Sweet Science
Diabetic Emergencies

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Diabetic Emergencies
• Hypoglycemia/Insulin Reaction
• Diabetic Ketoacidosis
• Diabetic Coma

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Hypoglycemia
(Insulin Reaction)
• Abnormally low blood glucose level, usually defined as less than 70, although level for infants and toddlers differs for safety.
• Determination of mild/moderate/severe based on level of function of patient, need for assistance and degree of intervention required to correct hypoglycemia
Possible Causes of Hypoglycemia in Type 1 Diabetics

- Too much insulin
- Too little food
- More exercise/physical activity than usual
- Remember that episodic borderline (55-70) hypoglycemia part of well controlled diabetes
- Excessive alcohol consumption

Signs/Symptoms of Hypoglycemia

- Pale
- Weak
- Shaky
- Palpitations
- Anxious
- Sweaty/Clammy
- Irritable
- Hungry

Treatment of Hypoglycemia

Cold & Clammy: Need Some Candy

https://www.cornerstones4care.com/content/dam/nni/cornerstones4care/pdf/content/Tracking/LowBloodSugar.pdf
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**Conscious & Can Swallow**

"Rule of 15":
1. Give 15g of fast acting carbs.
2. Wait 15 min.
3. Recheck blood glucose.
4. If BG not coming up, repeat.

Rule of thumb - 15g carbs will cause increase of 25-50mg/dL in BG.
Goal: to achieve BG >100mg/dL.

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**Unconscious or Unable to Swallow**

If lethargic, disoriented, unconscious, unable to swallow:
1. Give ½ mg Glucagon IM (1/2 of full syringe).
2. Position on left side.
3. Call 911.
5. Monitor glucose
6. Encourage eating when aroused
7. Can repeat Glucagon after 10-15min.

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**Glucagon Emergency Kit**

Lilly iPhone App will allow you to practice and show others how to use glucagon.
Hyperglycemia

- High blood sugar. Defined differently for different individuals.
- Typically >300 is uniformly considered excessive.
- Fasting blood glucose 126 or higher, although children with Type 1 Diabetes have a target that is often higher, especially infants and toddlers.

Hyperglycemia Causes:
- Excess carbohydrates relative to insulin dose
  - Carb count incorrect
  - Inadequate insulin dose
- Improper injection technique
- Medications such as Steroids
- Physiological stress
  - Surgery
  - Illness
  - Emotional)
- Lack of physical activity;

Signs/Symptoms of Hyperglycemia
- Polydipsia
- Polyuria
- Blurry vision
- Fatigue
- Headache
- Hungry

https://www.novonordisk.com/content/dam/novonordisk/novomedlink/resources/germaldocuments/HighBloodSugar_EG.pdf
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Treatment of Hyperglycemia

- Correction insulin at meals, bedtime, and other times depending on needs
- Needs determined by:
  - Timing of last insulin dose
  - Activity
  - Illness.

Hot & Dry: Blood sugar high

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Untreated sick days can lead to DKA.

Sick days often require MORE insulin for correction. Do NOT skip long-acting insulin.

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Sick Day Plan

Use with any signs/symptoms of illness...fever, nausea, vomiting.

Ketones are the problem not the high sugar.

Do NOT skip long-acting insulin.
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Ketones

- A fuel compound that includes acetone and aceto-acetic acid. They are formed in states of starvation or in conditions, such as diabetes, in which insulin doses are low or absent.
- Ketones have a characteristic odor and high levels cause nausea and vomiting.
- Very high ketones cause the blood to become acidic leading to DKA

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Checking for Ketones

Check ketones with belly pain, nausea, vomiting, fever every void (about every 2 hours) or until they resolve

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Ketones: Small or Less

If ketones are Trace or Small/(15 or less) on urine ketone stick, or 0.6mmol/L or less (serum):
- Check ketones every void while sick.
- Continue usual diabetes care with above addition.
- Pink, Drink, and Play.
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**Ketones: Moderate/Large**

- If ketones are MODERATE to LARGE/40+ or blood ketones are > 0.6mmol/L use ketone protocol.
- Insulin eliminates ketones
- To eliminate ketones, extra insulin must be given. (Remember, ketones are the problem, not the high blood sugar.)

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**Ketone Protocol**

1. Give shot of Apidra/Humalog/Novolog. Call office for first dose (and second dose if large ketones continue). Use correction factor to determine dose if ketones are declining.
2. Give sugared fluids (regular soda, & juice) based on age. Drinking SUGARED fluids creates hyperglycemia so extra insulin can be given.
   - 2-8 years old: 10-12 oz. per hour
   - 9-12 years old: 14-16 oz. per hour
   - Teenager: 24-36 oz. per hour
3. Recheck blood sugar (and ketones) 2 hours after giving insulin.
   - If ketones are trace/small (15), return to usual diabetes care.
   - If ketones are moderate (40) or greater repeat sugared fluids and insulin doses every 2 hours until ketones resolve.
4. If child has: difficulty staying awake, heavy breathing, cannot tolerate fluids, hypoglycemia, severe chest/stomach pain then should be sent to the emergency room or call 911 immediately.

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**Diabetic Keto-Acidosis**

- Diabetic Keto-Acidosis (DKA) is a potentially life-threatening acute complication of diabetes characterized by:
  - High ketones
  - High blood sugar (usually)
  - Acidosis
- DKA is caused from the build-up of ketones (fatty acids) in the blood stream and does not result from prolonged high blood sugars.
- DKA always develops because of insufficient insulin.
Diagnosis of DKA
• Approximately 25% of new diagnoses present in DKA, especially in younger patients (nearly 100% in those < 2 years of age).
• Recurrent DKA is always due to inadequate insulin, which typically means insulin omission.
DKA mortality ~ 0.5%  
Cerebral Edema (CE) occurs in 1% of DKA and is the major cause of mortality  
In those with CE ~ 1/3rd expire, ~ 1/3rd have permanent neurological injury, ~ 1/3rd recover without deficit.

Increased risk of DKA at Diagnosis in:
• Young age (<5 years)
• Lower income
• Lower parental education
• Lack of health insurance

Increased DKA Risk in Known diabetics with:
• Poor metabolic control (elevated A1c)
• Previous episodes of DKA
• Peripubertal & adolescent girls
• History of depression, other psych disorders
• Unstable family
• Limited access to medical services
• Insulin pump use
Causes of DKA

- Absolute Insulin deficiency
  Diabetes not suspected & diagnosis delayed
- Relative Insulin deficiency
  Physiological stress causing hyperglycemia without use of additional insulin

DKA is caused by a decrease in circulating insulin associated with increase in counter regulatory hormones such as glucagon, catecholamines, growth hormone, and cortisol.

Progressive dehydration, acidosis, electrolyte imbalance cause worsening clinical state — like a hamster on the wheel — until the cycle is broken with insulin and careful replacement of fluids and electrolytes (potassium, sodium, and phosphate), a self-perpetuating cycle of metabolic decompensation worsens.

Treatment of DKA

- Insulin
- Careful fluid & electrolyte replacement
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**Signs/Symptoms of DKA**

- Abdominal pain
- Dry mouth
- Weakness
- "Fruity" breath
- Chest pain
- Kussmaul Breathing (deep breathing not necessarily rapid)

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**Dangers of DKA**

- Cerebral edema
- Permanent neurologic injury
- Death

DKA severity is defined by degree of acidosis.
Diabetic Coma

- What is the cause?
- High blood sugar with untreated DKA?
- Low blood sugar without treatment?
- Treatment depends on the cause. If in doubt and no way to check blood sugar or ketones, treat as hypoglycemic.

Questions ???


