Guidelines for the management of diabetic ketoacidosis (DKA)

Author: RACH Diabetes Team and updated by Dr C Snowden / E Walton / M Lazner
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See also: Guidelines for the management of the newly diagnosed patient with diabetes not in DKA

Use BSPED Integrated Care Pathway for all documentation:-
BSPED | BSPED DKA Guidelines
(Colour copies also in resus and CED back office)

These guidelines are intended for children who are clinically dehydrated and who may also have vomiting +/or drowsiness.
These are general guidelines. They may be altered to suit individual situations.

All newly diagnosed Type 1 diabetes patients MUST be discussed with a member of the Diabetes team within 24 hours of diagnosis.

Contact the diabetes team using numbers below (leave a message and a member of the team will call you back within an hour):

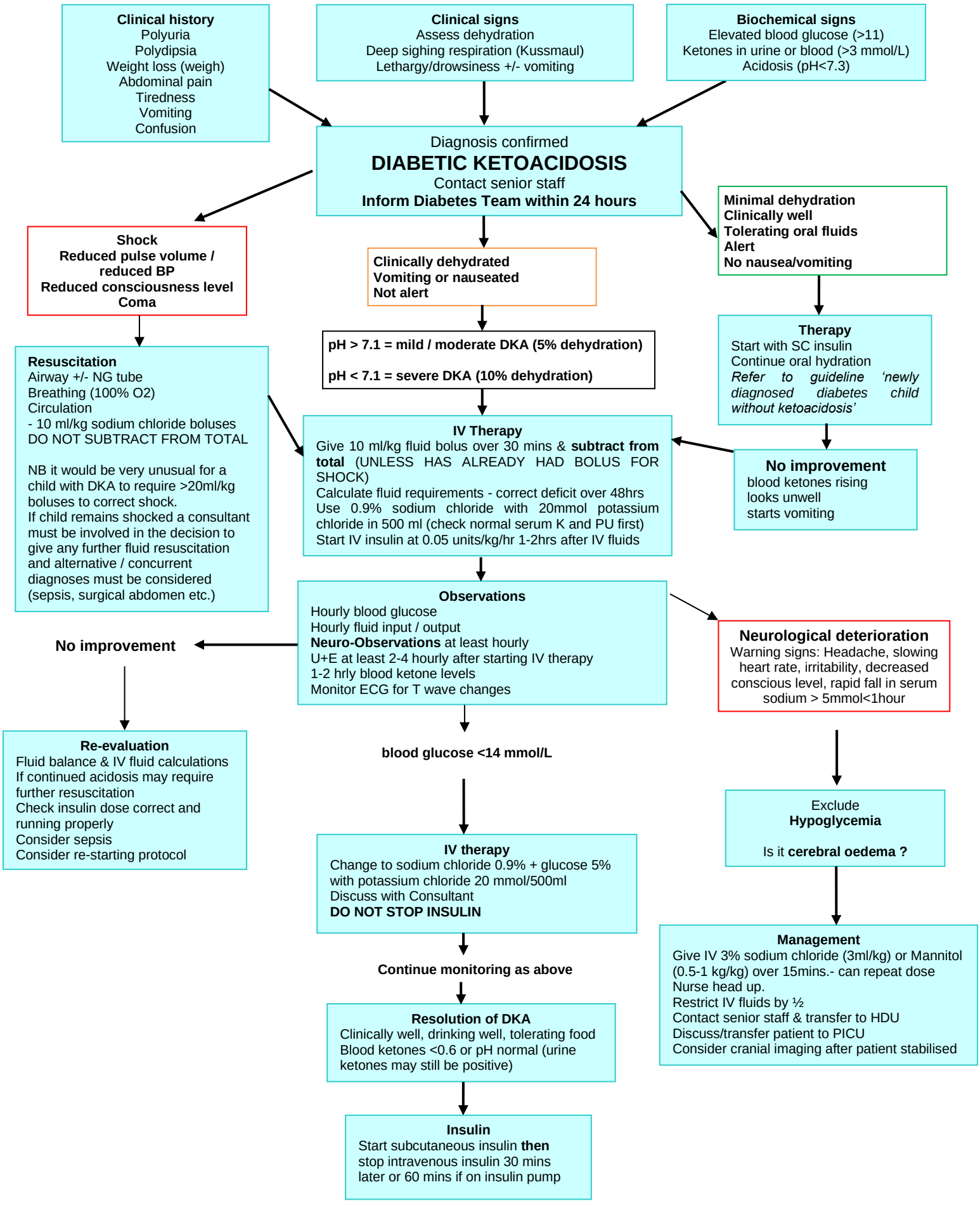
In hours – telephone ext. 63140
Out of hours – via switchboard on call rota

Please note this is not an emergency service. It may take **up to an hour** to call back.
Please be patient.

