

ENDOCRINE SYSTEM

DIABETIC KETOACIDOSIS (DKA)

(Based on guidelines of BSPE)

GENERAL

These guidelines refer to the management of sick children with

>5% dehydration
and/or drowsy
and/or clinically acidotic

Children with less dehydration and clinically well usually tolerate oral fluids and subcutaneous insulin.

Children can die from DKA. Always consult with the senior doctor on call.

MANAGEMENT

General resuscitation

- A (Airway) - Keep airway open by removing secretions or vomitus, insert airway, intubate if necessary. If comatose, insert N/G tube and keep stomach empty.
- B (Breathing) - Give 100% oxygen, bagging if necessary.
- C (Circulation) - Start infusion of N saline. If shocked give 10 ml/kg of 4.5% albumin solution as quickly as possible. Repeat if necessary.

Diagnosis

Symptoms of polydipsia, polyuria, weight loss.
Signs of acidotic respiration, dehydration, drowsiness, abdominal pain/vomiting.
High capillary blood glucose and ketonuria

Initial Investigations

Plasma glucose, urea, electrolytes, osmolality, full blood picture, arterial blood gases.
If pyrexia or shocked consider sepsis and obtain cultures and chest X-ray.
Weigh or estimate weight.

FLUIDS

a) Volume

If necessary, 10-20 ml/kg of 4.5% albumin to restore blood volume (see emergency resuscitation). Do not include this amount in calculating fluid volume over the first 24 hours.

Calculate fluid requirements over 24 hours as follows:

Requirements = Maintenance + Deficit

Maintenance volume

Age (yrs)	Volume (ml/kg/24 hrs)
0 - 2	100
3 - 5	90
6 - 9	75
>10	60

Deficit volume

Assume 10% dehydration

Deficit (litres) = 10% x body wt (kg)

Hourly infusion rate =
$$\frac{\text{Maintenance} + \text{Deficit}}{24}$$

ie rehydrate at a constant rate.

Observations

To be recorded by an experienced nurse/doctor both in A&E and ward

- a) Strict fluid balance. Catheterise if necessary
- b) Hourly capillary blood glucose estimations
- c) Frequent neurological observations. Alert medical staff immediately if signs of cerebral oedema or ECG changes of:

Hypokalaemia - tall U waves, PR interval change

Hyperkalaemia - peaked T waves, PR interval change

- d) Repeat plasma glucose, urea, electrolytes \pm astrup after 2 hours and then at least 4 hourly

Transfer to ICU if comatosed, shocked or evidence of cerebral oedema (see page 104)

INTRAVENOUS FLUIDS

The initial IV fluid used for normal maintenance requirements is:

- (a) 10% dextrose for neonates (5% dextrose if <1000g).
- (b) 0.18% sodium chloride in 4% dextrose for infants and children.

Maintenance fluid volume requirements for young infants in 24 hrs:

	In Incubator	Under Radiant Warmers
Day 1	50-80 ml/kg	80-100 ml/kg
Day 2	80- 100 ml/kg	100-120 ml/kg
Day 3	100-120 ml/kg	120-140 ml/kg
Day 4	120-150 ml/kg	140-160 ml/kg
Day 5	150 ml/kg	160-180 ml/kg
>5 days	150 ml/kg	200 ml/kg

Maintenance electrolyte requirements in 24 hrs:

Sodium	3 mmol/kg (33 ml 0.18% NaCl = 1 mmol)
Potassium	2 mmol/kg (1 ml 7.5% KCl = 1 mmol)
Calcium	0.75 mmol/kg (4 ml 10% Calcium-Sandoz = 1 mmol)
Magnesium	0.2 mmol/kg
Phosphate	1 mmol/kg

BLOOD PRODUCTS

Any patient presenting with a history of haemophilia or a congenital bleeding disorder **MUST** be referred to the Haematologist on-call.

PACKED RED CELLS

- Used for correction of anaemia.
- 4 ml/kg raises Hb by about 1g/dl.
- 15 ml/kg is usually sufficient for any one transfusion.

FRESH WHOLE BLOOD

- Sometimes used in infants with anaemia and infection or thrombocytopenia.
- 6 ml/kg raises Hb by about 1g/dl.
- In some cases, better to use packed cells, plasma and platelet concentrate.

HUMAN PLASMA PROTEIN FRACTION AND ALBUMIN

(Dilute 20% albumin solution with 3 times its volume of 0.9% NaCl or 5% dextrose).

These may be used to restore blood volume in shock. They have the advantages that cross matching is not required and they are speedily available at ward level.

Usually infuse 20 ml/kg rapidly before starting other IV fluids.