# Diabetic ketoacidosis care pathway 1

NHS SCOTLAND

Time of Arrival:_____
Location: _____
Date: _____

NAME: *Affix label*

## 0-4 hours Emergency Management

**Ideally patients with DKA should be managed in a MHDU setting**

**Aim:** To improve the acute management of diabetic ketoacidosis in adults aged 16 years and over within the first 4 hours of presentation (for paediatric management go to **www.bsped.org.uk** )

**Definition:** Severe uncontrolled diabetes with: a) ketonaemia/ketonuria b) metabolic acidosis c) usually with hyperglycaemia

**Severe DKA = pH <7.1 or HCO3 <5mmol/L or H+ > 80mEq/L**

**Consultant/Senior physician should be called immediately if:**

- Cerebral Oedema
- Hypokalaemia on admission
- Severe DKA
- Reduced conscious level

| **1. Immediate actions** | ✔ |
|---|---|
| Confirm diagnosis H+ > 45 or HCO3 < 18 or pH < 7.3 on **venous gases** | |
| Check U&Es and laboratory Blood Glucose | |
| Check urine or blood ketones | |
| Confirm patient ≥ 16 years | |
| Record time of arrival | |

| **2. Management 0-60 mins** | |
|---|---|
| Commence iv 1L Sodium Chloride 0.9% over 1 hour within 30 mins of admission | |
| Time and sign fluid commencement (on reverse) | |
| Commence soluble insulin IV 6 units/hour within 30 mins of admission | |
| Time and sign start of insulin (on reverse) | |
| Record SEWS/MEWS/SIRS score | |

| **Other interventions to be considered (tick box if performed)** | | | ✔ |
|---|---|---|---|
| Review ECG or cardiac monitor | | Blood cultures | |
| Record GCS score | | Central line | |
| Insert catheter if oliguric | | Chest Xray | |
| MSSU | | DVT prophylaxis | |
| If protracted vomiting insert NG tube | | **If deteriorating, consultant or senior physician called** | |

| **3. Ongoing Management 1-4 hours** | | | | | | | ✔ |
|---|---|---|---|---|---|---|---|
| Record: SEWS/MEWS/SIRS | | ECG | | GCS | | | |
| Time and sign ongoing Sodium Chloride 0.9% replacement (on reverse) | | | | | | | |
| 1L Sodium Chloride 0.9% hour 2 + KCL | | | | | | | |
| 500mls/hour for hours 3-4 + KCL | | | | | | | |
| Review $K^+$ result – admission or most recent result<br>Prescribe KCl in 500 ml Sodium Chloride 0.9% bag as:<br>None if anuric or $K^+$ > 5 mmol/L<br>10 mmol if level 3.5-5 mmol/L<br>20 mmol if level <3.5 mmol/L | | | | | | | |
| Check finger prick Blood Glucose hourly | 1hr | | 2hrs | | 3hrs | 4hrs | |
| Lab Glucose, U&Es and HC03 at: | | | 2hrs | | | 4hrs | |

(tick box if measured)

| **If Blood Glucose falls to ≤ 14 mol/L in first 4 hours** | |
|---|---|
| Commence Glucose 10% 500mls with 20 mmol KCl at 100ml/hour | |
| Continue Sodium Chloride 0.9% at 400mls/hour + KCL (as per K+ table above) until end of hour 4 | |
| Reduce insulin to 3 units/hour | |
| Maintain Blood Glucose >9 mmol/L and ≤14 mmol/L adjusting insulin rate as necessary | |
| If Blood Glucose <9mmol/L adjust insulin to maintain level >9mmol/L and <14mmol/L | |
| If Blood Glucose >14mmol/L see supplementary note | |
| Progress on to second DKA Care Bundle “4 hours to discharge” | |

## Fluid (potassium) prescription sheet

| | DATE | FLUID<br><br>POTASSIUM | Vol (ml)<br><br>Dose (mmol) | Duration | Signature | Serial No<br>Batch No | Time begun | Given by |
|---|---|---|---|---|---|---|---|---|
| A | | Sodium Chloride 0.9% | 500ml | 30mins | | | | |
| B | | Sodium Chloride 0.9% | 500ml | 30mins | | | | |
| C | | Sodium Chloride 0.9% | 500ml | 30mins | | | | |
| D | | Sodium Chloride 0.9% | 500ml | 30mins | | | | |
| E | | Sodium Chloride 0.9% | 500ml | 60mins | | | | |
| F | | Sodium Chloride 0.9% | 500ml | 60mins | | | | |
| G | | | | | | | | |
| H | | | | | | | | |

