CDE Exam Preparation
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Mentor/Best Practice Facilitator
March 2019
OBJECTIVES

- Review the etiology, signs and symptoms and prevalence of type 1 diabetes
- Discuss insulin requirements
- Review various types of insulin
- Discuss the benefits of pump therapy
- Discuss the management of exercise
- Review the driving guidelines for diabetes
- Discuss hypoglycemia
- Discuss the challenges of treatment of type 1 diabetes in children and adolescents that differ from adults
Clinical Practice Guidelines 2018
CDE Competencies 2018
Guidelines.diabetes.ca
Type 1

Autoimmune disorder
Genetic predisposition
+ Environmental trigger

Causing destruction of β-cells
❖ No insulin secretion
❖ Require exogenous insulin
**Type 1**

- **Onset**
  - Rapid
  - Symptomatic
    - Sudden Weight loss
    - Polydipsia
    - Polyuria
    - Polyphagia
    - Blurred vision

- Young and Lean
- Ketosis prone
**Type 1 Prediagnosis**

Stage 1:
- Presences of two or more islet antibodies

Stage 2:
- Presences of β-cell autoimmunity
- Dysglycemia is presymptomatic

Stage 3
- Onset of the symptomatic disease
- Only 10% of β-cell remain
2016 prevalence of diabetes was 9.3%
**DIABETES**

**Type 1**
- 10% of diabetes
- 25% of Type 1 are diagnosed as adults
- Parents, children and siblings of a person with type 1 have a **10 fold greater risk of developing diabetes**

**Type 2**
- 90% of diabetes
- 10 - 20% may be misdiagnosed LADA
Type 1

- GAD (glutamic acid decarboxylase)
- Ketones
- C-peptide
LADA- Latent autoimmune diabetes in adults

- Autoimmune
- Presence of antibodies
  - GAD 65(glutamic acid decarboxylase)
- Diagnosis is difficult
- Slow destruction of Beta cells
- Older, lean
- Often started on oral agents
- Don’t have high TG or low HDL
- Higher rate in underdeveloped countries
Blood Glucose control is always a balance between optimal blood glucose control and the risk of Hypoglycemia.
PHYSIOLOGIC INSULIN SECRETION

TYPES OF INSULIN

- Faster aspart 3-5 hours
- aspart/glulisine/lispro 3-5 hours
- NPH ~14 hours
- detemir/glargine ~24 hours
- Degludec >42 hours

Plasma Insulin levels mU/L

Hours

0 12 24
Physiologic versus Insulin injections

BASAL / BOLUS  40/60  OR  50/50
# Basal Insulins

<table>
<thead>
<tr>
<th>Category</th>
<th>Novo Nordisk</th>
<th>Lilly</th>
<th>Sanofi</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Generic</td>
<td>Brand</td>
<td>Generic</td>
</tr>
<tr>
<td><strong>Intermediate</strong></td>
<td>NPH</td>
<td>Novolin ge NPH</td>
<td>Humulin N</td>
</tr>
<tr>
<td>Onset 1-3 h</td>
<td></td>
<td>10 mL vial</td>
<td>10 mL vial</td>
</tr>
<tr>
<td>Duration up to 18 h</td>
<td></td>
<td>3 mL cartridge</td>
<td>3 mL cartridge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cloudy solution</td>
<td>Prefilled Pen (KwikPen)</td>
</tr>
<tr>
<td>Expiry after opening:</td>
<td></td>
<td>30 days</td>
<td>28 days</td>
</tr>
<tr>
<td><strong>Extended Long Acting</strong></td>
<td>detemir</td>
<td>Le vemir</td>
<td>glargine biosimilar</td>
</tr>
<tr>
<td>Onset 90 min</td>
<td></td>
<td>3 mL cartridge</td>
<td>Basaglar</td>
</tr>
<tr>
<td>Duration 24 h</td>
<td></td>
<td>Prefilled Pen (FlexTouch)</td>
<td>Prefilled Pen (Kwik pen)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expiry after opening:</td>
<td></td>
<td>42 days</td>
<td>28 days</td>
</tr>
<tr>
<td><strong>Ultra Long Acting</strong></td>
<td>degludec</td>
<td>Tresiba</td>
<td></td>
</tr>
<tr>
<td>Onset 1 h</td>
<td></td>
<td>100u/mL or 200u/mL</td>
<td></td>
</tr>
<tr>
<td>Duration 42 h</td>
<td></td>
<td>Once daily admin</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prefilled Pen (FlexTouch)</td>
<td></td>
</tr>
<tr>
<td>Expiry after opening:</td>
<td></td>
<td>56 days</td>
<td></td>
</tr>
</tbody>
</table>

