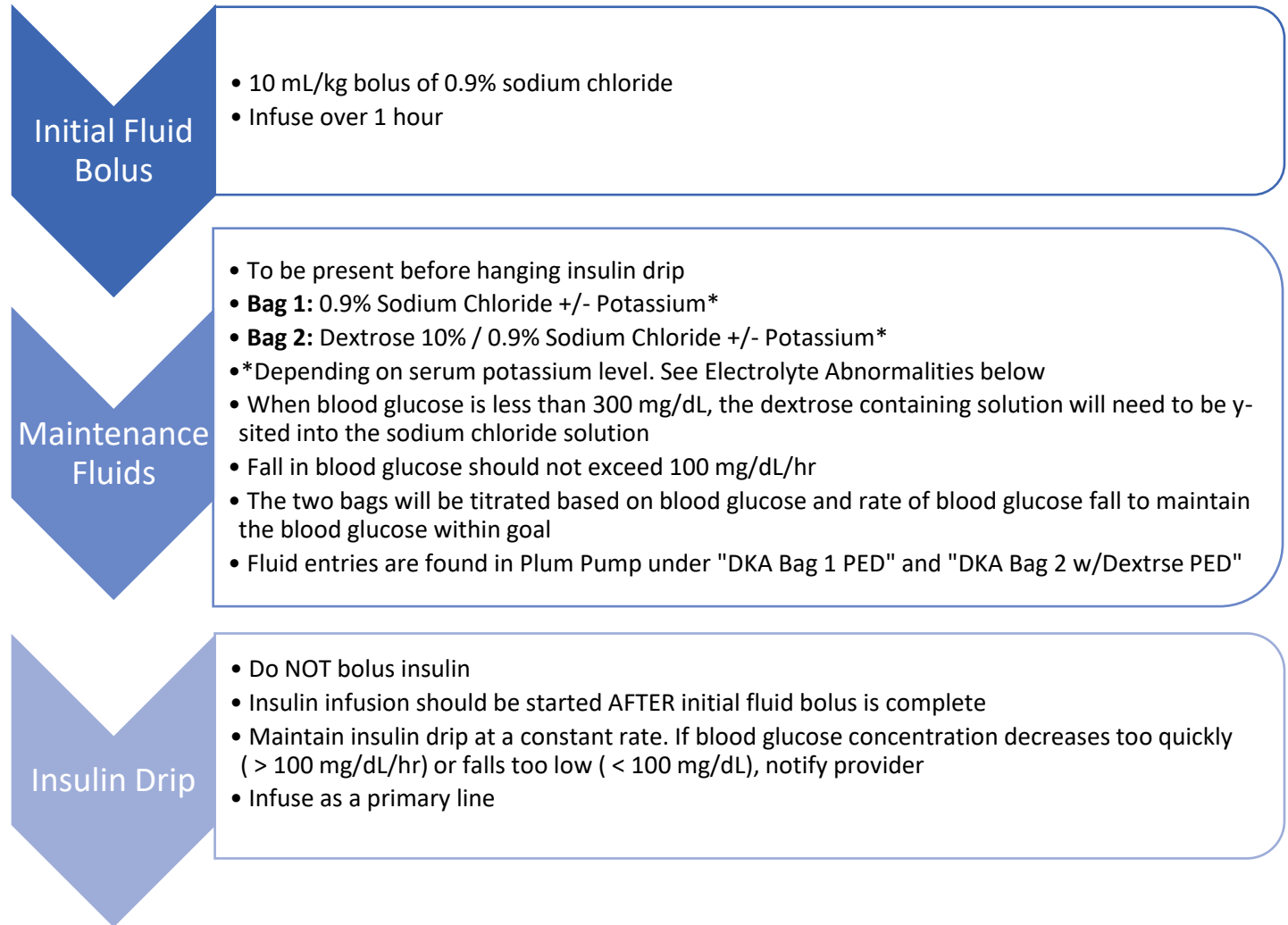


*Pediatric Diabetic Ketoacidosis (DKA) Nursing Reference*

**Inclusion Criteria**

1. Hyperglycemia (blood glucose > 200 mg/dL)
2. Ketosis (Beta Hydroxybutyrate (BHOB) > 1 mmol/L)
3. Metabolic acidosis (venous pH < 7.3) or serum bicarbonate < 15 mEq/L

