

# What You Need to Know to Help Your Patients with Diabetes

## Hypoglycemia

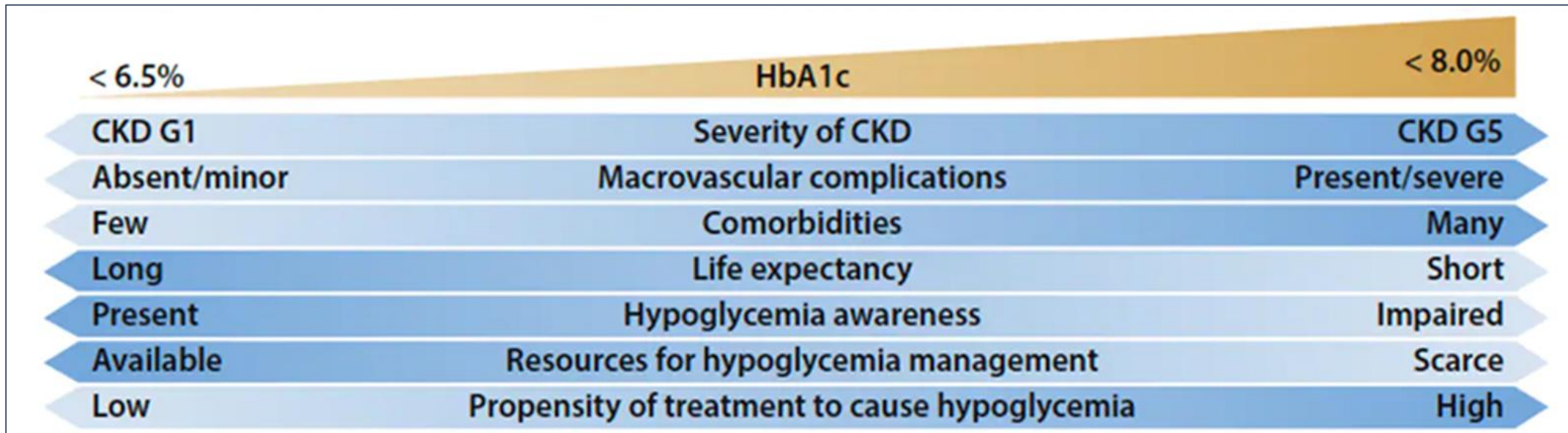
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June 2023

# Diabetes & Hypoglycemia

- Diabetes does not cause hypoglycemia – certain treatments of diabetes can lead to hypoglycemia
- A person with ***any type of diabetes*** has the potential to develop hypoglycemia if treated with a *hypoglycemic agent* (medication) – **Insulin, sulfonylureas or glinides**

