Diabetes Education
Train the Trainer Series:
Diabetes 101
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Diabetes Education
Children’s Healthcare of Atlanta

Reflection
As you go through this video, please pause to review the content and think about how you would apply this information to your school setting.
Introduction
The audience for this video is Georgia school nurses who care for students with a diabetes diagnosis.

Diabetes 101
Definition of Diabetes

Diabetes Management Basics

Diabetes Management at School

Definition of Diabetes
Diabetes Statistics
The Numbers
- More than 29.1 million people (9.3%) have diabetes:
  - Diagnosed with diabetes - 21 million
  - Undiagnosed but have diabetes - 8.1 million
  - Undiagnosed but have pre-diabetes - 86.0 million

Children
- 1 in 86,300 children have diabetes
- 1 in 400-600 children have Type 1
- 2 million adolescent ages 12-19 have pre-diabetes*
- 1 in 3 children born today will probably develop diabetes*
- 43% of GA 3rd graders are overweight or obese. (59% of adults)
- CDC: 8-45% of new onsets are likely Type 2

*Type 2 Diabetes

Definition of Diabetes
Diabetes is a metabolic disorder which is:
- Chronic and progressive
- Characterized by abnormal metabolism of carbohydrates, proteins and fats
- Associated with long term damage to organs such as the eyes, kidneys, nerves, heart and blood vessels

Glucose builds up in the blood because:
- Too little insulin is made
- The liver releases too much glucose
- High blood sugar (hyperglycemia) occurs because the release of glucose by the liver and uptake by the cells no longer matches
Normal Metabolism (Liver)

The Liver
Maintains blood glucose between meals
- Glycogenolysis (breakdown of glycogen to glucose)
- Gluconeogenesis (glucose made from protein and fat)
- Turns off after a meal due to glucagon suppression

Releases glucose in response to glucagon when blood glucose is low
The liver can release this glucose into our bloodstream in response to

Stress
Growth
Illness
Puberty

Normal Metabolism (Insulin)

Insulin is:
- A hormone made by beta cells in the pancreas
- Carries glucose from our blood to our cells to be used as energy; to the liver for storage
- Prevents the release of liver glycogen and fat breakdown
- Stores excess calories as fat

Normal Metabolism - Other Hormones

Glucagon — Secreted by the pancreas in response to low blood sugar or stress; stimulates glucose release by the liver which increase blood sugar

Incretins (Intestinal Hormones) — GIP and GLP-1* are released following a meal and increase beta cells sensitivity to glucose

Peptide-YY — reduces food intake

Endocannabinoid system — increases food intake

*gastric inhibitory peptide (GIP) and glucagon-like peptide-1 (GLP-1)
Normal Metabolism

Normal Blood Sugar and Hemoglobin A1c

- Normal Blood Sugar: 60-120 mg/dL
- Normal Hemoglobin A1c: 4.5-5.4 percent

Types of Diabetes

- Type 1: Autoimmune/Insulin dependent diabetes
- Type 2: Insulin Resistant/non-insulin dependent
- Other: Atypical, CFRD, Steroid Induced, Gestational

Type 1 Diabetes

- Type 1: Autoimmune/Insulin dependent diabetes

<table>
<thead>
<tr>
<th>Type</th>
<th>Age</th>
<th>Body Type</th>
<th>Insulin Function</th>
<th>Why?</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt; 30</td>
<td>Normal wt. Lean</td>
<td>Wt. loss at diagnosis</td>
<td>Zero or very little insulin</td>
<td>Autoimmune Environment/ virus trigger</td>
</tr>
</tbody>
</table>

About 1 out of every 350 to 500 people younger than 20.
Type 2 Diabetes

<table>
<thead>
<tr>
<th>Type</th>
<th>Age</th>
<th>Body Type</th>
<th>Insulin Function</th>
<th>Why?</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>&gt; 30</td>
<td>Normal wt. or</td>
<td>Insulin not working...</td>
<td>Heredity</td>
<td>Diet Exercise</td>
</tr>
<tr>
<td></td>
<td></td>
<td>overweight</td>
<td>insulin resistance</td>
<td>weak family history</td>
<td>Oral meds</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sedentary life style</td>
<td>Insulin</td>
</tr>
</tbody>
</table>

When someone has type 2, they usually have a strong family history of type 2 diabetes.

