MIL

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This Medicines Information Leaflet is produced locally to optimise the use of medicines by encouraging prescribing that is safe, clinically appropriate and cost-effective to the NHS.

The Management of Hypoglycaemia in Adults Attending Hospital

This MIL describes how adults attending OUH with hypoglycaemia (low blood glucose) should be managed, both those known to have Diabetes Mellitus (DM) and those not known to have DM who present unconscious.

Hypoglycaemia is a blood glucose concentration lower than normal (below 4.0mmol/L). In hospitalised patients with diabetes, the **suggested blood glucose concentration target is 6-10mmol/L, but 6-12mmol/L is acceptable**.

. Blood glucose targets are lower in pregnancy: an acceptable target for fasting blood glucose concentration is 3.5–5.3mmol/L in line with the OUH pregnancy guidelines. Hypoglycaemia in pregnancy should be treated if the blood glucose is lower than 3.0mmol/L, or if symptomatic with a blood glucose of 3.0-3.9mmol/L, for further guidance follow this link.

Hypoglycaemia is:

- classed as **"mild"** if the episode can be self-treated, and as **"severe"** if third party help is needed or if blood glucose concentrations are lower than 3mmol/L .
- common in people with diabetes on **insulin or sulphonylureas**, especially in those with **renal impairment** or in **older adults**.
- **common in hospital** due to the disruption to people's usual diet and treatment regimen, as well as concurrent illness.

Hypoglycaemia is a serious condition and **should be treated as an emergency** regardless of the level of consciousness. Hypoglycaemia **can be fatal**; it can also cause coma, hemiparesis and seizures. Prolonged hypoglycaemia can cause permanent neurological deficits.

Those patients with persistent hypoglycaemia despite rescue treatment should be investigated further as there may be another cause for this.

*Blood glucose below 4mmol/L in adults attending hospital must **always** be treated even if the person is asymptomatic (other than in pregnancy)*

Recognising hypoglycaemia

Signs and symptoms of hypoglycaemia include:

- Sweating
- Shaking
- Feeling of hunger
- Anxiety / irritability
- Palpitations
- Confusion / lack of concentration
- Seizures
- Incoordination
- Odd behaviour
- Speech difficulty
- Nausea
- Headache
- Drowsiness

Pseudohypoglycaemia: Patients with blood glucose concentrations which have been high for some time can experience symptoms of hypoglycaemia at blood glucoses above 4mmol/L. Symptoms of pseudohypoglycaemia only need to be treated if they are distressing to the patient. Consider a small carbohydrate snack (e.g., medium banana, slice of bread).

How to treat

Use the attached algorithm to guide the treatment of hypoglycaemia in all adult inpatients. A useful acronym to help guide treatment of hypoglycaemia is **STAR** (See link):

See: **Hypoglycaemia needs to be recognized.**

The lowest blood glucose concentration that is acceptable in a person with DM in hospital is 4mmol/L (see above target in PREGNANCY).

Treatment should be commenced without delay, regardless of whether the patient has symptoms, to return the blood glucose into the normal range.

Treat: **Treat hypoglycaemia orally whenever possible**. The first line oral treatment in the Trust is **one bottle (60 mls) of Lift®** (previoulsy known as Glucojuice®)

For IV treatment, use **75 mls 20% glucose infusion**. 50% glucose is **not** recommended unless very **severely** fluid restricted (e.g., dialysis) when 30 mL of 50% glucose IV may be requested by a Registrar or Consultant; extravasation of 50% glucose can cause tissue necrosis. Intramuscular glucagon is an effective and useful treatment option **if IV access is not available**. However it can only be used once in 24 hours. It has slower recovery and higher treatment failure so IV glucose is preferred. The use of IM glucagon has little or no effect in oral hypoglycaemic agent-induced hypoglycaemia, or if NBM, malnourished, under the influence of alcohol, severe liver disease or chronic hypoglycaemia.

Recurrent or persistent hypoglycaemia should be urgently reviewed

Assess: **Ensure treatment has been successful**

1. Capillary Blood Glucose (CBG) needs to be **rechecked after 15 minutes** and treatment repeated until blood glucose is 4 mmol/L or above. If hypoglycaemia persists after: three (oral or IV glucose) treatments, or after one dose of glucagon seek urgent medical review.