BASAL INSULINS

- Concentrated Toujeo

*Do not draw into a syringe!
**Basal Insulin**

**Ultra Long Acting**
- Tresiba
  - 100 u/ml
  - 200 u/ml*

- Duration: 42 hours
- Missed dose can be taken up to 8 hours later

*Do not draw into a syringe!*
# Bolus Insulin

## Summary of Canadian Insulin Products 2018

<table>
<thead>
<tr>
<th>Category</th>
<th>Novo Nordisk</th>
<th>Lilly</th>
<th>sanofi</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fast Acting</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onset 4-10 min</td>
<td>aspart</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration 3-5 h</td>
<td>Clear solution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flap</td>
<td>10 mL vial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 mL cartridge</td>
<td>Prefilled Pen (FlexTouch)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expiry after opening: 28 days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rapid</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onset 10-15 min</td>
<td>aspart</td>
<td>lispro</td>
<td>glulisine</td>
</tr>
<tr>
<td>Duration 4-5 h</td>
<td>Clear solution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Novorapid</td>
<td>10 mL vial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 mL cartridge</td>
<td>Prefilled Pen (FlexTouch)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expiry after opening: 28 days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Short</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onset 30-60 min</td>
<td>regular</td>
<td>regular</td>
<td></td>
</tr>
<tr>
<td>Duration 5-8 h</td>
<td>Clear solution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Novolin ge Toronto</td>
<td>10 mL vial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 mL cartridge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expiry after opening: 30 days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humulin R</td>
<td>100u/ml</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 mL cartridge</td>
<td>Prefilled Pen (KwikPen)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expiry after opening: 28 days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entuzity</td>
<td>500u/ml</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 mL cartridge</td>
<td>Prefilled Pen (KwikPen)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expiry after opening: 28 days</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Bolus Insulins

Fast Acting

• Fiasp

• 50% of insulin in first 30 min
• Improved post prandial BG
• Can be taken 20 min after a meal
**Bolus Insulin**

Fast Acting

- Fiasp

![Graph showing comparison between Faster-acting insulin aspart and Insulin aspart](image-url)
BOLUS INSULIN

Short Acting Concentrated

- Entuzity
  - Humalin R 500u/ml

*Do not draw into a syringe!

Indication is:
- >200 units/day
- A1c > 8 %
- BMI > 40
- Dial 5 unit
- Increase by %
FIT : Recommendations for Best Practice in Injection Technique

- Injection technique
- Use of devices
- Factors Affecting Absorption
- Injection Sites
- Lipohypertrophy
- Special Populations

www.FIT4diabetes.com/canada-english
INSULIN REQUIREMENTS - ADULTS

0.5 units/kg body weight
John eats 2 sandwiches and a large apple every day for lunch. Carbohydrate: bread 4 x 15 = 60, apple 20, total = 80 grams. He takes 10 units of insulin.

\[
\frac{80}{10} = 8
\]

His ratio is 1 unit insulin to cover 8 grams of carbohydrate.
Sandra has a salad, chicken and a smoothie for lunch.
Carbohydrate: smoothie = 75 grams
She takes 5 units of insulin

\[ \frac{75}{5} = 15 \]

Her ratio is 1 unit insulin to cover 15 grams of carbohydrate.
Maureen ratio is 1:8 at breakfast

Her meal is 375 ml of rice krispies, 250 ml milk, 125 ml raspberries (38 + 12 + 8).