Glycemic Control (T1DM)

<table>
<thead>
<tr>
<th>Plasma BG goal range</th>
<th>A1c</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before Meals</td>
<td>90 – 130 mg/dL</td>
<td>&lt;7.5%</td>
</tr>
<tr>
<td>Bedtime/overnight</td>
<td>4.0 – 7.2 mmol/L</td>
<td>A1c &lt; 7.0% is reasonable if achieved without excess hypoglycemia</td>
</tr>
</tbody>
</table>

- Goals should be individualized and lower goals may be reasonable based on benefit-risk assessment
- Blood sugar goals should be modified in children with frequent hypoglycemia unawareness
- Postprandial blood sugar values should be measured when there is a discrepancy between preprandial blood sugar values and A1c levels and to help assess glycemia in people with basal-bolus regimens
- The ADA recommends an A1c of < 7.5% across all pediatric age groups

Factors Affecting Blood Sugar Levels

<table>
<thead>
<tr>
<th>Raise Blood Sugar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food/Carbohydrates</td>
</tr>
<tr>
<td>Hormones/Stress/ILLNESS</td>
</tr>
<tr>
<td>Medications like steroids</td>
</tr>
</tbody>
</table>

Blood sugar levels will rise and fall during the school day. Why?

<table>
<thead>
<tr>
<th>Lower Blood Sugar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulin</td>
</tr>
<tr>
<td>Type 2 medications</td>
</tr>
<tr>
<td>Activity/Exercise</td>
</tr>
</tbody>
</table>
Diabetes Management Basics

Balance
Balance between:
- Food
- Insulin
- Exercise

Blood Sugar - Monitors
Features vary:
- Sample size
- Wait Time
- Alternate-site testing capacity
- Communication with other devices – pumps, continuous glucose monitors

Become familiar with the operation of the meter.
There is a 1-800 number on back of meter

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Blood Sugar - Lancing Devices

There are also a number of different lancing devices on the market. Be sure you know how to use the lancing devices your students have and check for adequate supplies.

Blood Sugar Monitoring Steps

Step by step instructions for standard glucose monitor kit:

1. Gather blood sugar monitoring supplies:
   - Lancing Device
   - Lancet
   - Test strips
   - Meter
2. Student washes and dries hands
3. If assisting student, put on gloves
4. Place test strip in meter
5. Hold the lancing device to side of finger; press button to stick finger
6. Apply blood to the strip according to meter directions
7. Look at blood sugar result on meter and record

Blood Sugar Monitoring Tips

When testing blood sugar:

- Alcohol not recommended for testing
- Sides of fingertips should be used
- Alternative sites can be used as well
  - Not if a low is suspected – always use side of fingertip
- Use control solution when opening a new bottle of strips and if you suspect error in reading
- Check expiration date on the testing strips
**Ketone Testing**

Check for ketones:

- **Injections:** when BS > 300 or sick
- **Pump:** when BS > 250 or sick

Note:
Vials of ketone strips expire 6 month after opening

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**Ketone Testing Procedure**

Steps to check for ketones:

1. Gather supplies
2. Child urinates in clean cup
3. Wear gloves, if performed by someone other than student
4. Dip the ketone test strip in cup with urine
5. Shake off excess urine, wait 15 seconds
6. Read and record results. Refer to the students DMMP to act on the results.

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**Checking for Blood Ketones**

Special monitors and strips to check for blood ketones:

- Be sure you know how your students will check and that you have all the needed supplies.
- The procedure is similar to checking for blood sugar. They will insert the ketone strip into the special meter, prick their finger and place the drop of blood on the test strip.
**Ketones Testing**

<table>
<thead>
<tr>
<th>Reading</th>
<th>Result</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;0.6</td>
<td>Normal</td>
<td>No action required</td>
</tr>
<tr>
<td>0.6 - 1.0</td>
<td>Slightly elevated</td>
<td>Drink extra fluids, Notify parent, Recheck blood sugar and ketones</td>
</tr>
<tr>
<td>1.0 - 3.0</td>
<td>Serious</td>
<td>Will require extra rapid-acting insulin, drink extra fluids, Contact doctor, Follow DMMP orders if at school</td>
</tr>
<tr>
<td>&gt;3.0</td>
<td>Emergency</td>
<td>Call 911, Closely monitor breathing</td>
</tr>
</tbody>
</table>