For children using an insulin pump and admitted with DKA

- **Discontinue the pump whilst treating for DKA**
- **start IV fluids and IV insulin as per current guidelines**

ALGORITHM FOR THE MANAGEMENT OF DIABETIC KETOACIDOSIS



Diagnosis of DKA

Uncontrolled / poorly controlled diabetes mellitus with acidosis and dehydration:

- **Acidosis** (pH< 7.3 or bicarbonate <15)
  and
- **Ketonaemia** (beta-hydroxybutyrate>3mmol/L)

Blood glucose levels are usually high (>11)

Severity classification	
Mild DKA	pH 7.2-7.29 &/or bicarb <15
Moderate DKA	pH 7.1-7.19 &/or bicarb <10
Severe DKA	pH <7.1 &/or bicarb <5

Always consult with the consultant paediatrician on call as soon as you suspect DKA, even if you feel confident of your management. Severe DKA being admitted to HDU to be discussed with HDU consultant. All others should be discussed with COW.

REMEMBER: CHILDREN CAN DIE FROM DKA

They can die from:

- Inhalation of vomit / **aspiration pneumonia**
- **Hypokalaemia**
- **Cerebral oedema**. This is unpredictable, occurs more frequently in younger and in newly diagnosed children.
- **Inadequate resuscitation.** Children who are shocked must receive adequate resuscitation.

Precipitating Factors for DKA

1. Delayed diagnosis and treatment of a new patient.
2. Failure to take adequate insulin or to adequately monitor diabetes.
   (Often secondary to teenage rebellion further complicated by unstable endocrine milieu due to pubertal hormonal changes.)
3. Vomiting or unable to drink & maintain hydration.
4. Infection.

Where to admit

Admit to HDU if:

- < 2 years
- Severe DKA – pH < 7.1 on presentation

A) EMERGENCY Management

1. General resuscitation

Airway – ensure patent airway
– If the child is comatose insert an airway
– If consciousness reduced or recurrent vomiting, insert N/G tube, aspirate and leave on open drainage

Seek urgent anaesthetic review if child unable to protect their airway

Breathing – give 100% oxygen if required by face-mask (NB: patient often has acidotic breathing)

Circulation – Insert IV cannula – preferably x2 large (take bloods, see point 4 below)
– Measure HR, BP and CRT
– ECG monitoring (for T waves - peaked in hyperkalaemia)

Shocked patients require adequate fluid volume resuscitation. A fluid bolus of 10ml/kg may be indicated. THIS WILL NOT BE SUBTRACTED FROM TOTAL FLUID DEFICIT

2. Initial fluid bolus

- **All** children with mild, moderate or severe DKA **who are not shocked but are felt to require IV fluids** should receive a **10ml/kg 0.9% sodium chloride** bolus over 30 minutes. This bolus SHOULD BE subtracted from the total fluid deficit calculation
- **Shocked patients**, i.e. those with a thready weak (low volume) pulse AND hypotension should receive a **10ml/kg bolus of 0.9% sodium chloride** over 15 minutes. This bolus SHOULD **NOT** BE subtracted from the total fluid deficit calculations. Be aware Shock is rare in children and young people (YP) with DKA, and tachycardia, prolonged CRT, tachypnoea are common in children and YP with moderate and severe DKA *but they do not signify shock*. They are signs of vasoconstriction caused by metabolic acidosis and hypocapnia.

  → Following the 10ml/kg bolus for shock patients should be re-assessed. If ongoing signs of shock they may require further 10ml/kg bolus to correct this.

- **Shocked patients** should be admitted to HDU.
- Whilst excessive fluid should be avoided because of the risk of cerebral oedema, it is important to ensure the circulation is adequate and fluid should be given to support this. Cerebral perfusion is dependent on both perfusion pressure and intracranial pressure; so hypotension/low perfusion pressure will also exacerbate the risk of brain injury.

NB. It would be very unusual for a child with DKA to require >2 x 10ml/kg boluses to correct shock. If child remains shocked a consultant must be involved in the decision to give any further fluid resuscitation and alternative / concurrent diagnoses must be considered (sepsis, surgical abdomen etc.)

