

Management of Diabetic Ketoacidosis (DKA) in children and Young People - Summary Clinical Guideline – Joint Derby and Burton

Aim and Purpose

To safely manage the care of children and young people in University Hospitals of Derby and Burton NHS Foundation Trust (both Derby and Burton sites) with diabetic ketoacidosis.

It would be **inappropriate to simply use a summary guideline for the safe management of DKA**. The full version of the guideline is required.

Introduction

These guidelines have been revised based upon guidance from the BSPED special interest group in diabetic ketoacidosis (Nov 2021), which itself was updated in light of NICE (Dec 2020) and UK resus council recommendations (May 2021).

For many aspects of the management of DKA the evidence base is limited and where there is limited evidence, consensus recommendations have been consolidated. These are general guidelines for management. Treatment may need modification to suit the individual patient and these guidelines do not remove the need for frequent detailed reassessments of the individual child's requirements and specific treatment tailored to those requirements.

The BSPED Integrated Care Pathway (with edits to incorporate local guidelines) is on [pages 18-34](#) of the full guideline. Please use this rather than printing the online version as that will not include our local variations. It is recommended that you print these and fill them out to aid management and documentation. **Please file this in the medical notes.**

Current BSPED guideline: <https://www.bsped.org.uk/clinical-resources/bsped-dka-guidelines>

Key points:

- 1) Where young people aged 16-18 years are managed by adult medical teams, it is considered appropriate for them to be managed using local adult guidelines that the teams are familiar with rather than using potentially unfamiliar paediatric guidelines. Where individuals aged 16-18 are managed by Paediatric teams the Paediatric guidelines should be followed.
- 2) The ISPAD **definition for DKA** with blood glucose >11mmol/l, acidosis with a bicarbonate of <15mmol/l or pH <7.3, and ketones of >3.0mmol/l has been adopted.
- 3) This guideline uses pH to categorise the severity of DKA and to determine the degree of dehydration.
 - Mild DKA – venous pH 7.2- 7.29 (or bicarbonate 10.1 - 15mmol/l). Assume 5% dehydration
 - Moderate DKA – venous pH 7.1-7.19 (or bicarbonate 5.1 - 10mmol/l). Assume 5% dehydration
 - Severe DKA – venous pH less than 7.1 (or bicarbonate < 5mmol/l). Assume 10% dehydration
- 4) **Careful management of fluid administration remains an important part of the management of diabetic ketoacidosis** because of the risk of cerebral oedema but

there is increased emphasis on the importance of treating shock and restoring appropriate circulatory volume:

- Patients presenting with **shock** should receive a **10 ml/kg bolus of 0.9% saline over 15 minutes** as soon as possible. Shock is defined as the APLS definition of tachycardia, prolonged central capillary refill, low volume peripheral pulses and hypotension (though this is a late sign of shock). Note poor peripheral perfusion with prolonged peripheral capillary refill, tachycardia and tachypnoea are common in moderate to severe DKA as signs of vasoconstriction due to metabolic acidosis and hypocapnia and would not be considered as shock. Following the initial 10 ml/kg bolus patients should be reassessed and further boluses of 10 ml/kg after discussion with the responsible senior paediatrician may be given if required to restore adequate circulation up to a total of 40 ml/kg at which stage inotropes should be considered. Boluses given to treat shock should NOT be subtracted from the calculated fluid deficit.
 - All patients with DKA (mild, moderate or severe) in whom intravenous fluids are felt to be indicated, even if **not shocked**, should receive an initial **10 ml/kg bolus of 0.9% saline over 30 minutes**. This bolus SHOULD be subtracted from the calculated fluid deficit.
- 5) The calculation of maintenance fluids should be based on the traditional formula used in paediatrics in the UK: 100 ml/kg/day for the first 10 kg body weight, plus 50 ml/kg/day for 10 to 20 kg and 20 ml/kg/day for each additional kilogram above 20 kg.
 - 6) A maximum weight of 75kg should be used for the calculation of fluid replacement and deficit as this ensures that excessive volumes of fluids are not given
 - 7) For insulin infusion we use **0.1 units/kg/hour for children aged 5 and above** in both Derby and Burton, and in **children younger than 5 years we recommend 0.05units/kg/hr** (consensus recommendation) to reduce the incidence of hypoglycaemia. The dose can be increased to 0.1units/kg/hour if acidosis is not resolving.
 - 8) Where **potassium** is above the upper limit of the normal range at presentation it is recommended that potassium is only added to Intravenous fluids after the patient has passed urine or until after the potassium has fallen to within the upper limit of the normal range
 - 9) In patients already on **long acting insulin** this should be continued and in new patients, consideration should be given to starting long acting subcutaneous insulin alongside intravenous insulin.