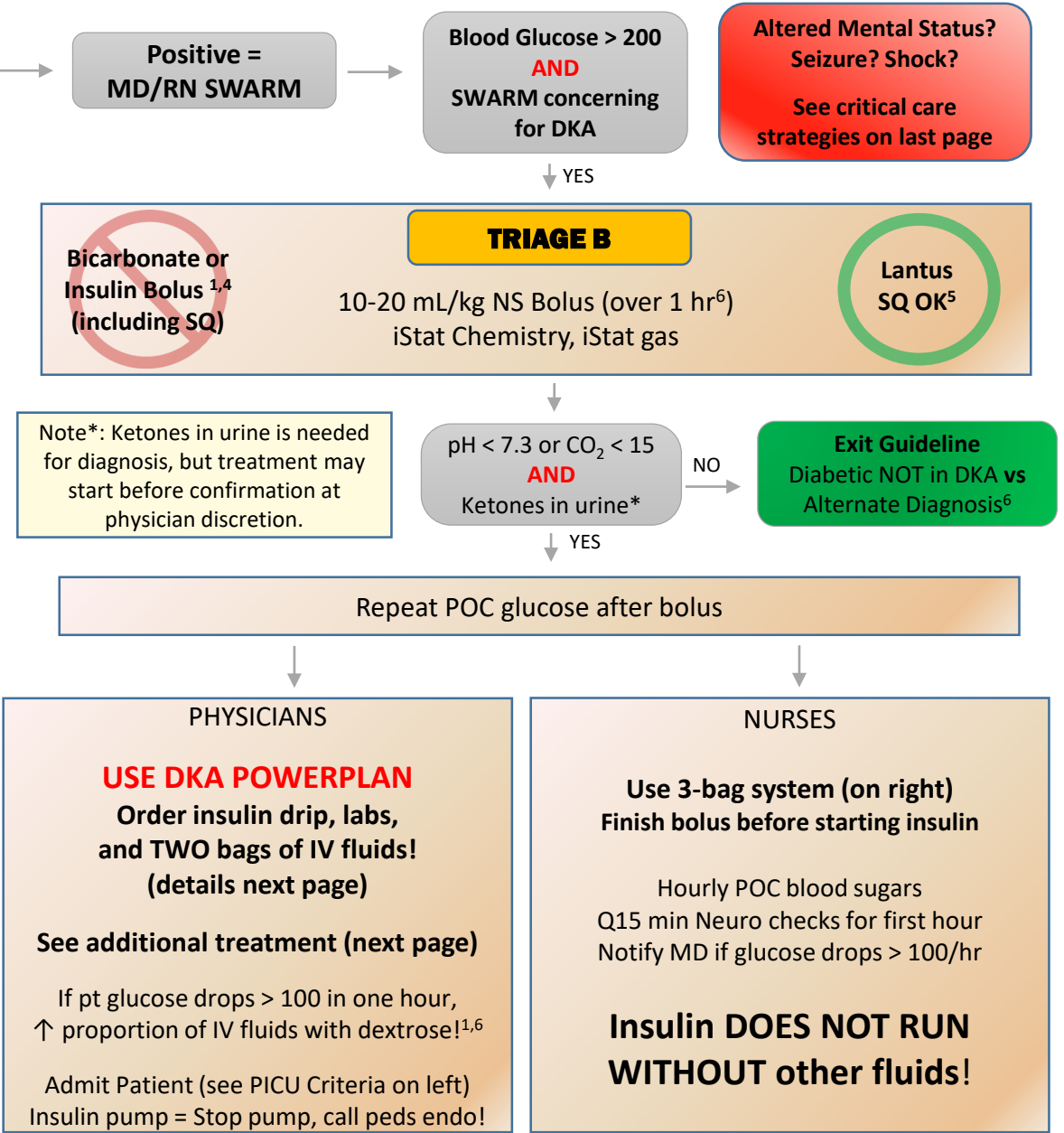


# UNMH Pediatric Diabetic Ketoacidosis Pathway

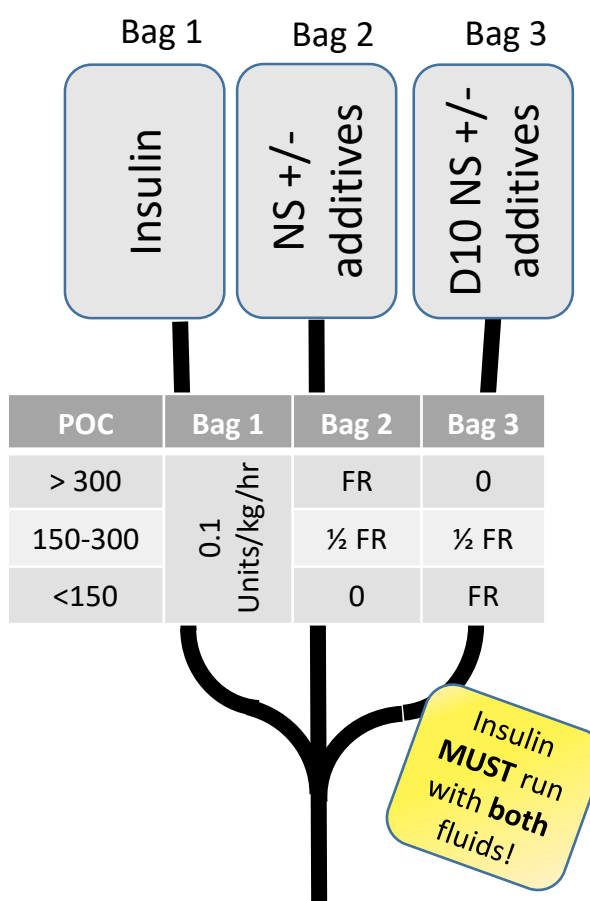
DKA Triage Screening Tool	
<b>History</b>	Known or <b>SUSPECTED</b> Type I Diabetes Mellitus
<b>PLUS ONE OF</b>	<ul style="list-style-type: none"> <li>Abdominal Pain</li> <li><b>Altered Mental Status*</b></li> <li>Extreme Thirst</li> <li>Fatigue</li> <li>Frequent Urination</li> <li>Kussmaul Breathing</li> <li><b>Respiratory Distress*</b></li> <li>Vomiting<sup>1</sup></li> <li>Weight Loss</li> </ul>

**DKA TREATMENT GOALS:**  
 Rapid diagnosis of DKA  
 Insulin Drip for DKA  
 Hourly glucose checks on insulin drip  
 Use 3-bag system  
 Do not drop glucose > 100 per hour  
 Appropriate disposition  
 No bicarbonate treatment

PICU Criteria	
pH < 7.1	Altered Mental Status
K <sup>+</sup> < 2.5	Dysrhythmia
Age < 2 years	Intubation
Profound shock	Cerebral Edema
Floor patients must have a bed on PSCU/6-East!	



## 3-Bag System and Starting Rates



Fluid Rate (FR) = 1.5 x maintenance<sup>1</sup>  
 Do NOT slow insulin rate!  
 If pt glucose drops > 100 in one hour, ↑ proportion of fluids running with dextrose!<sup>1,6</sup>

