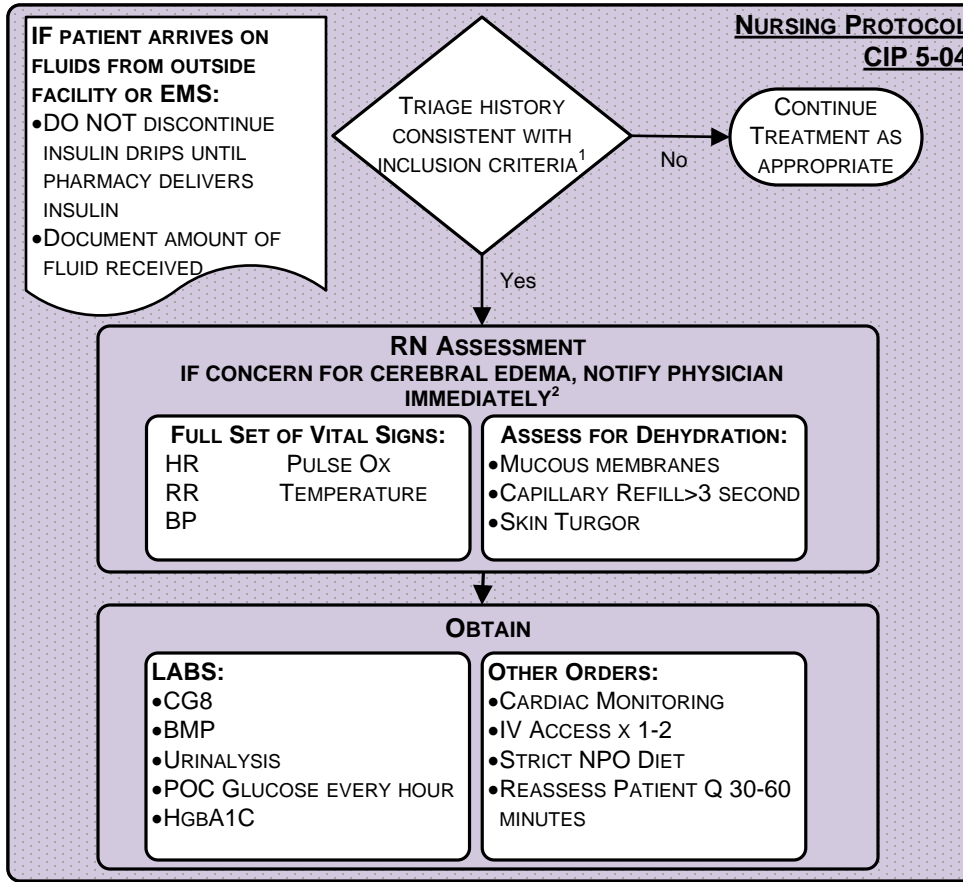


Clinical Practice Guideline for Management of Diabetic Ketoacidosis (DKA) in the ED/Inpatient/PICU

Original Publication 2012
Updated 2/14/24



¹INCLUSION CRITERIA

Suspected new onset diabetic with symptoms such as below OR known diabetic with signs/labs suggestive of DKA:

Symptoms:

- Polyuria
- Thirst
- Weight loss
- Vomiting
- Enuresis

Signs/Labs:

- Hyperglycemia (>200)
- pH <7.3
- Dehydration
- Ketonuria
- Rapid &/or deep respirations

²WARNING SIGNS OF CEREBRAL EDEMA

- Headache
- Inappropriate slowing of heart rate (>20 beats below baseline) &/or rising blood pressure
- Recurrent vomiting
- Change in neurologic status: restlessness, irritability, increased drowsiness, or incontinence
- Change in neurologic signs: Cranial nerve palsies, or slower pupillary response
- Altered/abnormal respiratory rate

³DKA CRITERIA

	pH	OR	HCO ₃ /Total CO ₂
Mild	7.2-7.29		10-17
Moderate	7.1-7.19		5-9
Severe	<7.1		<5

⁴HYPEROSMOLAR HYPERGLYCEMIC SYNDROME (HHS)

