Pediatric Diabetic KetoAcidosis (DKA) Algorithm

Recognition of DKA

- DKA can occur in existing or new onset type 1 or type 2 diabetes
- Diagnostic criteria: Diabetes (random blood glucose ≥11.1 mmol/L) + Ketonuria + Acidosis
- Clinical features: Polyuria, polydipsia, weight loss, dehydration, Kussmaul breathing, headache, decreased level of consciousness, abdominal pain, vomiting

Alert Pediatric Referral Centre

Initial Management

- Assess ABCs, vital signs (including BP) + neurovitals (GCS, pupils)
- Rapid bedside glucose, bedside blood ketones (if available)
- O₂ 10-15 Lpm non-rebreather mask (if signs of shock)
- IV Access x 2 lines (consider intraosseous if unsuccessful)
- Serum glucose, electrolytes, venous gas, urea, creatinine, serum osmolality
- Urinalysis for glucose, ketones; bladder catheterization if needed
- Consider other investigations:
  - Obtain cultures (e.g. blood, urine, throat) if clinical evidence of infection
  - ECG for baseline assessment of K⁺ status (if delay in obtaining serum K⁺)

Signs of CEREBRAL EDEMA?

- GCS <14 and/or irritability in younger children
- And/or Cushing’s triad: ↑BP, ↓HR, ↓RR

Flow Resuscitation (Based on recent evidence)

Administer 10 mL/kg NS bolus over 30 minutes.

Persistent tachycardia, or other signs of hypoperfusion (cap refill >2 sec or cool extremities)?

Rehydration Table: Total IV Fluids

<table>
<thead>
<tr>
<th>Weight</th>
<th>mL/kg/hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 – &lt;10 kg</td>
<td>6.5</td>
</tr>
<tr>
<td>10 – &lt;20 kg</td>
<td>6</td>
</tr>
<tr>
<td>20 – &lt;40 kg</td>
<td>5</td>
</tr>
<tr>
<td>≥40 kg</td>
<td>4 (MAX 250 mL/hr)</td>
</tr>
</tbody>
</table>

Repeat 10 mL/kg NS bolus over 30 min. Reassess after each bolus and repeat if persistent hypoperfusion. Discuss with Pediatric Referral Centre.

Pediatric Referral Centre Discussion

- Call Pediatric Referral Centre
- Assess and manage ABCs
- Bed rest, elevate head of bed to 30°
- If hypoperfused (tachycardia, cap refill >2 sec, cool extremities), give 10 mL/kg NS bolus over 30 minutes; reassess after bolus and repeat x 1 if persistent hypoperfusion. Discuss further fluid management with Pediatric Referral Centre.
- Run IV fluids at 60% of rate outlined in Rehydration Table
- 3% NaCl (5 mL/kg IV over 10 min) OR Mannitol (0.5 – 1 g/kg IV over 15 min)
- Start insulin infusion 0.1 units/kg/hr IV after 1 hour of IV fluids
- Head CT not required prior to transport

IV Fluids and Insulin

- Rehydrate with IV NS. Change to D10NS when glucose is <15mmol/L OR glucose is <25mmol/L and decreases by >5 mmol/L/hr
- Add 40 mmol/L KCI into IV fluid (if K⁺ <5 mmol/L and patient has voided in ED)
- Start insulin infusion 0.1 units/kg/hr IV after 1 hour of IV fluids
- NEVER use IV insulin bolus
- NEVER administer sodium bicarbonate

†See DKA instructions in Drug Dosing Binder

DKA Severity

<table>
<thead>
<tr>
<th></th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.2 – 7.29</td>
<td>7.1 – 7.19</td>
<td>&lt;7.1</td>
</tr>
<tr>
<td>HCO₃⁻</td>
<td>10 – 14</td>
<td>5 – 9</td>
<td>&lt;5</td>
</tr>
</tbody>
</table>

Hyperosmolar Hyperglycemic State (HHS)

- Consider if:
  - Glucose ≥33 mmol/L; HCO₃⁻ <15
  - Minimal acidosis/ketosis; negative or trace urine ketones
  - Osmolarity ≥330 mOsm/L

Discuss with Pediatric Referral Centre

CAUTION!

Intubation and ventilation are high-risk procedures for DKA patients, and should never be undertaken without consultation with your pediatric referral centre or transport team.

Cerebral Edema Management

- Call Pediatric Referral Centre
- Assess and manage ABCs
- Bed rest, elevate head of bed to 30°
- If hypoperfused (tachycardia, cap refill >2 sec, cool extremities), give 10 mL/kg NS bolus over 30 minutes; reassess after bolus and repeat x 1 if persistent hypoperfusion. Discuss further fluid management with Pediatric Referral Centre.
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Pediatric Referral Centre Discussion

- CONSIDERATION OF:
  - Difficult vascular access
  - Additional treatment of cerebral edema
  - Airway management
  - Ongoing fluid management

Ongoing Monitoring Until Transfer

- Q 1 hour: Blood glucose Fluid ins and outs
  - Neurovitals (GCS, pupils) HR and BP
- Q 2-4 hours: Electrolytes and venous gas Monitor ECG for T-wave changes

Dedicate one IV line to use as saline lock for serial bloodwork

A PedsPac resource from TREKK.
For more tools in the series, call 204-975-7744 or visit trekk.ca
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