## Glycemic Goals – limited by risk of hypoglycemia



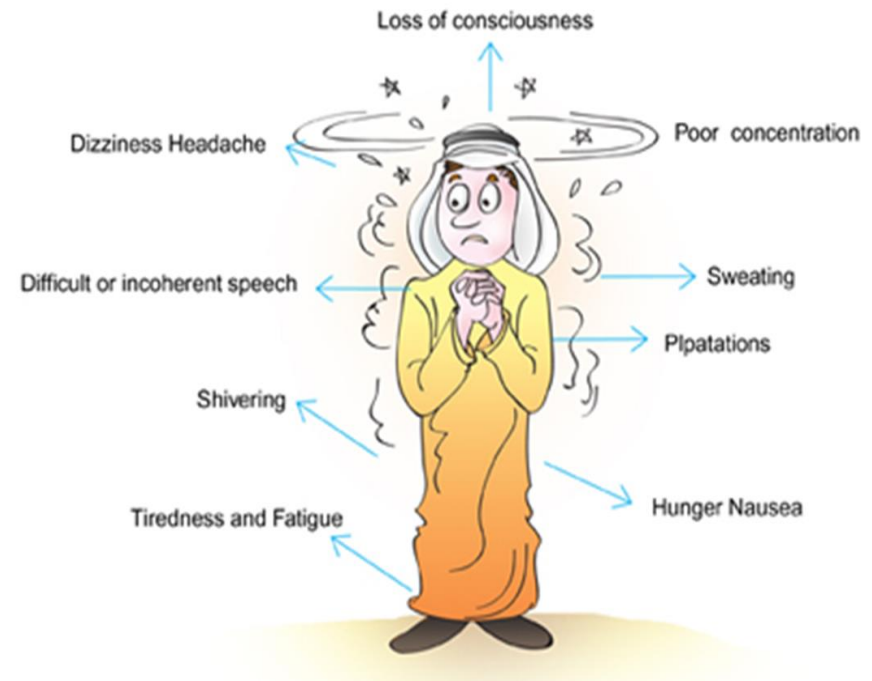
# Hypoglycemia in People with Diabetes

- Hypoglycemia defined as blood glucose  $<70$  for people with diabetes = *“Low Blood Sugar”*
- Hypoglycemia is the major *limiting factor* in the glycemic management of type 1 and type 2 diabetes.
- Asymptomatic Hypoglycemia -Hypoglycemic Unawareness defined as not getting the adrenergic & cholinergic warning symptoms of hypoglycemia
- Relative or Pseudo-Hypoglycemia - Some patients, especially with T2DM & poorly controlled DM, get symptoms of hypoglycemia with a blood sugar  $>70$
- Fear of Hypoglycemia – can be cause for high blood sugars and/or roller-coaster blood sugars

# Hypoglycemia (Low Blood Sugar)

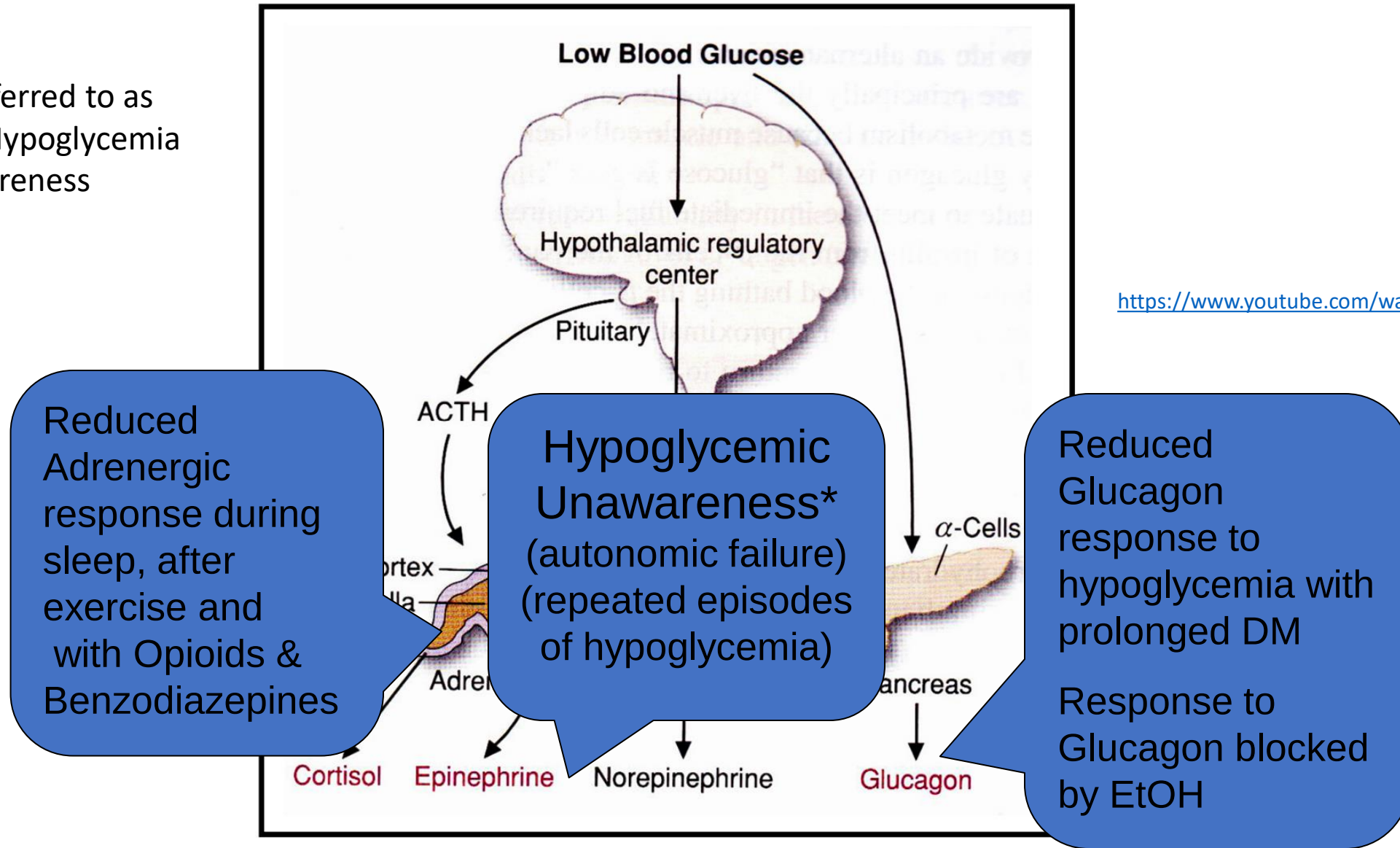
- **Level 1 hypoglycemia** is defined as a measurable glucose concentration  $<70$  mg/dL but  $\geq 54$  mg/dL.
  - A blood glucose concentration of 70 mg/dL has been recognized as a threshold for **neuroendocrine/neurogenic responses**
- **Level 2 hypoglycemia** (defined as a blood glucose concentration  $<54$  mg/dL)
  - This is the threshold at which **neuroglycopenic symptoms** begin to occur and requires immediate action to resolve the hypoglycemic event.
- **Level 3 hypoglycemia** -A severe event characterized by altered mental and/or physical status **requiring assistance** for treatment of hypoglycemia
  - may be recognized or unrecognized and can progress to **loss of consciousness, seizure, coma, or death**.
- In people without diabetes – hypoglycemia defined as BG  $<55$  with signs & symptoms that resolve when BG increased by treatment (can be due to tumors, dumping syndrome, etc.)

