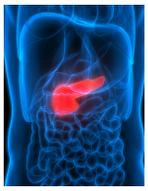
Diabetic Ketoacidosis

(Note - BSPED DKA guideline recently updated for 2021 and we recommend using the BSPED integrated care pathway)



DIAGNOSIS:

- **BLOOD GLUCOSE > 11** + **ACIDOSIS** - pH <7.3 or HCO3- <15mmol/l + **KETONAEMIA** – Blood Ketones >3mmol/l.
- Consider causes - think SEPSIS especially if fever/hypothermia, hypotension, raised lactate or refractory acidosis.
- ***If Hyperglycaemic in the absence of significant ketosis/acidosis – Consider Hyperosmolar Hyperglycaemic state.***

SEVERITY

Mild	pH 7.2-7.29 or Bicarb 10-15
Mod	pH 7.1-7.19 or Bicarb 5-10
Severe	pH < 7.1 or Bicarb < 5

INITIAL ASSESSMENT:

- **AIRWAY** - Assess patency as per APLS; Seek anaesthetic assistance early; CALL KIDSNTS; Consider NG tube.
- **BREATHING** - Give supplemental O2 if spO2<94%; Continuously monitor RR and SpO2.
- **CIRCULATION** - Record BP and repeat every 15 mins + continuous ECG monitoring; Obtain IV Access and send bloods for FBC, U&E, Glucose, Blood Gas and Ketones. **IF SIGNS OF SHOCK PRESENT** - Give a bolus of 10mls/kg Plasmalyte (0.9% saline if not available) over 15 min and re-assess for signs of shock; Consider further 10mls/kg boluses if shock persists (up to 40 ml/kg total); senior review if >20ml/kg; consider inotropes if shocked after 40 ml/kg fluid.
- **DISABILITY** - Measure GCS / AVPU 1 hourly in all children OR every 30 minutes in severe DKA / < 2 years old; Print and use BSPED observation chart; Assess for evidence of cerebral oedema - see box on **CEREBRAL OEDEMA below**.

FLUID DEFICIT AND CORRECTION:

- **IF SIGNS OF SHOCK PRESENT: Return to INITIAL ASSESSMENT.**
- **IF NOT SHOCKED** - give 10 ml/kg use 0.9% saline fluid bolus over 30mins.

Hourly Rate (ml/hr) = (Deficit – Initial Bolus) / 48hrs + Maintenance per hour

CALCULATE FLUID DEFICIT: (Use BSPED Calculator - click here for link). Use max 75kg or 97th centile in obese children.

- **Mild DKA** = 5% or 50 ml/kg; **Moderate DKA** = 5% or 50 ml/kg; **Severe DKA** = 10 % or 100 ml/kg.
- DEDUCT initial 10 ml/kg fluid bolus from deficit calculated.
- DO NOT DEDUCT fluid boluses needed for resuscitation of shock from deficit.

CALCULATE MAINTENANCE REQUIREMENTS: (Use BSPED Calculator)

- Give normal maintenance fluids (100%) if no cerebral oedema.
- 100 ml/kg/day for the first 10 kg of body weight; 50 ml/kg/day for the next 10 to 20 kg; 20 ml/kg/day for each additional kilogram above 20 kg (up to max 75 kg).

TYPE OF FLUID:

- **Initial fluid - 0.9% Saline with Potassium chloride 20mmol in 500mls. (40mmol/L)**
- If glucose <14 and ketones <3 - Change to 0.9% Saline + Glucose 5% + Potassium 40 mmol/l and reduce insulin if dose >0.05 units/kg/hr.
- If glucose <14 and ketones >3 - Change to 0.9% Saline & Glucose 10% + Potassium 40mmol/l and maintain insulin rate.
- **Hypokalaemia can be fatal in DKA** - Expect potassium to fall with insulin infusion. Monitor 2 hourly.
- If Potassium is >5.5mmol/l at presentation, only add Potassium to fluids once child passes urine or it falls to normal range.
- If Potassium is <3.0mmol/l on presentation, do not start insulin until >3.0mmol/l.
- If Potassium <3.0 mmol/l, consider suspending the insulin infusion and d/w Paediatric Consultant/KIDSNTS.

INSULIN:

- **Commence a soluble insulin infusion at 0.05 units/kg/hr 1-2 hours after beginning IV fluid therapy.**
- Continue long-acting insulin in known patients. If on an insulin pump, stop it when starting insulin infusion.
- If acidosis not improving or ketones not falling within 6 hours: increase insulin to 0.1units/kg/hr and CALL KIDSNTS.

CEREBRAL OEDEMA: CAN BE FATAL IN DKA

- Headache, irritability, ↓AVPU, ↓HR, ↑BP, pupils unequal/dilated or oculomotor palsy.
- If suspected: Give 3 ml/kg of 3% Saline or 2.5-5mls/kg of 20% Mannitol over 15 mins; Place in 30^0 head up position; Restrict maintenance fluids to 50%; Seek urgent anaesthetic help; CALL KIDSNTS; **Do not give bicarbonate.**
- Calculate corrected Na+ - this should rise with therapy by 0.5-1mmol/hr. If failing to increase and GCS falling treat as cerebral oedema.

$$\text{Corrected sodium (mmol/L)} = \text{measured sodium} + \frac{(\text{glucose} - 5.6)}{3.5}$$

MR/IA - Updated Nov 21. Review with BSPED update.