## H&P AND TREATMENT INFORMATION

HISTORY AND PHYSICAL	
Review of Systems	Polyphagia, Polydypsia, Polyuria, Weight Loss, Anorexia, Vomiting, Fatigue, Malaise
Known Diabetic	Insulin Use, most recent dose, insulin pump Home glucose/ketone measurements Age at dx, prior hospitalizations, previous DKA
Other Teenage females	Infectious sx, Ingestions, Trauma Risk of Pregnancy, STI
Physical Exam	Airway Breathing: Tachypnea, Kussmaul breathing Circulation: Capillary refill, pulses Neuro: Pupils, CN exam, motor, GCS, Mental Status Vital Signs (including temperature)

ADDITIONAL TREATMENT
Assure good IV access but avoid central lines due to risk of thrombus
Neurologic assessments every 15 minutes for first hour or until stable
Reeval for need for 2 <sup>nd</sup> bolus
Start 1.5 MIVF NS until 3-bag system ready
Start insulin infusion at least 1 hour AFTER 1 <sup>st</sup> bolus started <sup>1,4,6</sup>
Add glucose to fluids when blood sugar drops below 300 mg/dL or if dropping > 100/hr
0.2 U/kg Lantus now if new diabetic. Otherwise order their regular home dose.
Do NOT give bicarbonate OR insulin boluses <sup>1,4</sup>
Add antibiotic coverage if febrile