3. Rapid history and full examination

   - Polydipsia, polyuria, weight loss, lethargy, vomiting
   - Assess GCS (see below for actions if reduced conscious level).
   - Check pupils
   - Features of cerebral oedema include headache, irritability, slowing pulse, rising blood pressure, reducing conscious level (papilloedema is a late sign)
   - Symptoms/signs of any infection precipitating DKA
   - Features of ileus (common in DKA)
   - Weight (if unable to weigh calculate expected weight or use recent clinic weight)

4. Investigations

   - **Blood glucose** (Capillary blood glucose and also lab glucose)
   - **Venous blood gas**
   - **U & E, chloride, osmolality**
   - **Venous blood ketones** (lab beta-hydroxybutyrate and near patient testing ketone meter)
   - **HbA1c**
   - **FBC** (↑ WBC common and not always a sign of infection or sepsis)
   - Blood cultures and CRP if pyrexia or very unwell. (*Caution* - Septic diabetic patient may not have a high temperature. Suspect sepsis if there is fever or hypothermia, hypotension, refractory acidosis or lactic acidosis)
   - TFTs, Thyroid antibodies (TPO)
   - Coeliac screen
   - IgA levels
   - IA2 antibodies, GAD65 antibodies, ZnT8 antibodies

   For newly diagnosed patients only

   - Urine analysis
     - glucose and ketones
     - MSU for microscopy, culture and sensitivity if symptoms of UTI or leucocyte / nitrite positive

5. Additional calculations from available results:
   - Corrected Sodium (Na) = Measured Na + 0.3 x (Glucose – 5.5)
   - Anion Gap = (Na + K) – (Cl + Bicarb)
   - Plasma Osmolality = 2 x (Na+K) + blood glucose + Urea

6. Other investigations if indicated:
   - CXR
   - LP
   - Swabs (throat, genital, wounds etc…)
   - Viral studies (blood, urine, throat, stool etc…)
   - Research bloods – if any

7. Start hourly neuro-obs including GCS, whether or not drowsy on admission.

If conscious level decreased:

- Nil by mouth
- Nasogastric tube to empty stomach contents (acute gastric dilatation may be present) and aspirate hourly or continuous drainage.
- If GCS <8, consider elective intubation and ventilation to protect airway
- Catheterise bladder for accurate urine output
- Hourly or more frequent neuro-observations
- Conscious level is directly related to the degree of acidosis but signs of raised intracranial pressure suggest cerebral oedema that must be managed accordingly
- Inform HDU staff early. Discuss with Anaesthetist on call and STRS team as appropriate.

B) EARLY management

1. **FLUIDS:** remember to discuss fluids early with senior clinician in CED in very young children and critically ill children and YP as risk of cerebral oedema is higher

Fluid calculations must be completed on the BSPED proforma (colour printed copies in resus) *and* inputted into the online calculator:-

Paediatric DKA Calculator (dka-calculator.co.uk)

a) Volume of fluid

- By this stage circulating volume should have been restored - children with shock should have been adequately resuscitated with appropriate fluid volume replacement. Other patients should have received a fluid bolus of 10ml/kg as part of routine DKA management
- Once circulating volume has been restored calculate total fluid requirements for the first 48 hours as:

  Requirement = Deficit + Maintenance

- **Weight:** wherever possible use actual weight at presentation. To avoid excessive amounts of fluid in overweight children use a maximum weight of 75kg or the 98th centile weight for age (whichever is lower).

- Neonatal DKA requires special consideration and larger volumes of fluid than those quoted may be required - usually 100-150ml/kg/day)

- **Deficit**
  - Estimation of fluid deficit should be based on **initial** blood pH (It is not possible to accurately clinically assess degree of dehydration to work out the fluid deficit):-

Assume a 5% fluid deficit in mild-moderate DKA (pH 7.1-7.29 or bicarb 5-15)

Assume a 10% fluid deficit in severe DKA (pH < 7.1 or bicarb <5)

Deficit volume =

% deficit x weight x 10

- **Resuscitation fluid:** the volume of any fluid boluses given for **resuscitation** in children with **shock** should NOT be subtracted from the estimated fluid deficit.
- The **initial 10ml/kg bolus** given to all **non-shocked** patients SHOULD be subtracted from the estimated fluid deficit.
- The deficit should be replaced over 48 hours alongside appropriate maintenance fluids.

