severe low blood sugar causing the following symptoms:

- Seizure
- Unable to swallow
- Unconsciousness
SEVERE HYPOGLYCEMIA

Considerations for School:

- Glucagon is reconstituted, dose per MD orders (typical dose: 0.5 mg or 1 mg IM or SC)
- Once administered, the person should be turned onto their side due to the possible side effect of vomiting
- EMS should always be called after glucagon given
- After EMS is called, the student’s parents should be notified
HYPERGLYCEMIA

Blood sugar above the students specified range

Onset usually occurs over a period of time and has long term effects on the body and organs
HYPERGLYCEMIA

HYPERGLYCEMIA (High Blood Glucose)

Causes: Too much food, too little insulin or diabetes pills, illness, or stress.

Onset: Often starts slowly. May lead to a medical emergency if not treated.

SYMPTOMS:
- Extreme Thirst
- Need to Urinate Often
- Dry Skin
- Hungry
- Blurry Vision
- Drowsy
- Slow-Healing Wounds

WHAT CAN YOU DO?
- Check Blood Glucose
- Call Your Healthcare Provider
HYPERGLYCEMIA

Causes:
- Not enough insulin
- Missed insulin dose
- Eating too much food
- Illness
- Growth spurts
- Stress
- Decreased physical activity
- Rebound from a low
Considerations for School

- Provide water
- Possible correction with insulin
**Diabetic Ketoacidosis:**

Prolonged Hyperglycemia can result in a build up of ketones in the blood/urine, which can eventually lead to acidosis

**KETONES:**

Chemicals the body produces when it breaks down fat for energy

**Causes:**

- Forgetting to test/take insulin
- Infection/Illness
- Traumatic stress on body (particularly with type 2)
- Pump malfunction
- Not enough insulin
HYPERGLYCEMIA EMERGENCY

Symptoms:

- Upset stomach/nausea
- Stomach pain
- Vomiting
- Sweet, fruity breath
- Thirst and frequent urination (high blood sugar symptom)
- Dry mouth
- Drowsiness
- Deep breathing/labored breathing
- If left untreated, coma
Ketone Testing

- Parent provides urine ketostix or blood ketone testing meter and strips
- Test ketones per physician’s orders

Treatment:

- Insulin. Dose based on doctor’s guidelines and often dependent on ketone levels
- Fluid replacement (IVF or oral hydration)
- Sometimes hospitalization is required
HYPERGLYCEMIA EMERGENCY

Considerations for School

- Students should be sent home if ketotic
- If do not have ketone testing supplies at school, student is to be sent home if hyperglycemic and symptomatic
- EMS/911 should be called if a student is complaining of the following symptoms:
  - Nausea, vomiting, severe abdominal pain
  - Heavy breathing or shortness of breath
  - Dry mouth, extreme thirst
  - Increased sleepiness, lethargy
  - Altered level of consciousness
SCHOOL CONSIDERATIONS

How to plan/prepare for effective diabetes management in school

- Create school health team
- Review federal laws
  - Section 504
  - IDEA
  - IEP
- Prepare health documents
  - DMMP
  - Individualized health care plan
  - Emergency care plan
- Prepare an education plan
  - 504, all diabetics should have a 504 plan in place
  - IEP, if needed
- Train school personnel
Who should be a part of the school health team?

- Student
- Parent
- School Nurse and Health Aid
- Trained school personnel
- Administrators, including principal
- 504/IEP coordinator, special education services
- Teacher(s)
- Guidance counselor/school psychologist
- Lunchroom services, PE teacher, etc
SCHOOL CONSIDERATIONS

Actions of the School Nurse

• Understand your role with federal and state laws
• Know where emergency supplies are kept and how to recognize signs and symptoms of high and low blood sugars
• Obtain, review and implement the DMMP
• Facilitate initial school health team meeting
• Plan and implement training of designated staff
• Obtain necessary materials
• Accurate documentation
• Ongoing education
• Collaborate with outside agencies (i.e. physicians' offices)
• Communicate with parent/guardian
• Treat student with respect and enforce right of privacy
SCHOOL CONSIDERATIONS

• Develop an *individualized care plan* for the student
  • Brief description of diabetes
  • Blood sugar monitoring
  • Insulin regimen
  • Food plan
  • PE/recess
  • Interventions for hypoglycemia and hyperglycemia
  • Field trip/special events plan
  • Disaster plan
• **National Association of School Nurses**: continuing education program for school nurses and nurses called Helping Administer to the Needs of the Student with Diabetes in School (H.A.N.D.S.)
  
  • [https://www.nasn.org/programs/conferences/hands](https://www.nasn.org/programs/conferences/hands)

• **American Diabetes Association** offers “Diabetes Care Tasks at School: What Key Personnel Need to Know,”
  
  

• **Virginia Department of Education** diabetes training
  
REFERENCES

• **American Diabetes Association:** Safe at Schools

• **CDC:** statistical information, content

• **NASN:** H.A.N.D.S.

• **NDEP:** Helping the Student with Diabetes Succeed: A Guide for School Personnel

• **VDOE:** Manual for Training of Public School Employees in the Administration of Insulin and Glucagon

• **UC Barbara Davis Center:** Understanding Diabetes, 12th Edition, [http://www.barbaradaviscenter.org/](http://www.barbaradaviscenter.org/)