**ICU DKA/HHS Version 2 4/16/15**

Recommended for patient Age > 18 years old

**Nursing Orders**

 DKA goal glucose level 150-200 mg/dL UNTIL acidosis is resolved

 HHS goal glucose level 200-300 mg/dL UNTIL patient is mentally alert

 Point of Care Capillary Blood Glucose: Following fluid bolus and every hour while on insulin drip

 Assess neurologic status: every hour

 IF patient is admitted with an insulin infusion pump, physically remove the pump, tubing and subcutaneous catheter at start of insulin infusion

     IF capillary blood glucose decreases more than 100 mg/dL per hour

Step 1)  Start Dextrose infusion (BAG 2)  at 250-299 blood glucose rate if not already started.

\*\*If glucose continues to decrease more than 100mg/dL per hour:

Step 2) Decrease insulin infusion rate to 0.05 unit/kilogram per hour.

\*\*If capillary blood glucose continues to decrease more than 100 mg/dL:

           Step 3)  Notify Provider

 If urinary output less than 30 mL/hr Notify Provider

 Notify provider when basic metabolic panel results obtained 4 hours after first complete metabolic panel

 When capillary blood glucose < 200 mg/dL Notify provider for total fluid rate adjustments

 IF capillary blood glucose is less than 125 mg/dL AND Beta-Hydroxybutyrate > 1 and/or anion gap remains abnormal: Initiate DKA/HHS Hypoglycemia Protocol and Notify Provider

 When Beta-Hydroxybutyrate is less than 1 AND anion gap has normalized Notify Provider so transition to subcutaneous insulin can be made.

**Diet**

 NPO

 NPO except ice chips

 Clear Liquid Diet: Sugar free or diet liquids only

**IV/ Line Insert and/or Maintain**

 Peripheral IV insert/maintain

 Saline lock with saline flush every BID; Place 2nd IV if patient is in SHOCK OR if second IV is needed for any other infusions.

 Arterial Line insert/maintain

**Initial Treatment**

 ***IV Fluids - Bolus (If not already done in ED) For patients with severe hypovolemia, without cardiac compromise***

 If cardiogenic shock present consider hemodynamic monitoring and pressors

 Sodium Chloride 0.9% IV

 20 milliliter/kilogram intravenously BOLUS Now- Infuse as fast as possible

 15 milliliter/kilogram intravenously BOLUS Now- Infuse as fast as possible

 ***Bicarbonate Therapy***

 Consider IV bicarbonate therapy for pH less than or equal to 7.0

 sodium bicarbonate

 100 milliequivalent intravenous push once; Recheck blood gas and BMP post infusion and notify provider of results.

 ***Electrolyte Replacement***

 If serum potassium is 3.4-5.1 mEq/L potassium will be added to maintenance fluids.

 ***For serum potassium less than or equal to 3.3 mEq/L SELECT:***

 potassium chloride

 30 milliequivalent in 300 milliliter of NS intravenously infuse over 1.5 hour FOR PERIPHERAL IV; PATIENT MUST BE MONITORED

 30 milliequivalent in 100 milliliter of NS intravenously infuse over 1 hour FOR CENTRAL LINE IV ONLY; PATIENT MUST BE MONITORED

**Insulins**

 Insulin infusion begins following initial fluid resuscitation and continues until Beta-hydroxybutyrate is less than 1

 Select Insulin bolus only if not already given in ED

 insulin regular

 0.1 unit/kilogram intravenous push once

 insulin regular 250 units in 0.9% Saline 250 milliliter (1 unit/milliliter)

 0.1 unit/kilogram per hour - Begin after fluid bolus (if ordered)

**IV Fluids RATE**

 Recommended 2 Bag Total Fluid rate following initial fluid bolus: 250-500 mL/hr until glucose is less than 250 mg/dL followed by 150-250 mL/hr. May be adjusted for patient hydration status \*exclude insulin rate from total fluid rate\*

 2 Bag Total IV Fluid Rate: 250 milliliter/hour

 2 Bag Total IV Fluid Rate: \_\_\_\_\_\_\_\_\_\_ milliliter/hour

**2 bag Fluids -Select one 2 bag combination**

 Corrected Sodium = Measured Na + [(Serum glucose as mg/dL - 100)/100] X 1.6

 ***For corrected sodium greater than or equal to 135 mEq/L and potassium less than or equal to 5.1 mEq/L Select both***

 Sodium Chloride 0.45% IV with 20 mEq/L KCl; BAG 1

 \_\_\_\_\_\_\_ milliliter/hour continuous intravenous infusion Begin following initial fluid bolus Titrate per two-bag system calculator; Coincide with insulin infusion

 Dextrose 10% and 0.45% Sodium Chloride IV with 20 mEq/L KCl; BAG 2

 \_\_\_\_\_\_ milliliter/hour continuous intravenous infusion Begin when Blood Glucose is less than 300 mg/dL and titrate per two-bag system calculator; Coincide with insulin infusion

 ***For corrected sodium greater than or equal to 135 mEq/L and potassium greater than 5.1 mEq/L Select both***

 Sodium Chloride 0.45% IV BAG 1

 \_\_\_\_\_\_\_ milliliter/hour continuous intravenous infusion Begin following initial fluid bolus Titrate per two-bag system calculator; Coincide with insulin infusion

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**Transition to subcutaneous insulin- Begins after resolution of DKA or HHS**

 When patient is ready to transition to subcutaneous insulin SELECT Diabetes Management order set

**Laboratory**

 For patients with suspected DKA or HHS, consider obtaining serum electrolytes, glucose, calcium, magnesium, phosphorus, and blood gases at least every 2 to 4 hours in more severe cases. Monitor BUN, creatinine, and hematocrit every 6 to 8 hours until normal.

 ***Admission labs or labs to be obtained now: (IF not already done in ER)***

 CBC/AUTO DIFF

 COMPREHENSIVE METABOLIC PANEL

 MAGNESIUM LEVEL, PLASMA

 PHOSPHORUS LEVEL, PLASMA

 BETA-HYDROXYBUTYRATE, BLOOD

 GLYC-HEMOGLOBIN (HGB A1C)

 Blood gas study, arterial

 TROPONIN I

 BLOOD CULTURE, from two different sites five minutes apart

 UA W/MICROSCOPY, CULT IF INDIC

 OSMOLALITY, SERUM

 ***Timed Labs:***

 Adjust start times as needed based on ED or admission lab times

 BETA-HYDROXYBUTYRATE, BLOOD

 every 2 hours from first test, while on insulin drip

 BASIC METABOLIC PANEL

 every 4 hours x 24 hours

 MAGNESIUM LEVEL, PLASMA

 every 4 hours x 24 hours

 PHOSPHORUS LEVEL, PLASMA

 every 4 hours x 24 hours

 OSMOLALITY, SERUM

 every 4 hours x 24 hours

 Blood gas study, arterial

 every 4 hours

**Consults**

 Consult to diabetes educator