- **Maintenance**
  - Maintenance fluid volumes should be calculated by the traditional UK method (Holliday-Segar formula) as:-
    - 100ml/kg/day for the first 10kg of bodyweight
    - 50ml/kg/day for the next 10 to 20kg
    - 20ml/kg/day for each additional kg above 20kg

    Then multiply x 2 to get volume required in 48 hours

- **Fluid calculation**
  Calculate the fluid deficit (5% or 10%), subtract initial 10ml/kg bolus (*not* in shocked patients) and add this to the total maintenance for 48 hours then divide the total by 48 to get your hourly rate of maintenance + deficit fluid over 48 hours

$$\textbf{hourly rate (ml/hour)} = \frac{\textbf{(\{deficit – initial bolus\}) + (maintenance/day x 2)}}{48}$$

Example 1:

- A 20kg 6 year old boy who has a pH of 7.15 and is not in shock
  - moderate DKA => 5% dehydrated- will receive a 10ml/kg fluid bolus (200ml) over 30 minutes
  - Ongoing fluids will comprise:

5% deficit (moderate)	=	5 x 10 x 20kg = 1000 ml
Subtract initial bolus	=	1000-200 = 800 ml to be replaced over 48hrs
Maintenance		10 x 100 = 1000 ml per day for 1st 10kg
	+	10 x 50 = 500 ml per day for next 10kg (10-20kg)
	=	1500 ml/day total over 24 hrs
	=	3000 ml total in 48 hours
Total fluid		800 ml (deficit – bolus over 48hrs)
	+	3000 ml (maintenance over 48hrs)
	÷	**48**
	=	**79 ml/hr**

Example 2:

- A 60kg 15 year old girl with a pH of 6.9 who was shocked at presentation.
  - She has received 30ml/kg of 0.9% sodium chloride for **resuscitation** – these fluids are *not* subtracted from her requirement.
  - Ongoing fluids will comprise:

10% deficit (severe)	=	10 x 10 x 60kg = 6000ml
	=	6000ml to be replaced over 48hrs
Maintenance		10 x 100 = 1000ml per day for 1st 10kg
	+	10 x 50 = 500ml per day for next 10kg (10-20kg)
	+	40 x 20 = 800ml per days for next 40kg (20-60kg)
	=	2300 ml total over 24 hrs
	=	4600 ml total in 48 hours
Total fluid		6000 ml (deficit over 48 hrs)
	+	4600 (maintenance over 48 hrs)
	÷	**48**
	=	**220 ml/hr**

b) Type of fluid

- Use **0.9% sodium chloride with 20 mmol potassium chloride in each 500ml** bag (40 mmol/L) for initial maintenance/rehydration fluids *unless* there is evidence of renal failure or the potassium remains above the upper range of normal following resuscitation fluids (see 2. POTASSIUM below)
- Once blood glucose has fallen to <14 mmol/L change to glucose containing fluids (see C) ONGOING management below)

c) Oral fluids

- Do not give oral fluids whilst giving IV fluids for DKA until ketosis is resolving and there is no nausea or vomiting.
- An NG tube may be necessary in cases of gastric paresis.
- If oral fluids are given before the 48hr rehydration period is complete the IV infusion needs to be reduced to take into account the oral intake.

d) Fluid losses

- Replace significant ongoing fluid losses with appropriate fluid (e.g. 0.9% sodium chloride with potassium chloride for large gastric aspirates; 0.9% sodium chloride with 5% glucose and potassium chloride for diarrhoea).
- **Urinary losses are not routinely replaced** but if a massive diuresis continues for several hours, then fluid input may need to be increased. Discuss with a consultant.

2. POTASSIUM

- Use potassium containing IV fluids (0.3% potassium chloride which contains 20 mmol in 500 ml) for all fluids following any initial resuscitation boluses *unless:-*
    - There is evidence of renal failure

- potassium is above the upper limit of normal at presentation - in this case add potassium to IV fluids only if K+ <5.5mmol/l and once child has passed urine **or** potassium has fallen within upper limit of normal (this typically will happen after the first 10ml/kg fluid bolus has been given)

- Monitor serum potassium levels with U&Es every 2-4 hours
- Potassium levels fall once insulin is commenced. If hypokalaemia develops:-
  - Consider reducing the insulin infusion rate
  - Consider whether central venous access is required to give higher concentrations of IV potassium solutions (>40mmol/L)
  - Consider if oral potassium supplement is an appropriate option

3. INSULIN

Rehydration fluids are the most essential first line treatment. Once IV fluids are started, blood glucose levels will begin to fall. Insulin is used to switch off ketogenesis.