## ORDER INFORMATION

LAB ORDERS	
All	If New Diabetic
VBG	Islet Cell Antibodies
Chem 7, Mg, Phos	Insulin antibodies
CBC with diff	TSH
Hemoglobin-A1c	FT <sub>4</sub>
Ionized Calcium (iCa)	Celiac Disease Reflex Panel
Urinalysis (UA)	
Q1 hour POC Glucose	
If Severe DKA add a Lactate	

IV FLUID ORDERS <sup>1</sup>		
ALWAYS ORDER a bag with AND a bag without dextrose!		
	K > 5.5	K < 5.5
< 35 kg	Normal Saline AND D10 NS	NS + 20 mEq/L KCl + 20 mEq/L KPhos AND D10 + NS + 20 mEq/L KCl + 20 mEq/L KPhos
> 35 kg	Normal Saline AND D10 NS	NS + 40 mEq/L KCl + 20 mEq/L KPhos AND D10 + NS + 40 mEq/L KCl + 20 mEq/L KPhos
IF K < 2.5 or > 5.5 order an EKG K Acetate instead of KCl is allowed		
USE THE FOLLOWING INITIAL RATE		
POC Glucose	NS +/- additives	D10 NS +/- additives
> 300	1.5 maintenance	Bag at bedside
150 - 300	0.75 maintenance	0.75 maintenance
< 150	Bag at bedside	1.5 maintenance
Nurses need BOTH bags to start insulin drip Specialized fluids take time, start with NS at 1.5 maintenance while waiting for insulin and supplemental fluids		

## CRITICAL CARE STRATEGIES

### CEREBRAL EDEMA RISK FACTORS<sup>3</sup>

Risk Factors	Age < 3 years Prior Hx of DKA pH < 7.0 Na fails to correct as sugar ↓ Initial glucose > 1000 mg/dL	Bolus Insulin administration Insulin infusion within 1 hours of 1 <sup>st</sup> fluid bolus Bicarbonate administration
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CEREBRAL EDEMA DIAGNOSIS<sup>3</sup> = 1 Major + 2 Minor or 1 Diagnostic + 2 Major

Diagnostic	Abnl verbal/motor to pain Posturing (e.g. decorticate)	CN Palsy (usually III, IV, or VI) Cheyne-Stokes respirations
Major	Altered/fluctuating consciousness (GCS ≤ 13)	Sustained bradycardia Age-inappropriate incontinence
Minor	Vomiting Headache Age < 5 years	Does not easily wake Diastolic bp > 90 mmHg

### Cerebral Edema Treatment:

Elevate head of bed 3% NS over 30 minutes Mannitol Consider a slower initial insulin drip rate <sup>4</sup> Consider head CT AFTER initial treatment	5 mL/kg 0.5g/kg 0.05 units/kg/hr
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Call PICU attending if intubation or treatment for cerebral edema is required

### Shock Treatment:

NS or LR boluses until perfusion restored	20 mL/kg (up to 3)
Dopamine (Cold shock)	3 mcg/kg/min (Max 20)
Epinephrine (Cold shock)	0.03 mcg/kg/min (Max 1)
Norepinephrine (Warm shock)	0.03 mc/kg/min (Max 1)
Fever	See UNMH PED Sepsis Pathway

### Possible alternate diagnoses:

Stress response due to bacteremia, pneumonia, sepsis, metabolic disorder, or trauma

## Diabetic Ketoacidosis Criteria<sup>6</sup>

Mild	Moderate	Severe
pH 7.21 – 7.3 OR CO <sub>2</sub> 11-15	pH 7.11 – 7.2 OR CO <sub>2</sub> 6-10	pH < 7.1 OR CO <sub>2</sub> < 5 OR Altered Mental Status

### References:

1. Cooke DW, Plotnick L. Management of Diabetic Ketoacidosis in Children. *Pediatrics in Review*. Dec 2008;29(12):415-416.
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4. Wolfsdorf JI. The International Society of Pediatric and Adolescent Diabetes guidelines for management of diabetic ketoacidosis: do the guidelines need to be modified? *Pediatric Diabetes* 2014; 15: 277-286.
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6. Wolfsdorf JI, Glaser N, Angus M, Fritsch M, Hanas R, Rewers A, Sperling MA, Codner E. ISPAD Clinical Practice Consensus Guidelines 2018: Diabetic ketoacidosis and the hyperglycemia hyperosmolar state. *ISPAD Clinical Practice Consensus Guidelines*. 11 April 2018.