2. After initial successful treatment of hypoglycaemia, **CBGs** should be **monitored at**

3. **least hourly for 2 hours, then at least 4 hourly for the next 24 hours**. NB. This will need to be individualised depending upon the circumstances. E.g., if a patient has received a large overdose of a long-acting insulin, or renal function is impaired, more frequent monitoring may be required for a longer duration. Where an ultra long acting insulin e.g. Tresiba®, Toujeo® has contribuited to the hypoglycaemia, this effect can persist for **up to 72 hours**, therefore it is recommended to monitor CBG 4 hourly (including over night).

4. Identify likely **underlying cause for hypoglycaemia.**

   a) Glucose intake reduced/stopped but insulin therapy continued e.g., treatment not adjusted when enteral/parenteral feed stopped, when NBM or appetite reduced, insulin infusion administered without a glucose containing infusion alongside.

   b) Medication related

   - Be alert for **prescribing and/or administration problems** e.g., short-acting insulin or sulphonylurea written up or administered without food at non-meal times,

wrong dose of insulin prescribed, wrong insulin prescribed - please check with patient and GP.

- **Double and triple strength insulin pen devices** are available in the UK; ensure insulin has not been withdrawn from a pen or cartridge using an insulin syringe (this constitutes a **NEVER EVENT**).

- If a patient without diabetes becomes substantially hypoglycaemic, this could be due to a medication error e.g. diabetes medicine dispensed or given in error.

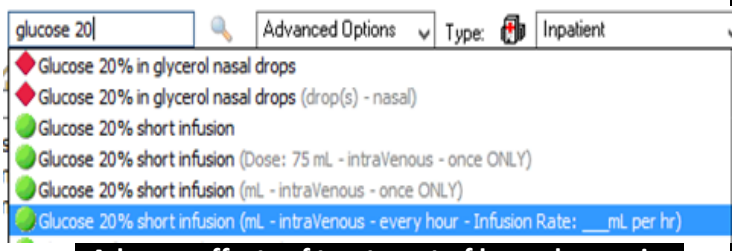
- Rare causes - seek specialist advice for further investigation.

Review: In most cases, after correcting the hypoglycaemia, diabetes medication to lower blood glucose concentrations should **still** be given, but doses may need to be reduced.

If concerned about the risk of further hypoglycaemia, give 50% of the dose of short, rapid, pre-mixed or intermediate insulins and then ask for review by the patient's medical team.

NEVER OMIT insulin in a person with type 1 Diabetes Mellitus - this can lead to Diabetic Ketoacidosis (DKA).

an IV glucose infusion, select the highlighted sentence in ePMA shown below to prescribe.



Adverse effects of treatment of hypoglycaemia

Adverse effects for the various treatment options:

1. All treatments: hyperglycaemia
2. Glucagon: nausea, vomiting, abdominal pain, hypotension, hypokalaemia, hypersensitivity reactions.
3. IV glucose: pain at injection site, vein irritation, venous thrombosis (all increased with increasing concentration), and low potassium, phosphate or magnesium.

Hypoboxes (adult)

A 'hypobox' contains all the equipment required to treat hypoglycaemia. This box should be kept in a prominent place in the clinical area. **It is the individual departments' responsibility to ensure that the box is checked daily** and re-stocked and sealed after use. Details for restocking are provided via the link above.

Contact details

If blood glucose does not return to normal range following the guidance in this MIL, or for recurrent hypoglycaemia contact: **Inpatient Diabetes Nursing Team Contacts (Oxford and Horton sites):**

All referrals must be requested via Requests & Prescribing (EPR) 'refer to Diabetes Inpatients – Adult'

Urgent advice (bleep) 4433

For urgent out of hours review or advice please contact the on-call Diabetes/Endocrine SpR via OUH Switchboard

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Reference: Joint British Diabetes Societies (JBDS). The Hospital Management of Hypoglycaemia in Adults with Diabetes Mellitus 4th Ed. Revised January 2020.

Revised: July 2021. Dr A Lumb, Dr C Crowley, D Jones

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Algorithm for the Treatment and Management of Hypoglycaemia in Adults Attending Hospital – Excluding Pregnancy

Hypoglycaemia is a serious condition and should be treated as an emergency regardless of level of consciousness. Hypoglycaemia is defined as blood glucose of less than 4mmol/L (if not less than 4mmol/L but symptomatic give a small carbohydrate snack for symptom relief). Hypo box contains what is required for immediate management.