How much insulin would she need?

\[
\frac{58}{8} = 7.25
\]
Matt uses 1:8 ratio at lunch.
He normally eats a full sub which has 74 g carbohydrate.
Today he decides to add 500 ml of chocolate milk (250 ml 24 g carb)

How much insulin would he normally use at lunch?
74/8=9.3

How much would he need today with the chocolate milk?
74+ 48= 122
122/8=15.3
INSULIN SENSITIVITY OR CORRECTION FACTOR

- The amount a person’s blood glucose will drop (mmol/L) for each unit of insulin.
- “100 Rule”
- 100 divided by Total daily dose of insulin
INSULIN SENSITIVITY OR CORRECTION FACTOR

Francine takes 11 units of basal insulin and bolus insulin (7 + 3 + 4)
TDD = 25

Calculate the ISF 100/25 = 4

I unit (rapid insulin) will ↓ blood glucose 4mmol/L
USING ISF

Present blood glucose – target blood glucose = correction

Sam’s blood glucose is 14 mmol/L
His target is 6 mmol/L
14 - 6 = 8
He needs to correct 8 mmol/L

His ISF is 1:2
8 / 2 = 4
He would take 4 extra units of rapid insulin as a correction
Kathy

- Basal bolus with Lantus and Apidra
- Ratio is 1:10
- How much insulin would she need for this meal?

- 2 slices WW toast
- 1 orange
- 175 ml artificially sweetened yogurt
- 1 egg
- Coffee, black

[Answer Options]

a) 4 units
b) 10 units
c) 6 units
d) 3 units
Kathy

- Basal bolus with Lantus and Apidra
- Ratio is 1:10
- How much insulin would she need for this meal?

- 2 slices WW toast
- 1 orange
- 175 ml artificially sweetened yogurt
- 1 egg
- Coffee, black

(c) 6 units
Kathy

- Target is 7 mmol/L
- Present blood glucose 11 mmol/L
- ISF: 1 unit to decrease 2 mmol/L

How much extra insulin would Kathy require?
Blood glucose – target
\[ 11 - 7 = 4 \]
4 divided by ISF of 2
Kathy would add 2 extra units of insulin
PUMP THERAPY

https://www.aliem.com/2013/12/insulin-pumps-understanding-them-and-complications/
PUMP THERAPY

Who would benefit?
- Poor blood glucose control
- Marked dawn effect
- Frequent hypoglycemia
- Erratic lifestyle
  - Sleep patterns
  - Shift work
  - Travel
  - Irregular meal times
# PUMP THERAPY

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Quality of Life</td>
<td>- Cost</td>
</tr>
<tr>
<td>- More flexible, less injections</td>
<td>- Time required for teaching</td>
</tr>
<tr>
<td>- Improved glycemic control</td>
<td>- Technology</td>
</tr>
<tr>
<td>- Severe hypoglycemia</td>
<td>- Risk of DKA if insulin flow is interrupted</td>
</tr>
<tr>
<td>- Hypoglycemia unawareness</td>
<td></td>
</tr>
<tr>
<td>- Marked Dawn effect</td>
<td></td>
</tr>
<tr>
<td>- Very low basal rates &lt; TDD 20 units</td>
<td></td>
</tr>
</tbody>
</table>
**PUMPS**

Calculating dose

0.5 unit/kg body weight

50/50 basal/bolus

Susan weighs 48 kg

0.5 x 48 = 24

12 units basal/ 12 units bolus
**PUMPS**

- Basal insulin is divided by 24 (hours in day)
  - $12/24 = 0.5$ units per hour

- Bolus insulin is split between 3 meals depending on the relative amount of carbohydrate
  - $12/3 = 4$

- For example: 3, 4, 5
PUMP THERAPY

Sample Basal Insulin Rates

- 12:00 am – 3:00 am 0.5 u/h
- 3:00 am – 8:00 am 0.7 u/h
- 8:00 am – 12:00 am 0.6 u/h

Use:
- I:C ratio for Mealtime bolus
- ISF for corrections bolus
CONTINUOUS GLUCOSE MONITOR (CGM)

- Sensor lasts 30 days
- Transmitter lasts 90 days
After a low wait 45 minutes and ensure blood glucose is above 5
COMPENSATION FOR PHYSICAL ACTIVITY