**Types of Insulin**

- **Bolus Insulin** (Mealtime Insulin)
  - Rapid acting
  - Taken before meals
  - Work 5-15 minutes after injecting
  - Last 2-5 hours
  - Some children take their insulin immediately after eating because:
    1. Don’t know what they are going to eat
    2. Don’t eat all the carbohydrates
    3. Risk of hypoglycemia

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**Basal Insulin (Background Insulin)**

Things to know about basal insulin:
- Lantus, Basaglar, Leveimir, NPH
  - (take at the same time daily)
- Background insulin needed 24 hours per day
- Controls glucose overnight and between meals
- Lantus, Basaglar, or Leveimir are usually taken once daily
- NPH maybe taken 1-2 times/day
- Covers moderate amounts of glucose from protein

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**Basal/Bolus Insulin Regimen**

Basal/Bolus insulin is also called MDI (Multiple Daily Injections)

**Advantages:**
- Flexible timing, frequency and food quantities
- Most children use this insulin dosing method

**Limitations:**
- Requires basic math and use a calculator
- Requires 2 injections daily at the same time each day
- May still require Rapid Acting Insulin (NovoLog, Humalog) at lunch if a correction is needed
- Requires eating a set amount of carbohydrates during meals
- Requires set times for meals and snacks
- Requires snacks to cover the insulin peaks

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**Premixed Insulin**

Combination of basal and bolus insulin’s:
- NovoLog Mix 70/30, Humalog Mix 75/25
  - Premixed is cloudy. Roll the bottle between your hands to mix.
- Requires 2 injections daily at the same time each day
- May still require Rapid Acting Insulin (NovoLog, Humalog) at lunch if a correction is needed
- Requires eating a set amount of carbohydrates during meals
- Requires set times for meals and snacks
- Requires snacks to cover the insulin peaks
### Diabetes Management Basics Insulin

<table>
<thead>
<tr>
<th>Type of Insulin</th>
<th>Insulin</th>
<th>When it starts working</th>
<th>How long it lasts</th>
<th>When to take it</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid-acting</td>
<td>Humalog, Novolog, and Apidra</td>
<td>5 to 15 minutes</td>
<td>2 to 3 hours</td>
<td>Right before eating</td>
</tr>
<tr>
<td>Short-acting</td>
<td>Regular</td>
<td>30 to 60 minutes</td>
<td>2 to 8 hours</td>
<td>30 minutes before eating</td>
</tr>
<tr>
<td>Intermediate-acting</td>
<td>NPH</td>
<td>1 to 2 hours</td>
<td>4 to 8 hours</td>
<td>Varies, take it at the same time each day</td>
</tr>
<tr>
<td>Mixed-insulin</td>
<td>Novolog 70/30 and insulin 75/25</td>
<td>5 to 15 minutes</td>
<td>1 to 6 hours</td>
<td>Right before eating, take it at the same time each day</td>
</tr>
<tr>
<td>Long-acting</td>
<td>Lantus, Levemir</td>
<td>1 to 2 hours</td>
<td>No peak</td>
<td>Varies, take it at the same time each day</td>
</tr>
</tbody>
</table>

### Insulin Action

**Comparison of Equal Amounts of Different Types of Insulin**

- **Rapid Acting (Humalog, Novolog, Apidra)**
- **Short Acting (Regular)**
- **Intermediate Acting (NPH)**
- **Long Acting (Lantus, Levemir)**

### Insulin Storage

**Opened insulin vials or pens:**
- Store at room temperature (36 - 86 degrees Fahrenheit)
- Discard vials after 28-30 days

**Unopened vials or pens:**
- Store in a refrigerator
- Good until their expiration date
- Do not freeze
Insulin Injection Tips

**Insulin works best when it is injected into a layer of fat under the skin, above the muscle tissue.**

- "If you can pinch a half an inch of fat" – for injections
- "If you can pinch an inch of fat" – for most pump sites
- Rotate sites: abdomen, thighs, buttocks, and upper arms
- Inject at least two inches away from navel, scars, and moles
- Student should help choose injection site

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Insulin Pens Examples

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Insulin Pens

Other items to know:

- Pen needles come in different lengths
- Insulin pens are either disposable or reusable
- "Air Shot" - dial 2 units, hold pen straight up
- Never leave the pen needle on pen
- Some pens will allow ½ unit dosing
Insulin Pumps

The five major pump companies are:
- Animas
- Minimed
- Accu-Check
- Tandem
- OmniPod

