How to prevent, identify and manage hypoglycaemia in adults with diabetes

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**Definitions of hypoglycaemia**

NICE\(^3\) defines hypoglycaemia as a glucose value of <3.5 mmol/L, while the ADA\(^4\) describes three levels of hypoglycaemia:

<table>
<thead>
<tr>
<th>Name</th>
<th>Plasma glucose</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypoglycaemia alert</td>
<td>&lt;3.9 mmol/L</td>
<td>• Lower limit of “glucose in range”</td>
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<td></td>
<td></td>
<td>• Usually asymptomatic</td>
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<td></td>
<td></td>
<td>• Treat to prevent hypoglycaemia</td>
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<tr>
<td></td>
<td></td>
<td>• Consider regimen change if recurrent</td>
</tr>
<tr>
<td>Clinically important</td>
<td>&lt;3.0 mmol/L</td>
<td>• Associated with impaired cognitive function</td>
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<td></td>
<td></td>
<td>• Repeated episodes cause reduced hypoglycaemia awareness</td>
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<td></td>
<td></td>
<td>• Predicts severe hypoglycaemia</td>
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<tr>
<td></td>
<td></td>
<td>• Associated with cardiac arrhythmias</td>
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<tr>
<td></td>
<td></td>
<td>• Predicts mortality</td>
</tr>
<tr>
<td>Severe</td>
<td>Not specified</td>
<td>• Cognitive decline results in the need for treatment by another person</td>
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<td></td>
<td></td>
<td>• May be further divided to specify episodes requiring parenteral therapy</td>
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<td></td>
<td></td>
<td>and/or episodes associated with loss of consciousness or seizure</td>
</tr>
</tbody>
</table>

For people with diabetes, hypoglycaemia may be better defined by the clinical picture and by the degree of distress and disruption an episode may cause.\(^5\)

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**Factors associated with increased risk of hypoglycaemia**

**Medical issues include:**
- Tight glycaemic control
- Previous history of severe hypoglycaemia
- Long duration of type 1 diabetes
- Duration of insulin therapy in type 2 diabetes
- Lipohypertrophy at injection sites
- Impaired awareness of hypoglycaemia
- Severe hepatic dysfunction
- Impaired renal function (including renal replacement therapy)
- Sepsis
- Inadequate treatment of previous hypoglycaemia

**Lifestyle issues include:**
- Terminal illness
- Cognitive dysfunction/dementia
- Increased exercise (relative to usual)
- Irregular lifestyle
- Alcohol
- Increasing age
- Early pregnancy
- Breastfeeding
- No or inadequate blood glucose monitoring

**Medical issues include:**
- Food malabsorption (e.g. gastroenteritis, coeliac disease)
- Bariatric surgery involving bowel resection

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**References** are available in the online version of this article.
Management of hypoglycaemia

In adults who are conscious, orientated and able to swallow:
- Give 15–20 g quick-acting carbohydrate:
  - 200 mL (a small carton) of smooth orange juice.
  - 60 mL Glucojuice.
  - 5 glucose tablets.
  - 6 dextrose tablets.
  - 4 large jelly babies.
  - 2 tubes of glucose gel (such as GlucoGel or Dextrogel).
- If the person does not feel better (or blood glucose level is still <4 mmol/L) after 10–15 minutes, repeat one of these treatments.
- When the person starts to feel better, and if they are not due to eat a meal, they should eat some starchy food, such as a sandwich or a banana, and be monitored afterwards.

In adults who are unconscious and unable to swallow:
- Place in recovery position.
- Glucose treatment should NOT be put into the person’s mouth.
- Intramuscular (e.g. GlucaGen) or subcutaneous (e.g. Ogluo) glucagon should be administered immediately.
  - Dose is 1 mg in adults and children aged ≥6–8 years or ≥25 kg in weight; and 0.5 mg in children aged <6–8 years and <25 kg in weight.
  - Glucagon is contraindicated in phaeocromocytoma and should be used cautiously in people with insulinoma or glucagonoma.
  - Not effective if liver glycogen is depleted. Thus, ineffective after prolonged fasting or if adrenal insufficiency, chronic hypoglycaemia or alcohol-induced hypoglycaemia.
- Emergency 999 transfer to hospital should be arranged if:
  - Intramuscular or subcutaneous glucagon is not available.
  - The family/carers are not trained to administer glucagon.
  - Alcohol is the cause of, or has contributed to, the development of hypoglycaemia: intravenous glucose is required.
- If the person does not respond to glucagon treatment within 10 minutes, emergency 999 transfer to hospital should be arranged for treatment with intravenous glucose.
- If the person responds to glucagon treatment within 10 minutes and is sufficiently alert and able to swallow safely, advise them to eat some oral carbohydrate.
- Vomiting is common in the recovery phase and hypoglycaemia may recur – close monitoring is required.

Prevention of hypoglycaemia

- Access to meaningful glucose monitoring if in a high-risk group (includes all persons taking a sulfonylurea and/or insulin).
- For type 1 diabetes and certain persons with type 2 diabetes, offer flash or continuous glucose monitoring as per NICE guidance (will have additional benefit of alarm features to warn of falling glucose levels).8,9
- Empower/educate the person with diabetes to be able to self-titrate medication doses based on glucose levels.
- Consideration of the management of glucose levels if missed meal/ increased activity.
- Ensure sensible intake of alcohol.
- Ensure good injection technique and injection site rotation.
- Ensure appropriate timing of medications.
- Easy access to appropriate hypoglycaemia treatment even when away from home and when driving.
- Timely diabetes reviews with healthcare team.

Useful questions for exploration of hypoglycaemia in consultations

- What do you understand by the term “hypoglycaemia”?
- What do you think causes hypoglycaemia?
- How would you recognise hypoglycaemia?
- Have you ever felt shaky or sweaty, maybe when you haven’t eaten for a while?
- Do you drive, cycle or regularly operate machinery?
- Have you ever had a hypo and how did you feel?
- How would you treat a hypo?

Special considerations

- DVLA regulations: see How to assess fitness to drive
- Individualised glycaemic targets in frailty/end-of-life care: see How to manage diabetes in later life
- Pregnancy and breastfeeding: see At a glance factsheet: Diabetes before, during and after pregnancy
- Intercurrent illness: see How to advise on sick day rules
- Hypoglycaemia unawareness: seek advice from specialist diabetes team
- Fear of hypoglycaemia: see Chapter 4 of Diabetes and Emotional Health
- Children and young people with diabetes: see NICE NG18 guideline

Useful resources for people with diabetes

- Diabetes UK Learning Zone
- Diabetes UK telephone Helpline: 0345 123 2399
- DVLA: A guide to insulin treated diabetes and driving

Consolidate your learning

Interactive case study:
Hypoglycaemia and type 2 diabetes