- Aggressive hydration: NS bolus 20 ml/kg, repeat until perfusion improves
- Insulin: may not be initially necessary, lower dose than DKA (0.025-0.05 units/kg/hr)
- Consult Endocrinology
- Admit to ICU

⁵PICU ADMISSION CRITERIA

ANY OF THE FOLLOWING:

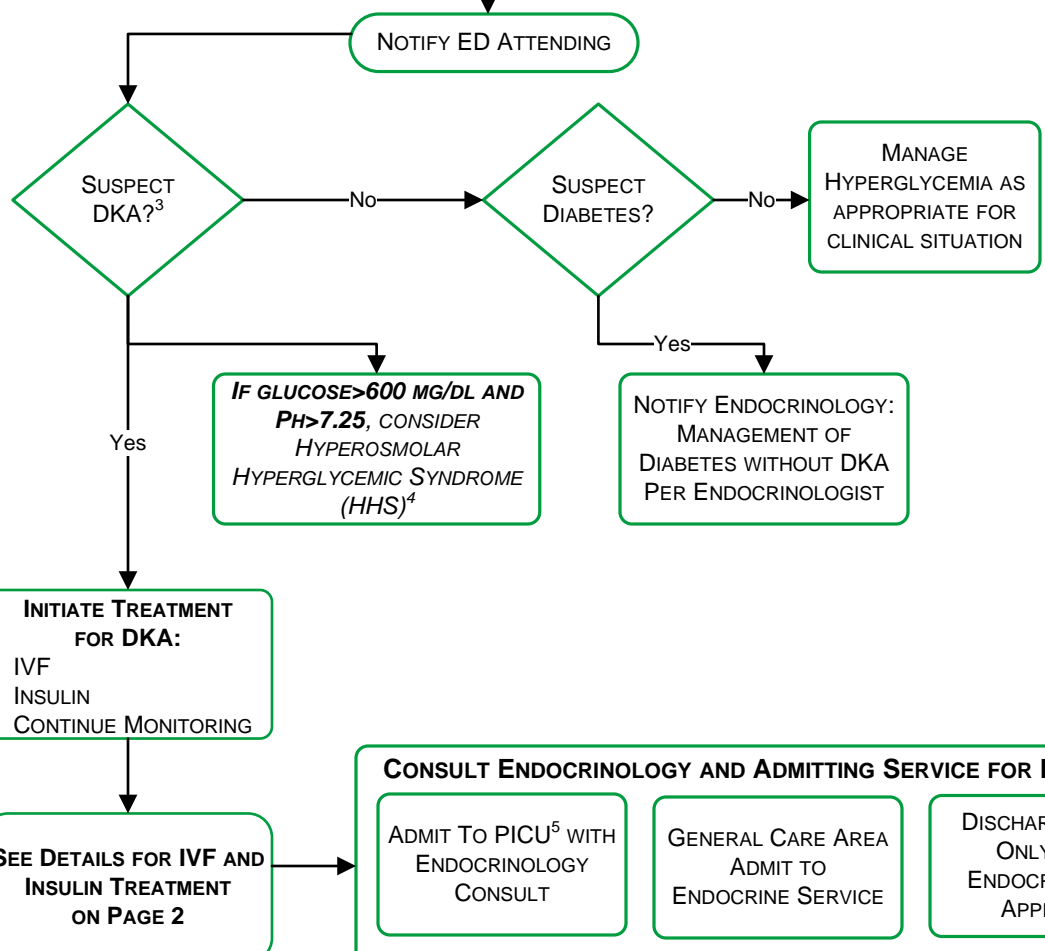
- pH <7.1
- K⁺ <3.0

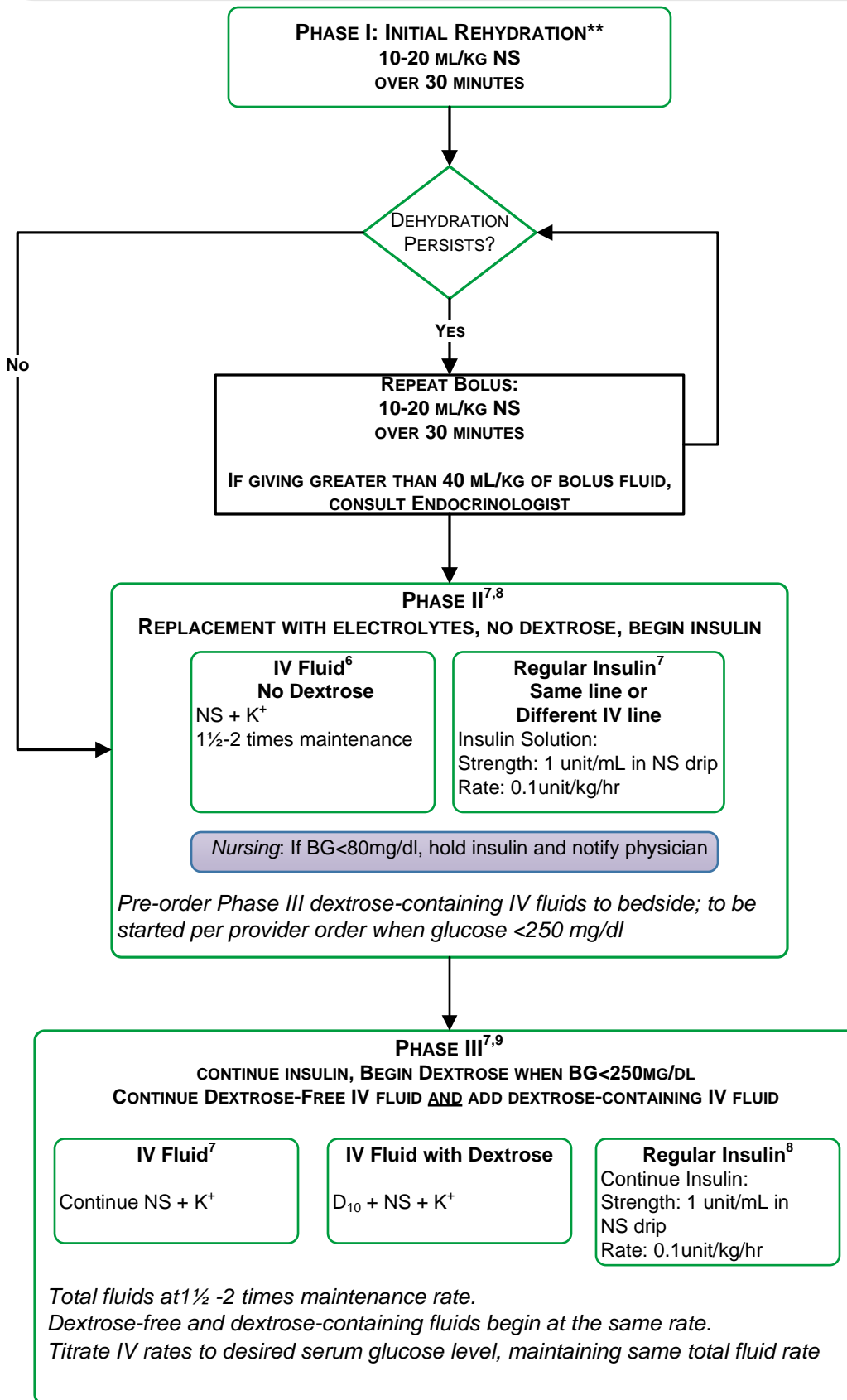
(based on most recently obtained labs)

- Altered mental status
- Severe dehydration

CONSIDER PICU ADMISSION IF:

- Age < 5 years
- Barriers to adequate monitoring/staffing in General Care





**MONITORING DURING ALL PHASES

POC Glucose

- Every 1 hour
- Target BG Range: 100-200mg/dl

Vital Signs and Neurovitals (Cerebral Edema)

- Every 1 hour

Venous Blood Gas and Chemistry

- Every 2-4 hours

POOR PERFUSION SIGNS

- Cool extremities
- Capillary refill > 3 seconds
- Hypotension (policy 23.00)

The following symptoms may persist, but not indicative of poor perfusion:

- Elevated heart rate
- Dry mouth
- Sunken eyes

IVF FOR PATIENTS TRANSFERRED IN

If patient has received over 30ml/kg IVF, consider starting replacement fluids at 1-1½ times maintenance

⁶REPLACEMENT FLUID THERAPY

- Goal is to re-hydrate patient, correct acidosis, and avoid major fluid shifts
- Provides ability to alter replacement therapy fluids with minimal bag changes without changing the rate of the Insulin therapy

⁷ADDING POTASSIUM (K⁺)

Add potassium based on serum K⁺ level:

K⁺ > 5.5 No K⁺ (Phase I fluids (NS) should continue until the K⁺ level decreases)

K⁺ 4-5.5 20mEq/L K⁺ phosphate AND 20mEq/L K⁺ acetate

K⁺ < 4 30mEq/L K⁺ phosphate AND 30mEq/L K⁺ acetate

⁸INITIATING INSULIN REGULAR

- Initiate Insulin after bolus(es) have infused
- If K⁺<3.5, start K⁺ prior to initiating insulin
- Prime IV tubing with insulin; let additional 20mL run out of tubing before connecting to patient/pump (this allows saturation of plastic binding sites)

⁹PHASE III

- Start when BG<250 mg/dL
- The K⁺ and Na⁺ content in each bag should be identical to each other



Patient has completed Phase I-III of treatment and BG < 250mg/dL:

Phase I: Fluid Rehydration with NS

Phase II: Fluid Replacement without dextrose, replace K⁺, begin insulin

Phase III: Fluid Replacement adding dextrose, continue insulin and K⁺

Assess Need for Labs¹⁰

PHASE IV⁷: REDUCE SODIUM CONTENT OF IV FLUID

IF patient is sufficiently stable, consider change to ½ NS after 4-6 hours of Phase III therapy

DO NOT TRANSITION TO THIS STAGE, OR USE CAUTION, IF PATIENT HAS BEEN TREATED FOR SUSPECTED CEREBRAL EDEMA DURING THIS ADMISSION OR IS AT UNUSUALLY HIGH RISK FOR DEVELOPING CEREBRAL EDEMA

IV Fluid⁷

Replace NS + K⁺ with
½ NS + K⁺

IV Fluid with Dextrose

Replace D₁₀ + NS + K⁺
with
D₁₀ + ½ NS + K⁺

Regular Insulin

Continue Insulin:
Strength: 1 unit/mL in
NS drip
Rate: 0.1 unit/kg/hr

Total fluids at 1½ -2 times maintenance rate.

Titrate IV rates to desired serum glucose level, maintaining same total fluid rate

PHASE V: TREATMENT OF PERSISTENT BLOOD GLUCOSE < 100MG/DL

- Increase D₁₀ to 100%
- Decrease insulin to 0.05 units/kg/hr; AND/OR
- Insulin and dextrose titration per physician order

Nursing: If BG < 80mg/dl, hold insulin and notify physician

PHASE VI: TRANSITION TO SUBCUTANEOUS INSULIN AND ORAL FEEDS TRANSFER OF CARE TO ENDOCRINOLOGY

When:

- Patient ready by clinical assessment (including resolution of lethargy and presence of hunger); **AND**
- HCO₃ > 15; **OR**
- pH > 7.29

Advance oral intake from ice chips to carb-containing meal as tolerated

Give Humalog (short-acting insulin based on meal) as discussed with Endocrinology

Discontinue IV insulin following administration of Humalog

¹⁰ LABS

If labs not previously drawn, obtain the following upon arrival to inpatient unit (PICU or floor):

- Phosphorus
- Hemoglobin A1c
- β-hydroxybutyrate

Antibodies for New Onset Diabetes ONLY:

- Tissue Transglutaminase, IgA [TTGAB]
- Immunoglobulin A Total [IGA]
- Thyroid Peroxidase AB
- Thyroglobulin AB [ATHY]

CRITERIA TO TRANSITION TO GENERAL CARE

- Clinical appropriateness of transfer will be based on provider discretion

DISCHARGE CRITERIA

- When patient is on subcutaneous insulin regimen and tolerating solid food
- Consider when social and educational needs are met