Kalkaska Memorial Health Center
Munson Healthcare Cadillac Hospital
Munson Healthcare Charlevoix Hospital
Munson Healthcare Grayling Hospital
Munson Healthcare Manistee Hospital
Munson Healthcare Paul Oliver Memorial Hospital
Otsego Memorial Hospital

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

Initial Fluid Bolus

- 10 mL/kg bolus of 0.9% sodium chloride

Maintenance Fluids

- **Bag 1:** 0.9% Sodium Chloride + 40 mEq Potasisum Chloride*
- **Bag 2: Select one option below**
  - Dextrose 5% / 0.9% Sodium Chloride + 20 mEq Potassium Chloride*
  - Dextrose 10% / 0.45% Sodium Chloride
  - *If serum potassium level > 5.5 use fluids that do not contain potassium (0.9% sodium chloride and dextrose 5 % / 0.9% sodium chloride)
- When blood glucose is approaching or is less than 300 mg/dL, the dextrose containing solution will need to be y-sited into the NS fluid bag
- Fall in blood glucose should not exceed 100 mg/dL/hr
- The two bags will be titrated based on blood glucose and rate of blood glucose fall to maintain the blood glucose within goal
- Please consider infusing as primary line(s)
- Fluid entries are found in Plum Pump under "DKA Bag 1 Ped" and "DKA Bag 2 w/ Dextrse PED"

Insulin Drip

- Do NOT bolus insulin
- Insulin infusion should be started AFTER initial fluid bolus is complete
- Maintain insulin drip at a constant rate. If blood glucose concentration decreases too quickly (> 100 mg/dL/hr) or falls too low (< 100 mg/dL/hr), notify provider
- Infuse as a primary line

Call provider for the following

- HR > 190 or less than 80
- All lab results; including:
  - Potassium $\leq$ 3.5 mmol/L or $\geq$ 5.5 mmol/L
- Mental status change

- Sudden onset of headaches or worsening headaches

Fluid Management

Fluid rates to be adjusted per provider order

Fluid Deficit Calculation

a. Total amount of fluid received in bolus = _____ mL (a)
b. 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 (b)

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

Deficit from table (b) _____ mL - bolus dose (a) _____ (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

Fluid Management Using the 2-Bag Method

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

Bag 2: Select one option below

- Dextrose 10% / 0.9% Sodium Chloride + /- Potassium*
- Dextrose 10% / 0.45% Sodium Chloride

*Depending on serum potassium level. See Electrolyte Abnormalities below

Fluid rates to be adjusted per provider order

Maintenance Fluid Management Guidance				
Blood Glucose (mg/dL)	**% of Rate from NS + 40 KCl**	**% of Rate from D5NS + 20KCl**	**% of Rate from D10 ½ NS**	**Final Dextrose concentration**
≥ 300	100 %	0	0	0
251-299	0	100 %	0	5 %
200-250	0	50 %	50 %	7.5 %

151-199	0	0	100 %	10 %

Potassium Abnormalities

Monitor for adequate urine output while replacing potassium

Initial Serum Potassium > 5.5

Maintenance Fluid Management Guidance				
Blood Glucose (mg/dL)	**% of Rate from 0.9 % NS**	**% of Rate from D5NS**	**% of Rate from D10 ½ NS**	**Final Dextrose concentration**
≥ 300	100%	0	0	0
251-299	0	100%	0	5%
200-250	0	50%	50%	7.5%
151-199	0	0	100%	10%

Initial Serum Potassium < 3.5

HOLD insulin drip until potassium level above 3.3 mmol/L

To be considered in addition to maintenance fluids.

Potassium Replacement Guide (0.5-1 mEq/kg/dose)

- K less than 3 = max 40 mEq per replacement; divided doses with max 20 mEq/dose
- K is 3 to 3.5 = max 30 mEq per replacement; divided doses with max 20 mEq/dose

If administering with potassium containing maintenance fluid watch for max potassium of 0.5 mEq/kg/hr or 20 mEq/hr (whichever is less) with cardiac monitoring.

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
• Headache • Alterations in neurological status (restlessness, irritability, increased drowsiness, incontinence, deterioration of GCS) • Vomiting • Bradycardia • Hypertension • Pupillary changes	• Age < 5 years • Severe acidosis • Serum osmolality > 350 mOsm • Elevated BUN • Failure of serum sodium to rise with treatment • Large volume of rehydration fluids (> 40 mL/kg) • Use of sodium bicarbonate

Common Calculations

Anion gap = Na – [Cl + HCO3]
Corrected sodium = Na + 1.6 [(glucose – 100)/100]
Osmolality = 2[Na] + [BUN]/2.8 + [Glucose]/18