

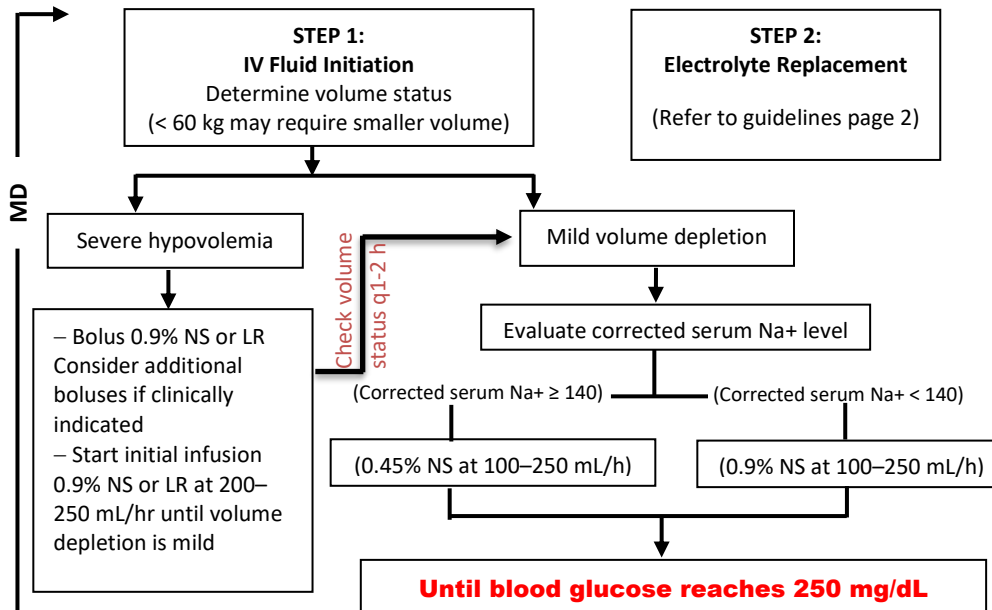


Adult Inpatient Moderate to Severe DKA and HHS Treatment Guidelines

GUIDELINES MAY BE ADJUSTED TO MEET INDIVIDUAL CLINICAL NEED(S) IF NECESSARY

Name:

MRN:



STEP 3: Insulin Drip Therapy

CAUTION: If $\text{K}^+ < 3.3$ mEq/L, **HOLD** insulin therapy and supplement until $\text{K}^+ > 3.3$ mEq/L (see pg 2). Initiate or resume insulin drip per protocol based on FS and continue to supplement K^+ in IV fluids

Consider sod. bicarbonate 100 mEq IVP x1 if ABG pH < 6.9 (or equivalent VBG pH)

Prior to insulin therapy:

- Order glucose checks q 1 hour
- Order STAT CMP, magnesium, phosphorus, VBG, serum & urine ketones, serum osmolality, blood gas, CBC with diff, UA, β -OH butyrate
- Calculate anion gap (AG) = $\text{Na} - (\text{Cl} + \text{HCO}_3)$

While on insulin drip therapy:

- Order STAT CMP, magnesium, phosphorus, VBG q4h

See MD order in Healthbridge	<input type="checkbox"/> Regular Insulin Continuous Infusion (100 units/100 mL NS) (Insulin drip rate based on 70 kg)		
	INITIATION: Regular Insulin IV infusion at 0.1 units/kg/hr x 1 hour, then follow titration scale below		
Blood Glucose (mg/dL)	MAINTENANCE: Regular Insulin IV infusion Titration Scale		
	BG Decline > 100 mg/dL per hr	BG Decline 50–100 mg/dL per hr	BG Decline < 50 mg/dL or per hr or BG increased from previous hr *
	> 400	↓ insulin infusion rate by 50%	Continue insulin infusion rate
	351 – 400	5 units/hr	10 units/hr
	301 – 350	4 units/hr	8 units/hr
	251 – 300	3.5 units/hr	7 units/hr
	201 – 250	3 units/hr	6 units/hr
	MD Note: Change IVF to D5LR or D5½NS or D5NS at 150–200 mL/h to maintain serum glucose 100–150 mg/dL AND continue insulin (may consider D10W if necessary) (Use D5NS if corrected $\text{Na}^+ < 140$ or remains volume depleted)		
	Treatment Goals: HHS: Titrate insulin to glucose target. vs. DKA: Titrate insulin rate (never zero) to insulin until ketosis resolves and anion gap normalizes. Dextrose rate may be increased. (DKA goal \neq glucose target.)		
	151 – 200	2 units/hr	3 units/hr
Notify MD for IV fluid order	100 – 150	1 units/hr	1 units/hr
70 – 99	Decrease rate to 50% of previous rate and give D50W (25 g in 50 mL) IVP x 1 STAT - Ensure patient receiving dextrose containing IV fluid - Repeat FS q15 mins and retreat until FS BG is maintained at ≥ 70 mg/dL x 2 consecutive readings - If cannot maintain glucose ≥ 70 mg/dL despite dextrose then titrate insulin down to 0.5 unit/hr		
< 70 Notify MD	HOLD insulin drip x 15 mins AND give D50W (25 g in 50 mL) IVP x 1 STAT (NOTIFY MD!!) - Ensure patient receiving dextrose containing IV fluid - Repeat FS BG q15 mins and retreat until FS BG ≥ 70 mg/dL x 2 consecutive readings NOTE: DO NOT STOP INSULIN DRIP FOR PROLONGED PERIOD (> 1hr) UNTIL ANION GAP HAS CLOSED (8-12 mEq/L). POTENTIAL RISK OF WORSENING/REBOUND ACIDOSIS AND/OR HYPERGLYCEMIA.		
If latest anion gap OPEN and FS BG after treatment:		If last anion gap CLOSED:	
- ≥ 70 mg/dL x 2 consecutive readings, restart insulin drip at 0.5 units/hr.		- < 70 mg/dL x 2, RN consult MD to reevaluate IVF (e.g. D10W or ↑ current IVF rate) and order Endocrine consult - Resume insulin drip at 0.1 unit/hr when FS > 100 mg/dL. Recheck FS q1hr.	
		- See page 2 for transition to subcutaneous insulin	

