

DKA and Inpatient Management

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What is DKA?

Definition: DKA is a serious complication of diabetes mellitus, primarily type 1, characterized by hyperglycemia, ketosis, and metabolic acidosis.

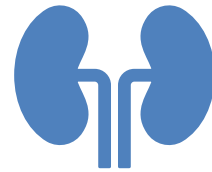
Prevalence in Children: Common initial presentation of type 1 diabetes in children.

Clinical Significance: Rapid onset, potentially life-threatening if untreated.

Key Features:

- Blood glucose > 200 mg/dL
- Arterial pH < 7.3
- Serum bicarbonate < 15 mmol/L
- Presence of ketones in blood/urine

Reference: Dhatariya et al., Nat Rev Dis Primers, 2020



What Happens in the Body?



Insulin Deficiency: Leads to increased lipolysis and free fatty acid release.



Ketogenesis: Liver converts fatty acids into ketone bodies (β -hydroxybutyrate, acetoacetate).



Metabolic Acidosis: Accumulation of ketones lowers blood pH.



Hyperglycemia: Due to increased gluconeogenesis and glycogenolysis.



Dehydration: Osmotic diuresis from hyperglycemia causes fluid and electrolyte loss.



Reference: Barski et al., Eur J Intern Med, 2023

Why Children Are at Higher Risk

Higher Metabolic Rate: Faster progression of acidosis.

Delayed Diagnosis: Often first presentation of diabetes.

Cerebral Edema Risk: Unique to pediatric DKA, especially during treatment.

Symptoms: Polyuria, polydipsia, weight loss, vomiting, altered mental status.

Reference: Glaser et al., Nat Rev Dis Primers, 2020

Role of Nurses in DKA Management

Early Recognition: Monitor for signs of dehydration, Kussmaul respirations, fruity breath.

Fluid & Electrolyte Management: Careful rehydration and potassium monitoring.

Insulin Therapy: Initiate IV insulin after fluid resuscitation.

Monitoring: Frequent glucose, ketone, and electrolyte checks.

Family Education: Importance of insulin adherence and sick-day rules.

Reference: Fayfman et al., Med Clin North Am, 2017

ER Course

ONCE IDENTIFIED TO BE IN DKA

- 2 large-bore IVs should be placed. Do not delay fluids or insulin if unable to get 2nd IV.
- Remove home insulin pump (if applicable)
- Fluid bolus given over 30-60 minutes prior to administering insulin.
- Do NOT give bicarb.

INSULIN

- IV insulin should start 1 hour after IV bolus hydration started *
- NEVER bolus IV insulin in a pediatric patient!

Case Study

HPI: Joey is a 11-year-old male with no past medical history, who presented with not feeling well despite recovering from viral illness. He had nausea and emesis for a couple of days last week which resolved. Mom also noted that he has been having polyuria and polydipsia for the past couple of days and weight loss ~ 15 lbs, hence mom took him to pcp and he was sent to ER due to hyperglycemia. No fever. He recovered from viral illness few weeks ago. No diabetes history in the family; mom has Hashimoto's and so does maternal grandmother. One of the maternal aunts had lupus.

ER course: Labs showed acidosis 6.97 BD 27 with lactate 1.4; HCO₃ 2.5; hyponatremia of 127; BG elevated at 651. UA with ketones. Initial bolus given and IV insulin started.

Case Study--PICU

Weight of 34.8 kg

Total fluids is 110 mL/hr

POC on admit to PICU is 600. GCS 14. You send your initial labs of: renal panel, mag, VBG lytes/lactate. Based on your orders, what rate should you start your insulin at? What fluids should be running?

1 hour later: BG 525. GCS 15. Based on your orders, what rate should your insulin be at? What fluids should be running?

1 hour later: BG 475. GCS 15. Based on your orders, what rate should your insulin be at? What fluids should be running?



Notify Provider if:

- Any signs or symptoms of **cerebral edema**
- Blood glucose drops **more than 100** in an hour.
 - Increased risk for cerebral edema
- Severe Hypokalemia (**K<2.5**)
 - Hypokalemia is expected as insulin drives the potassium back into the cells.
 - This hypokalemia increases risks of cardiac arrhythmias.
 - Severe hypokalemia is an independent risk factor for morbidity and mortality.
 - Consider EKG.



Transition

Patient continues to improve throughout your shift. He continues on insulin and fluids based on his Q1 hour blood glucose checks. At 1500 his blood sugar stable in the mid-100s, his pH = 7.3, HCO=18, GCS 15. What should you anticipate his plan will be? When should you anticipate giving the long-acting insulin? How would you anticipate the transition to go?

Transition

$\text{CO}_2 > 18$

$\text{pH} > 7.2$

Stable neuro exam

Patient able to tolerate oral intake

Transition

Long-acting insulin should be given at least 1 hour prior to stopping insulin gtt.

WHEN TRAY AND SHORT-ACTING INSULIN AVAILABLE AT BEDSIDE:

1. Check POC blood glucose.
2. Evaluate the number of carbs that will be eaten.
3. Calculate the amount of short-acting insulin to given.
 - a. Use sliding scale based on POC blood glucose.
 - b. Use carb coverage order based on number of carb to be eaten.
 - c. Verify type and amount with second RN.
4. Turn off insulin gtt and all fluids, give injection, and have patient eat.
5. Patient should finish meal (or at least the carbs) within 30 minutes of getting the short-acting insulin.

