Diabetes Management: Guidance for the School Nurse
Part 1

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Course Objectives

The learners will be able to:

- compare different types of diabetes and insulin
- describe basal & bolus regimens
- identify hypoglycemia
- identify advance technology using insulin pump therapy
- troubleshoot care for types of diabetes
- explain accurate method for carbohydrate calculations and nutrition
Type 1 vs. Type 2

Type 1

- Environmental Factors or Viral Trigger: Thought to be triggered by viruses such as measles or mumps
- Ethnicity (north of equator) & Genetic Factor: If a family member has type 1 diabetes, increased risk of developing exists
- Autoimmune - unclear what causes the immune system to start destroying pancreatic beta cells
- Age: elementary or preteenager years: body does not produce insulin, which is the hormone necessary for processing glucose (multiple organ effects)

Type 1 Treatment consists of

- Exercise & Diet
- Lifestyle
- Insulin
- Blood glucose testing (4-6 times/day)
- Prescribed meal plan consisting of carbohydrate calculations/counting
- Regular medical check-ups
The main issue diabetes is that body CAN’T use insulin effectively=insulin resistance or insulin deficiency

Cells become insulin-insensitive

Due to lifestyle choices

Combination of genetics and lifestyle choices including eating habits, exercise and being overweight/obese.

Type 2 Treatment consists of

- Initially diet and exercise
- Oral hypoglycemic agent (Metformin)
- May require insulin
Types of Diabetes

- Gestational
- Secondary or Medication-Induced
  - Cystic fibrosis related diabetes
  - Post-transplant
  - Chemotherapy regimens:
    - Interferon
    - L-Asparaginase
    - Glucocorticoids
# Types of Insulin

<table>
<thead>
<tr>
<th>Insulin Name</th>
<th>Type</th>
<th>Onset/Duration</th>
<th>Special Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humalog/Novolog/Apidra, Admelog</td>
<td>Rapid acting</td>
<td>Onset: 5-10 min Peak 1-2 hours Duration 3-6 hours</td>
<td>Used with carb counting and blood glucose sliding scale.</td>
</tr>
<tr>
<td>Fiasp</td>
<td>Very Rapid</td>
<td>Onset: Immediately after administration Peak 1-2 hours Duration 3-6 hours</td>
<td>Can be given immediately after eating- quick onset</td>
</tr>
<tr>
<td>NPH</td>
<td>Intermediate acting</td>
<td>Peaks 4-6 hrs Duration: approx. 12 hrs</td>
<td>Cloudy; mixed with rapid acting insulin; draw up “clear” first</td>
</tr>
<tr>
<td>Lantus/Levemir/Basaglar</td>
<td>Long acting</td>
<td>Duration: 18- 24 hrs</td>
<td>Cannot be mixed. Acts like body’s basal rate. Must be given at the same time everyday.</td>
</tr>
<tr>
<td>Tresiba</td>
<td>Long acting</td>
<td>Duration: 48 hrs.</td>
<td>Cannot be mixed. Acts like body’s basal rate. Administered every 24 hours</td>
</tr>
</tbody>
</table>
Basal & Bolus Regimen

Basal-Bolus Insulin Regimen Maintains Normal Blood Glucose Levels

- **Bolus** (Short-acting)
- **Basal** (Long-acting)

- Breakfast
- Lunch
- Supper
- Bedtime
Basal & Bolus Regimen

Lantus/Levemir/Tresiba/Basaglar

- Should ideally be given at approximately the **same** time every day
- **Cannot** be mixed with any other insulin in a syringe
- If the patient requires a correction at the same time that Lantus/Levemir/Tresiba/Basaglar is due, **MUST** administer separately
Humalog /Novolog/ Apidra/Fiasp/Admelog

- If hyperglycemic, a correction dose must be added to meal (carbohydrate) dose.
  - Target
  - ISF
  - Should be given with meals.
Hypoglycemia & Glucagon

TAKING CONTROL OF YOUR CHILD’S DIABETES

Hypoglycemia (Low Blood Sugar)

Hypoglycemia & Glucagon ➞ (right click, open hyperlink)
Hypoglycemia

To correct an episode of low blood sugar without overdoing it and spiking your blood sugar levels in the process. Follow the 15/15 Rule.

• You want to consume 15 g of fast acting carbohydrates (i.e: orange juice) to prevent your levels from continuing to fall to dangerous levels.

