
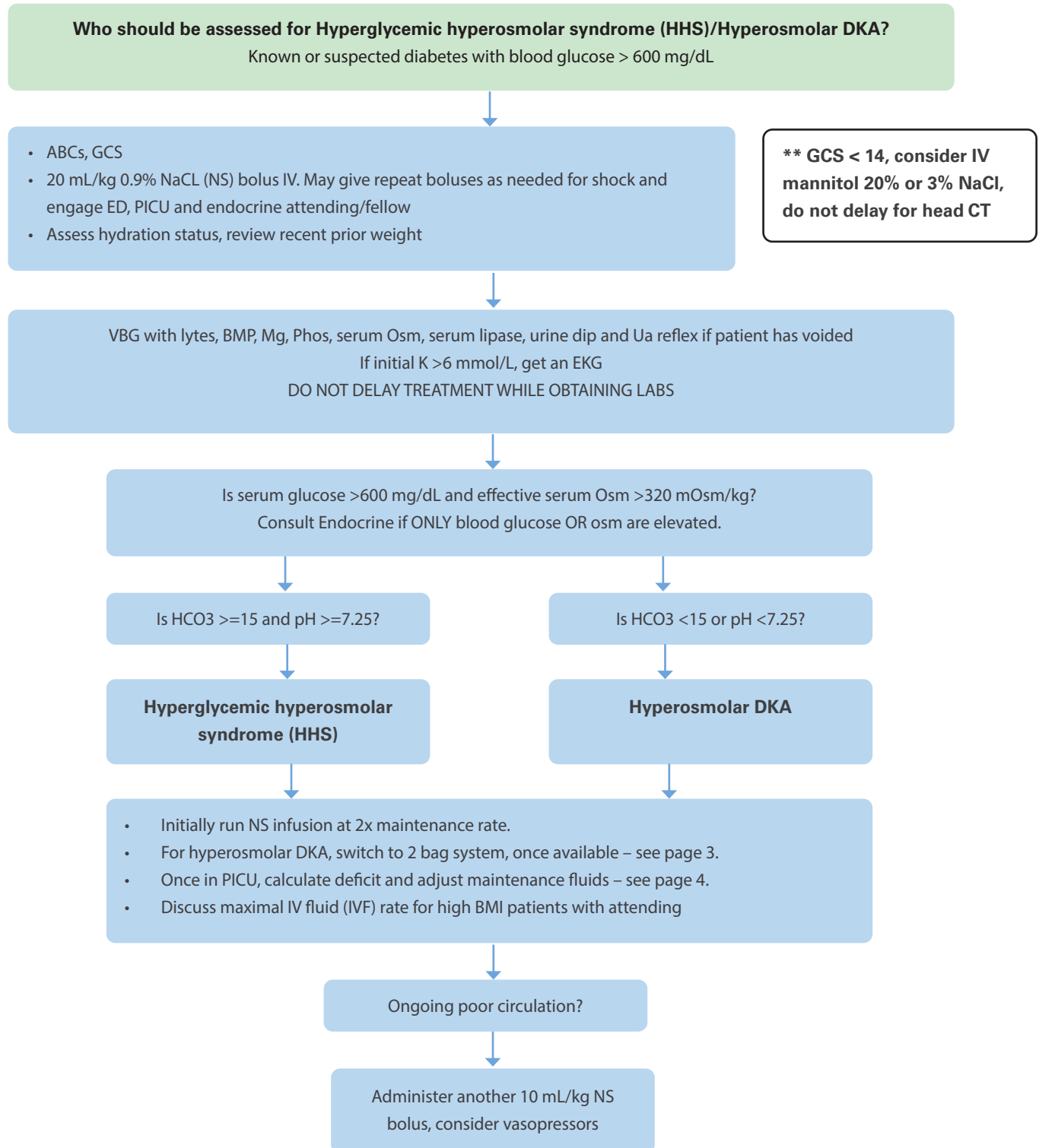


Clinical Guideline

Hyperglycemic Hyperosmolar Syndrome and Hyperosmolar DKA

Pediatric Emergency and Critical Care Medicine

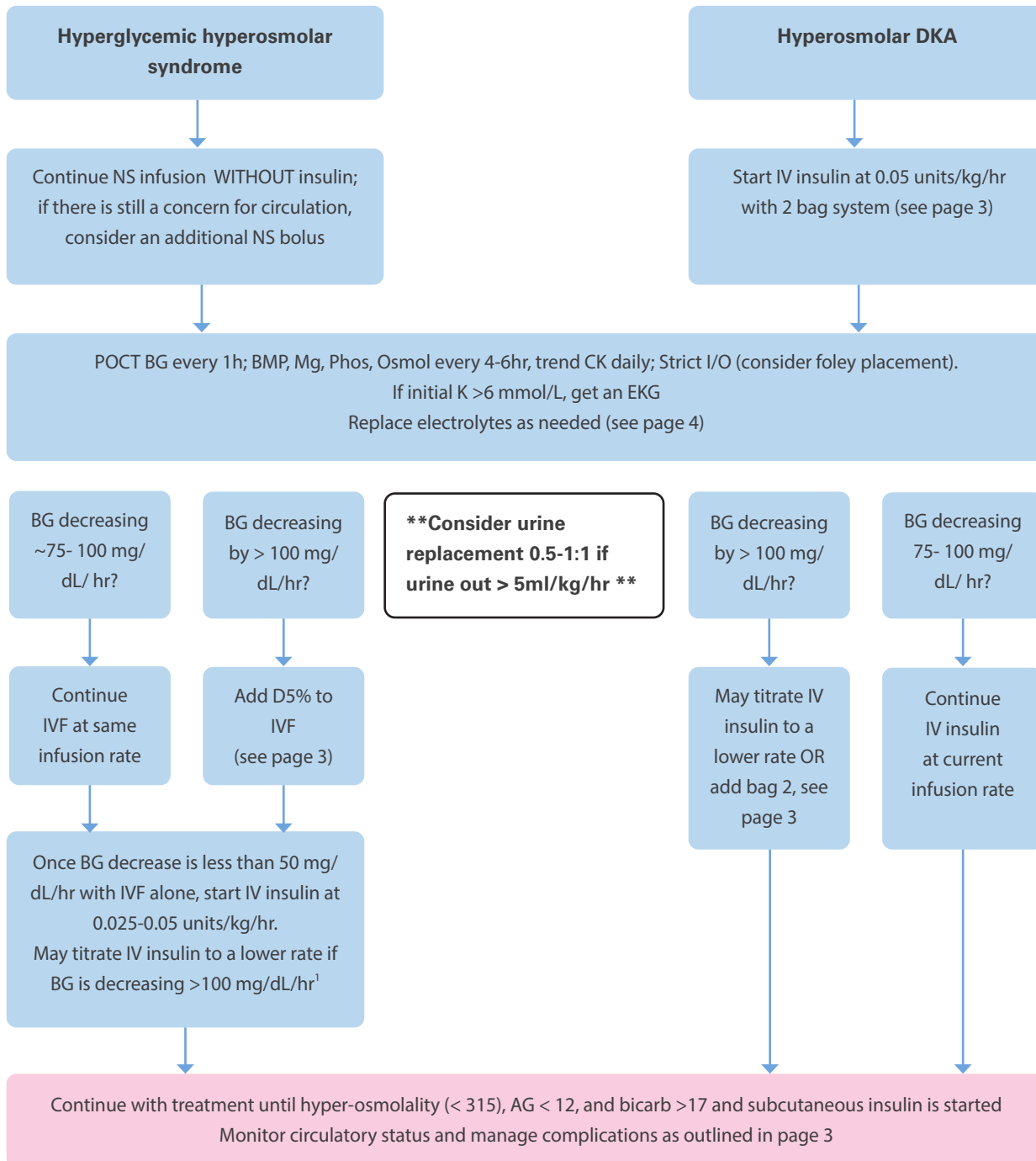
 This guideline serves as a guide and does not replace clinical judgment.



Clinical Guideline

Hyperglycemic Hyperosmolar Syndrome and Hyperosmolar DKA

Pediatric Emergency and Critical Care Medicine



Clinical Guideline

Hyperglycemic Hyperosmolar Syndrome and Hyperosmolar DKA

Pediatric Emergency and Critical Care Medicine

Complications

Shock/Arrhythmias

- Discuss need with PICU attending for vasopressors. Continue to monitor for signs and symptoms of SHOCK
- Check EKG for electrolyte dysregulation. Replete electrolytes as needed

High risk for venous thrombosis

- SCDs for all patients; consider prophylaxis SubQ lovenox / heparin; AVOID Central Lines access if possible
- Consider CBC daily while in intensive care

Malignant hyperthermia-like syndrome and/or rhabdomyolysis

- Monitor for increasing body temperature and CK, and consider treatment with Dantrolene sodium as needed
Loading dose 2.5 mg/kg and 1mg/kg every 4-6h IV until s/s resolve (MAX 10mg/kg) per episode
- Monitor for rhabdomyolysis with CK and urine myoglobin

Altered mental status: Immediately discuss with PICU attending. Consider IV mannitol 20% or 3% NS bolus.

