

Form Title **Diabetic Ketoacidosis Pediatric Emergency Order Set (for Sites Using D12.5W Solutions)**

Form Number **20903Bond**

© 2018, Alberta Health Services, CKCM



This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License. The license does not apply to content for which the Alberta Health Services is not the copyright owner.

To view a copy of this license, visit

<https://creativecommons.org/licenses/by-nc-nd/4.0/>

Disclaimer: *This material is intended for use by clinicians only and is provided on an "as is", "where is" basis. Although reasonable efforts were made to confirm the accuracy of the information, Alberta Health Services does not make any representation or warranty, express, implied or statutory, as to the accuracy, reliability, completeness, applicability or fitness for a particular purpose of such information. This material is not a substitute for the advice of a qualified health professional. Alberta Health Services expressly disclaims all liability for the use of these materials, and for any claims, actions, demands or suits arising from such use.*

Last Name <i>(Legal)</i>		First Name <i>(Legal)</i>	
Preferred Name <input type="checkbox"/> Last <input type="checkbox"/> First		DOB <i>(dd-Mon-yyyy)</i>	
PHN	ULI <input type="checkbox"/> Same as PHN	MRN	
Administrative Gender <input type="checkbox"/> Male <input type="checkbox"/> Female		<input type="checkbox"/> Non-binary/Prefer not to disclose (X) <input type="checkbox"/> Unknown	

Diabetic Ketoacidosis Pediatric Emergency Order Set *(for Sites Using D12.5W Solutions)*

Select orders by placing a (✓) in the associated box

For more information, see Clinical Knowledge Topic ***Diabetic Ketoacidosis, Pediatric - Inpatient***

Weight _____ kg

Initial DKA Management (First Hour of Care) Orders

Patient Care

- Notify physician if:
- decreased or changing level of consciousness (*restless, irritable, drowsy, obtunded, decreased motor or verbal response to pain*) especially after initial improvement
 - headache, hypertension, vomiting, incontinence, cranial nerve palsies, oxygen desaturation

Diet

- NPO

Monitoring

Vital Signs

- Monitor vital signs: heart rate, blood pressure, respiratory rate, temperature, oxygen saturation every _____ minutes
Minimum of every hour in the initial 1-4 hours, more frequently if required
- Cardiac Monitoring: Continuous Pulse oximetry or cardiac monitor
- Neurovitals: level of consciousness, Glasgow coma scale (GCS) to detect any changes concerning for cerebral edema every ____ minutes
- Intake and Output: Strictly monitor intake and output hourly

Point of Care Testing

Refer to Diabetic Ketoacidosis, Pediatric - Emergency and Inpatient for the severity of DKA

- Blood Glucose Monitoring – POCT, by finger poke **hourly**; Check blood glucose using glucometer at the bedside prior to administering any IV fluids
- Urine Ketones – POCT every void; _____ ; monitor at minimum every 4-8 hours until persistently negative and an order is received to discontinue; every void if measured on the unit (*measure urine ketones OR beta-hydroxybutyrate*)

Prescriber Name	Prescriber Signature	Date <i>(dd-Mon-yyyy)</i>	Time <i>(hh:mm)</i>

**Diabetic Ketoacidosis Pediatric Emergency
Order Set (for Sites Using D12.5W Solutions)**

Last Name (Legal)		First Name (Legal)	
Preferred Name <input type="checkbox"/> Last <input type="checkbox"/> First		DOB(dd-Mon-yyyy)	
PHN	ULI <input type="checkbox"/> Same as PHN	MRN	
Administrative Gender <input type="checkbox"/> Male		<input type="checkbox"/> Female	
<input type="checkbox"/> Non-binary/Prefer not to disclose (X)		<input type="checkbox"/> Unknown	

Laboratory Investigations
Initial Lab Orders - STAT (unless already collected)

Hematology
 Complete Blood Count (CBC) with differential

Chemistry
Once

- Sodium (Na) LEVEL
- Potassium (K) LEVEL
- Chloride (Cl) LEVEL
- Glucose Random LEVEL
- Bicarbonate (CO₂ Content)
- Creatinine LEVEL
- Urea
- Osmolality
- Calcium (Ca) LEVEL
- Beta-hydroxybutyrate – if available (*measure urine ketones OR beta-hydroxybutyrate*)
- Phosphate (PO₄) LEVEL
- Anion gap
- Hemoglobin A1C (*if not done in last 30 days*)
- Magnesium (Mg) LEVEL