• You wait 15 min and recheck blood sugar levels

• No physical activity
Hypoglycemia

Hyperglycemia and Ketones ➔ (right click, open hyperlink)

Hyperglycemia (High Blood Sugar)

Correct BS per sliding scale ➔ Drink water ➔ Check for ketones ➔ NO physical activity

Hyperglycemia Management - Blood sugar greater than 250mg/dl

1. Check urine for ketones
   a. If positive for small ketones, drink lots of water or sugar free fluids
   b. If positive for moderate to large ketones, drink lots of water/sugar free fluid and call MD

2. Use sliding scale (Humalog/Novolog) to correct high blood sugar ONLY if it has been 3 hours since fast acting insulin to
Diabetic Emergencies

Diabetic Emergency

(right click, open hyperlink)
Diabetes Medical Management Plan/Treatment Authorization (DMMP)

School Year: 20___-20__

Student’s Name:

ID:

Date of Birth:

Grade:

School Name:

V.A.

School Contact Person:

Phone:

CONTACT INFORMATION:

Phone Numbers:

Parent/Guardian 1:

Home:

Work:

Cellular:

Parent/Guardian 2:

Home:

Work:

Cellular:

Other Emergency Contact:

Home:

Work:

Cellular:

EMERGENCY NOTIFICATION: Notify parent/guardian of the following conditions:

1. Loss of consciousness or seizure (Call 911 immediately)
2. Low blood sugar (Call 911 or give 15 grams fast acting carbohydrate such as:
   a. Juice (2 oz)
   b. Fruit (1 small)
   c. Snack (1 ounce)
   d. 4 tsp glucose tablets
   e. 2 Tablespoons (1/2 tsp) sugar
   f. 2 Tablespoons (1/4 tsp) salt
   g. 100 ml orange juice

3. Forcing of insulin injection
4. Excited or agitated behavior
5. Seizure (Call 911 immediately)

MANAGEMENT OF HIGH BLOOD GLUCOSE (Over 200 mg/dL):

Usual signs/symptoms for this student:

Indicate treatment choices:

Management:

Blood Glucose:

Target Range:

Insulin During School:

安全管理计划授权

学校年份：20___-20__

学生姓名：

ID：

出生日期：

年级：

学校名称：

VA

学校联系人：

电话：

联系人信息：

电话号码：

监护人1：

家庭：

工作：

手机：

监护人2：

家庭：

工作：

手机：

其他紧急联系人：

家庭：

工作：

手机：

紧急通知：立即通知家长/监护人以下情况：

1. 丧失意识或癫痫发作（拨打911）
2. 低血糖（拨打911或给予15克快速作用碳水化合物）
   a. 果汁（2盎司）
   b. 水果（1小块）
   c. 零食（1盎司）
   d. 4汤匙葡萄糖片
   e. 2汤匙（1/2茶匙）糖
   f. 2汤匙（1/4茶匙）盐
   g. 100毫升橙汁

3. 强迫注射胰岛素
4. 兴奋或焦虑行为
5. 癫痫发作（拨打911）

管理高血糖（超过200毫克/分升）

常见症状

治疗选择：

管理：

血血糖：

目标范围：

学校期间使用胰岛素：

学生姓名：

ID：

日期：

学校期间使用胰岛素：

学生是否接受过胰岛素注射训练：是

学生在不拿胰岛素的情况下是否可以自行管理：是
Diabetes Management for School Nurses
Part 2

Awilda Valdes RN, CDE
Diabetes Nurse Clinician
Insulin Administration

Insulin Pumps
What is Pump Therapy?

- Also known as continuous subcutaneous insulin infusion (CSII)
- Uses a rapid acting insulin: Humalog, Novolog, Admelog, Apidra or Fiasp.
- Eliminates the need for long acting insulin: Lantus, Levemir, Basaglar, Tresiba, or Toujeo
The pump gives us the flexibility to program different basal rates throughout the day therefore leading to overall better glycemic control.
Insulin Pump Terminology

**Cartridge**
- The cartridge is where the insulin is stored within the pump.

**Insulin Pump**
- A mechanical device that pushes insulin out to the body through an infusion set.

**Infusion set**
- A small tube that connects the cartridge of insulin to the cannula/catheter

**Cannula/catheter**
- Small catheter inserted via a needle device that stays under the skin for 2-3 days at a time continuously delivering insulin
**Insulin Pump Therapy**

**MILESTONES IN PUMP HISTORY**

- **EARLY ’60S**
  - Lab Use Only
  - Large
  - The prototype of the first pump that delivered glucagon as well as insulin, backpack style, was made in the early ’60s.