## Once Blood Glucose <14mmol start Glucose 10% in addition to Sodium Chloride 0.9%

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| I | | Glucose 10% | 500ml | 5 hours | | | | |
| | | KCL 20 mmol | | | | | | |
| J | | Glucose 10% | 500ml | 5 hours | | | | |
| | | KCL 20 mmol | | | | | | |
| K | | | | | | | | |

## Intravenous Insulin Prescription

| DATE<br>TIME | INSULIN RATE<br>(units/hr) | TYPE OF INSULIN | SIGNATURE | GIVEN BY |
|---|---|---|---|---|
| | 6units/hour when<br>Blood Glucose >14 mmol/L | | | |
| | 3units/hour when<br>Blood Glucose ≤14 mmol/L | | | |
| | | | | |
| | | | | |
| | | | | |

## Supplementary notes

1. **Guidance on bicarbonate**
   Do not use bicarbonate.
2. **Potassium Replacement**
   KCL should not normally be administered at a rate of greater than 20mmol/hour
3. **WBC Count**
   The WBC count is often raised in DKA and antibiotics should only be administered if there is clear evidence of infection.
4. **Blood Glucose >14 mmol/L**
   If Blood Glucose rises >14mmol/L do not stop glucose, adjust insulin to maintain level between 9 and 14 mmol/L
5. **Signs of Cerebral Oedema**
   Children and adolescents are at the highest risk of cerebral oedema. Consider if:

- Headaches
- 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
- Administer IV mannitol (100mls of 20% over 20 minutes) or dexamethasone 8mg (discuss with Consultant)
- Undertake CT scan to confirm findings;
- Consider ITU (check arterial blood gases)
- If there is a suspicion of cerebral oedema or the patient is not improving as expected /within 4 hours of admission, call Consultant.

6. **Laboratory Blood Glucose Testing**
   It is reasonable to use a point-of-care blood glucose meter to monitor blood glucose level if the previous laboratory blood glucose value is less than 20 mmol/L .
7. **Insulin Management**
   Insulin should be prescribed, beginning at 6 units/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.

**Do not stop glucose once started**

**Pathway for Management of DKA in Aberdeen Royal Infirmary Updated May 2022**

Patients diagnosed with DKA – as per the guidance in the DKA pathways documents, should have treatment initiated immediately at their point of entry to the hospital ie ED or AMIA. Patients will then be transferred to another medical ward. All patients should have adequate IV access established prior to transfer.

The following gives guidance on which location patients should be admitted to. However at times of severe shortages of beds in Critical Care or ward 105 or ward closures patients may need to be transferred to other locations but **this should only happen after discussion with the consultants on-call for Critical Care and Diabetes** (24/7 see Rota watch).

- Patients with mild DKA should be admitted to ward 105
- Patients with severe DKA should be admitted to Critical Care as they require closer monitoring.
- Patients with mild DKA but with other acute illness or serious co-morbidities (eg Heart Failure, End Stage / Dialysis dependent renal failure) may require closer monitoring and should be discussed with Critical Care.

**A Guide for the Assessment of Severity of DKA**

The presence of one or more of the following may indicate severe DKA:

- Blood ketones over 6mmol/L
- Bicarbonate level below 5mmol/L
- Venous/arterial pH below 7.1
- Hypokalaemia on admission (under 3.5mmol/L)
- GCS less than 12
- Oxygen saturation below 92% on air (assuming normal baseline respiratory function)
- Systolic BP below 90mmHg
- Pulse over 100 or below 60bpm

*However* patients who are clinically very well i.e. normal BP, pulse, oxygen sats and GCS and not vomiting may be managed in ward 105 if pH between 7 and 7.1.

The guidance only applies to adults over the age of 16 years. Under the age of 16 years the paediatric protocol should be used (www.bsped.org.uk). Young people over the age of 16 but who are not fully developed (completed puberty) should be discussed with senior staff and using the paediatric protocol in HDU considered.

**Assessment of improvement of DKA**

Response to treatment in the first hour can be assessed by monitoring the rise in bicarbonate. A rise of less than 3 mmol/l or a fall in bicarbonate or a deterioration in clinical indicators may require a patient to be transferred to Critical Care for further monitoring once simple factors such as patency of lines etc has been assessed. This should be discussed with the on-call team for Critical Care and Diabetes.

**Stepdown of patients to ward 105**

Patients can be *considered* for step down to ward 105 after 4 hours if they no longer meet the criteria for severe DKA, are clinically improving and clinically appropriate. Patients with other acute co-morbidities may not be appropriate for ward 105.

**PLEASE NOTE THAT THE ABOVE IS FOR GUIDANCE BUT ANY DEVIATION FROM THIS GUIDANCE MUST BE DISCUSSED WITH THE CRITICAL CARE AND DIABETES CONSULTANTS ON-CALL.**