How Insulin Pumps Work

Basal Rate:
Continuous delivery of insulin in tiny amounts programmed in units per hour

Meal Bolus:
Insulin for meals or snacks given based on amount of CHO to be eaten before a meal or snack

Correction or Supplemental Bolus:
An extra bolus of insulin given to correct for a high blood sugar

Insulin Pump Tips

- Keep Insulin pump guide and toll free number with supplies
- Request extra supplies to be kept at school:
  - Extra insulin
  - Syringes or insulin pen device to administer insulin if needed
  - Extra pump supplies: infusion sets/pods, inserter, reservoirs, batteries
Pump Basics

Facts Beneficial to School Nurses
School Nurses will need to know pump basics:
• How to bolus
• How to suspend
• How to check status of the pump and site
• How to review history/confirm a bolus
• How to change batteries

If the pump infusion set or pod is no longer functional, and the student is unable to re-insert their own infusion set/pod, a parent or guardian will be contacted to come to school to re-insert the infusion set or pod.

Diabetes 101 – Part 1

Definition of Diabetes

Diabetes Management Basics

Diabetes Management at School

Diabetes Management at School
Patricia Vacarella, MPA, RN, NCSN, CDE
Diabetes Education
Children’s Healthcare of Atlanta
Reflection
As you go through this video, please pause to review the content and think about how you would apply this information to your school setting.

Primary Goal
DIABETES MEDICAL MANAGEMENT PLAN (DMMP)
(Diabetes Care Plan for School)
- Signed by health care provider
- Basis for all diabetes care at school
  - Routine care
  - Emergency care

Additional Goals
Additional goals for the management of diabetes at the school include:
- Early recognition and treatment of hypoglycemia and hyperglycemia
- Having diabetes trained staff available at all times during school day and during any school sponsored events
- Providing children with diabetes equal access to educational and school sponsored opportunities
Role of the School Nurse

The school nurse is essential in:

- Planning
- Implementing
- Evaluating routine and emergency diabetes care at school

Georgia law allows the training of unlicensed, assistive personnel to deliver routine and emergency diabetes care at school.

Role of the School Nurse

The licensed professional nurse remains the ideal healthcare provider to:

- Liaison with the family, student, school staff and Endocrinologist to develop Individual Health Plans (IHPs)
- Implement IHPs based on DMMPs
- Provide diabetes training
- Evaluate DMMP effectiveness

Other responsibilities of the school nurse are:

- Interpret the Diabetes Medical Management Plan
- Collaborate with school team, student and parents to develop Individual Health Plans (IHPs)
- Train and evaluate school staff in diabetes care as delegated by the school principal
- Advocate for the student with diabetes
- Collaborate with school team, student and parents in the development of 504 and/or IEP as needed
Trained Diabetes Caregiver

Tasks at School

- Communication with registered professional nurse, parents and school staff as needed
- Assessment of diabetes supplies provided by parent
- Insulin calculation and administration, including injections and pumps
- Blood sugar checks
- Early recognition/treatment of hypoglycemia and hyperglycemia
- Be an advocate for the student with diabetes
- Early recognition/treatment of hypoglycemia and hyperglycemia
- Encourage and assist the student with self management skills – as appropriate for age
- Be an advocate for the student with diabetes

This list is only a general guideline for diabetes care tasks at school. Many students will be able to handle all or almost all routine diabetes care by themselves. Some students will need school staff to perform or assist with routine diabetes care. It is always a good idea to closely supervise and assist the care of any newly diagnosed patients as needed.

Blood Sugar - Monitoring

School Nurse Role:

- Work with the student, family, and school staff to interpret doctor’s orders
- Review the DMMP to determine times for routine daily blood sugar checks
- Determine medically appropriate additional checks
- Plan for urgent checks and necessary treatment

Blood Sugar - Accommodations

Accommodations:

- A student should be permitted to check blood sugar and respond to the results at any time during the school day
- The treatment for a blood sugar number should be pre-determined prior to the beginning of classes
- The student should be allowed to check and treat in the classroom if indicated on the DMMP

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Blood Sugar - Management
We will discuss:

• Checking blood sugar
• Equipment
• Timing of blood sugar checks
• Tips for school

Blood Sugar Monitoring Tips
It is very important to:

• Not over-react to numbers
• Say “in range” or “out of range” vs “good” or “bad”
• Do not ask, ”WHAT DID YOU EAT?!”
• Ask “Do you remember taking your insulin this morning?”