- **LATE 70S — EARLY 80S**
  - Smaller But Still not easy
  - Small
  - In the late 70s and early 80s, Dean Kamen’s company, DEKA, developed a new system for outpatient care called AutoSyringe.

- **2013**
  - Easiest to Use
  - Petite
  - t:slim is the first insulin pump to use a touchscreen interface.

- **Products**
  - Medtronic
  - Omnipod
  - Tandem T-slim
Available with its own CGM called Guardian Enlite (630G) and Guardian Sensor 3 (670G)

Offers threshold suspend - automatically

Turns off pump for 2 hours once reaches a preset low BG value

The 670G offers SmartGuard technology with two levels of automated insulin delivery
Omnipod™

- Tube free design
- Inserts automatically with no needles in sight
- Waterproof
- PDM includes food library
- Future integration with Dexcom CGM
Tandem T: Slim™

- First touchscreen insulin pump
- Delivers insulin in the tiniest increments available
- Has Basal IQ and Control IQ technology
- Watertight design
- Uses internal rechargeable battery, powers for 7 days
- Available with G6 Dexcom CGM integrated technology
Continuous Glucose Monitoring Devices

Dexcom™

Medtronic Enlite™ or Guardian™
(work with Medtronic pump)
* Approved for use in children 2 yrs. and older

* Provides blood glucose (BG) readings every 5 minutes

* G6 sensor - 10 day wear. No calibration
Freestyle Libre

- Provides a BG reading every 1 minute
- Calibration not required
- Sensor changed every 14 days
- Does not alarm however new model will be able to
Case Scenarios
Part 3

Jacquelyn Verme
APRN, PPCNP-BC, CDE
JV is a 6 y/o girl with T1DM. It is 9am. You check her BG. BG is 314 mg/dl. Her insulin regimen is as follows:

- Lantus 7 units at night, Humalog 1:20 gr CHO with meals, ISF (correction scale): 1:50>150
  - 151-200= 1 unit
  - 201-250= 2 units
  - >251 = 3 units

What is the first question you would want to ask?
Check to see when was the last time that she received insulin. Insulin could still be working from breakfast to bring blood glucose down.
Case Scenario #1

- She ate 40 grams of carbohydrates before school at 7:45am.
In this case scenario, you would wait the 3 hours from last time she was injected to provide the insulin correction since she still has insulin working in her body.

You should also check her urine for ketones.
JB is a 14 y/o boy with T1DM. His blood sugar prior to PE is 345 mg/dl. He had lunch 3 hours ago. His insulin regimen is as follows:
- Basaglar 22 units at night, Novolog 1:7 gr CHO, and ISF 1:30>130

131-160 = 1 unit
161-190 = 2 units
191-220 = 3 units
221-250 = 4 units
251-280 = 5 units
281-310 = 6 units
>311 = 7 units

What would you do?
Case Scenario #2

- Inject a correction of 7 units for the elevated BG
- Provide water
- Check urine for ketones- If ketones are positive, he should not attend PE
- He should not participate in PE until his BG level has come down below 250 mg/dl- Exercising signals the body to release glucose into the blood stream for energy. Due to the lack of available insulin, he is at risk for development of ketones in the urine
- Re-check BG in 1-2 hours if he is still at school
AW is a 12 y/o girl with T1DM, currently managed on pump therapy. She comes to the office with complaints of a headache. You test her BG and it's 410 mg/dl. She ate lunch and received insulin via the pump 2 and a half hours ago.

1. What are you thinking? What do you think is happening?

2. What would you do?
Case Scenario #3

- Check to see if other carbs were consumed
- Review carb count for lunch
- Consider possible pump malfunction
- Inject insulin using syringe/vial or insulin pen.
- Check urine for ketones
- Provide water
- Contact parent
MG is a 9 y/o boy with newly diagnosed T1DM. He reports to your office because his CGM is beeping. His CGM reads 45 mg/dl.

What do you do first?
First confirm blood glucose via finger stick.
   You check his BG via finger stick and it's **50 mg/dl**.

What would you do now?
Case Scenario #4

- Provide a 15 gram carbohydrate snack such as:
  - 4 glucose tabs
  - 4oz of juice
  - 6oz regular soda
- Recheck BG in 15 minutes via finger stick
- Do not look at CGM- It has a delay!
Case Scenario #5

AD is an 7 y/o girl with T1DM. She comes to your office and reports she “does not feel well”. You begin to prepare to check her blood glucose when she passes out in front of you.