* Troubleshoot with MD if glucose increases while on insulin drip: Causes may include: 1) insulin drip off 2) IV access loss/infiltrated 3) Patient eating 4) Steroids or excessive glucose administered



Transition to subcutaneous insulin therapy (requires order entry in electronic health record)**Anion Gap Closure and/or Absence of Ketones**

- **Insulin glargine:** Recommended starting dose 0.25 units/kg. Consider insulin drip requirements over the past 6-8hrs and current blood glucose fingerstick. Consider patient's home dose if reliable.
- ICU DKA Transition to SC Insulin
 - If tolerating PO diet then see Healthbridge Insulin Order Set: ICU DKA Transition to Subcutaneous Insulin
 - If on tube feeds then see Healthbridge Insulin Order Set: Enteral / Tube Feeds
 - If NPO post insulin drip and no tube feeds then CONTINUE D5W, discontinue insulin drip and add Aspart sliding scale
- MD to discontinue insulin drip 2 hrs after long acting insulin administration
- Consider Endocrinology Consult

If patient able to tolerate PO (MD enters diet order)

- MD orders insulin aspart 0.08 units/kg/dose TID with meals
- No further insulin drip titration per fingersticks by RN (run at fixed rate)

Electrolyte Replacement Guidelines:**POTASSIUM replacement**

Serum Potassium	Establish adequate urine output (0.5 mL/kg/hr) before giving potassium
< 3.3 mEq/L	Hold insulin and give 20 – 40 mEq potassium riders until K > 3.3 mEq/L
3.3 – 5.3 mEq/L	Give 20 – 30 mEq potassium riders to keep serum K between 4 – 5 mEq/L
> 5.3 mEq/L	Do not give potassium, but check serum K every 2 hours

PHOSPHORUS replacement

Use POTASSIUM PHOSPHATE when serum potassium < 4 mEq/L. Each mL contains 3 mmol phosphate and 4.4 mEq potassium.		Use SODIUM PHOSPHATE for patients with serum potassium ≥ 4 mEq/L. Each mL contains 3 mmol phosphate and 4 mEq sodium.	
Serum Phosphorus			
2.0-2.5 mg/dL	<ul style="list-style-type: none"> • 10 mmol Potassium Phosphate (with 15 mEq Potassium) IVPB in 250 mL NS over 4 hours 	<ul style="list-style-type: none"> • 10 mmol Sodium Phosphate (with 13 mEq Sodium) IVPB in 250 mL NS over 4 hours 	
1.5 – 1.9 mg/dL	<ul style="list-style-type: none"> • 15 mmol Potassium Phosphate (with 22 mEq Potassium) IVPB in 250 mL NS over 4 hours 	<ul style="list-style-type: none"> • 15 mmol Sodium Phosphate (with 20 mEq Sodium) IVPB in 250 mL NS over 4 hours 	
1.0-1.4 mg/dL	<ul style="list-style-type: none"> • 21 mmol Potassium Phosphate (with 30.8 mEq Potassium) IVPB in 250 mL NS over 4 hours 	<ul style="list-style-type: none"> • 21 mmol Sodium Phosphate (with 28 mEq Sodium) IVPB in 250 mL NS over 4 hours 	
< 1.0 mg/dL	<ul style="list-style-type: none"> • Central line required: 30 mmol Potassium Phosphate (with 44 mEq Potassium) IVPB in 250 mL NS over <u>6 hours</u> 	<ul style="list-style-type: none"> • Central line required: 30 mmol Sodium Phosphate (with 40 mEq Sodium) IVPB in 250 mL NS over <u>6 hours</u> 	

MAGNESIUM REPLACEMENT

Serum Magnesium	Magnesium Replacement Order
1.3-2.0 mg/dL	<ul style="list-style-type: none"> • Magnesium Sulfate IVPB – 2 grams/50 mL x 1 dose (over 1 hour)
< 1.3- mg/dL	<ul style="list-style-type: none"> • Magnesium Sulfate IVPB – 4 grams x 1 dose (Infused as two 2-gram bags; each bag over 1 hour)

MD/PA Name: _____ Signature: _____ Date: _____ Time: _____
 Nurse Name: _____ Signature: _____ Date: _____ Time: _____