Neurogenic response → Neuroglycopenia



# Counter-Regulatory Hormones

\*now referred to as  
Impaired Hypoglycemia  
Awareness



# Symptoms of Hypoglycemia

## Early “mild” symptoms (adrenergic/cholinergic):

- Sudden moodiness or confusion
- Dizziness
- Feeling shaky or trembling
- Hunger
- Headaches
- Irritability
- Pounding heart; racing pulse
- Skin turning pale
- Sweating or clammy
- Weakness
- Anxiety

## Late severe symptoms (neurocognitive):

- Poor coordination
- Poor concentration or confusion
- Difficulty speaking or slurred speech
- Numbness around mouth & lips or other localized neurologic symptoms
- Seizures or convulsions
- Passing out
- Coma
- Death

6.10 Occurrence and risk for hypoglycemia should be reviewed at every encounter – ask about hypoglycemia & if they can feel their symptoms ***if taking meds that can cause hypoglycemia***

Hypoglycemia is not caused by the diabetes but by certain treatments (overtreatment) – not all diabetes medications cause hypoglycemia

# Symptoms of Hypoglycemia

Nighttime symptoms:

- Damp sheets or bed clothes due to perspiration
- Nightmares or bad dreams
- Tiredness
- Irritability, headache or confusion upon waking
- Not waking up

## Signs and Symptoms

Here's what may happen when your blood sugar is low:



If low blood sugar is not treated, it can become severe and cause you to pass out. If low blood sugar is a problem for you, talk to your doctor or diabetes care team.

