### Orders for Adults with DKA and Hyperglycemic Hyperosmolar State (HHS)

These orders may be initiated in the Emergency Department

**DKA:** Moderate ketonemia, arterial pH <7.3, serum glucose >250 mg/dL, serum bicarbonate <18 mEq/L  
**HHS:** Serum glucose >600 mg/dL, minimal ketonemia or ketonuria, serum bicarbonate >15 mEq/L, pH >7.3

<table>
<thead>
<tr>
<th>Admit</th>
<th>Date:</th>
<th>Time:</th>
<th>Location:</th>
<th>Attending</th>
</tr>
</thead>
</table>

**Diagnosis**

**Drug allergies or adverse reactions**  
- No known drug allergies  
- List:  

**Monitor and Record**

- Vital signs & I&O every hour until stable, then every 2 hours x 24 hours  
- Insert Foley if no urine output within first hour or within ________ hours  
- STAT fingerstick (capillary) blood glucose  
  (Use venous or arterial draw if glucose >450 or <45 mg/dL or SBP <60 mmHg)  
- Neuro checks every 2 hours (maintain seizure precautions) x 24 hours

**Diet**

- NPO  
- Ice Chips  
- Other:  

**Activity**

- Bed rest  
- Bathroom privileges with assistance  
- Other:  

**Admission lab**

- STAT Metabolic Profile (Glucose, BUN, Creatinine, Na, K, Cl, HCO₃, Ca)  
- Serum ketones  
- Serum PO₄, Mg  
- Arterial blood gas  
- CBC with diff.  
- Blood cultures x 2  
- Urine C&S  
- Atc  
- TSH  
- B-hydroxybutyrate  
- Serum osmolality (measured)  
- Record acidosis-ketosis gap (AKG = arterial pH – plasma B-hydroxybutyrate. AKG >3 may indicate drug abuse®)  
- Other:  

**Additional labs & studies**

- K and HCO₃, every ______ hour(s). Call results to physician (hourly monitoring is recommended)  
- Metabolic profile every 4 hours x 24 hours.  
- Call results to physician  
- Ca, PO₄, Mg every ______ hours x 24 hours.  
- Call results to physician  
- Record anion gap  
- AG = (Na) – (Cl + HCO₃)  
- EKG  
- Chest X-ray  
- Portable chest X-ray  
- Culture and sensitivity of:  
- Other:  

**Initial IV fluids**

- Run IV at ________ ml per hour for ________ hours (Adjust for fluid volume already given in ER)  
- Use 0.9% NaCl if corrected sodium is low (less than ________ mEq/L)  
- 0.45% NaCl if corrected serum sodium is normal or elevated  
  (Corrected sodium: Add 1.6 mEq to Na lab value for each 100 mg/dL glucose greater than 100 mg/dL)  
- Other:  

**Mix standard insulin drip**

- Discontinue all previous insulin orders  
- Mix 100 units Regular insulin in 100 mL NS  
- Other: Mix ________ units of insulin in ________ mL NS  

**Give initial IV insulin bolus**

- Bolus ________ units Regular insulin IV (recommend 10-15 units Regular insulin IV)  
- Other: Bolus ________ units of insulin in ________ mL NS  

**Start insulin infusion**

- Start insulin infusion at ________ units per hour  
  Recommend infusion rate is calculated as: Glucose mg/dL ÷ 100 (Ex: Glucose=350 → Start 3.5 units/h)
**Target range for glucose**

- **Rate of glucose reduction not to exceed 100 mg/dL per hour**
  - **DKA:**
    - 100 to 130 mg/dL
    - Other
  - **HHS:**
    - Low target:
    - High target:

**Monitor glucose every hour**

- Obtain lab glucose if fingerstick blood glucose is >450 or <45 mg/dL or SBP <60 mmHg
- Change frequency of glucose monitoring to:

**Adjust insulin infusion rate**

- Note: No patient begins on Algorithm 3 or 4 without endocrine service authorization
- Start on Algorithm 1
- Start on Algorithm 2 (Consider if s/p CABG, transplant, glucocorticoid therapy, >80 U/d insulin)
  - Move up or down on the same algorithm each hour if glucose remains outside target range
  - Advance one algorithm column (i.e. 1→2, etc.) if glucose is outside the target range at highest infusion rate
  - Treat for hypoglycemia if glucose is <60 mg/dL
  - Decrease one algorithm column (i.e. 2→1, etc.) if glucose is 60-69 mg/dL or decreases >60 mg/dL in 1 hour

### Algorithm Table

<table>
<thead>
<tr>
<th>BG units/h</th>
<th>Algorithm 2</th>
<th>Algorithm 3</th>
<th>Algorithm 4</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
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<td>70–109 0.5</td>
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<td>110–119</td>
<td>0.5</td>
<td>110–119 1</td>
<td>110–119 2</td>
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<td>120–149 1.5</td>
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<td>&gt;360 6</td>
<td>&gt;360 12</td>
<td>&gt;360 16</td>
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</tbody>
</table>

Treat hypoglycemia

1. • Glucose <40 mg/dL: Give 1 ampule D50W (25 grams) by slow IV push over 30 seconds
   • Decrease insulin infusion by moving down 1 algorithm (i.e. 2→1, etc.)
   • Recheck glucose in 15 minutes; repeat D50W, as above, if necessary
2. • Glucose 40-59 mg/dL: Give ½ ampule D50W by slow IV push over 30 seconds
   • Recheck glucose in 15 minutes; repeat D50W, as above, if necessary

**Maintenance IV fluids**

- When blood glucose is:
  - **DKA:** 200 mg/dL, change IV to D5 ½ NS and run at ____________ mL/hour
  - **HHS:** 250 mg/dL, change IV to D5 ½ NS and run at ____________ mL/hour
  - **Other:**
    - For patients at risk of volume overload, consider D5W or D50W (Infuse D5W via central line using infusion pump)

  **Note:** HHS: Maintain blood glucose at 250-300 mg/dL until plasma osmolarity is ≤315 mosm/Kg

**Potassium replacement**

- **Call physician if K is <3 or >6 mEq/L** (Note: Urine output should be >30 mL/hour before starting K+ replacement)
  - Add KCl to IV fluids:
    - If K is <3.3 mEq/L, add 30 mEq KCl/L of IV fluid
    - If K is 3.3-5.2 mEq/L add 20 mEq KCl/L IV fluid to maintain K between 4-5 mEq/L
    - If K+ is >5.2 mEq/L, hold KCl
    - Consider KPO4 instead of KCl if serum PO4 is low
  - **Other:**
### Phosphorus Replacement

- Consider if evidence of alcohol abuse, malnutrition, etc.
  - Give 10 mEq/L KPO₄ in one liter of IV fluid x 1
  - Other:

### Sodium Bicarbonate (DKA)

- Give sodium bicarbonate
  - If pH < 6.9 dilute 100 mmol NaHCO₃ in 400 mL H₂O containing 20 mEq KCl
  - Infuse over 2 hours
  - Other:
  - IV Push __________ ampule of NaHCO₃
  - Recheck arterial pH (ABG) within __________ minutes and call results to the attending

### Alert Parameters for Notifying Physician

- Two consecutively treatments for hypoglycemia
- K less than __________ mEq/L
- Withholding IV insulin infusion for >1 hour with no other source of insulin
- TPN stopped, interrupted or any change in formulation
- Deterioration in mental status
- Patient does not respond to above orders for glycemic control
  - Other:
  - Other:

### Transition to SQ Insulin

- Proceed to Texas Diabetes Council Transition Algorithm From I.V. to S.Q. Insulin
  - Other:

### Other Orders

- 1.
- 2.
- 3.
- 4.

### References: