

Problem Based Learning Activity

The “Recall” Version:

Indicate the onset, peak and duration of each type of insulin (rapid acting, regular, intermediate acting and long/ultra long acting).

List the signs and symptoms of hyper glycemia and hypoglycemia with the correlating nursing interventions and patient teaching.

The Hook:

A 16-year-old male client presents to the ER accompanied by his parents. The client exhibits drowsiness with confusion to place and time and significant generalized weakness. Client exhibits dry mucous membranes, poor skin turgor, rapid deep respirations, and fruity odor to breath.

Parents report client has shown increasing fatigue and weakness over past few weeks with unexplained weight loss of about 15 pounds despite eating and drinking “all the time”. Client has also had some recent episode of enuresis which is a new situation as client has been continent since age 2.

Client mumbling “my stomach hurts, I think I need something to eat” and guarding abdomen. No overt tenderness to palpation observed.

Client’s Vital signs are:

BP 110/72

HR 118

RR 32

Temperature 98.8 F

O2 saturation 97% on room air

Diagnostics:

Blood glucose per finger stick 450

ABGs: PH 7.28; CO₂ = 35; HCO₃ = 14; O₂ = 90

Urine + for ketones, + for glucose per dipstick

Investigation & Data Gathering: What objective data, evidence, context, or missing pieces of information must they immediately gather to define the exact scope of the problem?

Students should ask:

Does the client have any allergies?

Has the client traveled out of country recently?

Is there a personal or family history of heart, kidney, liver, endocrine disorders?

Students need to request electrolyte panel, beta-OHB, HbA1c level, and CBC to rule out infections, see long picture of glucose levels, obtain accurate ketone levels, and address any electrolyte imbalances –particularly potassium.

Evidence-Based Frameworks: What specific industry standards, academic theories, ethical codes, or professional guidelines must they cite to support their proposed actions?

Following standard protocols endorsed by the NIH and the American Diabetes Association, the initial management would include:

1. Fluid Resuscitation:

Begin with isotonic fluids like 0.9% Normal Saline at 15–20 mL/kg/h for the first hour to restore intravascular volume and improve renal perfusion.

Switch to 0.45% Saline at 4–14 mL/kg/h once hemodynamically stable, depending on the patient's hydration status and serum sodium levels.

When blood glucose reaches 200–250 mg/dL, add dextrose (e.g., D5W) to intravenous fluids to prevent hypoglycemia while insulin continues clearing the ketones.

2. Insulin Therapy:

Start a continuous Intravenous Insulin Infusion at 0.1 units/kg/h, often after an initial 0.1 units/kg bolus.

Once blood glucose falls below 250 mg/dL, the insulin rate may be halved to 0.05–0.1 units/kg/h.

The goal is a steady decline in glucose (50–75 mg/dL per hour) until DKA criteria resolve.

3. Electrolyte Management (Potassium):

DKA depletes total body potassium, and insulin drives potassium back into cells, dropping serum levels.

If potassium is <3.3 mEq/L, delay insulin therapy and aggressively replete potassium first.

If potassium is between 3.3 and 5.3 mEq/L, add potassium to intravenous fluids to maintain levels in the safe range (4.0–5.0 mEq/L)

4. Bicarbonate:

It is generally only considered in cases of severe acidemia (pH <6.9), otherwise, usually avoided, as it can cause paradoxical central nervous system acidosis and increase the risk of cerebral edema

5. Transition to SQ insulin:

Once the acidosis has resolved, the anion gap is closed, and the patient is able to eat and drink safely, the IV insulin can be discontinued.

Patients should be transitioned to a basal-bolus subcutaneous insulin regimen to ensure they do not relapse into DKA.

A standard protocol follows two main components:

Basal Insulin (Background): A long- or ultra-long-acting insulin (e.g., Lantus, Tresiba, or Toujeo) taken once or twice daily. This keeps blood sugar stable overnight and between meals.

Bolus Insulin (Mealtime): A rapid-acting insulin (e.g., Humalog, NoVo Rapid, or Fiasp) injected before every meal or snack, dose determined by carbohydrate content of meal/snack

Synthesis & Deliverable: What final professional product will they produce to communicate their solution? (e.g., a strategic brief, a code patch, a client pitch, a lesson plan modification, or an executive summary).

Students will create a “memory album” of the events of the Hospital course culminating in the recommended prescription for sub Q insulins and referral to nutritionist for dietary management. Also included will be primary Type I Patient Education Teaching Points pamphlet.

Justification: How will they defend their choices if challenged by superiors, clients, or an oversight board?

Students will defend their choice by correlating client’s laboratory results and responses to interventions with the NIH/ADA guidelines for management of DKA in a type I diabetic client.