# Hypoglycemic Effects

- Neurocognitive effects

- cognitive effects & impairment, coma, brain dead, dementia



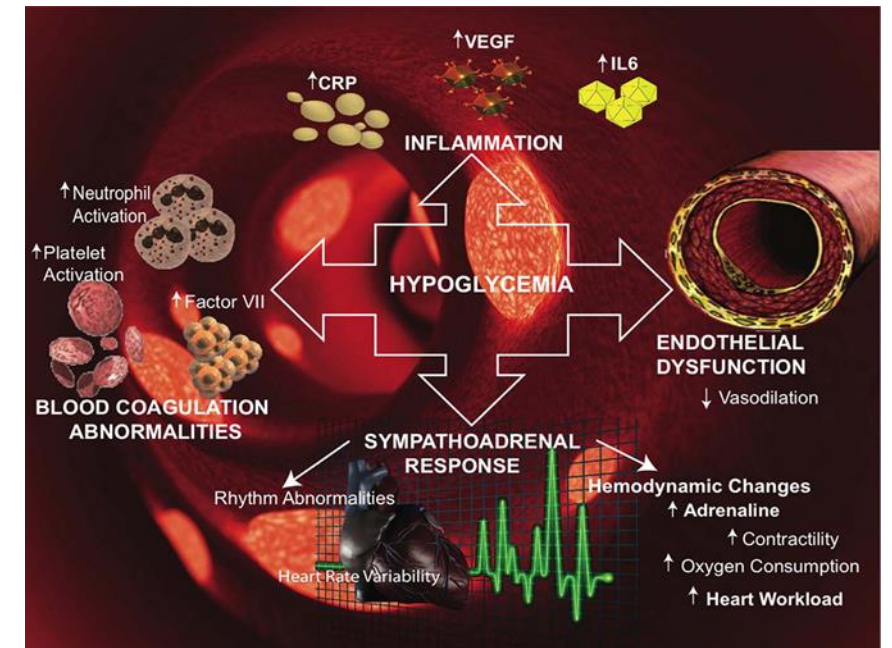
- Increased falls and trauma

- Impaired driving/ accidents
- Fractures, lacerations, Traumatic Brain Injury



- Increased CVD and Mortality

- Acute Ischemia
- Atherogenic effects
  - Pro-inflammatory/ Pro-coagulant
  - Greater at BG 50 than BG 200;
  - Elevated for >7-8 days after event
- Arrhythmogenic effects
  - “Dead in bed”



# Hypoglycemic Risk



If taking Insulin & insulin secretagogues (SUs & glinides)

- Intensive or tight control & targets
- Risk in T2DM: in Accord highest risk with A1c >9%
  - Not all hypoglycemic risk is from tight control
- Missed / irregular meals (food insecurity)
- Risk higher with longer duration of diabetes
  - Progressive loss of Beta cells
- Increased in the elderly, especially if cognitive impairment (“vicious cycle”)
- Medication errors & safety
  - literacy, numeracy, lack of education