Patient conscious, oriented and able to swallow

Give 15-20g of quick acting carbohydrate, such as 5 dextrose tablets (preferable in renal or fluid restricted patients).
Or
One bottle (60ml) Lift® (previously known as Glucojuice®) provides 15g of fast carbohydrate.

Test capillary blood glucose level after 15 minutes and if still less than 4mmol/L repeat up to 3 times if necessary. If still hypoglycaemic, call doctor and consider IV 20% glucose* infusion at 50ml/hr via a large vein or 1mg Glucagon† IM if not contraindicated.

Patient conscious and able to swallow, but confused, disoriented or aggressive

If capable and cooperative, treat as if patient conscious, orientated and able to swallow.

If not capable and cooperative but able to swallow give 2 tubes of 40% glucose gel or, if ineffective, 1mg Glucagon† IM if not contraindicated.

Test blood glucose level after 15 minutes and if still less than 4mmol/L repeat above up to 3 times. If still hypoglycaemic, call doctor and consider IV 20% glucose* infusion at 50ml/hr via a large vein or 1mg Glucagon† IM if not contraindicated.

Patient unconscious/fitting or very aggressive or nil by mouth

Contact doctor for urgent/immediate review – consider fast bleep

Stop IV insulin (if running). Check ABC, disability (CBG and GCS) and exposure (including temperature).
Give 75ml‡ 20% glucose* IV over 15 minutes via large vein or intraosseously
Or
1mg Glucagon† IM if not contraindicated.
Recheck glucose after 15 minutes and if still less than 4mmol/L, repeat treatment.

When blood glucose is 4mmol/L or above give 15-20g of carbohydrate e.g. two digestive biscuits / one slice of bread / 300-400ml milk / medium banana / 150-200 ml pure fruit juice / *one bottle (60ml) Lift® provides 15g of fast carbohydrate.* **For patients with enteral feeding tube –** give *one bottle (60ml) Lift®.* Once glucose 4mmol/L or above restart feed / give bolus feed or start IV 20% glucose*infusion at 50ml/hr via a large vein.
Do not give IV 20% glucose via dedicated parenteral nutrition line.

If IM Glucagon has been used give 40g of carbohydrate (double the above)

If blood glucose 4mmol/L or above patient is conscious and able to swallow, follow guidance on left.

If nil by mouth (NBM), once glucose greater than 4mmol/L give IV 20% glucose* infusion at 50ml/hr via a large vein until no longer NBM or reviewed by doctor. If likely to remain NBM seek specialist diabetes advice.

If still hypoglycaemic (CBG remains below 4mmol/L) consider 20% glucose* IV infusion 50ml/hr via a large vein. Full medical review to consider other causes of coma e.g. SAH, cerebral oedema.

DO NOT OMIT SUBSEQUENT DOSES OF INSULIN. CONTINUE REGULAR CAPILLARY BLOOD GLUCOSE MONITORING FOR 24 TO 72 HOURS (i.e. at least 1 hourly for 2 hours, then 4 hourly for 24hours, extended for individual patients as per **Asses** point 2 of this MIL). REVIEW INSULIN / ORAL HYPOGLYCAEMIC DOSES. GIVE HYPOGLYCAEMIA EDUCATION AND REFER TO DIABETES TEAM.

Special considerations

†Glucagon: max 1mg per 24hrs

- Ineffective in oral hypoglycaemic agent-induced hypoglycaemia, or if NBM, malnourished, under the influence of alcohol, severe liver disease or chronic hypoglycaemia
- May take 15 minutes for effect
- If fully anticoagulated, IV glucose preferred, but IM glucagon is acceptable into deltoid area and press on arm afterwards, if needed.

*In **very severely** fluid restricted patients e.g. renal dialysis 30 mL of 50% glucose may be used on specialist registrar or consultant advice (higher phlebitis risk)

‡20% Glucose 100ml ready to hang infusion bottle contains 75ml dose due to fill volume of infusion set.

If a patient not on insulin or oral hypoglycaemics becomes substantially hypoglycaemic, the cause **must** be established as this could be due to a medication error