- **Start an insulin infusion 1-2 hours after beginning intravenous rehydration**.

a) A continuous low-dose infusion of intravenous insulin (usually at **0.05 unit / kg / hr**) via electronic syringe pump is preferred

b) How to make up insulin infusion:
- → Add 50 units of soluble insulin (Actrapid or Novorapid) to 49.5ml 0.9% sodium chloride in a 50ml syringe.
- → Rotate the syringe to mix the insulin and sodium chloride solution
- → This will make a concentration of 1 unit/ml
- → Desired rate in units/kg/hr (usually 0.05 units/kg/hr) x Weight = units/hr ≡ ml/hr
  - E.g. 22kg child needs 0.05 units/kg/hr insulin
  - 22 x 0.05 = 1.1 units/hr ≡ 1.1ml/hr

c) The prescription should record:
a) The concentration of insulin in the syringe as 50 units/50 ml (1 unit/ml)
b) The rate in units/kg/hr
c) The rate in units/hr and in ml/hr (these are the same)

For known patients who are already on a long acting subcutaneous insulin, continue this alongside IV treatment.

4. Bicarbonate

Do not give intravenous sodium bicarbonate to children and young people with DKA.

If metabolic acidosis is persisting, consider:-
- Insufficient insulin to switch off ketogenesis

  - check blood ketones to ensure falling adequately. If not:-
    - check lines / check insulin calculations / check infusion pump
  - consider increasing the insulin dosage to 0.1 unit/kg/hour, after discussion with the diabetes team or on call consultant
- Inadequate resuscitation
- Sepsis
- Salicylate or other prescription or recreational drugs
- Hyperchloraemic acidosis from sodium chloride in normal sodium chloride (likely if the above have been excluded - does not require specific treatment)

NB: The anion gap is typically 20-30mmol/L in a patient with ketoacidosis - an anion gap >35mmol/L may suggest concomitant lactic acidosis and should prompt review of the clinical picture.

(In cases of life-threatening hyperkalaemia or severe acidosis with impaired myocardial contractility discuss with an intensivist whether bicarbonate may have a role.)

C) ONGOING Management

1) Monitoring

- Hourly BP, basic observations & neuro obs/GCS (increase frequency if abnormal, young child or pH<7.1)
- Strict fluid balance (urinary catheter may be needed in young/sick children)
- Hourly capillary blood glucose (often inaccurate in presence of poor peripheral circulation/severe acidosis so cross check with lab glucose every 2-4 hrs)
- 1-2 hourly blood ketones using HOSPITAL meter
- **Lab U&Es, glucose, ketones and venous blood gases every 2-4hrs for the first 24hrs** (more often if clinically indicated)
  - Calculate plasma osmolality and corrected sodium (NB sudden drop in plasma osmolality/corrected sodium may be early indicator of impending cerebral oedema and needs careful review of patient condition and management including review of fluids being given - see below)

Record all blood results on 'Serial Data Sheet' on page 10 of BSPED Integrated Care Pathway. This will help monitor progression and response to treatment.

- Weight at least once daily
- Urine testing of all samples (glucose & ketones)

2) Ongoing management of fluids and IV insulin

- Once the blood glucose has fallen below 14mmol/L, change the intravenous fluids to **0.9% sodium chloride + 5% glucose + 0.3% potassium chloride** (20mmol in 500ml) *and:-*

- *If ketones <3* use 0.9% sodium chloride / **5% glucose** / potassium chloride and continue insulin at 0.05 u/kg/hr
- *If ketones >3,* consider use of 0.9% sodium chloride / **10% glucose** / potassium chloride and increase insulin to 0.1 u/kg/hr (10% glucose to avoid hypoglycaemia with higher insulin dose)

- **Blood glucose should fall gradually at a rate of 5 mmol/hr or less**.

  If rate of glucose fall is more rapid, consider changing to **0.9% sodium chloride + 5% glucose + 0.3% potassium chloride** (20mmol in 500ml) earlier.

- During the recovery phase, if blood sugars increase again to >14 mmol/L, do not restart plain 0.9% sodium chloride, but continue fluids with glucose and potassium chloride. Consider reducing the rate of IV fluids, especially if the child is also drinking orally.