Exercise requires:

- Add additional food
- Decrease Insulin
- Both
- None
PHYSICAL ACTIVITY IN TYPE 1

PHYSICAL ACTIVITY IN TYPE 1

PHYSICAL ACTIVITY IN TYPE 1

## Physical Activity in Type 1

<table>
<thead>
<tr>
<th>Glucose Trends</th>
<th>Main Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intensity and duration of exercise, insulin to glucagon ratio, fitness, nutrition, initial glucose concentration</td>
</tr>
<tr>
<td></td>
<td>Intensity and duration of exercise, insulin to glucagon ratio, counter-regulatory hormones, lactate concentration, fitness, nutrition, initial glucose concentration</td>
</tr>
<tr>
<td></td>
<td>Intensity and number of intervals, insulin concentration, counter-regulatory hormones, lactate concentration, fitness, nutrition, initial glucose concentration</td>
</tr>
</tbody>
</table>

CONSIDERATIONS FOR PHYSICAL ACTIVITY

- Timing of exercise compared to meal
- Blood glucose before starting exercise
- Weight goal: maintenance or loss
- Type of exercise
- Avoidance of injections in exercising muscles
- Do not exercise if blood glucose is above 16.7 mmol/L
Do Not Exercise!

Blood Glucose 16.7 or above

Severe hypoglycemia in previous 24 hours
### Compensation for Physical Activity

<table>
<thead>
<tr>
<th></th>
<th>Insulin</th>
<th>Carbohydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light exercise</td>
<td>Reduce bolus by 10%</td>
<td>Add 10 grams before activity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(May not be needed)</td>
</tr>
<tr>
<td>Moderate Exercise</td>
<td>Reduce Bolus by 20%</td>
<td>Add 15-30 grams before exercise</td>
</tr>
<tr>
<td>Vigorous Activity</td>
<td>Reduce Bolus by 30-50%</td>
<td>Add 30-60 before or after exercise</td>
</tr>
</tbody>
</table>
HYPOGLYCEMIA

Definition

- the development of autonomic or neuroglycopenic symptoms
- a low plasma glucose level (<4.0 mmol/L for patients treated with insulin or an insulin secretagogue); and
- symptoms responding to the administration of carbohydrate. The severity of hypoglycemia is defined by clinical manifestations

2018 Clinical Practice Guidelines
HYPOGLYCEMIA

Severity of hypoglycemia

- Mild: Autonomic symptoms are present. The individual is able to self-treat.

- Moderate: Autonomic and neuroglycopenic symptoms are present. The individual is able to self-treat.

- Severe: Individual requires assistance of another person.

- Unconsciousness may occur. PG is typically <2.8 mmol/L.
**HYPOGLYCEMIA SYMPTOMS**

**Neurogenic (autonomic)**
- Trembling
- Palpitations
- Sweating
- Anxiety
- Hunger
- Nausea
- Tingling

**Neuroglycopenic**
- Difficulty concentrating
- Confusion
- Weakness
- Drowsiness
- Vision changes
- Difficulty speaking
- Headache
- Dizziness
HYPOLYCEMIA

Teach glucagon to family members

Carry glucagon when traveling
TREATMENT FOR HYPOGLYCEMIA

- 15 grams of carbohydrate
RISK FACTORS FOR SEVERE HYPOGLYCEMIA

- Prior episode of severe hypoglycemia
- Current low A1C (<6.0%)
- Hypoglycemia unawareness
- Long duration of insulin therapy
- Autonomic neuropathy
- Low economic status
- Food insecurity
- Low health literacy
- Cognitive impairment
- Adolescence
SICK DAY MANAGEMENT

- Illness can result in elevated blood glucose requiring more insulin
- NEVER omit insulin even if vomiting
- Untreated hyperglycemia can result in DKA
SICK DAY MANAGEMENT

Sick Day Guidelines for Insulin users

S [Sugar] Check every 2-4 hours
I [Insulin] Continue to take it!
C [Carbohydrate] Take some every 1-2 hours
K [Ketones] Test if your blood glucose is above 16

Symptoms like a cold, flu, or sore throat can cause your blood sugar to rise. It is important to continue to monitor your blood sugar levels, eat and/or drink, and take insulin. Insulin often needs to be increased during an illness.