Target Ranges
Target ranges are individualized, but here are some age specific examples:

<table>
<thead>
<tr>
<th>Age</th>
<th>Target Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5 years</td>
<td>100-200</td>
</tr>
<tr>
<td>6-11 years</td>
<td>80-180</td>
</tr>
<tr>
<td>12 years and over</td>
<td>70-150</td>
</tr>
</tbody>
</table>

Note: Students may have a wider target range at school for adequate concentration and performance.
Target Ranges - School

School Target:
A range at which it is reasonable to expect adequate concentration and performance at school.
- 90 to 180
- 80 to 200

Keeping Blood Sugar In Target Range

General recommendations for blood sugar testing times:
- Before eating meals
- Whenever there are symptoms of hypoglycemia or hyperglycemia
- When feeling sick or “funny” at school

Keeping Blood Sugar In Target Range

Additional time to consider checking blood sugar school:
- At the end of the school day
- After physical activity PE and/or recess
- Before leaving school for a field trip
- Before physical activity PE and/or recess
- Prior to academic testing
- During illness

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Keeping Blood Sugar In Target Range

Stay tuned in to the student’s daily schedule:

- Collaborate with the family
- Regular blood sugar checks based on DMMP and Student Schedule
- Identify patterns
- Extra checks may be helpful for newly diagnosed students

Hypoglycemia Recognition

The symptoms of hypoglycemia can vary from person to person, and can change over time. During the early stages of low blood sugar, symptoms may be:

- Sweating
- Shakiness
- Hunger
- Anxiety
- Fatigue
- Pale skin color
- Yawning
- Irritability

Hypoglycemia Recognition

With mild to moderate symptoms of hypoglycemia, it is essential to act promptly in order to avoid a more severe reaction and possible emergency situation. If untreated, symptoms can become more severe, and can include:

- Difficulty walking
- Extreme weakness
- Dazed or “spaced out” appearance
- Bizarre behavior or personality changes
- Confusion
- Unconsciousness or seizure
Situations to Avoid

Prevention of hypoglycemia at school is essential for the student’s well-being and academic performance.

Think Ahead!

Example 1:
- Lunch is delayed

Example 2:
- Physical activity

Remember – exercise can lower blood sugar up to 24 hours!

Hypoglycemia Treatment

FIRST -
Check blood sugar if meter is available.

However, if no meter is available, treat for hypoglycemia on the spot. If untreated, hypoglycemia may progress to more serious events.

NEVER -
Send a student with suspected hypoglycemia anywhere alone.

If the blood sugar is < 70 and the symptoms are mild, treat with the ‘Rule of 15’:
- Give 15 grams of fast acting carbohydrates
- Wait 15 minutes and recheck blood sugar
- If the blood sugar is still < 70:
  - Give another 15 grams of fast acting carbohydrates
  - Recheck blood sugar in 15 minutes
  - Repeat up to 3 times – if blood sugar is not in range after this, contact parent
Hypoglycemia Treatment

15 gm Fast Acting Carbs:

- 4 oz. Fruit Juice
- 4 Glucose Tablets
- 1 Tbsp. sugar
- 1 Tbsp. Honey
- 4 oz. Regular Soda (Not Diet)
- 1 Tube of Glucose Gel
- 1 Tube of Cake Mate Gel

Unconscious or Seizure

If the child is having a seizure or is unconscious, it is better to use Glucagon in these situations.

Glucagon Emergency Kit

Contents:

- 1 mg of freeze-dried glucagon (Vial)
- 1 ml of water for reconstitution (Syringe)
Use of Glucagon Emergency Kit

- Position the student on his or her side
- Do not attempt to give anything by mouth
- Administer glucagon according to medical orders
- While treating, have another person call 911
- Contact the parents/guardian if child is at school
- Stay with the student until EMS arrives
- Notify student’s health care provider

Glucagon Emergency Kit

Special Considerations:

- It may take 10-20 minutes for the student to regain consciousness
- Nausea or vomiting may occur
- Check blood sugar
- Give sips of juice or soda when alert enough to swallow
- After 10 minutes or so, encourage solid foods

Hypoglycemic Unawareness

Blood sugar below 70 without symptoms is Hypoglycemic Unawareness

Hypoglycemia unawareness can occur in those who:

- Frequently have hypoglycemia episodes
- Have had diabetes for a long time
- Are young children and/or are newly diagnosed and may not have learned to recognize the symptoms

These individuals may no longer produce the adrenaline response that is responsible for the early warning signs and symptoms of hypoglycemia. When a young child or newly diagnosed child experiences hypoglycemia, it is very important to acknowledge their symptoms and remind them to notify someone if they feel them again. It is not uncommon for the first episodes of hypoglycemia to occur at school after being diagnosed.
Hyperglycemia

Symptoms

- Excessive urination (polyuria)
- Excessive thirst (polydipsia)
- Excessive hunger (polyphagia)
- Weight Loss
- Fatigue
- Blurry vision

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Hyperglycemia: Behavioral/Cognitive Changes

The effect may include behavioral or cognitive changes such as:

- Decreased interests
- Impaired short term memory
- Decreased attention span
- Irritable or temper flare up
- Overall decreased school performance

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Hyperglycemia: Possible Causes

Possible Causes

- Late, missed or too little insulin
- Insulin pump malfunction/insertion set out
- Food intake exceeds insulin coverage
- Illness or injury
- Stress
- Medications
- Other hormones, such as menstrual period

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Hyperglycemia Management at School

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Always refer to the student's orders (DMMP) first.

- **Insulin** - Corrective dose of rapid or short acting insulin
- **Hydrate** - Water, non-sugar drinks or electrolyte fluids
- **Monitor** - Check blood sugar and urine ketones

Hyperglycemia Management at School

**Communicate**

**Contact parents** if the child is ill, vomiting, lethargic, having trouble breathing or has moderate to large ketones.

**Contact doctor** if unable to reach parent, or if you feel parent is unable, or unwilling to implement safe care and physician communication.

EMS may be indicated if unable to reach parent or doctor, or if severe symptoms persist (difficulty breathing, etc.).

Hyperglycemia Management: Ketones

The body will break down fat for several reasons:

- There is not enough insulin
- The body needs more energy
- Stress hormones
- Glucose is not available in the blood

Ketones initially pass into the urine and can build up in the blood and body tissues. The longer ketones are allowed to build up, the more likely they will result in acidosis.

- **DKA** – Diabetic Ketoacidosis
- Diabetic Ketoacidosis can progress to an emergency situation
Diabetic Ketoacidosis (DKA)

Two things to remember about blood sugar management are:
1. Hyperglycemia is NOT considered an emergency
2. Hyperglycemia IS an emergency if symptoms of Diabetic Ketoacidosis develop

Diabetic Ketoacidosis: Signs & Symptoms

- Hyperglycemia with moderate to large ketones
- Vomiting
- Stomach pain
- Drowsiness
- Sweet, fruity odor to the breath
- Thirst and frequent urination
- Deep and/or labored breathing (call 911)
- If not treated, can result in coma

Diabetic Ketoacidosis: Causes

Severe insulin deficiency:
- Missed doses
- Illness/severe stress
- Pump malfunction:

In pump cases: Diabetic Ketoacidosis may suddenly occur
In non-pump cases: Diabetic Ketoacidosis does not occur suddenly

- Symptoms may gradually occur over days or weeks with continued untreated hyperglycemia.
Diabetic Ketoacidosis: Special Concerns

Hyperglycemia is more urgent for students on pumps.

- Diabetic Ketoacidosis can begin to occur within 2-3 hours
- Indicates a pump malfunction or disconnect

**WHEN IN DOUBT, CHANGE YOUR SET OUT!**

Treating Hyperglycemia

The steps for treating hyperglycemia with a pump:

1. Make sure the pump and tubing are working.
2. If blood sugar > 250, check for ketones.
3. If ketones are present, contact the Endocrinologist.
4. At school, always follow the DMMP orders and communicate with the parent.

