

Immediate Management of Diabetic Ketoacidosis

Confirm the diagnosis of diabetic ketoacidosis: ALL 3 MUST BE PRESENT

Ketonaemia 3 mmol/l and over or significant ketonuria (>2+ on standard urine sticks) *and*

Blood glucose >11 mmol/l or known diabetes mellitus *and*

Bicarbonate (HCO₃⁻) <15 mmol/l **and/or** venous pH <7.3

Assess severity

One or more of the following may indicate severe DKA - consider discussion with seniors and involvement of critical care:

- Blood ketones >6 mmol/l or bicarbonate level <5 mmol/l or venous/arterial pH <7.1
- Hypokalaemia on admission (under 3.5 mmol/l)
- GCS less than 12 or abnormal AVPU scale
- Oxygen saturation <92% on air (assuming normal baseline respiratory function)
- Systolic BP below 90 mmHg
- Pulse >100 or <60 bpm
- Anion gap above 16 (*Anion gap* = [Na⁺ + K⁺] - [Cl⁻ + HCO₃⁻])

0 to 60 minutes: Immediate management upon diagnosis

A) IV access and initial investigations	B) Restoration of circulating volume	C) Potassium replacement	D) Commence fixed rate IV insulin infusion (IVII)
<ul style="list-style-type: none"> • Rapid ABC • Large bore IVI and START FLUID REPLACEMENT (see B) • Assess vital signs (temp, BP, HR, sats) • GCS: a drowsy patient requires critical care input • Perform initial investigations: blood ketones, venous and capillary glucose, U&Es, venous blood gases, FBC, infection screen as indicated 	<p><i>SBP < 90mmHg</i> Likely due to low blood volume but consider other causes eg. sepsis Give 500ml 0.9% saline over 10-15 mins. May be repeated. If no improvement SEEK SENIOR ASSESSMENT. MAY NEED ITU.</p> <hr/> <p><i>SBP > 90mmHg</i> Typical regimen for 70kg fit adult 0.9% saline 1000ml over 1hr 0.9% saline with KCl over 2 hrs (x2) 0.9% saline with KCl over 4 hrs (x2) Reassess needs at 12 hours. Slower rates should be used in young adults, elderly, CCF</p>	<p>HYPOKALAEMIA AND HYPERKALAEMIA ARE LIFE THREATENING AND COMMON IN DKA.</p> <p><i>Be aware of potassium requirements for subsequent replacement. Check potassium levels as detailed on chart.</i></p> <p>If K > 5.5 mmol/l give no potassium If K 3.5 - 5.5 give 40mmol/l KCl If K < 3.5 seek senior review - higher infusion rates are indicated.</p>	<ul style="list-style-type: none"> • If weight not available, estimate (kg) • If pregnant, use present weight (seek senior advice) • Start fixed rate IVII via pump. Use predrawn syringe containing 50 units of soluble insulin in 50ml 0.9% saline. • Infuse at 0.1 units/kg/hr (eg. 7ml/hr if 70kg) • If patient usually takes Lantus or Levemir insulin, continue this at usual dose and time. • Insulin may be given in same line as IV fluid, providing a Y-connector with one-way, anti-siphon valve is used.

60 minutes to 6 hours: Metabolic and clinical review and stabilisation

A) Re-assess patient; monitor vital signs	B) Review metabolic parameters	C) Identify/treat precipitating factors
<ul style="list-style-type: none"> • Consider urinary catheter if anuric • Consider NG tube if obtunded or vomiting • If O₂ sats falling, perform arterial blood gases and request/repeat CXR • Regular obs and EWS charting as appropriate • Accurate fluid balance (minimum urine output 0.5ml/kg/hr) • Cardiac monitoring if DKA severe • Give LMWH as per NICE guidance (CG 9 Jan 2010) 	<ul style="list-style-type: none"> • Measure blood ketones and capillary glucose hourly • Review response to IVII by calculating rate of fall of ketone level hourly... • If ketones not falling by at least 0.5 mmol/l/hr increase IVII rate by 1 unit/hr until rate achieved; • If ketones not falling as expected, check pump, infusion tube, connections etc. • Measure venous blood gas pH, bicarbonate and potassium at 60 mins, 2 hrs and 2 hrly thereafter. Check appropriateness of potassium replacement hourly. • Continue fixed rate IVII until ketones < 0.3mmol/l, venous pH >7.3 and/or venous bicarbonate > 18mmol/l. • If glucose falls < 14mmol/l commence 10% glucose at 125ml/hr alongside 0.9% saline. 	<p>Review CXR, urinalysis and ECG and treat as appropriate.</p>

Please refer to Intranet/DKA Management sheet for full guideline. This contains advice on when to stop IV treatment and restart usual insulin.

Treatment of Acute Hypoglycaemia in Adults with Diabetes in Hospital

HYPOGLYCAEMIA IS DEFINED AS a blood glucose < 4.0 mmol/l.
 If blood glucose > 4.0 mmol/l but patient is symptomatic give a small carbohydrate snack for symptom relief.

MILD	MODERATE	SEVERE
Patient conscious, orientated and able to swallow.	Patient conscious but confused/ disorientated or aggressive and able to swallow safely.	Patient unconscious/fitting, very aggressive or nil by mouth.
<p>Give 25g of glucose (or 3-4 heaped teaspoons of sugar) in 150ml of water orally OR 200ml fruit juice.</p> <p>Repeat blood glucose after 10-15 minutes.</p> <p>Treatment can be repeated up to 3 times.</p> <p>If hypoglycaemia persists consider IN glucose 10% at 100ml/hr.</p>	<p>If patient able to swallow safely give 1-2 tubes of Glucogel.</p> <p>Repeat blood glucose after 10-15 minutes.</p> <p>Treatment can be repeated up to 3 times.</p> <p>If hypoglycaemia persists consider IN glucose 10% at 100ml/hr.</p>	<p>Check ABC, stop any IV insulin and fast bleep a doctor.</p> <p>If patient has IV access give 75-80ml glucose 20%. If no IV access available 1mg of glucagon can be given IM. (If patient has severe liver disease this should be avoided.)</p> <p>Repeat blood glucose after 10-15 minutes.</p> <p>Treatment can be repeated up to 3 times.</p> <p>If hypoglycaemia persists consider IN glucose 10% at 100ml/hr.</p> <p>Patient must be reviewed by a doctor.</p>
<p>Blood glucose should now be above 4 mmol/l. Give 20g of long acting carbohydrate eg. 2 biscuits or a slice of bread or next meal if it is due.</p> <p>For enterally fed patients only: Restart feed or give bolus feed as per feeding plan, or supplement intake with IV glucose 10% at 100ml/hr.</p>		
<p>DO NOT OMIT SUBSEQUENT DOSES OF INSULIN. Continue regular capillary monitoring for 24 to 48 hours and give hypo education or refer to DSN for advice. Medication review should be undertaken by medical team.</p>		
<p>For patients with renal impairment: Glucogel may be used for mild to moderate hypoglycaemic episodes. In severe cases of hypoglycaemia, 25ml of 50% glucose may be given directly into dialysis circuit.</p>		

Comprehensive documentation and the equipment and supplies needed to treat hypoglycaemia can be found in the “Hypo Box” in every clinical area.