



Clinical Guideline

MANAGEMENT OF HYPOGLYCAEMIA IN CHILDREN AND YOUNG PEOPLE WITH TYPE 1 DIABETES

SETTING

PATIENTS Children and young people with diabetes mellitus

Guidance

- **Definition** of hypoglycaemia in children with diabetes is a blood glucose < 4.0 mmol/L. (This nationally accepted '4 is the floor' in diabetes provides a safety margin. It should not be confused with the lower level of 2.5-2.8 mmol/L used for patients without diabetes.)
- **Signs and Symptoms of Hypoglycaemia ('Hypo')** vary between individuals and may change with age. A child/adolescent may exhibit some of the symptoms below, while others may have no symptoms.

Symptoms and signs can be classified into 3 groups: autonomic, neuroglycopaenic and behavioural. (The list is not exhaustive and if you suspect a child/adolescent is experiencing a hypo their capillary blood glucose MUST still be checked.)

Autonomic	Neuroglycopaenic	Behavioural
<ul style="list-style-type: none">• Pale• Sweating/clammy• Hungry• Tremor• Restlessness	<ul style="list-style-type: none">• Headache• Confusion• Weakness, lethargy• Glazed expression• Visual/speech disturbances• Seizures• Unconsciousness	<ul style="list-style-type: none">• Irritability• Mood change• Erratic behaviour• Nausea• Combative behaviour

- It is important to explain to young people with T1D the effects of alcohol consumption on blood glucose levels, in particular the increased risk of hypoglycaemia including hypoglycaemia whilst sleeping.
- **Treatment of Hypoglycaemia:** The treatment varies with the degree of severity. The severity of hypoglycaemia can be categorised as mild, moderate or severe. Mild and moderate hypos should receive the same treatment as there is little clinical research to suggest they are separate entities.
 - **Mild or Moderate Hypoglycaemia:** child able to tolerate oral fluids / Glucogel. [See Page 2](#)
 - **Severe Hypoglycaemia** Unconscious or fitting child requires parenteral therapy (IM glucagon or IV glucose). [See Page 3](#)

Also remember:

- Do not leave a child/adolescent with hypoglycaemia alone.
- Do inform Paediatric Diabetes Nurse Specialists of any patients with diabetes presenting with hypoglycaemia to the ED, even if not admitted. (*Insert local contact details*)



Treatment of Mild or Moderate Hypoglycaemia

1. Follow this box if child is co-operative and able to tolerate oral fluids

Give 10-20g of fast acting oral carbohydrate such as:

- 3-4 glucose tablets
- 200 ml (~ ½ cup) sugary drink (not diet) such as cola (20g) .

NB Chocolate or milk WILL NOT bring glucose levels up quickly enough

Approximately 9 g of glucose is needed for a 30 kg and 15g glucose for 50kg child (0.3g/kg) -*ISPAD

2. Follow this box if child refuses to drink, is uncooperative, but is conscious

Give Glucogel® or Dextrogel® (formerly known as Hypostop®). This is a fast acting sugary gel, in an easy twist top tube.

Each tube contains 10g glucose.

Squirt tube contents in the side of each cheek (buccal) evenly and massage gently from outside enabling glucose to be swallowed and absorbed quickly.

DO NOT use Glucogel in an unconscious or fitting child.

After 10-15 minutes recheck blood glucose:

1. If still low (<4 mmol/l) and able to take oral fluids repeat Box 1 above (once)
2. If still low (<4 mmol/l), refuses to take oral but is conscious, follow Box 2 above (once)
3. If deteriorated after first run through above or not responded after having administered 2nd dose of above then proceed to **Box 4 (See Page 3)**
4. If better and blood glucose > 4.0 mmol/L follow Box 3 (see below) * (*note: ISPAD recommends restoration of blood glucose level to 5.6 mmol/L and local units may choose to follow ISPAD guidance*)

3. If feeling better and blood glucose level >4.0mmol/L, Retest **20-30 minutes** later to confirm target glucose (>4.0 mmol/L) is maintained.

(*Patients on insulin pumps may have differing local policy guidelines as to the need for adjustment of basal insulin rates following correction of a hypoglycaemic episode. Please refer to your local policy guideline*.)