Blood Gases

- Blood gas capillary
- Blood gas venous mixed
- Ionized calcium (iCa) LEVEL (*with gas if available*)

Microbiology

 Microbiology (*order appropriate cultures as indicated*)

Urine Tests
 Urinalysis Random; for ketones

Diagnostic Investigations

- Electrocardiogram - 12 Lead
- Chest X-ray PA and Lateral (GR Chest, 2 Projections)
- Chest X-ray portable (GR Chest, 1 projection)

Fluid Management
Intravenous orders

Volume should be expanded to restore peripheral circulation. Most children with severe DKA appear very unwell due to some degree of dehydration and significant acidosis. It is rare for them to be in shock.

*Follow the American Heart Association Pediatric Advanced Life Support (PALS) 2015 guidelines for a patient in shock, and **consider an additional diagnosis such as sepsis.***

Check blood glucose using glucometer at the bedside prior to administering IV fluids.

Prescriber Name	Prescriber Signature	Date (dd-Mon-yyyy)	Time (hh:mm)
-----------------	----------------------	--------------------	--------------

**Diabetic Ketoacidosis Pediatric Emergency
Order Set (for Sites Using D12.5W Solutions)**

Last Name (Legal)		First Name (Legal)	
Preferred Name <input type="checkbox"/> Last <input type="checkbox"/> First		DOB(dd-Mon-yyyy)	
PHN	ULI <input type="checkbox"/> Same as PHN	MRN	
Administrative Gender <input type="checkbox"/> Male		<input type="checkbox"/> Female	
<input type="checkbox"/> Non-binary/Prefer not to disclose (X)		<input type="checkbox"/> Unknown	

Fluid Management (continued)
In the absence of shock in the first 1-2 hours:

Newer evidence supports up to 20 ml/kg in moderate to severe DKA

- 0.9% NaCl 10 ml/kg/dose, IV over one hour to provide initial volume expansion. Do not infuse more rapidly than over 1 hour.

Dose: Weight in kg _____ x 10 mL/kg = _____ mL IV over 1 hour

- 0.9% NaCl 20 ml/kg/dose, IV over one hour to provide initial volume expansion. Do not infuse more rapidly than over 1 hour.

Dose: Weight in kg _____ x 20 mL/kg = _____ mL IV over 1 hour

IF patient IS in decompensated shock (systolic blood pressure less than [70 + 2x(age in years)] mmHg):

- 0.9% NaCl 20 mL/kg/dose, IV

Dose: Weight in kg _____ x 20 mL/kg = _____ mL IV rapidly

- 0.9% NaCl 10 mL/kg/dose, IV

Dose: Weight in kg _____ x 10 mL/kg = _____ mL IV rapidly

- Electrolyte solution (PLASMA-LYTE A) bag 20 mL/kg/dose

Dose: Weight in kg _____ x 20 mL/kg = _____ mL IV rapidly

- Electrolyte solution (PLASMA-LYTE A) bag 10 mL/kg/dose

Dose: Weight in kg _____ x 10 mL/kg = _____ mL IV rapidly

- Reassess vital signs and peripheral perfusion immediately following any bolus fluid administration

- Repeat bolus if no improvement in heart rate or blood pressure, as necessary to restore adequate perfusion.

Ongoing DKA Management (1-4 Hours after Presentation) Orders
Patient Care

Admit to inpatient unit (in a pediatric DKA site) OR Initiate arrangements to transfer patient for subsequent patient care to a center with pediatric DKA expertise

- Diet/Nutrition: NPO

Monitoring

- Vital signs: heart rate, blood pressure, respiratory rate, temperature, O2 saturation every _____ minutes
(Indicated at a minimum of every hour in the initial 1-4 hours)

- Neurovitals: level of consciousness, Glasgow coma scale (GCS) to detect any changes concerning for cerebral edema every _____ minutes

- Cardiac Monitoring: Continuous Pulse oximetry or cardiac monitor

- Intake and Output: Strictly monitor fluid volume intake and output hourly

Point of Care Testing

- Blood Glucose Monitoring – POCT, by finger poke **hourly** and prn

Frequent blood glucose measurement at the bedside will be required while adjusting insulin/ IV in first 1-4 hours