If Ketones are present:

- Have the student drink water and consult the DMMP.
- Continue to test blood sugar and ketones every hour until blood sugar is in target range and no ketones.
- Continue to take correction insulin injections as directed by your Endocrinologist until your blood sugar reaches target range.
- If your blood sugar is less than 200 and ketones are present, additional insulin is usually required.
- Contact the student's parent and/or healthcare provider according to the DMMP for specific guidelines.
Possible Academic Concerns with Diabetes

Cognitive function disrupted by both hypoglycemia and hyperglycemia

Frequent hypoglycemia can be related to decreased spatial intelligence and delayed recall

Long term neuro effects from hyperglycemia (not the occasional hyperglycemia) can decrease verbal intelligence

Testing and exams should occur when a student’s blood sugar is in target range

Classroom Accommodations with Diabetes

Examples of typical classroom accommodations:

• Access to water and bathroom at all times

• Blood sugar testing and treatment may be allowed in the classroom if age appropriate and approved in DMMP

• Access to snacks at all times

• No academic or other penalty for medical absences related to diabetes

Accommodations specific to standardized testing:

• Check blood sugar before and during testing, if specified in their plan

• Have access to food, drink, and restroom during the testing period

• Be excused from testing with an opportunity for retake later, should a serious high or low blood sugar episode occur
Classroom Accommodations with Diabetes

- Full participation in all academic and extracurricular activities
- System in place to provide accommodations during standardized testing
- Never send a student who is symptomatic with actual or suspected hypoglycemia or hyperglycemia anywhere alone
- Adequately trained staff available to student at all times, including field trips and other school-sponsored events

Age Specific Care at School (3-5)

Ages 3-5
- Cannot think abstractly
- Does not understand “getting shots is to keep you healthy”
- Needs constant reinforcement that diabetes care (injections and finger sticks) is not a punishment

Diabetes Responsibilities
- School staff will need to perform all tasks
- Child may gradually learn to cooperate
- May be inconsistent with food choices – insulin may need to be given after meals

Age Specific Care at School (6-7)

Ages 6-7
- Cannot think abstractly
- Self centered
- Home responsibilities may increase as they begin to read

Diabetes Responsibilities
- School staff will need to perform and supervise all tasks
- Child may slowly learn to cooperate and begin to make some choices; select finger for a blood test, wash hands, etc.
- May begin to recognize signs of hypoglycemia
Age Specific Care at School (8-12)

**Ages 8-12**
- Thinks more concretely
- More logical and understanding
- More curious, social and responsible

**Diabetes Responsibilities**
- Can learn to do blood sugars, begin initial carbohydrate counting, administer insulin with supervision
- Can recognize and treat hypoglycemia
- Can remember snacks and make food choices, but may need reminders or alarms

Age Specific Care at School (13-18)

**Ages 13-18**
- More independent, but behavior varies
- Able to think abstractly
- Body image and friends more important
- Experimentation with alcohol and street drugs

**Diabetes Responsibilities**
- Capable of doing majority of blood sugar tests, carbohydrate counting, insulin, pump tasks, but require supervision with dosage
- Gradually understand good blood sugar control to prevent complications

Psychological Impact of Diabetes

[Stages of Grief]
- Shock
- Denial
- Sadness
- Anger
- Anxiety
- Guilt
- Adaptation to Diabetes

Children's Healthcare of Atlanta Diabetes Center
Psychological Impact of Diabetes

The First Difficult Year...

“Adjustment to a diagnosis of diabetes takes 6–9 months for children and 9–12 months for parents. Diabetes control and usual family functioning are difficult during this period.”

Diabetes Spectrum, January 2003 vol. 16 no. 1 7-12

Diabetes is 24/7

Diabetes never takes a vacation...

- 5 or more injections a day
- 5 or more sticks for blood sugar a day
- Counting EVERY carbohydrate eaten
- Supplies/Snacks
- Constant juggling of food, insulin, exercise, blood sugar numbers to stay in balance

Summary

- Defined Diabetes
- Explored the basics of diabetes management
- Covered the diabetes management at school
Diabetes Train the Trainer Series

For more information visit: www.choa.org/medical-services/diabetes

- Diabetes 101
- Carbohydrate Counting
- Physical Activity
- The Diabetes Medical Management Plan
- Taking Type 1 Diabetes to School

Resources

- Safe at School: http://www.diabetes.org
- Diabetes Spectrum January 2003 vol. 16 no. 1 7-12
- Diabetes Care 32:1001–1006, 2009
- Pediatric Diabetes Volume 21, Issue 2, pages 134–141, March 2012
- P.E.D.S.Pediatric Education for Diabetes in Schools National Version
- Juvenile Diabetes Research Foundation: http://www.jdrf.org
- School Advisory Toolkit: http://www.jdrf.org

Children’s Healthcare of Atlanta

For more information on any of the Trainer the Trainer topics:

- Visit us at: www.choa.org
- Call us at: (404) 785-KIDS