Treatment of hypoglycaemia should increase the blood glucose by approximately **3–4 mmol/L**

If hypo is **just before** a meal time (when insulin is usually given) the hypo should be treated first and once the blood glucose is >4.0 mmol/L the insulin should be given as usual. **DO NOT OMIT INSULIN**, especially important with an early morning hypo.

Review history of hypo: If possible the cause should be identified and if necessary the insulin dose adjusted, e.g. for early morning/night-time hypo ask about extra exercise the evening before and details of bedtime snack.



Treatment of Severe Hypoglycaemia

Follow this page if child is unconscious or fitting (or also not responded from **page 2**)

CHECK CAPILLARY BLOOD GLUCOSE AND CONFIRM HYPOGLYCAEMIA (<4 mmol/l)

- Do involve medical assistance by this stage:
Outside hospital: call emergency services. Inside hospital: bleep paediatric registrar
- Place in the recovery position if possible and assess Airway Breathing Circulation
- DO NOT attempt to give any oral fluid or Glucogel®
- If IV access is present go straight to **box 5 instead of box 4**

4. Give Glucagon (Glucagen) by Intramuscular injection

- Check if IM glucagon has been given at home or in ambulance. Check expiry date
 - Administer intramuscularly or subcutaneously in the thigh.
 - If age under 12 give 0.5 mg glucagon by IM injection
 - If age 12 or over, give 1 mg glucagon by IM injection
- OR BNF guidance uses body weight**
- 2-17 yrs (body weight less than 25kg) 500micrograms glucagon by IM injection
 - 2-17y body weight >25kg for 1mg glucagon by IM injection

Glucagon is a fast acting drug and the child/adolescent should respond after 5 minutes.

After the child has regained consciousness leave him/her on one side as one of the common side effects of glucagon is

5. IV 10% Glucose

If recovery is not adequate after a dose of glucagon or IV access is readily available **AND** BG <4 mmol/l, then administer up to a maximum of 5mls/kg 10% dextrose as slow IV bolus. (*NICE 2015)

Note: If alcohol causes or contributes toward hypoglycaemia, glucagon may be ineffective (as hepatic stores of glycogen depleted) and intravenous glucose will be required.

Further Monitoring after a Severe Hypoglycaemia:

- Check blood glucose after 5 minutes, 15 minutes and then half hourly until BG stable
- Continue to monitor baseline observations: oxygen saturation, pulse, blood pressure, temperature
- Record presence of or absence of ketones.
- Document management
- Inform diabetes team if during the day, or if concerns during the night.
- Do not omit normal insulin unless instructed to do so by diabetes team.

If blood glucose >4.0 mmol/l and child able to tolerate oral fluids:

- Offer clear fluids, and once tolerating clear fluids offer complex carbohydrates, such as toast, crackers (**see Box 3, Page 2**)
- Try to identify the cause of hypoglycaemia and discuss this with the patient/family
- Refer to diabetes team for review of treatment, advice or education

If child not improving:

- If patients have protracted vomiting and are unable to tolerate oral fluids, hospital admission and IV glucose infusion must be considered, especially if a child has returned to the emergency department with further hypoglycaemia during the same intercurrent illness.
- If a child/Adolescent remains unconscious on correction of BG consider cerebral oedema, head injury, adrenal insufficiency or drug overdose



If frequent hypoglycaemia and /or recurrent seizures especially if at young age, diabetes team should consider referral for assessment of cognitive function.

If frequent unexplained hypoglycaemia consider evaluation for other causes such as unrecognised coeliac disease or Addison's disease.

Glucagon should be readily accessible to all parents and caregivers, especially when there is a high risk of severe hypoglycaemia. Education on administration of glucagon is essential

Blood glucose monitoring should be performed prior to exercise, and extra carbohydrates should be consumed based on the blood glucose level and the expected intensity and duration of the exercise

REFERENCE

1. NICE (2015) Diabetes (type 1 and type 2) in children and young people. NICE guideline NG18 www.nice.org.uk/guidance/ng18
2. ISPAD Clinical Practice Consensus Guidelines 2014. Assessment and management of hypoglycemia in children and adolescents with diabetes. Ly TT et al *Pediatr Diabetes*. 2014 Sep;15 Suppl 20:180-92. doi: 10.1111/pedi.12174. Epub 2014 Jul 12.