IV mannitol 20% dose: 0.25-1 gram/kg over 2 minutes

IV 3% NS dose: 2-3 mL/kg over 2 minutes

2 Bag system Total IVF rate = Bag 1 _____ mL/kg + Bag 2 _____ mL/kg	
If K+ <5:	If K+ > 5:
Bag 1: NS + KPhos 15 mmol/L + KCl 20 meEq/L	Bag 1: NS
Bag 2: D5 NS + KPhos 15 mmol/L + KCl 20 mEq/L	Bag 2: D5 NS
	Add KPhos and KCl once K+ falls <5 + patient is voiding

Clinical Guideline

Hyperglycemic Hyperosmolar Syndrome and Hyperosmolar DKA

Pediatric Emergency and Critical Care Medicine

Fluid replacement

In order to more accurately capture rate of rehydration, the following calculation tool can be used.

Fluid Rate Calculation

A. Deficit = _____% dehydrated x 10 x preadmission weight in kg _____ mL

B. Hourly maintenance rate (4-2-1 rule) x total hours to replace _____ mL

C. Add "A" and "B" = _____ mL

D. Total fluids given by outside hospital, EMS, and VCU ED _____ mL

E. Subtract "D" from "C". Will give you total remaining fluid to replace = _____ mL

F. Total hours remaining to infuse replacement fluids _____ hours

G. Divide answer in "F" from "E" to obtain hourly replacement fluid rate = _____ mL/hr

(Rate will be ~ 2 x maintenance fluid rate. Do not start rate above 2 x maintenance without first discussing with Attending)

Effective serum Osmolality calculation: $2 * \text{Na (uncorrected)} + \text{Glucose}/18 + \text{BUN}/2.8$

Electrolyte replacement

1. Magnesium sulfate: if serum Mg value is less < 1 mg/dL; administer IV 25-50 mg/kg/dose every 4 -6 hours; max dose of 2 gram/hr. Monitor levels every 4-6 hours
2. Potassium:
 - With acidosis, K⁺ will shift from the intracellular to extracellular compartment. Once acidosis is corrected, it will shift back out into extracellular fluid.
 - If K⁺ is < 5mmol/L and patient is voiding, ensure sufficient K⁺ is added to IV fluids.
 - If K⁺ is > 5mmol/L, DO NOT add K⁺ to IV fluids until patient is voiding and K⁺ is < 5mmol/L • Subsequent potassium replacement therapy can be based on serum potassium
3. Phosphate: Monitor levels every 4-6hours due to risk of hypophosphatemia leading to rhabdomyolysis, hemolytic anemia, and paralysis.
4. Bicarbonate therapy is generally contraindicated due to the risk of hypokalemia -- Trials have shown no clinical benefit of Na Bicarb, but well recognized adverse effects noted.
5. Calcium: Replace as needed with CaCl 10-20 mg/kg (max 1000 mg) over 15-60 minutes.
via CVL only; if PIV access, give IV Ca Gluconate 60 mg/kg/dose (max 3 grams/dose) infuse over 50-60 minutes

Hyperglycemic Hyperosmolar Syndrome and Hyperosmolar DKA Guideline Executive Summary

Children's Hospital of Richmond at VCU HHS Workgroup

Pediatric Critical Care Medicine Owner: Carly Robinson, CPNP-AC
Pediatric Endocrinology: Bryce Nelson, MD, PhD
Pediatric Emergency Medicine: Jon Silverman, MD, MPH
Pediatric Pharmacy: Kristin Cox, PharmD, BCPPS

Approved (November 2021)

Pediatric Emergency Medicine Quality Committee:
Judith Barto, MD

Chief of Pediatric Emergency Medicine:
Frank Petruzella, MD, MS

Medical Director of Pediatric Critical Care Medicine:
Mark Marinello, MD

Chief of Pediatric Critical Care Medicine:
Oliver Karam, MD, PhD

CHoR Clinical Guidelines Committee:
Jonathan Silverman, MD, MPH
Ashlie Tseng, MD

CHoR Quality Council:
Matthew Schefft, DO, MSHA
Dory Walczak, MS, RN, NE-BC, CPHQ

References

Wolfsdorf et al. (2018). ISPAD Clinical Practice Consensus Guidelines 2018: Diabetic ketoacidosis and the hyperglycemic hyperosmolar state. *Pediatr Diabetes. Suppl* 27:155-177.
Zeitler et al. (2011). Hyperglycemic Hyperosmolar Syndrome in Children: Pathophysiological Considerations and Suggested Guidelines for Treatment. *J Pediatr* 158(1):9-14.

Citation

Title: HHS Guideline

Authors:

Carly Robinson, CPNP-AC
Bryce Nelson, MD, PhD
Jon Silverman, MD, MPH
Kristin Cox, PharmD, BCPPS

Date: November 2021

Retrieval website: <http://www.chrichmond.org/clinicalguideline-HHS>

Example:

Children's Hospital of Richmond at VCU, Robinson C, Nelson B, Silverman J, Cox K. HHS Guideline. Available from: <http://www.chrichmond.org/clinicalguideline-HHS>