

# Diabetic ketoacidosis care bundle 1

Time of Arrival: \_\_\_\_\_ NAME: *Affix label*  
 Location: \_\_\_\_\_  
 Date: \_\_\_\_\_

## 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](http://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 HCO<sub>3</sub> <5mmol/L or H<sup>+</sup> > 80mEq/L**

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

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

### 1. Immediate actions

Confirm diagnosis H <sup>+</sup> > 45 or HCO <sub>3</sub> < 18 or pH < 7.3 on <b>venous gases</b>	
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	<input type="checkbox"/>	Blood cultures	<input type="checkbox"/>
Record GCS score	<input type="checkbox"/>	Central line	<input type="checkbox"/>
Insert catheter if oliguric	<input type="checkbox"/>	Chest Xray	<input type="checkbox"/>
MSSU	<input type="checkbox"/>	DVT prophylaxis	<input type="checkbox"/>
If protracted vomiting insert NG tube	<input type="checkbox"/>	<b>If deteriorating, consultant or senior physician called</b>	<input type="checkbox"/>

### 3. Ongoing Management 1-4 hours

Record: SEWS/MEWS/SIRS	<input type="checkbox"/>	ECG	<input type="checkbox"/>	GCS	<input type="checkbox"/>	
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 <sup>+</sup> result						
Prescribe KCl in 500 ml Sodium chloride 0.9% bag as:						
None if anuric						
10 mmol if level 3.5-5 mmol/L						
20 mmol if level <3.5 mmol/L (tick box if measured)						
Check finger prick Blood Glucose hourly	1hr	<input type="checkbox"/>	2hrs	<input type="checkbox"/>	3hrs	<input type="checkbox"/>
Lab Glucose, U&Es and HC03 at:	2hrs		<input type="checkbox"/>	4hrs		<input type="checkbox"/>

### If Blood Glucose falls to ≤ 14 mol/L in first 4 hours

Commence 10% Glucose 500mls with 20 mmol KCl at 100ml/hour	
Continue Sodium chloride 0.9% at 400mls/hour + KCL (as per K <sup>+</sup> 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 POTASSIUM	Vol (ml) Dose (mmol)	Duration	Signature	Serial No 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%

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

## Intravenous Insulin Prescription

DATE TIME	INSULIN RATE (units/hr)	TYPE OF INSULIN	SIGNATURE	GIVEN BY
	6units/hour when Blood Glucose >14 mmol/L			
	3units/hour when 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 (an indication for checking 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 as rapid falls in Blood Glucose may be associated with cerebral oedema.

**Do not stop glucose once started**

# Diabetic ketoacidosis care bundle 2

## 4 hours to discharge

Time bundle started: \_\_\_\_\_ NAME: *Affix label*  
 Location: \_\_\_\_\_  
 Date: \_\_\_\_\_

**Whenever possible, all patients should be notified to the diabetes team within 12 hours of admission**

**Aim:** To improve management of diabetic ketoacidosis in adults aged 16 years and over more than 4 hours after presentation

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

### Subsequent Management ✓

Review Blood Glucose results and U&Es	
Prescribe usual long acting insulin SC if relevant along with iv insulin (Detemir, Glargine, Insulatard Humulin I etc) at patient's usual times	
Continue Sodium chloride 0.9% + KCl at 250 mls/hr until BG <14 mmol/L	

### When Blood Glucose falls <14 mmol/L (If not fallen in first 4 hours)

<ul style="list-style-type: none"> <li>Commence 10% Glucose with 20 mmol KCl 100ml/hour</li> <li>Reduce Sodium chloride 0.9% to 150mls/hour + KCL (according to K+ table below)</li> <li>Reduce insulin to 3 units/hour</li> <li>Maintain Blood Glucose &gt;9 mmol/L and ≤14 mmol/L adjusting insulin rate as necessary</li> </ul>	
Review U&Es	
Review K+ result and replace KCl in 500 ml 0.9% Saline bag as: <ul style="list-style-type: none"> <li>None if anuric</li> <li>10 mmol if level 3.5-5 mmol/L</li> <li>20 mmol if level &lt;3.5 mmol/L</li> </ul>	

Measure and record Lab glucose, U&Es and HCO<sub>3</sub> 4 hourly for 24 hours (Measure lab BG 2 hourly if BG>20mmol/l)

8  12  16  20  24

Convert back at next convenient meal time to usual sc insulin regimen when: <ul style="list-style-type: none"> <li>HCO<sub>3</sub> within normal reference range</li> <li>Patient eating normally</li> </ul> Stop iv fluids and iv insulin 30 mins after usual injection of pre-meal sc insulin	
Phone/refer for specialist diabetes review before discharge. If not available, ensure specialist team receives a copy of the discharge summary	
Do not discharge until HCO <sub>3</sub> normal, established on usual sc regimen and eating normally	

### If Blood Glucose rises >14 mmol/L after glucose commenced ✓

<ul style="list-style-type: none"> <li>Continue 10% Glucose with 20mmol KCL at 100ml/hour</li> <li>Continue Sodium chloride 0.9% at 150mls/hour + KCL to 150mls/hour</li> <li>Increase insulin to maintain Blood Glucose &gt; 9 mmol/L and ≤14 mmol/L</li> <li>When Blood Glucose ≤ 14mmol/L adjust insulin rate as necessary to maintain Blood Glucose &gt; 9 and ≤ 14 mmol/L</li> </ul>	
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### Good Clinical Practice

Record SEWS/MEWS/SIRS and GCS score. Finger prick Blood Glucose hourly	
Review other investigations	
If not improving at start of this bundle/after 4 hours: <ul style="list-style-type: none"> <li>Check that equipment is working</li> <li>Confirm venous access is secure</li> <li>Check non-return valve on pump</li> <li>Replace 50ml syringe with fresh saline &amp; insulin</li> <li>Call consultant/senior physician if all the above is working and patient still deteriorating</li> </ul>	

#### Supplementary Notes

**1. Continuation of Insulin** 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.

**2. Consider Precipitating Factors**

- Common causes include:
- Omissions of insulin
  - Infection
  - Newly diagnosed

- Myocardial infarction
- Combination of the above.
- Some or all of the following may have contributed to the DKA episode:
  - Errors in insulin administration
  - Faulty equipment
  - Practical problems.

**3. Refer for Specialist Diabetes review as soon as possible**

- For local diabetes Service:
- Insert No here \_\_\_\_\_

**Ensure insulin is prescribed before patient leaves hospital.**

