Management of Hypoglycaemia in Paediatric Diabetes - Joint Derby and Burton

Reference no.: CH CLIN D05/Sept 2022/v009

Introduction

To manage children and young people with hypoglycaemia (hypo) secondary to diabetes mellitus safely.

Aim and Purpose

The guideline should be used for treatment of hypoglycaemia in children with diabetes mellitus within the University Hospitals of Derby and Burton NHS Foundation Trust. It can also be used safely to treat unexplained hypoglycaemia in any child over 4 weeks of age, but consideration should then be given to cause, with investigations initiated according to Chemical Pathology clinical guidelines (Investigation of hypoglycaemia CHISCG12)

Definitions, Keywords

Children with diabetes usually have symptoms of hypoglycaemia at a slightly higher level (**<4mmol/L**) than the general population (**between 2.5-2.8mmol/L**) but may also be asymptomatic and so still require treatment. Symptoms (see table below) vary between individuals and may present as physical signs such as becoming pale and clammy or having a seizure in the severe cases but could also present more insidiously such as headache, lethargy or irritability. The list below is not exhaustive; if you suspect a child/adolescent is experiencing a hypo, their capillary blood glucose MUST still be checked.

Autonomic	Neuroglycopaenic	Behavioural
• Pale • Sweating /clammy • Hungry • Tremor • Restlessness	• Headache • Confusion • Weakness, lethargy • Glazed expression • Visual/speech disturbances • Seizures • Unconsciousness	• Irritability • Mood change • Erratic behaviour • Nausea • Combative behaviour

Treatment varies depending on degree of severity
Mild or moderate - conscious and able to tolerate oral fluids, food or Dextrose gel.

Severe - unconscious, semi-unconscious including those having a seizure.

Main body of Guidelines

Management should be started after confirming the blood glucose of <4mmol/L or if a patient with a continuous glucose monitoring device has scanned and has a level <4mmol/L.

(N.B. Patients on **insulin pumps** – see Pump Guidelines for detailed treatment of Hypoglycaemia with Continuous Subcutaneous insulin Infusion. (CH CLIN D 14 for Derby, WC/NP/89P for Burton)

Treatment of Mild or Moderate Hypoglycaemia

Box 1.

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

Give fast acting oral carbohydrate.

e.g. Dextrose/glucose tablets, Lift Glucose Chews, Lift glucose shot, fruit juice, glucose powder

Calculate the amount depending on the weight of the child and the blood glucose level – see table 1 below

N.B. Chocolate and milk **WILL NOT** bring glucose levels up quickly enough.

Box 2.

Follow this box if child refuses to take treatment or is uncooperative, but IS conscious and has a swallow reflex

Give fast acting Dextrose Gel

Each tube of Gel contains 10g glucose. