

The Management of Hypoglycaemia (Hypos) for Adults

Blood glucose < 4mmol/L

Hypoglycaemia is the commonest side-effect and the most feared complication of insulin or sulphonylureas (e.g.glicazide or glibenclamide) therapy. The National Diabetes Inpatient Audit 2015/16 data shows 21.8% of inpatients with diabetes experience one or more hypoglycaemic episode during their hospital stay and this has been associated with increased length of hospital stay and mortality.¹ Thus regular testing of blood glucose and prompt treatment of hypoglycaemia episode when it occurs is essential.

Potential causes of Inpatient Hypoglycaemia¹

Medical issues	Reduced carbohydrate intake
<ul style="list-style-type: none"> • Inappropriate use of 'stat' or 'PRN' rapid/short acting insulin • Acute discontinuation of long term steroid therapy • Recovery from acute illness/stress • Mobilisation after illness • Major amputation of a limb • Incorrect type of insulin or oral hypoglycaemic therapy prescribed and administered • Inappropriately timed insulin or oral hypoglycaemic therapy in relation to meal or enteral feed • Change of insulin injection site • IV insulin infusion with or without glucose infusion • Inadequate mixing of intermediate acting or mixed insulins • Regular insulin doses or oral hypoglycaemia therapy being given in hospital when these are not routinely taken at home 	<ul style="list-style-type: none"> • Missed or delayed meals • Smaller carbohydrate portions than usual with no change in insulin dose • Change of the timing of the biggest meal with no change to insulin regime • Change in eating pattern including snacks • Prolonged starvation time e.g. 'Nil by Mouth', pre- op • Vomiting • Reduced appetite / food intake • New medications affecting hypoglycaemic awareness e.g. labetalol • Stress and anxiety of being in hospital

Symptoms: Patients normally experience symptoms when blood glucose is <4mmol/L namely **palpitations, sweating, shaking, hunger, confusion, drowsiness, speech difficulty, loss of consciousness, etc.** Although most patients will experience symptoms, some would have lost their early warning signs, it is therefore important to perform a blood glucose test (if measurement is difficult the treatment should not be delayed).

Treatment in a variety of clinical situations (See flow chart on page 4):

A. Patients who are conscious, orientated and able to swallow

1) Give 15-20g of quick acting carbohydrate of the patient's choice where possible. This gives a quick rise in blood glucose in 5-10 mins eg:

- 4 – 5 GlucoTABS[®] tablets*
- 60ml GlucoJuice[®] drink *
- 150 – 200 ml non diet coke
- 3 – 4 heaped teaspoons of sugar dissolved in water
- 3 – 4 jelly babies
- 4 – 5 wine gums
- 150 -200ml pure fruit juice e.g. Orange juice

* (Available in Hypo boxes stocked on the wards)

N.B. Patients following a low potassium diet (due to chronic kidney disease) should not use orange juice to treat hypoglycaemia.

N.B. Sugar dissolved in water is not an effective treatment for patients taking acarbose as it prevents the breakdown of sucrose to glucose.

- 2) Repeat capillary blood glucose measurement 10-15 minutes later. If blood glucose <4.0mmol/L, repeat step 1 up to 3 times.
- 3) If blood glucose remains <4.0mmol/L after 30 - 45 minutes (or 3 cycles), **contact a doctor**. Consider 1mg of glucagon IM (may be less effective in sulfonylurea induced hypos or patients under the influence of alcohol) or IV 10% glucose infusion at 150 – 200ml over 15 minutes.
- 4) Once blood glucose is above 4.0mmol/L and patient has recovered, give a long acting carbohydrate of patient's choice where possible to ensure the blood glucose levels do not drop again eg:-
 - 2 digestive biscuit or
 - 1 portion fruit or
 - 1 slice of bread (ideally multigrain or granary) or
 - Normal meal if due (must contain carbohydrate)

NB: If the hypo occurs just before meals ensure you treat first. If the blood glucose level is below 3mmol/L a larger dose of fast acting sugar may initially be needed e.g. 5 dextrose tablets. Also for those experiencing hypoglycaemic symptoms but have blood glucose level >4mmol/L, treat with a small carbohydrate snack only e.g. 1 medium banana or a slice of bread or normal meal if due ¹.

B. Patients who are conscious but confused, disorientated, unable to cooperate, aggressive but are able to swallow.

- 1) If patient is incapable and/or uncooperative, give 1.5-2 tubes Glucogel® squeezed into the mouth between the teeth and gums (ensure gag reflex is present). If this is ineffective give Glucagon 1mg IM (may be less effective in sulfonylurea induced hypos or patients under the influence of alcohol).
- 2) Repeat capillary blood glucose measurement 10-15 minutes later. If blood glucose <4.0mmol/L, repeat step 1 up to 3 times.
- 3) If blood glucose remains <4.0mmol/L after 30-45 minutes (or 3 cycles), **contact a doctor**. Consider IV 10% glucose infusion at 150 - 200ml over 15 minutes.
- 4) Once blood glucose is above 4.0mmol/L and patient has recovered, give a long acting carbohydrate as in **section A**.

C. Patients who are unconscious and/or having seizure and/or are very aggressive

- 1) Check: **Airway, Breathing, Circulation, Blood Glucose, GCS and Temperature**.
If patient has insulin infusion in situ, **stop immediately. Fast bleep a doctor**
- 2) Give Glucagon 1mg IM (may be less effective in patients prescribed sulfonylurea therapy/patients currently under the influence of alcohol) which may take up to 15 minutes to take effect. Glucagon mobilises glycogen from the liver and will be less effective in those who are chronically malnourished e.g. alcoholics, in starved patients with no glycogen stores or severe liver disease. In this situation or if prolonged treatment is required, IV glucose is better.
- 3) Repeat capillary blood glucose measurement 10-15 minutes later. If blood glucose <4.0mmol/L, and IV access is available, give 150 – 200ml of 10% glucose over 15 minutes. Repeat capillary blood glucose measurement 10 minutes later. If blood glucose still <4.0mmol/L, repeat treatment.
- 4) Once the blood glucose is greater than 4.0mmol/L and the patient has recovered give a long acting carbohydrate as in **section A**.

D. Patients who are conscious, orientated but 'Nil by Mouth'

If patient has insulin infusion regimen, adjust as per prescribed regimen, and seek medical advice.

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1). Options 2-3 in section **C** above are all appropriate treatment options.

2). Once blood glucose greater than 4.0mmol/L and patient has recovered consider 10% glucose at a rate of 100ml/hr until patient is no longer nil by mouth or has been reviewed by the doctor.

E. Patients requiring enteral feeding

Treatment – To be administered via feed tube only:

Do not administer these treatments via a TPN line

- 1) Give 15-20g of quick acting carbohydrate e.g.
 - 2 Glucogel tubes - not for use with fine bore NGT
 - 150 – 200ml Orange juice to provide 15 – 20 gm carbohydrate
 - 110 – 140 ml Fortijuce® (NOT Fortisip®) to give 15-20 g carbohydrate

N.B. All treatments should be followed by a water flush of the feeding tube to prevent tube blockage.

- 2) Alternatively
 - Give IM Glucagon injection (providing no severe hepatic disease or recurrent hypos)
 - If severe or recurrent hypoglycaemia and patient has IV access, give 10% Glucose at 100 ml/hour.
- 3) Repeat capillary blood glucose measurement 10-15 minutes later. If blood glucose still <4.0mmol/L, inform doctor, repeat step 1 or 2 and recheck in 10minutes
- 4) If blood glucose remains <4.0mmol/L after 25 minutes bleep a doctor, ensure IV access if not already done so and start IV 10% glucose infusion at 100ml/hour, increasing IV volume given as necessary, according to patient response.
- 5) Once blood glucose is above 4.0mmol/L and patient has recovered, give a long acting carbohydrate e.g.
 - Restart feed, if within 1 hour of usual feed start time
 - If bolus feeding, give additional bolus feed (read nutritional information and calculate amount required to give 15-20 g carbohydrate. Contact Dietitian, if required)
 - Give 10% IV glucose at 100 ml/hr.

For all patients:

- **DO NOT omit** insulin injection if due. However, dose review may be required.
- Review the insulin regimen and the insulin dose administered prior to the hypoglycaemic event.
- Document hypoglycaemic events in patient's notes.
- Ensure regular capillary blood glucose monitoring is continued for 24 to 48 hours.
- Educate on hypoglycaemia or refer to the Diabetes Specialist Nurse.
- If the hypoglycaemia was due to sulfonylurea or long acting insulin therapy then be aware that the risk of hypoglycaemia may persist for up to 24-36 hours following the last dose, especially if there is concurrent renal impairment.
- Patients given glucagon require a larger portion of long acting carbohydrate to replenish glycogen stores
- Where glucose infusion is required the volume should be determined by clinical circumstances

Reference

1. The Hospital Management of Hypoglycaemia in Adults with Diabetes Mellitus. JBDS, September 2013. Available at: <http://www.diabetes.org.uk/> Accessed: 02/06/2017.
2. BNF online, Available at: <https://bnf.nice.org.uk/> Accessed 02/06/2017.
3. National Diabetes Inpatient Audit 2015 Published 23 June 2016 by Health and Social Care Information Centre (HSCIC)
4. Guidelines for Management of Enterally Fed Adult patients with Diabetes CHUFT updated April 2016

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Blood glucose < 4mmol/L with or without symptoms

