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What and why

- Hypoglycaemia is a lower-than-normal blood glucose concentration. It can be defined as “mild” if the episode can be self-treated and “severe” if assistance is required.¹
- Hypoglycaemia is the commonest side effect of insulin and sulfonylurea therapy.
- Potential impacts include: **physical morbidity** (blackouts, seizures, coma, cognitive dysfunction), **cardiovascular damage** (cardiac arrhythmias, ischaemic heart disease), **poor concordance with treatment** (defensive snacking and weight gain, challenges with glycaemic control), **accidents and injury** (fractures, road accidents), **psychological effects** (fear of hypoglycaemia, diabetes distress), **reduced quality of life** and **economic costs** (days off work, hospital admissions, ambulance call-outs).
- For a variety of reasons, including lack of awareness and fear of DVLA implications, hypoglycaemia is often unreported.
- In a recent meta-analysis of a pooled 2 462 810 individuals with diabetes, the prevalence of hypoglycaemia ranged from 0.074% to 73.0%.²

Definitions of hypoglycaemia

NICE³ defines hypoglycaemia as a glucose value of <3.5 mmol/L, while the ADA⁴ describes three levels of hypoglycaemia:

Name	Plasma glucose	Implications
Hypoglycaemia alert	<3.9 mmol/L	<ul style="list-style-type: none"> • Lower limit of “glucose in range” • Usually asymptomatic • Treat to prevent hypoglycaemia • Consider regimen change if recurrent
Clinically important	<3.0 mmol/L	<ul style="list-style-type: none"> • Associated with impaired cognitive function • Repeated episodes cause reduced hypoglycaemia awareness • Predicts severe hypoglycaemia • Associated with cardiac arrhythmias • Predicts mortality
Severe	Not specified	<ul style="list-style-type: none"> • Cognitive decline results in the need for treatment by another person • May be further divided to specify episodes requiring parenteral therapy and/or episodes associated with loss of consciousness or seizure

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

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

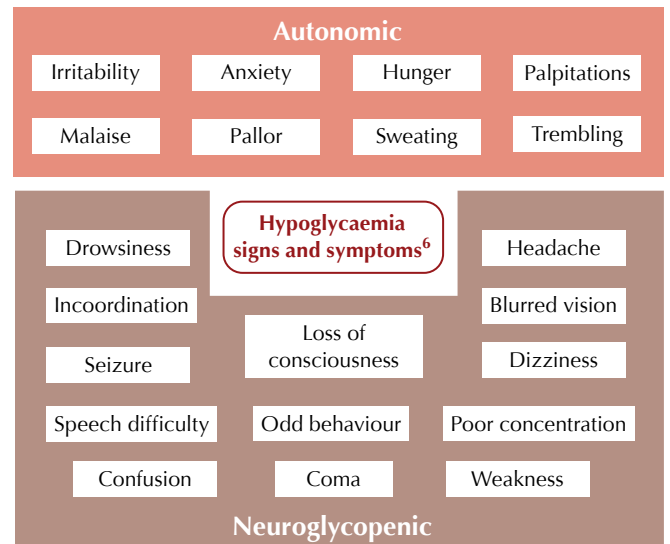
- Terminal illness
- Cognitive dysfunction/dementia

Lifestyle issues include:

- Increased exercise (relative to usual)
- Irregular lifestyle
- Alcohol
- Increasing age
- Early pregnancy
- Breastfeeding
- No or inadequate blood glucose monitoring

Carbohydrate intake/absorption issues include:

- Food malabsorption (e.g. gastroenteritis, coeliac disease)
- Bariatric surgery involving bowel resection



Note: Older people are more likely to have severe cognitive impairment during hypoglycaemia, and are less likely to experience prior autonomic warning symptoms, than younger people.⁷

Ensure that the person and family/carers are aware of the early warning signs of hypoglycaemia and the importance of immediate blood glucose measurement and emergency treatment of an acute episode.

References are available in the [online version](#) of this article

Management of hypoglycaemia³

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](#)