- As blood glucose levels fall, a gradual rise in corrected sodium in the initial phase of treatment is normal, and does not require any correction. As the rehydration progresses, the serum sodium levels will return to normal. Management should also aim to keep the osmolality stable during treatment of DKA.

  - **Occasionally an exaggerated increase in corrected sodium occurs (>5 mmol/L in 4-8 hrs).** This suggests too much fluid loss or insufficient replacement.

  → Review the IV fluids being given to the child and consider any additional fluids required for the child after discussion with the consultant on call.

  - **A rapid decrease in corrected sodium (>5 mmol/L in 4-8 hrs) suggests too much fluid administered/fluid given too rapidly and may increase the risk of cerebral oedema.**

  → Review IV fluids (including all fluid calculations done and any oral intake) and consider management suitable for cerebral oedema after discussing with a consultant.

- Oral fluids can be introduced when ketosis has begun to resolve, the child is not nauseous or vomiting, and feels ready to drink. If oral fluids are given before the 48 hour rehydration period is completed IV fluids need to be reduced to take account of the oral intake.

- Small amount of urine ketones can persist for 24 to 48 hours and do not reflect ongoing ketogenesis. Blood ketones are more useful in monitoring a trend.
  Anion gap is also a useful measure to follow resolution of ketogenesis. A normal anion gap of <18 indicates resolution of ongoing ketogenesis.

- Insulin infusion can be stopped (and subcutaneous insulin initiated - see 'Subcutaneous Insulin Therapy' below) when:

- Anion gap <18 mmol/L - pH >7.3 - Urine ketones – Negative or trace only (or blood ketones <0.6) - Child drinking / eating well without vomiting

Beware

1. Hypoglycaemia

Hypoglycaemia in diabetes = blood glucose < 3.9 mmol/L

Actions:

- Give 2 ml/kg bolus of 10% Glucose IV. Do not stop the insulin infusion.
- Consider escalating the glucose concentration in the intravenous fluids:-
  - to **0.9% sodium chloride + 5% glucose + 0.3% potassium chloride** (20mmol/500ml)
  - or **0.9% sodium chloride + 10% glucose + 0.3% potassium chloride** (20mmol/500ml) – please refer to the "**prescribing non-standard concentrations of infusion fluids**" guideline on Microguide > Paediatrics & Neonatology > Paediatrics > Pharmacy / Prescribing Guidelines

- If hypoglycaemia persistent **consider decreasing insulin infusion by half** (i.e. from 0.05 units/kg/hr of insulin to just 0.025 units/kg/hr of insulin).

2. Hypokalaemia

Monitor ECG if potassium is high or low:
High potassium → peaked T waves; QRS wide and slurred
Low potassium → low or inverted T waves, ST-depression; U waves

- Increase K content in IV fluids- a central line may be necessary
- If has started oral intake and clinically improving give oral K supplements

3. Cerebral oedema

Cerebral oedema is a **major cause of mortality** in paediatric diabetic ketoacidosis that can occur at any time.
Early manifestations of cerebral oedema include:-

- Headache
- Agitation/irritability
- Unexpected fall in heart rate
- Increased BP

Later manifestations of cerebral oedema include:-

- Deterioration in consciousness level
- Abnormalities in breathing pattern e.g. pauses
- Oculomotor palsies
- Abnormal posturing/seizures
- Pupillary inequality or dilatation
- Papilloedema

If cerebral oedema is suspected, Consultant on-call & HDU staff should be notified immediately and the following measures should be undertaken:

a) Maintain airway, breathing, oxygenation, circulation and perfusion.

b) Exclude hypoglycaemia

c) Administer "hypertonic saline" = 2.7% sodium chloride - 3ml/kg over 15 minutes. Can be repeated if required.
(Mannitol 20%, 0.5-1g/kg over 15 minutes is alternative to 2.7% sodium chloride, used rarely now).

d) Restrict rehydration infusion rate to ½ of original rate until situation improves.

e) Notify and transfer to HDU if patient not there already. Nurse with child's head elevated (10°) and in midline.

f) Discuss with STRS. Consider intubation and ventilation and transfer to PICU.

g) Aim to keep CO_2 >3.5 kPa, preferably at 4 to 4.5 kPa. Do not hyperventilate.

h) Consider repeat boluses of 2.7% sodium chloride* to prevent rebound increase in intracranial pressure (every 2 – 6 hours).

i) Consider Neuro-imaging (CT or MRI scan) to exclude other diagnoses e.g. thrombosis, haemorrhage or infarction; these can present in a similar way.

j) Consider Phenobarbital if convulsions.