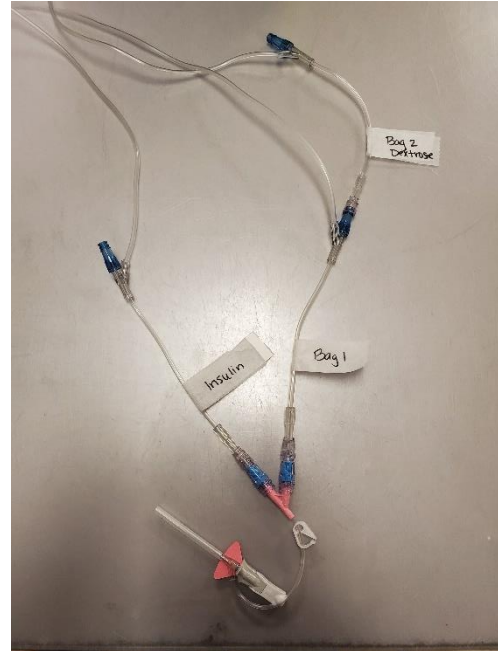
**Initial Management**



Call provider for the following	Laboratory monitoring
<ul style="list-style-type: none"> <li>• HR &gt; 190 bpm or &lt; 80 bpm</li> <li>• All lab results; including:               <ul style="list-style-type: none"> <li>○ Potassium &lt; 3.5 mmol/L or &gt; 5.5 mmol/L</li> </ul> </li> <li>• Mental status change</li> <li>• Sudden onset of headaches or worsening headaches</li> </ul>	<p>Every hour</p> <ul style="list-style-type: none"> <li>• Blood glucose</li> <li>• If blood glucose &gt; 570 mg/dL or &lt; 20 mg/dL, nurse to enter order for "glucose-whole blood"</li> </ul> <p>Every four hours</p> <ul style="list-style-type: none"> <li>• BMP, Phosphorus, pH, Beta-hydroxybuterate</li> </ul>

**Setting up Fluids and Insulin**

- Insulin must go at the site closest to the patient
- Do not Y insulin into fluids
- Fluids may be Y-sited together at one port
- Each fluid and insulin needs to be on its own pump
- Leave 2<sup>nd</sup> line empty for blood draws



**Fluid Management**

**\*Fluid rates to be adjusted per provider order\***

**Fluid Deficit Calculation**

a. Calculate fluid deficit from the table below

Degree of Dehydration	Fluid Deficit
Mild	5 % = 50 mL / kg
Moderate	8 % = 80 mL / kg
Severe	10% = 100 mL / kg

\_\_\_\_\_ kg x \_\_\_\_\_ mL/kg = \_\_\_\_\_ mL (a)

b. Total amount of fluid received in bolus = \_\_\_\_\_ mL (b)

c. Calculate remainder of fluid deficit: subtract (b) from (a)

Deficit from table (a) \_\_\_\_\_ mL - bolus dose (b) \_\_\_\_\_ (mL) = \_\_\_\_\_ (mL) (c)

d. Calculate maintenance fluid requirements for next 48 hours

200 mL/kg for first 10 kg  
 + 100 mL/kg for next 10 kg  
 + 40 mL/kg for kg greater than 20 kg  
 = \_\_\_\_\_ (mL) (d)

e. Calculate total fluids required for the next 48 hours: add (c) to (d) = \_\_\_\_\_ mL (e)

