CPEG Pediatric DKA Algorithm: Ongoing Management

Refer to TREKK Pediatric DKA Algorithm for initial management

DKA: Monitoring

Ongoing Monitoring (until resolution of acidosis)

- **Q1H**: HR, BP, bedside glucose, neurovitals, fluid ins and outs
  - *If any decline in GCS, go to DKA with suspected cerebral injury*
- **Q1-2H x 2 then Q1-4H**:
  - Blood gas, glucose (BG), Na, K, Cl, urea, creatinine, urine ketones
  - Optional Ca, phos
- Calculate anion gap and consider adding serum beta-hydroxybutyrate (BOHB) to assess acidosis and guide weaning of insulin infusion

To distinguish ongoing DKA from hyperchloremic acidosis:

	Anion gap	BOHB
DKA	> 12	> 1 mmol/L
Hyperchloremic acidosis	≤ 12	< 1 mmol/L

DKA: Ongoing Fluid Management

RATE: Fluid Resuscitation Table (from TREKK DKA Algorithm)

Weight	< 10 kg	10 to < 20 kg	20 to < 40 kg	40 kg or more
mL/kg/hr	6.5	6	5	4 (MAX 250 mL/hr)

3 principal elements of IV fluids to consider:

a) Saline concentration:

- FIRST 6 HOURS***: 0.9% NaCl***
- AFTER 6 HOURS: consider changing to solution containing 0.45% NaCl (to reduce the risk of hyperchloremic acidosis)

b) Potassium

- Add KCl only after patient voids and serum K <5 mmol/L
- At least **40 mmol/L KCl** is typically required
- Optional 50:50 mix of 20 mmol/L KCl plus 20 mmol/L Kphos

Note: Patients in DKA are at high risk of HYPOkalemia. Frequent monitoring and attention to serum K is essential. If HYPOkalemia persists despite maximum rate of K replacement (60 mmol/L in peripheral IV), then the insulin infusion rate should be reduced. Also consider oral supplements.

c) Dextrose

ADD D5W or D10W to 0.9%NaCl or 0.45% NaCl when

- BG <15 mmol/L **OR**
- BG decreasing >5 mmol/L/hour

Insulin

- Dilute 50 units of regular insulin in 50 mL NS for 1 unit/mL. Flush tubing with 5 mL of insulin solution
- **Dose**: **0.1 units/kg/hour****
  - Continue this dose until DKA corrected (pH >7.30, HCO3 >15 mmol/L, BOHB < 1 mmol/L and/or anion gap ≤ 12)
  - Target glucose of 8 -14 mmol/L

Note: Patients in DKA are at risk of persistent hyperchloremic metabolic acidosis. BOHB & AG are better indicators of DKA correction than pH & HCO_3 alone

- Convert to SC insulin once DKA is corrected and patient able to tolerate oral fluids. If this occurs between usual meal insulin times, ↓ insulin infusion by 25-50% q1-2 hours to keep BG in target range until insulin is due
- Discontinue insulin infusion and IV fluids 30 minutes after SC rapid acting insulin is given

** *In very young patients, those with HYPOkalemia, or correcting acidosis but inability to maintain BG with D12.5% solution, consider rates of insulin 0.05 units/kg/hr. .*

DKA with Suspected Cerebral Injury

Recognition:

- May be clinically apparent at presentation, or develop within first 12-24 hours of treatment
- Risk factors for cerebral injury:
  - Greater acidosis (lower pH and pCO_2)
  - More severe dehydration
  - Young age (<5 years)
  - New onset diabetes

- **Warning signs:**
  - Headache, irritability or altered behaviour, somnolence, decreasing level of consciousness
  - Abnormal vital signs and blurred disc margins are LATE signs
  - Immediate management is essential if cerebral injury is suspected. CT head is not helpful in acute management and should be deferred

Immediate Management – High Suspicion of Cerebral Injury

- Move to place of intensive monitoring, call emergency response team if available; RN and MD at bedside
- Assess and support ABCs. The need for intubation is RARE (see Page 1)
- Initiate intensive monitoring
- Raise head of bed to > 30°
- Give 3% NaCl 5 mL/kg IV over 10 minutes. *If only one IV line, hold maintenance fluids during 3% NaCl infusion .* Alternative: Mannitol 0.5-1 g/kg IV over 20 minutes
- Consult PICU

Ongoing Monitoring

- Cardiorespiratory monitor, more frequent neurovitals
- Biochemical monitoring as for DKA
- Consider head imaging once stable

Ongoing Fluid Management

- Refer to page 1 for initial guidelines
- Provide fluid boluses if needed for perfusion, **THEN**
- Adjust IV fluids to 60% or to maintain normal BP, but avoid overhydration
- Fluid choice:
  - **0.9% NaCl** OR **D10W/0.9% NaCl** + **40 mmol/L KCl** (as per glucose criteria on Page 1)
- Potassium – as for DKA

Insulin

- Dose: 0.05-0.1 units/kg/hour

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