

Guidelines for the Emergency Management of Diabetic Ketoacidosis

(This chart relates to patients over 17 years only)

Name:

Date of Birth: DD / MM / YYYY

MRN Number:

NHS Number:

(OR AFFIX HOSPITAL LABEL HERE)

Please consider discussing with dcc if:

pH <7.0, capillary ketones > 6mmol/L, bicarbonate <5 mmol/L, anion gap >16, GCS <12, age <17 or >75, Na <120 mmol/L, K < 3.5 mmol/L, septic, hypotensive, evidence of organ failure (heart/renal/liver), acute cardiac event, and/or persistent brady/tachycardia

| Diagnosis | Result | Investigations |
|--|--------|--|
| Capillary Blood Glucose >11 mmol/L | | VBG (Do ABG IF sats <90%) <input type="checkbox"/> CXR <input type="checkbox"/> |
| Venous pH: < 7.3 | | FBC, CRP <input type="checkbox"/> MSU <input type="checkbox"/> |
| Venous HCO3: < 15mmol/L | | U&Es, HCO3, CRP <input type="checkbox"/> Blood cultures <input type="checkbox"/> |
| Ketones: capillary ketones > 3 mmol/L (Refer to Ketone protocol A0357) | | Troponin T <input type="checkbox"/> ECG <input type="checkbox"/> |

Insulin infusion (to treat the acidosis and not for glycaemic control)

- Continue long-acting insulin e.g. Lantus (Glargine), Abasagar (Glargine), Semglee (Glargine), Levemir (Detemir), Tresiba (Degludec), Toujeo (Glargine U300)
- Suspend rapid acting and mixed insulins while on iv insulin.
- For a patient presenting with a new diagnosis of T1DM commence Glargine 0.25 units/kg once daily alongside IV insulin
- Start fixed rate insulin infusion (FRII) at 0.1 units.kg/hour
- Once glucose <14 mmol/L ADD a 10% dextrose infusion AND consider reducing rate of FRII to 0.05 units/kg/hour
- Once pH >7.3, bicarbonate >18 mmol/L and capillary ketones <0.6 mmol/L switch to variable rate IV insulin infusion
- STOP SGLT2-i ("gliflozins") and **DO NOT RESTART**

| IV fluid regimen | | | | Potassium | | | | | | | | |
|---|---|------------|-----------|---|------------------|---------|------------|---|----------------|----------|------------|-----|
| For resuscitation | | | | 1. In general, if serum potassium is <5.5 and patient is passing urine add 40mmol KCl to 1L 0.9% normal saline 2. Note maximum rate of KCl delivery outside of DCC setting is 10mmol/hr; 20mmol KCl can be added to 1L 0.9% NaCl being infused over 2 hours 3. A patient with renal failure who is not passing urine may not need potassium replacement | | | | | | | | |
| Bag | Fluid | Rate | Potassium | | | | | | | | | |
| 1 | 0.9% Saline | 60mins | None | | | | | | | | | |
| 2 | 0.9% Saline | 2 hours | As per K+ | | | | | | | | | |
| 3 | 0.9% Saline | 2-4 hours* | As per K+ | | | | | | | | | |
| 4 | 0.9% Saline | 4 hours* | As per K+ | | | | | | | | | |
| 5 | 0.9% Saline | 6 hours* | As per K+ | | | | | | | | | |
| *According to response, caution in 17-25 yr olds, elderly, pregnant, heart or renal failure To maintain blood sugar while still acidotic 10% Dextrose when Capillary Blood Glucose <14 mmol/L @100ml/hr initially. For euglycaemic DKA start 10% dextrose at 125ml/hr If glucose levels continue to drop despite 10% dextrose reduce IV insulin to 0.05 units/hr | | | | <table border="1"> <thead> <tr> <th>Plasma Potassium</th> <th>Add KCl</th> </tr> </thead> <tbody> <tr> <td><3.5mmol/L</td> <td>40mmol/L and senior review as additional K+ may be required</td> </tr> <tr> <td>3.5- 5.5mmol/L</td> <td>40mmol/L</td> </tr> <tr> <td>>5.5mmol/L</td> <td>Nil</td> </tr> </tbody> </table> | Plasma Potassium | Add KCl | <3.5mmol/L | 40mmol/L and senior review as additional K+ may be required | 3.5- 5.5mmol/L | 40mmol/L | >5.5mmol/L | Nil |
| Plasma Potassium | Add KCl | | | | | | | | | | | |
| <3.5mmol/L | 40mmol/L and senior review as additional K+ may be required | | | | | | | | | | | |
| 3.5- 5.5mmol/L | 40mmol/L | | | | | | | | | | | |
| >5.5mmol/L | Nil | | | | | | | | | | | |
| Bicarbonate (SpR/Consultant only) HDU/ ITU Only Generally NOT indicated, only consider if pH remains low and inotropes required 250- 500ml 1.26% of bicarbonate over 4 hours | | | | | | | | | | | | |

| Other issues | Monitoring |
|--|---|
| You may need to consider another fluid regime if electrolytes imbalanced Consider CVP line if poor LV or renal function Urinary catheter NG tube if drowsy/vomiting Treat any precipitating event LMW heparin (prophylactic dose) - as per current Trust guideline Oxygen If in doubt ask for senior review | See page 2 for suggested biochemical review regime Hourly pulse / BP / Blood Glucose / Urine output Check Capillary Ketones 1-2 hourly Document results and clinical review in hospital notes as well as on proforma |

Inform the Diabetes Team of admission via the E-Referral System

| Monitoring for Diabetic Ketoacidosis | | | | | | | | |
|--------------------------------------|---|--------|---------|---------|---------|----------|----------|----------|
| Time | 0 | 1 hour | 2 hours | 4 hours | 6 hours | 12 hours | 18 hours | 24 hours |
| Actual time | | | | | | | | |
| Glucose (Lab) mmol/L | | | | | | | | |
| Sodium mmol/L | | | | | | | | |
| Potassium mmol/L | | | | | | | | |
| Urea mmol/L | | | | | | | | |
| Creatinine μ mol/L | | | | | | | | |
| pH (Venous) | | | | | | | | |
| HCO ₃ mmol/L | | | | | | | | |
| Capillary Ketones mmol/L | | | | | | | | |
| Signature (doctor) | | | | | | | | |
| Print name | | | | | | | | |

| Aim | After recovery |
|--|---|
| <ul style="list-style-type: none"> Glucose decreasing by 3 mmol/L/hour Ketones reducing by 0.5 mmol/L/hour Bicarbonate increasing by 3 mmol/L/hour | |
| <p>If no improvement in blood glucose or pH/HCO₃ / ketones, check:</p> <ul style="list-style-type: none"> patency of cannula pump operation insulin addition laboratory glucose <p>If all above satisfactory then increase insulin infusion rate by 1- 2 units/ hour AND Discuss with registrar or consultant</p> | <ul style="list-style-type: none"> Transfer to s/c insulin when patient able to eat plus blood ketones <0.6 mmol/L, and pH >7.3 If patient unable to eat and not in DKA switch to variable rate insulin infusion Stop IV insulin ONLY at a mealtime 30 minutes after s/c injection of rapid acting insulin has been given; basal insulin must also have been administered in past 24 hours. DO NOT STOP IV INSULIN UNLESS ALL THESE CRITERIA ARE MET <p>Refer all these patients to the Diabetes Team for education and review via Trust e-referral system.</p> |

Intravenous Insulin for Diabetic Ketoacidosis Prescription Chart

Stage 1:

| Continue long acting s/c insulin | | Record of syringes given | | |
|---|---------------------|--------------------------|---------|--------------------------|
| Insulin prescription | | Date | Time | Signature and print name |
| 50 units of ACTRAPID drawn up using an insulin syringe made up to 50mL with 0.9% sodium chloride and infused intravenously via 50mL syringe driver. Run the insulin and dextrose infusions through the same cannula using a Vygon extension set (code 832.04) | | DD / MM / YYYY | 00 : 00 | |
| | | DD / MM / YYYY | 00 : 00 | |
| | | DD / MM / YYYY | 00 : 00 | |
| Doctor signature | Print name | DD / MM / YYYY | 00 : 00 | |
| Bleep | Date DD / MM / YYYY | DD / MM / YYYY | 00 : 00 | |

| Suggested Regime for IV Fixed Rate Insulin (not for use in children under the age of 17 years). | | | |
|---|----------------|-----------|-------|
| Fixed Dose Insulin Regime 0.1 units/ Kg/ Hr | | | |
| Date | | | |
| Weight | | | |
| To commence | Units per hour | Signature | Bleep |
| | | | |
| Use this fixed rate insulin dose until: _____ | | | |
| Capillary Ketones < 0.6 mmol/L, pH > 7.3 | | | |
| At this stage transfer to usual insulin or variable rate insulin infusion. | | | |
| Patients with Type 1 Diabetes always need some insulin – the insulin infusion must never be stopped without giving subcutaneous insulin. | | | |

| Date | Fluid | Vol.(mL) | Route of admin. | Duration of admin. | Signature | Serial no. | Time | Given by |
|----------------|----------|-----------|-----------------|--------------------|-----------|------------|---------|------------|
| | Additive | Dose (mg) | | | | Batch no. | | Checked by |
| DD / MM / YYYY | | | | | | | 00 : 00 | |
| | | | | | | | | |
| DD / MM / YYYY | | | | | | | 00 : 00 | |
| | | | | | | | | |
| DD / MM / YYYY | | | | | | | 00 : 00 | |
| | | | | | | | | |
| DD / MM / YYYY | | | | | | | 00 : 00 | |
| | | | | | | | | |

NB: Change to 10% dextrose when Blood Glucose less than 15mmols and still acidotic if still requiring fluid resuscitation, patient may require simultaneous saline and dextrose infusions. Monitor fluid balance carefully.

| Date | | 00-01 | 01-02 | 02-03 | 03-04 | 04-05 | 05-06 | 06-07 | 07-08 | 08-09 | 09-10 | 10-11 | 11-12 | 12-13 | 13-14 | 14-15 | 15-16 | 16-17 | 17-18 | 18-19 | 19-20 | 20-21 | 21-22 | 22-23 | 23-24 | Total |
|------|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Blood Glucose (mmol/L) | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Units of insulin/hour | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Syringe Volume | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Ketones | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Initials | | | | | | | | | | | | | | | | | | | | | | | | | |

NB: *indicates total units of insulin in 24 hours

| Date | | 00-01 | 01-02 | 02-03 | 03-04 | 04-05 | 05-06 | 06-07 | 07-08 | 08-09 | 09-10 | 10-11 | 11-12 | 12-13 | 13-14 | 14-15 | 15-16 | 16-17 | 17-18 | 18-19 | 19-20 | 20-21 | 21-22 | 22-23 | 23-24 | Total |
|------|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Blood Glucose (mmol/L) | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Units of insulin/hour | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Syringe Volume | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Ketones | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Initials | | | | | | | | | | | | | | | | | | | | | | | | | |

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|------|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Blood Glucose (mmol/L) | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Units of insulin/hour | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Syringe Volume | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Ketones | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Initials | | | | | | | | | | | | | | | | | | | | | | | | | |

NB: *indicates total units of insulin in 24 hours