UNC Pediatric DKA Guidelines

A. Admission
   1. Confirm DKA: plasma glucose ≥ 200 mg/dl; ketones; pH ≤ 7.3, HCO_3^- ≤ 15 mmol/L
   2. Vital signs Q1 hr
   3. Neuro checks Q1 hr
   4. Strict I/O
   5. Continuous cardiopulmonary monitoring
   6. Bedrest (bathroom privileges when stable)
   7. NPO

B. IV Fluids

   Use the following algorithm to calculate fluid RATE:

   1. Body weight in kilograms: (1) _____kg

   2. Establish extent of dehydration (decreased BP, tears, skin turgor, capillary refill, increased hematocrit) (*dry oral mucosa is not reliable measure of extent of dehydration because open mouthed, Kussmaul respirations will make the mucosa dry)

	Infants	Children	
Mild:	5% = 50 ml/kg	3% = 30 ml/kg	
Moderate:	10% = 100 ml/kg	6% = 60 ml/kg	
Severe:	15% = 150 ml/kg	9% = 90 ml/kg	(2)_____ml/kg

   3. Multiply (1) x (2) for total fluid deficit: (3)_____ml

   4. Give normal saline bolus if patient is hemodynamically unstable or shocky.
      Recommend 5-10 ml/kg over 1-2 hours, max should be < 30 ml/kg.
      (If patient has already received a fluid bolus at an OSH,
      that total should also go in blank 4) (4)_____ml

   5. Calculate remainder of fluid deficit after bolus:
      subtract (4) from (3): (5)_____ml

   6. Calculate maintenance fluid requirements for the next 48 hours:
      200 ml/kg for the first 10 kg body weight
      + 100 ml/kg for the next 10 kg

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Last Rev (8/7/17)

+ 40 ml/kg for the remaining kg (6)_____ml/48 hrs

7. Calculate the total amount of fluid to be given for your patient over the next 48 hours. Add (5) + (6) (7)_____ml/48 hrs

8. Calculate the hourly fluid rate for fluid replacement: Divide (7) by 48 (8)_____ml/hr

9. Fluid selection
   a. Use NS as the initial fluid, at the rate determined in (8). Continue for 1-2 hours.
      i. If child is hypokalemic and has had adequate urine output, may add 20-40 mEq/L KCl
      ii. If the child is coming from an outside hospital and has already had some initial resuscitation, and/or has been started on insulin, skip this step and start the 2 bag method on arrival to the PICU.

   b. After 1-2 hours of resuscitation with NS, begin a "2 bag method" (and discontinue the NS).
      i. Y together: NS with 20 mEq/L KCl + 13.6 mmol/L KPO_4 and
      D10 NS with 20 mEq/L KCl + 13.6 mmol/L KPO_4

      *Use your clinical judgment. Above fluid recommendation is for serum K+ = 3.1 – 5.5. If patient is hyperkalemic with serum K+ > 5.5, remove K+ from fluids. If patient is hypokalemic with serum K+ <3.1, may order more K+ than described above. EPIC order set has recommended K+ content for fluids based on serum K+ levels.

      *You should expect that you will need to change the additives in the fluids based on frequent monitoring of electrolytes as described below.

      *(13.6 mmol/L KPO_4 = 20 mEq/L KPO_4)

   c. Fluid rate of the 2 bag system is determined by serum glucose level:

      Glucose > 350 mg/dl: Run NS + additives at 100% of calculated rate [from line (8)]
      Glucose 250 – 350 mg/dl: Run NS at 50% rate, run D10 NS at 50% rate
      Glucose < 250 mg/dl: Run D10 NS + additives at 100% rate

*If at any point the glucose falls by more than 100 mg/dl in the previous hour, nursing staff should notify MD, and should then run D10 NS + additives at 100% rate

C. Insulin
   a. It is no longer indicated to start insulin on presentation of DKA, as it is thought to increase mortality.
   b. Insulin should be initiated after 1-2 hrs of resuscitation with NS (at the time of starting the 2 bag method described above).
   c. When indicated, begin an infusion of Regular insulin at 0.1 units/kg/hr

D. Labs & Monitoring
   a. On admission for all patients:
      i. VBG or CBG
      ii. Chem 10: Na, K, Cl, CO_2, BUN, Cr, glucose, Ca, Mg, Phos
      iii. Serum ketones
      iv. Hemoglobin A1C
      v. Urinalysis
      vi. CBC
   b. For NEW onset DKA patients:
      i. C-peptide
      ii. GAD-65 antibodies
      iii. Islet cell antibodies
      iv. Insulin antibodies
      v. TSH, free T4
      vi. TTG
      vii. Serum total IgA
   c. Ongoing labs:
      i. Accucheck Q1 hour
      ii. CBG or VBG, electrolytes (Na, K, Cl, CO_2,iCa, glucose) Q4 hours
      iii. Phos Q4 hours if patient has Phos in IV Fluids
      iv. Chem 10 (Na, Ka, Cl, CO_2, BUN, Creatinine, glucose, Ca, Mg, Phos) Q8 hrs
      v. Urine for ketones Q void or Q6 hours if foley in place

E. Notify MD
   a. Blood glucose < 80 mg/dl or > 400 mg/dl
   b. Blood glucose falls > 100 mg/dl
   c. Potassium < 3.0 mmol/L or > 5.0 mmol/L

d. Phosphorous < 2.0 mg/dl
e. Onset of headache or worsening headache
f. Any mental status change
g. Alteration of vital signs

F. Additional Notification
   a. Physicians are to notify the Medical Director of Pediatric Diabetes or the Pediatric Endocrinologist on call in case of insulin-related hypoglycemia requiring IV glucose treatment.