- Urine Ketones – POCT every _____; monitor at minimum every 4-8 hours until persistently negative and an order is received to discontinue; every void if measured on the unit (*measure urine ketones OR beta-hydroxybutyrate*)

Prescriber Name	Prescriber Signature	Date (dd-Mon-yyyy)	Time (hh:mm)

**Diabetic Ketoacidosis Pediatric Emergency
Order Set (for Sites Using D12.5W Solutions)**

Last Name (Legal)		First Name (Legal)	
Preferred Name <input type="checkbox"/> Last <input type="checkbox"/> First		DOB(dd-Mon-yyyy)	
PHN	ULI <input type="checkbox"/> Same as PHN	MRN	
Administrative Gender <input type="checkbox"/> Male		<input type="checkbox"/> Female	
<input type="checkbox"/> Non-binary/Prefer not to disclose (X)		<input type="checkbox"/> Unknown	

Laboratory Investigations
Chemistry
Every 2-4 hours, minimum of Q4H to monitor response to therapy

- Sodium (Na) LEVEL every _____ hours
- Potassium (K) LEVEL every _____ hours
- Chloride (Cl) LEVEL every _____ hours
- Glucose Random LEVEL every _____ hours
- Bicarbonate LEVEL every _____ hours

Every 8 hours

- Osmolality every 8 hours
- Creatinine (Cr) LEVEL every 8 hours
- Urea (BUN) every 8 hours
- Anion gap every 8 hours
- Calcium (Ca) LEVEL every 8 hours
- Beta-hydroxybutyrate – if available every 8 hours
- Phosphate (PO4) LEVEL every 8 hours
- Magnesium (Mg) LEVEL every 8 hours

Blood Gases

Capillary or venous blood gases are acceptable.

- Blood gas capillary every 4 hours
- Blood gas venous every 4 hours
- Alternate q4h blood gas with q4h chemistry labs
(Optional: if warranted for more severe DKA, can alternate collection with chemistry labs to monitor lab values every 2 hours)
- Ionized calcium (iCa) LEVEL *(with gas if available)*

Fluid Management

After initial volume expansion over first 1 hour (0.9%NaCl 10-20mL/Kg over 1 hour), an IV solution containing potassium is recommended. 0.9% NaCl with 40 mmol KCl/L is recommended if patient is voiding.

Hypotonic solutions should NOT be used in the initial management of DKA. Most patients can be continued on isotonic solutions for their whole DKA treatment.

Check serum potassium before starting fluid management. If elevated, consider starting with potassium - free fluid.

Avoid over-hydration, total fluid should not exceed 2x maintenance in the first 24 hours

- Total hourly fluid rate = _____ mL/hr
Mild or Moderate = 1.5x maintenance rate. Severe = 2x maintenance rate
Total Hourly Fluid rate = Bag A (saline) + Bag B (saline and dextrose)

1. Initiate Bag A

(Use when blood glucose greater than 17 mmol/L. Once blood glucose approaches 17 move to Bag A + Bag B system)

If additional potassium is required in addition to 40 mEq/L potassium in IV fluids, follow local policy regarding availability of IV fluids containing 60 mEq/L of KCL

- 0.9% NaCl with _____ mEq/L KCL *(recommended 40 mEq/L)* at calculated total hourly fluid rate = _____ mL/hour

Prescriber Name	Prescriber Signature	Date (dd-Mon-yyyy)	Time (hh:mm)
-----------------	----------------------	--------------------	--------------

**Diabetic Ketoacidosis Pediatric Emergency
Order Set (for Sites Using D12.5W Solutions)**

Last Name (Legal)		First Name (Legal)	
Preferred Name <input type="checkbox"/> Last <input type="checkbox"/> First		DOB(dd-Mon-yyyy)	
PHN	ULI <input type="checkbox"/> Same as PHN	MRN	
Administrative Gender <input type="checkbox"/> Male <input type="checkbox"/> Female		<input type="checkbox"/> Non-binary/Prefer not to disclose (X) <input type="checkbox"/> Unknown	

Fluid Management (continued)
2. Add Bag B once blood glucose is less than or equal to 17 mmol/L

Add dextrose to IV fluids using Two-plus-One system (dextrose IV bag, dextrose/saline IV bag plus insulin)

 12.5% Dextrose System with 0.9%NaCl

Start with a combination of Bag A and Bag B that provides a dextrose concentration of **D10W/0.9%NaCl with 40 mEq/L KCL.**

This is accomplished by:

<ul style="list-style-type: none"> • Bag A: 0.9% NaCl with _____ mEq/L KCL (recommended 40 mEq/L) • Rate: (20% of total hourly fluid rate = total hourly fluid rate X 0.2) = _____ mL/hour 	AND	<ul style="list-style-type: none"> • Bag B: D12.5W/0.9% NaCl with _____ mEq/L KCL (recommended 40 mEq/L) • Rate: (80% of total hourly fluid rate = total hourly fluid rate X 0.8) = _____ mL/hour
--	------------	---

 Titrate dextrose infusion to maintain blood glucose 8-15mmol/L.

