Sweet & Sour: Management of the Hypoglycemic Diabetic Patient

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Objectives

- Identify factors that increase the risk of hypoglycemia in the type 2 diabetic
- Describe why transport is indicated for the type 2 diabetic treated for hypoglycemia
- Distinguish between insulin types
Which oral hypoglycemic agent is most likely to cause hypoglycemia?

- A. Actos
- B. Glyburide
- C. Metformin
- D. Januvia
Which type of insulin has the fastest onset of action?

- A. Aspart
- B. Lantos
- C. Detemir
- D. Regular
Which drug increases the risk of hypoglycemia in patients taking Amaryl?

- A. Aspirin
- B. Benadryl
- C. Digoxin
- D. Lipitor
Distinguishing the types

**Type 1**
- 5% of diabetics
- Usually
  - Lean
  - Less than 40 years at onset
- Insulin levels absent or low
- Need insulin to survive

**Type 2**
- Usually
  - Onset at middle-age or older
  - Overweight (20% are not)
  - Normal or high insulin levels
- Insulin resistance
- Gradual onset
- Treatment varies
  - Weight loss
  - Oral hypoglycemic agents
  - Insulin
Balancing Act

Tight A\textsubscript{1}C control

- Weight gain/quality of life
- Reduce risk of long-term problems
- Increased risk of hypoglycemia

Poor A\textsubscript{1}C Control

- Heart, kidney, PVD
- Lower risk of hypoglycemia

Increased risk of hypoglycemia

Reduce risk of long-term problems

Weight gain/quality of life
Insulin can be fast onset with short duration or fast onset with long duration of action.

- **Rapid Acting**
  - Peak ½-1 ½ hr

- **Short Acting**
  - Peak 2 ½ -5 hr

- **Intermediate Acting**
  - Peak 4-12 hr

- **Long Acting**
  - Duration ~24 hr

- **Mixes e.g. Novolin 70/30 combine intermediate & short-acting**
Insulin Pump
Insulin Pump

Twist until arrows line up
Insulin Pump

Squeeze to release
Oral Diabetic Agents

• Biguanides - metformin (Glucophage)
  o Extended release – Glucophage XR, Fortamet, Glumetz
  o Does not increase pancreatic insulin secretion
    • Increased risk if taking with repaglinide (Novonorm, Prandin) or sulfonylureas
  o Risk of acidosis

• Sulfonylureas
  o Glipizide (Glucotrol), glyburide (Diabeta, Micronase), glimepiride (Amaryl), micronized glyburide (Glynase)
  o Increase pancreatic insulin secretion
  o Take once per day – effects may last up to 48 hours

Recurrent episodes in 2-7% of patients so transport is recommended (Fitzpatrick & Duncan, 2009)
Other type 2 agents

- Thiazolidinediones (Actos)
  - Decrease insulin resistance at cell

- Alpha-glucosidase (Precose, Glycet)
  - Inhibit CHO breakdown/absorption in small intestine

- DPP-4 Inhibitors
  - Sitagliptin (Januvia), Saxagliptin (onglyza), Lingliptin (Trajenta)
  - Improves insulin level after a meal, lower glucose production
  - Only works when BGL is elevated
Hypoglycemic Risks in Type 2

- Risk higher with pre-existing
  - Renal disease, heart disease, alcoholism
- Medication interactions with
  - Salicylates
  - Sulfonamides (including sulfa drugs Bactrim/Septra)
  - Fibric acid derivative (gemofibrozil [Lopid])
  - Warfarin

Hypoglycemia often occurs after the patient starts a new drug
Drugs Affecting Hypoglycemic Agent Absorption/Function

- Atazanavir
- Clarithromycin
- Erythromycin
- Fluconazole
- Fluoxetine
- Fluvastatin
- Fluvoxamine
- Gemfibrozil
- Aspirin
- Grapefruit
- Indinavir
- Isoniazid
- Itraconazole
- Ketoconazole
- Metronidazole
- Ritonavir
- Sulfamethoxazole
- Voriconazole

Beta blockers also
Hypoglycemia in Older Adults

- 20% of episodes result from undiagnosed infection
- >30% of hypoglycemic episodes in >65yo (higher if they take insulin)
- Decreased ‘autonomic warning signs’ of hypoglycemia
  - May have no sx until BGL<45 mg/dL
  - Worsens if taking SSRIs. Beta blockers, ACE inhibitors
  - Alcohol ingestion associated with hypoglycemia
Why do patients become hypoglycemic?
Causes

• Diabetic patients
  o Imbalance between insulin and glucose intake
  o Physical activity
• Non-diabetics
  o Medication – usually diabetic
    • Quinine (malaria treatment)
  o Excess alcohol ingestion without food
• Critical illness
  o Hepatitis, renal disease, starvation (anorexia), sepsis
• Insulin overproduction
• Adrenal or pituitary disorders
Signs & Symptoms

- Irritability or anxiety
- Tremulousness
- Headache
- Hunger
- Weakness
- Difficulty sleeping
- Loss of consciousness

- Tachycardia
- Sweating
- Mental status change
- BGL <70 mg/dL
- Loss of consciousness
Initial Food Choices

- 1/2 to ¾ c. OJ or grape juice
- 2 glucose tabs
- 2 doses glucose gel
- 2-4 pieces hard candy
- 5 gum drops
- 1-2 TBSP honey
- 6 oz (1/2 can) soda
  - Not diet
- 2 TBSP cake icing

Need 10-15 gm CHO rapidly absorbed
Avoid fats – slow absorption
Dextrose IV/IO

Adult 25 gm 10-50% Dextrose
- 50 mL 50% dextrose
- 100 mL 25% dextrose
- 250 mL 10% dextrose

Pediatric 0.5 – 1 gm/kg 10-25% dextrose
- 2 mL/kg 25% dextrose
- 4 mL/kg 12.5% dextrose
- 5 mL/kg 10% dextrose

Model EMS Clinical Guidelines 2014
“Medic respond to check the welfare”

Did not come for dialysis this am
Found unconscious GCS 7
Blood glucose <10 mg/dL
VS 120/80 P 76 R 14 SaO2 98%
D50W 25 G given
Regains consciousness – declines transport
Hx diabetes type 2 (placed on glucophaghe the day prior)
Outcome

- HTN, renal failure, emphysema
- Made sandwich – reassessed after eaten
- Blood glucose 124 mg/dl
- Continues to refuse transport
- Spouse out of town
- Tells paramedics he will contact PMD prior to taking additional medication
0830 the next day...

- Medic 1 check the welfare
- Pt. did not come to dialysis
- Found prone, pulseless in bedroom
- Pooling in dependent areas
- Asystole

Renal disease associated with increased incidence of adverse medication effects
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Thank-you!
References


