**DIABETIC KETOACIDOSIS (DKA) MANAGEMENT**

Diabetic ketoacidosis (DKA) is the leading cause of morbidity and mortality in children with type 1 diabetes. It’s defined as a state of absolute or relative insulin deficiency resulting in hyperglycemia (blood glucose greater than 200 mg/dL) and metabolic acidosis from accumulation of ketoacids in the blood. A child or adolescent in DKA (or ketosis) requires immediate medical attention. Use the algorithm below to guide clinical decisions—including the decision about the best site to deliver care.

For guidance in treating severe DKA with CNS involvement, call (801) 622-1000; ask for diabetes physician on call (Primary children’s Medical Center). DKA is a life-threatening condition, and never more so than in this circumstance.

**DKA MANAGEMENT ALGORITHM**

**Ketosis**
- pH: 7.3-7.35
- HCO3: 15-18
- Urine ketones: small-large

**Mild to moderate DKA**
- pH: 7.2-7.3
- HCO3: 10-15
- Urine ketones: mod-large

May require Intravenous fluids, but may often be managed with subcutaneous insulin. Transfer as necessary to a facility that can provide the level of care and monitoring outlined below.

1. Give a 10-20 cc/kg bolus of NS or Ringer’s lactate if IV necessary.
2. Bedside PG checks as outlined on page 15, and urine ketones checked with every void until normal.
3. No other labs, unless initial labs were abnormal or child is unable to eat.
4. Start SC insulin per page 14 guideline.
5. Encourage intake of clear fluids that do not contain sugar.

**Moderate to severe DKA**
- pH: <7.2
- HCO3: <10
- Urine ketones: >10%

Required IV volume expansion and IV insulin. Transfer to a facility with a pediatric ICU, based on patient’s needs (see below).

Consult, stabilize and transfer immediately to facility with a pediatric ICU if DKA with:
- Clouded consciousness suggesting cerebral edema
- Shock
- Other organ involvement
- Need for mechanical ventilation
- Inotrope infusion

Note: Cerebral edema accounts for 57-87% of all DKA deaths—of which there were 2,000 nationwide in 2001.

Initiate treatment described below as able, even if awaiting transfer:

**IV volume expansion**:
- Often this volume expansion results in a substantial reduction in blood glucose level.
  1. IV bolus of Ringer’s lactate or NS: 10-20 ml/kg over the first 1-2 hours.
  2. Repeat only if there is evidence of cardiovascular instability (shock).
  3. IV fluids, usually 1.5 x maintenance ½ NS + 20-40 mEq/L KCl.

**IV insulin**:
- Start after initial fluid bolus.
  1. Repeat PG at bedside before starting insulin therapy.
  2. Give insulin drip 0.1 units/kg/hr (25 U regular insulin in 250 ml NS). Aim is to reduce PG gradually (about 50-100 mg/dL/hr) to level of 150-250 mg/dL to prevent hypoglycemia or acute changes in osmolarity.
  3. When the PG approaches 200 mg/dL, add dextrose to the IV fluids (D10).
  4. Titrate the dextrose concentration in the IV fluids to 12% dextrose as required to maintain PG level between 150 and 250 mg/dL.
  5. Except for situation of true hypoglycemia, do NOT decrease insulin below 0.08 U/kg/hr until the acidosis is resolved (bicarb >15, pH >7.3), since insulin is required to prevent ketogenesis and correct the acidosis.

Note: Patient’s laboratory values may continue to deteriorate for the first 2 to 4 hours after treatment is initiated. But if patient is not improved by 6 to 8 hours after beginning treatment, transfer immediately to facility with PICU.

**Precipitating factors**
- **Isolated DKA episode(s)** caused by missed insulin injections, infection, and failure to adjust insulin dosage when needed.
- **Recurrent DKA** caused by missed insulin injections
  - Have a higher incidence of psychiatric illness especially depression

*Because primary care providers may have limited access to experienced pediatric specialists, the values recommended here for treatment stratification are more conservative than those in the ADA’s 2005 statement on type 1 management.*