Adjust with each hourly blood glucose level (by Glucose Meter POCT or serum glucose)

If blood glucose is greater than 15 mmol/L	→	Increase Bag A (saline) and decrease Bag B (saline and dextrose) rate by 20% of total hourly fluid rate
If blood glucose is less than 10 mmol/L	→	Decrease Bag A (saline) and increase Bag B (saline and dextrose) rate by 20% of total hourly fluid rate
If blood glucose is between 10 to 15 mmol/L	→	No changes to IV rates for either solution

Total hourly fluid rate _____ mL/hour x 0.2 = _____ mL/hour (Amount by which the IV fluid rate of each bag will change with each adjustment, maintaining total hourly fluid rate)

Total Hourly Fluid rate = Bag A (saline) + Bag B (saline and dextrose)

- In some clinical circumstances adjusting by more (or less) than 20% of the total hourly fluid rate may be required. Use clinical judgment.

If blood glucose decreases more than 5 mmol/L per hour, contact physician.

Only use this section if the Two Plus One bag system is not available:

Fluids for patients being transferred to a pediatric site or when a Two Plus One bag System is not available and glucose level is reaching 17 mmol/L such that glucose must be added. Continue previous IV rate.

Mild/moderate DKA = 1.5x maintenance rate Severe DKA = 2x maintenance rate

D5W/0.9%NaCl with 40 mEq/L KCL _____ mL/hr

D5W/0.9%NaCl _____ mL/hr

Prescriber Name	Prescriber Signature	Date (dd-Mon-yyyy)	Time (hh:mm)
-----------------	----------------------	--------------------	--------------

**Diabetic Ketoacidosis Pediatric Emergency
Order Set (for Sites Using D12.5W Solutions)**

Last Name (Legal)		First Name (Legal)	
Preferred Name <input type="checkbox"/> Last <input type="checkbox"/> First		DOB(dd-Mon-yyyy)	
PHN	ULI <input type="checkbox"/> Same as PHN	MRN	
Administrative Gender <input type="checkbox"/> Male		<input type="checkbox"/> Female	
<input type="checkbox"/> Non-binary/Prefer not to disclose (X)		<input type="checkbox"/> Unknown	

Fluid Management (continued)
4. Additional Fluids Orders if Required

Medications
Insulin Infusion (after receiving 1-2 hours of IV fluids)

Start insulin infusion after patient has received initial volume expansion over 1-2 hours and is hemodynamically stable.

IV insulin boluses are always contraindicated. Early IV insulin infusion (within 1st hour of administration of fluids) may increase risk of cerebral edema.

If metabolic acidosis is not improving after 4 hours, re-evaluate that rehydration calculations are correct, insulin infusion is properly mixed, intravenous lines are not occluded, are patent and infusing.

Once these are re-evaluated, if no improvement consider consulting pediatric endocrinology and/or PICU.

insulin infusion; Humulin R 1 unit/mL in 0.9%NaCl; _____ units/ hour (0.1 units/Kg/hr) = mL/hr IV continuously

Analgesics and Antipyretics

acetaminophen (recommended dose 15 mg/kg/dose) _____ mg PO/PR every 4 hours PRN for fever or discomfort. (Maximum 75 mg/kg/day, 1000 mg/dose AND 4 grams/day whichever is less)

ibuprofen (recommended dose 10 mg/kg/dose) _____ mg PO every 6 hours PRN for fever or discomfort. (Maximum 400 mg/dose, less than 6 months, acetaminophen is preferred)

Consults

- Consult Pediatrics
 Consult Pediatric Critical Care Medicine

Prescriber Name	Prescriber Signature	Date (dd-Mon-yyyy)	Time (hh:mm)
-----------------	----------------------	--------------------	--------------