Diabetic Ketoacidosis (DKA) Management

Patient < 18 years presenting with signs/symptoms of DKA[a]

Obtain immediate POC glucose

Continuous cardiac and pulse oximetry monitoring

Place PIV x 2

Obtain CBC, RFP, VBG, UA, β-hydroxybutyrate, HgA1C (unless obtained in the last 30 days), urine pregnancy test as indicated[1]

Initial Fluid Bolus (Phase I)[2]

LR (preferred) or NS 10-20 ml/kg (max 1L) given over 1 hour

Give initial bolus rapidly only if in decompensated shock

Only one bolus recommended if hemodynamically stable

Reassess perfusion after each bolus & avoid cumulative bolus > 40ml/kg unless persistent shock

Consider vasopressors after 3rd bolus if hemodynamically unstable

POC glucose > 600

No / Yes

Criteria for Insulin Infusion

Hyperglycemia ≥ 200 mg/dL

Venous pH < 7.25 *and/or* Bicarb < 15 mmol/L

β-hydroxybutyrate ≥ 3 mmol/L *or* moderate/large ketones[b]

No / Yes

Consider alternative diagnoses

Consult Peds Endo as needed (see risk stratification for known diabetics)[c]

New Onset Diabetes

Yes / No

Obtain new onset diabetes labs[d]

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Obtain serum osmolality

Serum osmolality ≥ 320 mOsm/kg AND Bicarb ≥15 mmol/L

No / Yes

Contact PICU for admission for Hyperglycemic Hyperosmolar Syndrome (HHS)[e] management

Hypokalemia

No / Yes

Potassium repletion (page 3)[f] prior to insulin infusion

Insulin Infusion + "2 Bag System" Fluid Administration (Phase II)

Use PowerPlan: ***ED Peds DKA Insulin***
Order insulin infusion at 0.1 u/kg/hour[g]
Order Bag A (NS preferred) and Bag B (D10 ½ NS preferred)
Administer IVF at 1.5x maintenance rate[h] (see 2-bag distribution table below)
Nurse-initiated IVF titration based on q 1 hr POC glucose

Plasma Glucose	Bag A (NS)	Bag B (D10 1/2NS)	Final Dextrose Concentration
> 300	Total fluid rate	0	0%
200-300	½ total fluid rate	½ total fluid rate	5%
< 200	0	Total fluid rate	10%

Monitoring

Vital signs + neuro checks q 1 hr
POC glucose q 1 hr (serum glucose if POC glucose >600)
BMP, VBG q 2 hrs
Serum iCa, Phos, urine dipstick q 4 hrs

Meeting indications for treatment of cerebral edema[i]

No / Yes

Meeting PICU Admission Criteria[j]

No / Yes

Admit to Peds Floor

Admit to PICU

Elevate head of bed
Give Mannitol 1 g/kg over 20 min[k] OR 3% NaCl 5 ml/kg, max 250 ml, over 20 min[l]
Do NOT delay therapy for CT imaging

Footnotes:

a. Presentations concerning for DKA: patient with or without known history of diabetes presenting with hyperglycemia, polyuria, polydipsia, nausea/vomiting, abdominal pain, deep and fast respirations (Kussmal breathing), fruity/acetone-like odor on breath, fatigue, confusion, altered mental status

b. If bicarb < 15 but pH ≥ 7.25, consult pediatric endocrinology.

c. Cerebral Edema Risk Stratification:
   - i. High Risk:
     - i. pH < 7.0 (≥ 3 years), pH < 7.1 (< 3 years), glucose >1000 mg/dL, corrected sodium >155 mEq/L, new neurologic deficit
     - ii. Dispo typically to PICU
   - ii. Medium Risk:
     - i. Does not meet low or high risk criteria, progressive ketonuria, inability to tolerate PO
     - ii. Dispo typically to inpatient pediatric floor with peds endo consult
   - iii. Low risk:
     - i. pH > 7.2, bicarb > 15, improving ketones, able to tolerate oral PO
     - ii. Dispo typically to pediatric floor vs structured outpatient management if appropriate per peds endo

d. New Onset Diabetes Labs: HgbA1c, insulin antibodies, GAD antibodies, IA-2 antibodies, zinc transporter 8 antibodies, C-peptide, celiac panel, TSH

e. Lab findings typical of Hyperosmolar Hyperglycemic State: glucose >600 mg/dL, venous pH >7.35, bicarb ≥ 15 mEq/L, minimal or absent ketones, serum osmolality ≥ 320 mOsm/kg

f. Potassium Repletion:

Initial Potassium (mEq/L)	Insulin	Fluids (Bag A)	Additional Repletion	Repeat Potassium Level
≤ 3	Do not start until repeat potassium > 3	NS + KCl 20 mEq/L	PO (preferred): 1 mEq/kg (max 40 mEq) PO using oral liquid or powder packet - or - IV (alternative if not tolerating PO): 1 mEq/kg (max 40 mEq) IV infused over 4 hours Infusion rate: 0.25 mEq/kg/hr (max 10 mEq/hr)	1-2 hours after end of potassium administration
3.1-3.3	May start only if additional IV potassium repletion has been administered (PO) or if is being infused (IV)	NS + KCl 20 mEq/L	PO (preferred): 0.5 mEq/kg (max 20 mEq) PO using oral liquid or powder packet - or - IV (alternative if not tolerating PO): 0.5 mEq/kg (max 20 mEq) IV infused over 2 hours Infusion rate: 0.25 mEq/kg/hr (max 10 mEq/hr)	1-2 hours after end of potassium administration
> 3.3	Start immediately	LR (preferred) or NS	None	Standard lab frequency

Footnotes:

g. Insulin drip should be started after the initial fluid bolus is completed. Insulin drip is to be administered via a dedicated pump (i.e. Alaris pump), and never pushed/bloused IV.
h. Do not exceed 4L/m2/day (including initial fluid bolus)
i. Diagnosis of cerebral edema:[3]
    g. Minor criteria:
        g. Headache, especially if worsening or recurring during treatment
        h. Vomiting, especially if developing or recurring during treatment
        i. Irritability, lethargy, or not easily aroused from sleep, especially if occurring or worsening after initiation of treatment
        j. Elevated BP (e.g. diastolic BP >90 mmHg)
    h. Major criteria:
        g. Abnormal or deteriorating mental status after initiation of therapy, agitated behavior, or fluctuating level of consciousness
        h. Incontinence inappropriate for age
        i. Inappropriate slowing of heart rate (e.g. decline >20 bpm that is not attributed to improved intravascular volume or sleep)
    i. Diagnostic criteria:
        g. Abnormal motor or verbal response to pain
        h. Decorticate or decerebrate posture
        i. Abnormal pupillary response or other CN palsy
        j. Abnormal neurogenic respiratory pattern (e.g. grunting, Cheyne-Stokes respirations, apnea)
    j. Treatment Indications:[3]
        g. 1 diagnostic criteria, OR
        h. 2 major criteria, OR
        i. 1 major and 2 minor criteria, OR
        j. 1 major and 1 minor criteria (if child is under 5 years)
j. PICU admission criteria:
    g. Initial pH < 7.25 or bicarb < 15 and/or requiring insulin drip
    h. Concern for cerebral edema
    i. Cardiorespiratory instability
    j. Age < 2 years
    k. Severe electrolyte disturbances (e.g. K < 2 or > 7)
k. If giving mannitol, closely monitor intake and output (i.e. consider a foley catheter if unable to urinate or measure output). Mannitol is contraindicated if hypotensive.[2]
l. Do NOT use hypertonic saline if hypernatremic. May develop hyperchloremic acidosis.[2]

References:

1. MU Emergency Department – Pediatric DKA – Nurse Initiated-Protocol, 2026.
2. MU Emergency Department – Pediatric Diabetic DKA – Protocol, 2024.
3. Diabetic ketoacidosis in children: Cerebral injury (cerebral edema), UpToDate, 2025.