

# Hyperglycemia Hyperosmolar Syndrome Pathway

- Exclusion criteria:**
- $\text{HCO}_3^- < 15 \text{mEq/L}$
  - Large ketones in urine ( $>80 \text{mg/dL}$ )
  - Beta-hydroxybutyrate (BHB)  $> 1 \text{mmol/L}$

**Suspected Hyperglycemia Hyperosmolar Syndrome (HHS)**

Signs/symptoms: extreme thirst, frequent urination, confusion, vision changes

Other considerations: history of diabetes, either type 1 or 2, absence of Kussmaul breathing, fruity breath, abdominal pain

- HHS definition:**
- Glucose  $> 600 \text{mg/dL}$
  - $\text{HCO}_3^- > 15 \text{mEq/L}$
  - Serum osmolality  $> 320$
  - Small to zero ketones in urine ( $<30 \text{mg/dL}$ )
  - Beta-hydroxybutyrate (BHB)  $\leq 1 \text{mmol/L}$

- Triage Level 2
- Obtain EPOC STAT
- Vital signs and neuro checks q1h

Did EPOC results indicate diabetic ketoacidosis (DKA)?

Yes → Follow [DKA Pathway](#)  
\*consider mixed picture

- No
- Use ED HHS order set
  - Obtain the following STAT:
    - Chem 8 (BMP)
    - VBG
    - Serum osmolality
    - Calcium
    - Phosphorus
    - Magnesium
    - Creatinine kinase
    - Beta-hydroxybutyrate (BHB)
  - Place 2 IVs
  - NPO
  - Administer 20mL/kg (up to 1L) lactated ringers (LR) or normal saline (NS) over 1 hour
  - Evaluate and treat any co-morbid diagnosis

Does patient require additional fluid bolus?  
Signs of shock (HR, BP, altered mental status, significant dehydration)

- Yes →
- Repeat blood glucose
  - Repeat LR or NS fluid bolus

- No
- Repeat blood glucose q1h
  - Do NOT start insulin infusion
  - Start 2 bag system:
    - (D: D10 + ¼ NS + 20 K phos + 20 K acetate)
    - (S: ¼ NS + 20 K phos + 20 K acetate)
  - Repeat the following q2h
    - Chem 8 (BMP)
    - VBG
    - Serum osmolality
    - Calcium
    - Phosphorus
    - Magnesium
    - Creatinine kinase
  - Vital signs every 15 minutes
  - Monitor urine output every 30 minutes
    - Replace 1:1 with LR over the next 30 minutes (in addition to 2 bag system resuscitation)

- Admit to PICU**  
*Management per ICU physician*
- Start insulin infusion
  - Start an anticoagulant
  - Place Endocrinology consult, if not already completed

Transfer to Med/Surg once meet the following criteria:

- No fluid bolus in 12 hours
- Hemodynamically stable for at least 12 hours
  - Normal vital sign trend for age/gender without interventions or medications
- Off urine replacement
- Sodium within normal limits
- Serum osmolality  $< 300$
- Ready for transition off insulin drip

- Resuscitation Guide for 2 bag system:**
- Weight  $< 30 \text{kg} = 1.5 \times$  maintenance
  - Weight  $> 30 \text{kg} = 2 \times$  maintenance
- Considerations:
- Use recently documented pre-illness weight if available
  - For obese patients, consider maintenance rate in context of ideal body weight
- Calculation ideal body weight for adolescents:  $22 \times \text{height (m}^2\text{)}$**