MANAGEMENT OF DIABETIC KETOACIDOSIS IN CHILDREN AND ADOLESCENTS

Pediatric Endocrine Society Kenya

Symptoms
Polyuria/polydipsia

Nocturia/ enuresis

Abdominal pain, nausea and vomiting

Fast breathing/ dyspnea

Weight loss

Weakness/ fatigue

Confusion/ altered level of consciousness

Signs/ examination findings
Dehydration

Kussmaul breathing

Fruity /acetone breath

Lethargy/drowsiness

Biochemical Markers
Blood sugar ≥ 11.1 mmol/L

Elevated blood or urine ketones (≥2+ ketones)

Diabetic Ketoacidosis diagnosis confirmed (contact a senior doctor)

Shock
weak or absent peripheral pulses, cold peripheries, CRT >3 sec, reduced level of consciousness/ coma

Resuscitate! Keep Nil per Oral
Airway ± NG tube

Breathing (100% oxygen)

Circulation (0.9% saline 20mls/kg IV bolus over 15 min)

Repeat until circulation is restored (max 2 boluses)

Dehydration
(but not in shock)

IV Fluid Therapy, Keep Nil per oral
0.9% saline 10 -20ml/kg over 1 hour

Calculate fluid requirement (maintenance plus deficit fluid)

Correct fluid deficit over 48 hours

Add KCl 40 mmol per litre of fluid

No dehydration
Tolerating oral fluids

Oral rehydration - ORS
Start subcutaneous insulin (see sick day management insulin dosing)

No improvement

Insulin Therapy
Start insulin therapy one hour after initiation of fluids.
Recommendation: Continuous regular (soluble) insulin infusion 0.05- 0.1 units/kg/hour using infusion pump or IV infusion giving set until resolution of DKA
NB: If no insulin pump or IV infusion giving sets use SC insulin as follows:
Regular insulin: 0.13-0.17 U/kg SC every 4 hours **OR**
Rapid-acting insulin: 0.15 U/kg SC every 2 hours until resolution of DKA

DO NOT GIVE INSULIN AS IV BOLUS
DO NOT GIVE BICARBONATE

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Monitoring

Hourly blood glucose/ vital signs
4-6 hourly UECS/ Venous blood gas analysis and blood or urine ketones
Hourly fluid input & output
ECG for T-wave changes
Neurological status hourly
Amount of insulin administered

Worsening neurological status: warning signs

Severe or worsening headache

Slowing of heart rate

Irritability, confusion

Decreased consciousness

Incontinence

Specific neurologic signs

Acidosis not improving

Re- evaluate

IV fluid calculations

Need for additional resuscitation

Insulin dose and delivery system

Rule out sepsis

Blood glucose <17 mmol/L

OR fall in RBS >5 mmol/L per hour

IV therapy

Add glucose to IV fluids to make normal saline/5% dextrose) to prevent hypoglycemia.

NB: If hypoglycemic (RBS <4 mmol/L) give a bolus of IV 10% dextrose 5 ml/kg, reassess, and continue with dextrose containing IVF infusion. Can increase dextrose concentration up to 12.5% based on the glucose levels if using a peripheral line.

Exclude hypoglycemia (RBS <4 mmol/L)

If no hypoglycemia, suspect cerebral edema

Treat as cerebral edema (CE)

Initiate treatment as soon as you suspect CE.

Give Mannitol 0.5-1g/kg IV over 10-15 min. Can repeat dose after 30 minutes OR

Give 2.5-5mls/kg of 3% hypertonic saline over 10-15 min as alternative to mannitol or if no response to mannitol

Adjust fluid administration rate to 70% of the usual rate

Consult senior staff

Move to ICU

Consider brain imaging after stabilizing patient

Improved

Clinically well, ketoacidosis resolved, tolerating oral feeds

Transition to Basal-Bolus SC insulin

Start subcutaneous insulin then stop IV insulin after appropriate interval: Regular (soluble) insulin overlap for 30 minutes; Rapid-acting insulin overlap for 15 minutes, Intermediate or Long-acting basal insulin overlap for 2 hours)
Starting dose: pre-pubertal 0.5-0.7 U/kg/day, pubertal 0.8-1.2 U/kg/day and titrate appropriately.