f. Determine hourly rate: divide (e) by 48 hours = \_\_\_\_\_ mL/hr

<b>Maintenance Fluid Management Guidance</b> (to be used for titration during all phases & electrolyte abnormalities)				
<b>Blood Glucose</b> (mg/dL)	<b>% Rate from Bag 1</b> (Saline + electrolytes)	<b>% Rate from Bag 2</b> (Dextrose / Saline + electrolytes)	<b>Final Dextrose Concentration</b>	<b>Insulin Infusion Rate</b> (units/kg/hr)
> 300	100 %	0	0	0.1
200-300	50 %	50 %	5 %	0.1
100-200	0	100 %	10 %	0.1
< 100	Provider discretion <ul style="list-style-type: none"> <li>• Decrease insulin drip rate to as low as 0.05 units/kg/hr and/or</li> <li>• Increase glucose infusion rate by increasing D10 fluid rate (up to 2x maintenance) or</li> <li>• Change to D12.5/NS at 100% total rate</li> </ul>			

**Initial Fluid Management Using the 2-Bag Method (initial 4-6 hours of management)**

**Bag 1:** 0.9% Sodium Chloride + / - Potassium\*

**Bag 2:** Dextrose 10% / 0.9% Sodium Chloride + /- Potassium\*

\*Depending on serum potassium level. See Electrolyte Abnormalities below

*\*Fluid rates to be adjusted per provider order\**

**Continued Fluid Management Using the 2-Bag Method (after the initial 4-6 hours of management)**

Can continue using the original fluids or fluids may be changed to contain 0.45% sodium chloride instead (See Electrolyte Abnormalities section below).

*\*Fluid rates to be adjusted per provider order\**

**Electrolyte Abnormalities**

**Potassium abnormalities**

Monitor for adequate urine output while replacing potassium

Serum Potassium	Potassium in the maintenance fluids
Greater than 5.5 mmol/L	None
3.5 – 5.5 mmol/L	20 mEq/L K-Acetate + 20mEq/L K Phosphate
Less than 3.5 mmol/L	30 mEq/L K-Acetate + 30mEq/L K Phosphate *HOLD insulin drip until K above 3.3 mmol/L

**Chloride abnormalities**

After initial 4-6 hours may consider changing both bags of maintenance fluids to contain 0.45% sodium chloride to decrease amount of chloride being administered.

**DKA Resolution & Insulin IV to SQ Transition**

Signs of DKA Resolution	
Correction of acidosis <ul style="list-style-type: none"> <li>Sodium bicarbonate &gt;18 mEq/L</li> <li>pH &gt;7.3</li> </ul>	Tolerance of diet <ul style="list-style-type: none"> <li>No vomiting, tolerating ice chips, appears ready to eat</li> </ul>
Serum glucose < 300 mg/dL	BHOB < 1 mmol/mL

\*\*\*There should be an overlap of at least 2 hours with intermediate- or long-acting insulin/basal insulin, but can consider shorter overlap of 1 hour with addition of rapid-acting insulin/bolus insulin per provider between administration of subcutaneous insulin and discontinuation of intravenous insulin.

**Common Calculations**

Anion gap = Na – [ Cl + HCO<sub>3</sub> ]

Corrected sodium = Na + 1.6 [(glucose – 100)/100]

Osmolality = 2[Na] + [BUN]/2.8 + [Glucose]/18

**Cerebral Edema**

- Patients being treated for DKA are at high risk for development of cerebral edema
- Notify provider if any of these signs or symptoms are observed

Signs and Symptoms	Risk Factors
<ul style="list-style-type: none"> <li>• Headache</li> <li>• Alterations in neurological status (restlessness, irritability, increased drowsiness, incontinence, deterioration of GCS)</li> <li>• Vomiting</li> <li>• Bradycardia</li> <li>• Hypertension</li> <li>• Pupillary changes</li> </ul>	<ul style="list-style-type: none"> <li>• Age &lt; 5 years</li> <li>• Severe acidosis</li> <li>• Serum osmolality &gt; 350 mOsm</li> <li>• Elevated BUN</li> <li>• Failure of serum sodium to rise with treatment</li> <li>• Large volume of rehydration fluids (&gt; 40 mL/kg)</li> <li>• Use of sodium bicarbonate</li> </ul>