What do you do?
Case Scenario #5

- Call 911
- Check blood glucose, if low
- Prepare and inject glucagon IM to thigh (largest muscle of the body) or Baqsimi nasal spray
- Place student side lying after injection as vomiting is a common side effect of glucagon
- Notify parent
Diabetes Nutrition Management: Carbohydrate Counting
Part 3

Monica Grimaldi, RDN/LDN, CDE
What are Carbohydrates?

- Carbohydrates are our body's MAIN ENERGY SOURCE!
- Carbohydrates are the primary source of food that causes BG to rise.
- School aged children typically should be having 45-60g per meal, however it may all be individualized.
Why Count Carbohydrates?

- All Carbohydrates turn into GLUCOSE in our body.
- GLUCOSE needs insulin to enter the Red Blood Cell for ENERGY!!
- Patients receive insulin with meals according to Insulin to Carb ratio prescribed by MD.
Which Foods Contain Carbohydrates?

- Grains; Breads, pasta, rice, cereal, and crackers
- Starchy Vegetable: corn, potatoes, beans, yuca, etc
- Milk/Milk substitutes and Yogurt
- Fruits and Fruit Juices
- Sugar, honey, syrup, and sweet foods

These foods will cause your BG to rise within 2 hours!
Which Foods **DO NOT** Contain Carbohydrates?

- Meats, Chicken, Turkey, Pork, Fish
- Deli Slices
- Eggs
- Oils/Butter/Margarine (Fats)
- Cheese
- Condiments *****

**THESE FOODS WILL NOT CAUSE BG TO RISE!**

*(CAUTION: Depending on amount consumed!!)*
Reading Nutrition Labels

Step 1: Look at Serving Size

Step 2: Total Carbohydrates
Counting Carbohydrates

1 serving = 15g of Carbohydrates

What is: 1 serving of Grains?

**Grains, Breads, and Cereals**

- 1 oz. bread (1 slice bread, ¼ large bagel/6-inch corn tortilla)
- 2 1/2 inch Biscuit
- 1/3 cup cooked rice, couscous, barley
- 1/2 cup Quinoa
- 4-6 Crackers, pretzels
- 1/3 cup cooked pasta
- 4 in pancakes/waffles
- Bun, Hamburger/Hotdog (1/2 Bun)
- English Muffin (1/2)
- 3/4 to 1 cup cold cereal, unsweetened
- 1/2 cup cooked cereal, oatmeal, grits
- 1/4 cup Granola

What is: 1 serving of Fruits?

**Fruits**

- 1 small piece fruit (Apple, Orange, Kiwi)-“Size of a TENNIS BALL”
- 1/2 cup canned fruit in its own juice
  - 1/2 banana/1 small banana
- 1 cup cantaloupe or honeydew melon
- 1/2 cup 100% fruit juice (4 oz)
  - 12 Cherries
- 1/2 Grapefruit (Large)
- 2 tablespoons dried fruit
- 3 ounces grapes (17 small)
  - 1 cup raspberries
- 3/4 cup blueberries or blackberries
- 1 1/4 cup strawberries, watermelon
- 1/2 cup Mango, Papaya, Pineapple
  - 2 small plums
  - 2 small Mandarins
1 SERVING = 12 GRAMS OF CARBOHYDRATES

**Milk and Yogurt**

- 1 cup low-fat milk
- ¾ to 1 cup plain yogurt
- 1 cup soy milk
- ½ cup ice cream
What Are FREE Foods?

“Free” foods are foods that have less than 20 calories and less than 5 grams of carbohydrate in each serving.

Including:
- Sugar-free Jell-O, Sugar Free Popsicles, Sugar Free Jelly
- Diet Beverages, Coffee
WHAT’S THE DIFFERENCE?

- Starchy Vegetables count as part of your CARBOHYDRATE count because they contain STARCH.
- NON-STARCHY vegetables, do NOT have many CARBOHYDRATES.
- 1 serving of a STARCHY vegetable (½ CUP) has 15 grams of CARBS
## Starchy VS. NON-Starchy Vegetables

**Starchy Vegetables:**
1 serving = ½ cup (15 grams)
- Parsnip
- Plantain
- Potato
- Sweet Potato
- Pumpkin
- Yuca
- Acorn
- Butternut squash
- Green Peas
- Corn
- Beans – Black, Lima, Pinto
- Black Eyed Peas
- Split Peas
- Lentils