Always take your ______________________ (long-acting insulin)
Take your ______________________ (rapid insulin)
If you are able to eat/drink, use the chart on the next page to add extra insulin.

Call your Health Care provider if you:
- Vomits more than twice in 12 hours
- Has severe stomach pain
- Has rapid breathing
- Has a rapid heart beat
- Has fruity smelling breath (ketones)
- Has difficulty staying awake

Often when people are sick they prefer to nibble or sip fluids during the day. Be sure to include items with carbohydrate. Use the sample meals below as a guide. Add sugar-free fluids to prevent dehydration.

Breakfast: 1/2 cup apple juice and 8 crackers (Carbohydrate 30 grams)
- water or sugar-free beverages
Morning snack: 4 melba toast or 3/4 cup of ginger ale (Carbohydrate 15 grams)
- sugar-free beverages
Lunch: 3 arrowroot cookies and 1/2 cup regular jelly (Carbohydrate 30 grams)
- water or sugar-free beverages
Afternoon snack: 1 ready-to-serve pudding (Carbohydrate 25 grams)
- sugar-free beverages
Evening meal: 1/2 cup mashed potatoes and 1/2 cup ginger ale (Carbohydrate 30 grams)
- water or sugar-free beverages
Evening snack: 1 popside (2sticks) (Carbohydrate 20 grams)

Clear Fluids

For People with Diabetes

“Clear fluids” means you can see through them and there are no particles or pulp.
Carbohydrates need to be consumed anytime you are using clear fluids, to provide glucose for energy. You will need to continue with your medication and insulin to control blood sugars. In addition to carbohydrate containing beverages you will need sugar free fluids to prevent dehydration.

CAUTION: Red and purple beverages are to be avoided when preparing for a colonoscopy. Here is a sample menu to use.

<table>
<thead>
<tr>
<th>Breakfast</th>
<th>Carbohydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/3 cup apple juice and 1/2 cup ginger ale (Carbohydrate 30 grams)</td>
<td></td>
</tr>
<tr>
<td>Morning snack</td>
<td>1 cup powder or 3/4 cup of ginger ale (Carbohydrate 15 grams)</td>
</tr>
<tr>
<td>Lunch</td>
<td>1/2 cup white grape juice and 1/4 cup regular jelly (Carbohydrate 30 grams)</td>
</tr>
<tr>
<td>Afternoon snack</td>
<td>1 cup regular ginger ale (Carbohydrate 15 grams)</td>
</tr>
<tr>
<td>Evening meal</td>
<td>1/4 cup regular jelly and 3/4 cup of Gatorade (Carbohydrate 30 grams)</td>
</tr>
<tr>
<td>Even evening snack</td>
<td>1/4 cup regular jelly and 1/2 popside (Carbohydrate 20 grams)</td>
</tr>
</tbody>
</table>

Carbohydrate Beverages
Each contain 10 grams of carbohydrate and can be substituted in the menu:
- Apple juice: 1/3 cup
- Cranberry juice (white): 1/4 cup
- Cranberry cocktail (white): 1/3 cup
- Cranberry cocktail low calorie: 1 cup
- Gatorade: 3/4 cup
- Grape juice (white): 1/4 cup
- Powerade: 3/4 cup
- Regular jelly: 1/4 cup
- Regular tea: 1/3 cup
- Regular ginger ale: 1/4 cup
- Regular popsicle: 1 stick

Sugar Free Beverages
- Clear Coffee or Tea
- Clear Brisk
- Club Soda
- Crystal Light
- Diet Cranberry
- Diet Jello
- Diet Pop
- Powerade Zero
- Wiser
- Use as desired

