

Inclusion Criteria for Hyperosmolarity

- Serum BG ≥ 500 mg/dL **AND**
- Effective Serum Osmolality $\geq$ to 350 mOsm/kg

Continue Monitoring:

Q1hr: BG, vital signs and hydration
Q2hr: BMP (corrected Na), serum Osm, and UOP
Q4hr: CK, phosphate, magnesium

If CK increasing:

- Concern for rhabdomyolysis: High BUN/Cr, consult Nephrology
- Fever: Evaluate for infection, consider dantrolene

If low Mg:

- 25 to 50 mg/kg/dose q 4-6h (3-4 doses)

Consider the following labs based on pt severity:

Q4hr: ABG, VBG, Lactic acid, iCA
Q12hr: Troponin
Q24hr: Nt-ProBNP, LFTs, Coagulation studies

Pt with hyperglycemia AND hyperosmolarity admitted to PICU

Fluid bolus (≥ 20 mL/kg): 0.9% NS
 (Repeat bolus based on clinical status to restore peripheral perfusion)

Is the pt experiencing HHS or Hyperosmolar DKA?

Hyperosmolar DKA

[See DKA algorithm](#)

Differentiating between HHS and Hyperosmolar DKA

HHS

- Serum bicarbonate ≥ 16 mmol/L
- Urine ketones small/moderate

Hyperosmolar DKA

- Serum bicarbonate < 16 mmol/L[^]
- Urine ketones large

Rate Adjustment Based on BG Rate of Change (See HHS fluid calculation form in Epic)		
	BAG 1	BAG 2
Rate of BG change (mg/dL/hr)	NS w/ additives	D ₁₀ NS w/ additives
≥ 75	Decrease 25%	Increase 25%
25-75	No change	No change
< 25	Increase 25%	Decrease 25%

• Fluid: 1.5 maintenance over 24 to 48 hr^{\$}
 • Replace UOP (Bag 3: 0.45% Saline)
 • Do not start insulin drip
 • **Continue monitoring**

Goal for BG decline per hour:
 75 to 100 mg/dL/hr

Is BG declining:

< 25 mg/dL/hr

• Consider insulin @ 0.025 to 0.05 units/kg/hr
 • Increase Bag 1: By 25%*
 • Decrease Bag 2: By 25%*
 *See HHS fluid calculation form in Epic

Consider repeating fluid bolus based on clinical status to restore peripheral perfusion

25 to 75 mg/dL/hr

No change to IV fluids needed

Continue monitoring with aim to rehydrate over 48 hours:

- Change fluid composition based on serum electrolytes & BG^{\$}
- Replace UOP with 0.45% Saline

≥ 75 mg/dL/h

• Do not start insulin drip
 • Decrease Bag 1: By 25%*
 • Increase Bag 2: By 25%*
 *See HHS fluid calculation form in Epic

Consider repeating fluid bolus based on clinical status to restore peripheral perfusion

Superscript meanings:

^{\$} = Fluid based on: serum electrolytes (Corrected Na), blood glucose, urine output and clinical hydration status. Consider using additive free selection if K⁺>4

[^] = Serum bicarbonate: 12 to 15 mmol/L; Review insulin and fluids plan with consideration for complications from hyperosmolarity

Abbreviations (laboratory & radiology excluded):

Pt = Patient
 NS = Normal saline
 BG = Blood glucose
 HHS = Hyperglycemic Hyperosmolar Syndrome
 DKA = Diabetic Ketoacidosis
 UOP = Urine output
 PICU = Pediatric Intensive Care Unit