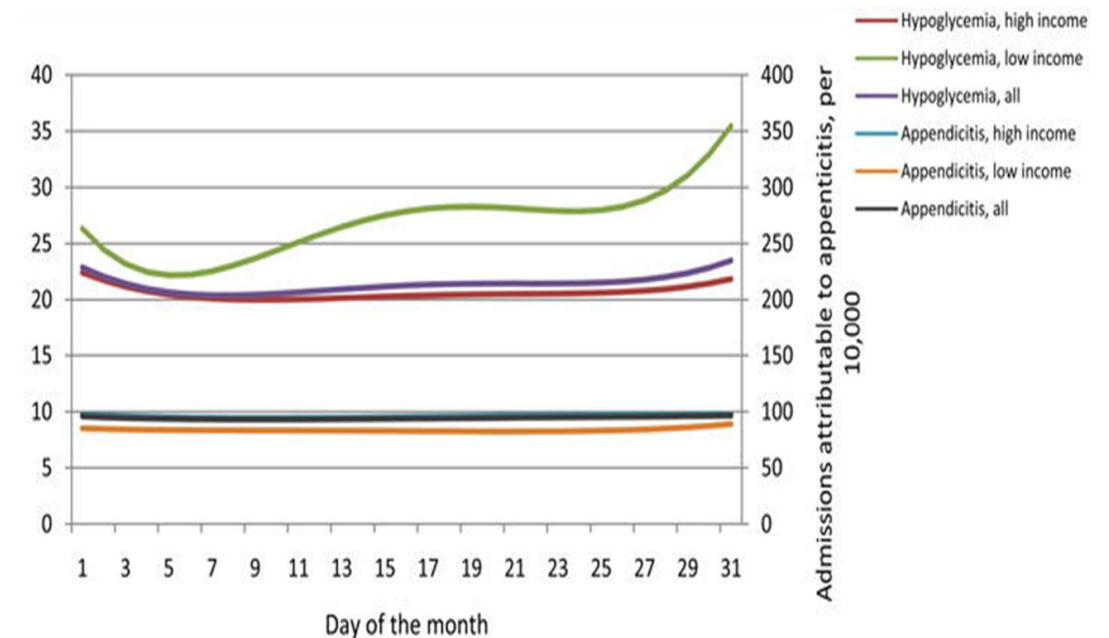


- Renal and/or Hepatic Impairment
  - Prolonged duration (reduced drug &/or insulin clearance)
  - reduced Gluconeogenesis (GNG)
- EtOH, Opioids, benzodiazepines
  - Reduced counter-regulatory responses – not recognize symptoms
  - EtOH blocks Hepatic glucose output (glucagon ineffective)
- Exercise / Increased activity
  - Increased glucose utilization and insulin sensitivity (3days)
  - Blunted counter-regulatory response (autonomic failure)



# Irregular or Insufficient Food Intake

- Missed / Delayed / Reduced Meals
  - Job demands, travel, meetings, etc.
  - Fasting for tests or procedures
  - Illness (eat less or unable to eat or vomiting)
  - Lack of nutritional knowledge (carbs) (eggs & bacon)
    - Struggles with numeracy (carb counting & insulin dose)
- Reduced ability to shop for or prepare meals
  - Aging, widower, loss of vision, amputations, cognitive decline, etc.
- Lack of food (food insecurity)
  - Insufficient money or SNAP funds for purchasing food



# ADA Hypoglycemia Recommendations

- **6.10 Occurrence and risk for hypoglycemia** should be reviewed at every encounter and investigated as indicated. Awareness of hypoglycemia should be considered using validated tools. *C if taking meds that can cause hypoglycemia*
- **6.11 Glucose (approximately 15–20 g) is the preferred treatment** for the conscious individual with blood glucose <70 mg/dL, although any form of carbohydrate that contains glucose may be used.
  - Fifteen minutes after treatment, if blood glucose monitoring (BGM) shows continued hypoglycemia, the treatment should be repeated.
  - Once the BGM or glucose pattern is trending up, the individual should consume a meal or snack to prevent recurrence of hypoglycemia. B
- **6.12 Glucagon** should be prescribed for all individuals at increased risk of level 2 or 3 hypoglycemia, so that it is available should it be needed.
  - Caregivers, school personnel, or family members providing support to these individuals should know where it is and when and how to administer it. Glucagon administration is not limited to health care professionals. E

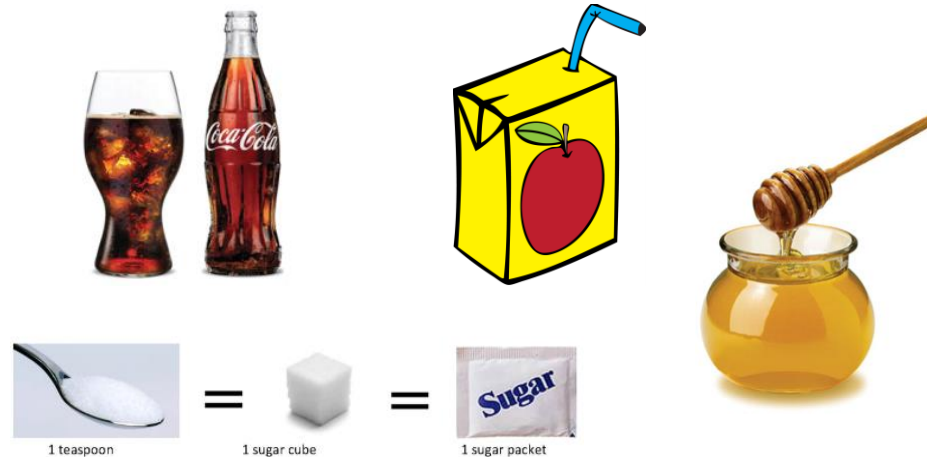
# Treating Hypoglycemia – Patient Education