***The licensed preparation of 2.7% Sodium Chloride (Polyfusor) is available in the Trust**

<u>Subcutaneous Insulin Therapy:</u>

Discuss with the diabetes team (contact OOH Diabetes Clinician as needed). Confirmation of the following plan is required, as for individual patients this may vary slightly from this guideline:

Use MDI (multiple daily injections) or basal bolus regimen for all patients regardless of age, as the preferred insulin regimen.

MDI regimen

- start basal bolus regimen (4 injection regimen) utilising NOVORAPID before each meal and LEVEMIR usually given at the same time every day at bedtime.

  NOVORAPID doses are generally estimated at **0.1 unit/kg** for each meal (with some variation) and LEVEMIR dose at **0.2 units/kg**.

  There is no need for mid-morning and mid-afternoon snacks with this insulin regimen.

- Start with (pre meal) subcutaneous fast acting insulin (e.g. Novorapid) at a convenient meal. Leave IV cannula in situ in case diet and fluids are not tolerated. If possible consider going straight from IV insulin to child's usual regimen.

- Give subcutaneous fast acting insulin (Novorapid) up to 5 minutes before the meal and stop IV insulin 30 minutes after the first s/c injection of insulin (Novorapid) to prevent rebound hyperglycaemia.

- A guide to approximate dose (rounded to the nearest 0.5 units) of insulin (Novorapid) with meals, based on pre-meal blood glucose levels is as follows:

  - Pre meal BM <10 – mealtime insulin 0.1 unit/kg + no additional correction
  - Pre meal BM 10.1-17 – mealtime insulin of 0.1 unit/kg + additional correction of 0.02 units/kg
  - Pre meal BM 17.1-24 – mealtime insulin of 0.1 unit/kg + additional correction of 0.04 units/kg
  - Pre meal BM >24.1 – mealtime insulin of 0.1 unit/kg + additional correction of 0.06 units/kg

  NB: Children should be ketone free for at least 24 hours if they are to recommence CSII pump

- The insulin dose needs to be reviewed at least daily.

- Consider extra dose of fast acting insulin if blood sugar >14 with or without ketones. Additional fast acting insulin for high glucose >14mmol/L (+/- Ketones >0.6mmol/L) is approximately another 0.02 units/kg (rounded to the nearest 0.5 units) on a 2 hourly basis if required

- Make sure corrections of SC insulin are NEVER given closer than 2 HRS apart

- For children <15Kg in weight requiring only 0.02u/kg correction doses outside of meal times please discuss with the diabetes team if rounding to the nearest 0.5u is appropriate and if corrections are necessary outside of meal times

- Do not advise exercise if blood sugars high with ketonuria.

Please note:

1. In severe cases where whole body potassium depletion is likely, consider oral potassium supplements.

2. Educate new patients and parents. Assess precipitants of ketoacidosis in older patients with established diabetes.

3. Blood glucose monitoring should be done by capillary blood glucose testing using the HOSPITAL meter before 3 main meals of the day and at bedtime as a minimum and should the child appear unwell.

4. Discharge will vary with the family. The aim is to get the child and the family home as soon as the child is well and child / family have been educated about diabetes. Plans for discharge should be made in conjunction with the Diabetes Nurse Specialist, who will be in frequent contact with the family when they go home. Inform the GP of the child's diagnosis, discharge and treatment. Make outpatient appointment in the diabetic clinic for 1 month. There is a TTO prescription guide on the intranet.

Diabetic keto-acidosis – Investigations chart – Use if BSPED chart not available

Name DOB Trust ID:

Date									
Time									
pH									
pCO_2									
Bicarb									
BE									
Na									
K									
Urea									
Creat									
Pl. Osm									
Corr Na									
Cap Gluc									
Lab Gluc									
Hb									
WBC									
N									
Plate									
Hct									
Blood Cult									
Urine Cult									
CRP									
TFTs									
Coeliac screen									
GAD65/IA2/ZnT8/Islet cell antibodies									
HbA1c									

Are research bloods taken? (if any)

Estimated Osmolality = 2(Na+K) + gluc + urea

Corrected Na = Actual Na + 0.3(gluc-5.5)