Waterloo Wellington Diabetes

September 2015

Waterloo Wellington Diabetes

Revised January 2016
# Insulin Adjustment for Sick Days

<table>
<thead>
<tr>
<th>Blood Glucose mmol/L</th>
<th>Blood Ketones mmol/L</th>
<th>Urine Ketones</th>
<th>Action Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 3.9</td>
<td>negative</td>
<td></td>
<td>Decrease pre-meal insulin</td>
</tr>
<tr>
<td>4.0 - 16.0</td>
<td>&lt;0.6</td>
<td>+ or -</td>
<td>Usual insulin dose</td>
</tr>
<tr>
<td>4.0 – 16.0</td>
<td>≥ 0.6</td>
<td>Small light purple +2</td>
<td>Add an Extra 10% in addition to pre-meal dose</td>
</tr>
<tr>
<td>&gt;16.0</td>
<td>&lt;0.6</td>
<td>+ or -</td>
<td>Add an Extra 10% in addition to pre-meal dose</td>
</tr>
<tr>
<td>&gt;16.0</td>
<td>≥0.7 – 1.4</td>
<td>Moderate purple +3</td>
<td>Add an Extra 15% in addition to pre-meal dose</td>
</tr>
<tr>
<td>&gt;16.0</td>
<td>≥1.5 – 3.0</td>
<td>Large dark purple +3</td>
<td>Add an Extra 20% every 4 hours in addition pre-meal dose Contact your Dr. or healthcare team as soon as possible.</td>
</tr>
</tbody>
</table>

My rapid insulin is____________________
OTHER AUTOIMMUNE COMORBIDITIES

- Thyroid
  - 15-30%
  - Screening is important

- Celiac
  - 4-9%?
  - Silent

- Addison Disease
  - Recurrent hypoglycemia
  - Decreased insulin requirements
OTHER THERAPIES

- Metformin
- Liraglutide
- SGLT2
Which statement about people with type 1 diabetes is accurate?

a) 49% of people experience diabetes distress
b) 10% of people have depression
c) 90% of people feel their health care providers listen to them
d) 90% of people were helped to set goals by their health care providers
ELEVATED BLOOD SUGAR

What is the name given to an elevated blood sugar following a low blood sugar?

a) Dawn Effect
b) Pseudo hypoglycemia

✓c) Somogyi effect
d) Szycofski effect
QUESTIONS
GOALS:
- Optimal Growth and development
  - Physical and psychologically
- Prevent severe hypoglycemia
  - Disrupts cognitive function
  - Severe Hypoglycemia age <6 can result in later cognitive impairment
- No symptoms of hyperglycemia
  - Hyperglycemia has also been shown to affect cognitive function
- Lots of Energy
- Interest in Friends and Activities
- Regular School Attendance
CHALLENGES

- Growth Spurts
  - **HORMONES**
  - Altered patterns of eating and activity
- Recognition of Hypoglycemia
  - Nocturnal Hypoglycemia
  - Fear of seizures (parents)
- Changing behavior
  - Is this a normal response for a child this age or is this diabetes related?
- Variable Appetite
- Food Jags
- Illness
  - Regular colds, flu, infections require additional attention to maintain blood sugar control and prevent DKA
**Insulin Dose**

- Children .3-.5 u/kg
- Adolescents 1.0-1.5 u/kg
**Blood Sugar Targets**

<table>
<thead>
<tr>
<th>Age</th>
<th>A1c</th>
<th>AC Meals</th>
<th>2 hr PC Meals</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;18</td>
<td>≤7.5</td>
<td>4-8</td>
<td>5-10</td>
</tr>
</tbody>
</table>

2018 Clinical Practice Guidelines
Preprandial 6-10

- Severe or excessive hypoglycemia
- Hypoglycemia unawareness
RATIONAL FOR TARGETS

- Infants/Toddlers/Preschool
  - Unpredictable food intake
  - Can’t recognize hypoglycemia
  - Prevent Hypoglycemia due to effect on cognitive function

- School Age
  - Communicate Hypoglycemia
  - Food more predictable
  - Lacking in Judgment

- Teenagers
  - Recognize and Treat Hypoglycemia
  - Understand concept of Balance
  - Able to Plan Ahead
Honeymoon

- Can last from a few weeks up to 2 years
- Good blood glucose control with decreased insulin requirements
- Insulin may even be stopped
## Hypoglycemia