- Hypoglycemia “**Rule of 15/15**”

- 1) Check your blood glucose: If your blood glucose is 70-100mg/dL and you are symptomatic (sweaty, shaky, hungry, irritable, tired) or your blood glucose is less than 70mg/dL, take **15 grams of fast acting carbohydrates\***.

- \*Examples of fast acting carbohydrates are:

- 3-4 glucose tablets OR
- 1 tube glucose gel OR
- 1 cup non-fat milk OR
- 6 oz regular soda OR
- 4oz (1/2 cup) fruit juice OR
- 5 lifesavers OR
- 2 tablespoons of raisins or
- 2 teaspoons of sugar or honey.



- 2) **Wait 15 minutes and then recheck** your blood glucose. If your blood glucose is not up to 100mg/dL, then repeat the above treatment.
- If the symptoms of low blood glucose are gone but it is *more than 1 hour away from your mealtime*, **eat a snack** of 1 starch and 1 protein such as ½ sandwich OR 1oz cheese and 6 crackers OR 1 tbsp. peanut butter and 6 crackers OR 4oz non-fat milk and 2 graham crackers.

# Sources of Carb (want “rapid” Carbs for fast absorption)

- **Great Sources of Carbohydrate for a Low Blood Sugar**

- *Glucose gels (cake gels) (absorbed from lining of mouth)*  
*Glucose tabs*  
*Smarties*  
*Pixie Sticks*



- These are all dextrose and glucose and are broken down and in your system within 10 minutes. Dextrose is very similar to glucose in terms of it's molecular structure, which makes it a fast source of carbohydrate for a low.

- **Pretty Good Sources of Carbohydrate for a Low Blood Sugar**

- *Juice box*  
*Soda*  
*Dried fruit*  
*Jellybeans*
- These sources can take at least 20 minutes to break down and get into your bloodstream (e.g., Jellybeans have a lot of additives and fillers, which your body has to break down first, before digesting the carbohydrates)

- **Not-So-Great Sources of Carbohydrate for a Low Blood Sugar**

- *Ham sandwich*  
*Peanut Butter Sandwiches*  
*Chocolate bars*  
*Cookies*  
*Ice cream*
- These sources of carbohydrates are loaded with fats and proteins, which will slow down the digestion process and delay your body's ability to get that glucose into your bloodstream.

# Glucagon

## Joslin Diabetes Center Patient Guide



### If you pass out [from low blood sugar]

- If ... you do not take care of low blood glucose, you may pass out.
- If you do, a drug called **glucagon** should be injected into your skin, like you do with insulin.
- This can be done by a family member or friend who has been taught how to do it.
- Since glucagon may cause you to vomit, you should be placed on your side when the injection is given.
- If no one knows how to give the injection, you should be taken to a hospital.
- You need a prescription for a glucagon kit.
- You should awaken about 10 minutes after the glucagon is injected. If you do not, you should be taken at once to a hospital.

# Glucagon- new formulations & delivery

- [Using BAQSIMI<sup>®</sup>, Dosing & Storage | BAQSIMI \(glucagon\) nasal powder](#)
- [What Is Gvoke<sup>®</sup> \(glucagon injection\): Glucose Autojector Pen for Diabetics \(gvokeglucagon.com\)](#)

