NHS
Greater Glasgow and Clyde

CLINICAL GUIDELINE

Diabetes, Management of Acute Diabetic Ketoacidosis

A guideline is intended to assist healthcare professionals in the choice of disease-specific treatments.

Clinical judgement should be exercised on the applicability of any guideline, influenced by individual patient characteristics. Clinicians should be mindful of the potential for harmful polypharmacy and increased susceptibility to adverse drug reactions in patients with multiple morbidities or frailty.

If, after discussion with the patient or carer, there are good reasons for not following a guideline, it is good practice to record these and communicate them to others involved in the care of the patient.

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Lead Author:	Steve Cleland
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Important Note:

The Intranet version of this document is the only version that is maintained.
Any printed copies should therefore be viewed as 'Uncontrolled' and as such, may not necessarily contain the latest updates and amendments.

MANAGEMENT OF ACUTE DIABETIC KETOACIDOSIS

Below is a link to the care pathway for the management of diabetic ketoacidosis in adults. Specific guidelines exist for the management of DKA in children.

MANAGEMENT OF DIABETIC KETOACIDOSIS (DKA)

Diagnosis – severe uncontrolled diabetes with:

1. Hyperglycaemia (blood glucose > 14mmol/l, usually but not exclusively);
2. Metabolic Acidosis (H^+ >45mEq/L or HCO_3^- <18 mmol/L or pH <7.3 on venous gases);
3. Ketonaemia (>3.0 mmol/l) /ketonuria (>++).

SEVERITY CRITERIA

One or more of the following may indicate severe DKA and should be considered for level 2 care (MHDU if available). It may also be necessary to consider a surgical cause for the deterioration.

1. Blood ketones over 6mmol/L
2. Bicarbonate level below 5mmol/L
3. Venous/arterial pH below 7.1
4. Hypokalaemia on admission (under 3.5mmol/L)
5. GCS less than 12 or abnormal AVPU scale
6. Oxygen saturation below 92% on air (assuming normal baseline respiratory function)
7. Systolic BP below 90mmHg, Pulse over 100 or below 60bpm
8. Anion gap above 16 [Anion Gap = (Na+ + K+) – (Cl- + HCO3-)]
9. Cerebral Oedema

CARE PATHWAYS

The protocol for the emergency management of DKA should be used for all eligible patients (for paediatric DKA management guidance go to https://www.bsped.org.uk/clinical-resources/bsped-dka-guidelines/ With the protocol the care pathways for 0 – 4 hours and 4 hours – discharge should be completed for each DKA episode. These provide instruction on fluid balance, insulin and potassium replacement. Please note there are DKA order sets on trakcare (DKA baseline and DKA continuing care).

The DKA care pathway (Care pathway 0 – 4 hours and 4hrs to discharge) is available online at:

https://www.nhsggc.org.uk/media/260549/dkap1_revised4-sl2.pdf

In patients aged 13-16 years presenting with DKA, the management of DKA should be discussed with relevant paediatric staff.

Supplementary notes as per Care Pathway 0–4 hours

1. **Continue background subcutaneous insulin** (glargine, levemir, degludec, isophane insulin) while on fixed rate intravenous insulin. Stop CSII infusion pump in DKA. Do not re-start CSII without specialist diabetic input.

2. **Guidance on bicarbonate:** Do not use bicarbonate.
3. **Potassium replacement:** administer at rate <20mmol/hour of KCl.
4. **WBC count:** This is often raised in DKA. Only give antibiotics if there is clear evidence of infection.
5. **Blood glucose >14mmol/L:** If this rises >14mmol/L do not stop glucose, adjust insulin to maintain level between 9–14mmol/L. See guidance above regarding insulin dose adjustment. *Do not stop glucose once started.*
6. **Signs of cerebral oedema:** Children and adolescents are at the highest risk. Consider if headaches, or reduced conscious level. Monitoring for signs of cerebral oedema should start from the time of admission and should continue until up to at least 12 hours after admission. If there is a suspicion of cerebral oedema or the patient is not improving as expected, within 4 hours of admission, call the consultant. Consider ITU (check arterial blood gases). Administer:
    1. **Mannitol IV (100ml of 20% over 20 minutes) or dexamethasone IV 8mg (discuss with consultant)** and undertake CT scan to confirm findings.
7. **Laboratory blood glucose testing:** It is reasonable to use a point-of-care blood glucose meter to monitor BG level if the previous laboratory BG value is <20mmol/L.
8. **Insulin management:** Insulin should be prescribed, beginning at 6units/hour. Rate will generally be reduced with time depending on clinical circumstances, presence of long-acting insulin and to avoid a fall of >5mmol/L per hour as rapid falls in blood glucose may be associated with cerebral oedema.
9. **Assessment of response to insulin:** Sensitivity to insulin can vary markedly with time and between patients. If BG level is not falling, **always** check pump devices, IV lines and IV cannulae to ensure patients are getting prescribed insulin dose. Consider other causes that could be contributing: sepsis, steroid therapy, obesity or liver disease. Higher doses of insulin are needed in adolescents, patients taking >1 unit/kg in the basal state.
10. **In patients with kidney failure or heart failure, as well as the elderly and adolescents**, the rate and volume of fluid replacement may need to be modified.
    1. For patients with kidney disease please discuss fluid replacement regimen with renal on call.
    2. For adolescents management of DKA to be discussed with relevant paediatric staff

Supplementary notes as per Care Pathway 4 hours – discharge

1. **Consider precipitating factors:**
    - Common causes include – omissions of insulin, infection, newly diagnosed diabetes, myocardial infarction or a combination of these factors.
    - Some or all of the following may have contributed to the DKA episode – errors in insulin administration, faulty equipment, practical problems.
2. **Refer for specialist diabetes review:** Whenever possible, all patients should be notified to the diabetes team within 12 hours of admission. When the clinical condition has stabilised, consider the educational and emotional needs of the patient and carers.

Ensure insulin is prescribed before patient leaves hospital. This must include the specific type of insulin, dose and appropriate device.