<table>
<thead>
<tr>
<th>Child’s Age</th>
<th>&lt; 5</th>
<th>5-10</th>
<th>&gt; 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrate</td>
<td>5 g</td>
<td>10 g</td>
<td>15 g</td>
</tr>
</tbody>
</table>

**Mini dose glucagon 10 ug per year of age**
- minimum 20 ug,
- maximum 150 ug

2018 Clinical Practice Guidelines
GLUCAGON
OTHER AUTOIMMUNE DISEASE

Thyroid

- Most likely girls at onset of puberty
- Testing at Diagnosis and every 2 years
- +ve antibodies screen 6-12 months
OTHER AUTOIMMUNE DISEASE

Celiac
- 4-9% of children with Type 1
- Screening controversial,
  Done as clinically indicated

No wheat, rye, barley
Non-contaminated oats
# Screening for Complications

<table>
<thead>
<tr>
<th>Condition</th>
<th>Screening Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nephropathy</strong></td>
<td>Age 12 with 5 years duration yearly</td>
</tr>
<tr>
<td><strong>Retinopathy</strong></td>
<td>Age 15 and 5 years duration yearly</td>
</tr>
<tr>
<td><strong>Neuropathy</strong></td>
<td>Post puberty, 5 years duration and Poor Control</td>
</tr>
<tr>
<td><strong>Hypertension</strong></td>
<td>Twice per years</td>
</tr>
<tr>
<td><strong>Dyslipidemia</strong></td>
<td>Age 12 and 17 or &lt;12 if BMI &gt; 97th or family history</td>
</tr>
</tbody>
</table>

2018 Clinical Practice Guidelines
Eating Disorders

Females with diabetes have a 2 fold risk of eating disorders.
EATING DISORDERS

- Anorexia - restriction of calories
  - Inadequate food intake
- Binge Eating
- Bulimia
  - binge eating then purging
  - Food intake is often out of control when binging
- Diabulimia - Insulin under dosing or omission

A1c over 12% is indicative of insulin omission
Eating Disorders Red Flags!

- Unexplained lows
- Unexplained weight loss or lack of weight gain
- A1c above 10%
- Restriction of carbohydrate
- A1c/meter and log book discrepancy
- Recurrent DKA
- Reverting to symptoms pre-diagnosis
- Lack of fingerpricks

EATING DISORDERS

8 - 30% of Adolescents with diabetes have either an eating disorder or disordered eating.
Misc

- Flu shots yearly
- Females counseling about contraception
- Alcohol
- Recreational drugs
- Driving
Risk of developing Type 1 Diabetes?

- Identical Twin: 1 in 2-3 chances
- Father: 1 in 16-20 chances
- Sibling: 1 in 20 chances
- Mother, child born before age 25: 1 in 25 chances
- Mother, child born after age 25: 1 in 100 chances
- No Family Members: 1 in 250-400 chances
Jessica is a 17 year old who has had diabetes for 12 years. She had a recent admissions for DKA and has lost 20 pounds since her last clinic visit.

What would be the most likely cause of the weight loss?

a) Additional exercise
b) Starvation diet
✓ Insulin omission
d) Less hypoglycemia from frequent use of fibre snacks
Mr. & Mrs. Singh are quite upset that their daughter’s A1c has increased to 9.3% from the previous level of 7.6%. You noticed when seeing the 13 year old, that she had started to mature physically. Your best explanation to the parents would be?

a) All teenagers cheat when away from their parents
b) The A1c of 9.3 % is acceptable for a teenager

✓) Teenagers experience a surge of hormones that requires increased insulin
d) The blood glucose control is important to reduce the risk of complications once puberty is reached.
Sick Day Management

Justine has just had her wisdom teeth removed. She is trying to convert her lunch to liquids which she can tolerate. She normally has 45 grams of carbohydrate. Which answer is **not** equivalent?

a) 1 cup orange juice and 1 stick of popsicle

✓ b) 1 cup jello and 1 cup apple juice

c) 1 pudding cup and ½ cup ice cream

d) 1 cup chicken noodle soup and 8 crackers and ½ cup gingerale
Questions

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