**Non-Starchy Vegetables:**
1/2 cup cooked = 5 grams
- Artichoke
- Asparagus
- Baby corn
- Bean sprouts
- Beets
- Brussels sprouts
- Broccoli
- Cabbage
- Carrots
- Cauliflower
- Celery
- Chayote
- Coleslaw
- Cucumber
- Eggplant
- Green Beans
- Jicama
- Kohlrabi
- Leeks
- Mushrooms
- Okra
- Onions
- Pea pods
- Peppers
- Radishes
- Rutabaga
- Salad greens (chicory, endive, escarole, lettuce, romaine, spinach, arugula, radicchio, watercress)
- Sprouts
- Sugar snap peas
- Swiss chard
- Tomato
- Turnips
- Water chestnuts
- Zucchini
Sugar-free **DOES NOT** Equal Carbohydrate-free

- Sugar free foods also contain Carbohydrates and fat.
- We can still have these foods, but consider the Carbohydrates and make sure you are providing adequate insulin.
- Compare Labels: Notice Sugar Free Ice cream has equal amount of CHO’s and has more Saturated fat!
Phone Applications Help Count Carbs

1. Carb counting with Lenny- Helps you learn carb counting in a fun and easy way.

2. Nutrislice: Carb count for foods in Public school system- Search for “Miami-Dade public school system” under Organization.

3. Fooducate: Carb count and health grades.
Miami-Dade School Menus
Which foods contain Carbohydrates?
Quiz Time!

Which foods contain Carbohydrates?
How many grams of carbs per serving?
_______

How many grams of carbs if I have two servings? _____
How many grams of carbs per serving? **27 grams**

How many grams of carbs if I have two servings? **54 grams**
What is the servings size?

How many grams of carbs?
What is the servings size? 2 bars

How many grams of carbs? 29 grams
How many grams of carbohydrates for entire package?

What If I only want to eat half?
Reading Label Practice

- How many grams of carbohydrates for entire package? **24g of carbs**
- What If I only want to eat half? **~12g carbs**
How many chips in 1 serving?

How many grams of carbohydrates per serving?

How many servings and grams of carbs if I eat 39 chips?
How many chips in 1 serving? **13 chips**

How many grams of carbohydrates per serving? **19 grams**

How many servings and grams of carbs if I eat 39 chips? **57 grams - 3 servings**
What is an Insulin To Carbohydrate Ratio?

- A unit of insulin needed for coverage of grams of carbohydrates eaten!!
- Helps maintain blood glucose (BG) on target without a BG spike post-meals!

How do I calculate each dose??
- Let’s Practice!
Time to Practice!

My Insulin To Carbohydrate Ratio is:
1 Unit per every ____ g of Carbs

How many grams of Carbohydrates?

One Hamburger ______
1/2 cup of corn ______
1 tennis ball sized apple ____
1 diet iced tea ______

How Many Grams of Carbohydrate in my meal?  __________

Now Calculate YOUR units of Insulin for this meal using INSULIN to CARB ratio:

_______ units of Insulin for my meal
How many grams of Carbohydrates?

One Hamburger  30
1/2 cup of corn  15
1 tennis ball sized apple  15
1 diet iced tea  0

How Many Grams of Carbohydrate in my meal?  60

Now Calculate YOUR units of Insulin for this meal using INSULIN to CARB ratio:

5 units of Insulin for my meal
My Insulin To Carbohydrate Ratio is:
1 Unit per every ___ g of Carbs

How many grams of Carbohydrates?

2 slices of toast  ________
2 scrambled eggs  __________
1 cup of Milk (8oz) ________

How Many Grams of Carbohydrate in my meal?  __________

Now Calculate YOUR units of Insulin for this meal using INSULIN to CARB ratio:

_____________ units of Insulin for my meal
My Insulin To Carbohydrate Ratio is:
1 Unit per every __15__ g of Carbs

How many grams of Carbohydrates?

2 slices of toast  30
2 scrambled eggs  0
1 cup of Milk (8oz) 12

How Many Grams of Carbohydrate in my meal? 42

Now Calculate YOUR units of Insulin for this meal using INSULIN to CARB ratio:

2.8 = 3 units of Insulin for my meal
Questions
Resources

- American Diabetes Association
- Academy of Nutrition and Dietetics
- JDRF (2020). Diabetes Basics. [https://www.jdrf.org/t1d-resources/about/](https://www.jdrf.org/t1d-resources/about/)
- JDRF (2020). Daily Management. [https://www.jdrf.org/t1d-resources/daily-management/](https://www.jdrf.org/t1d-resources/daily-management/)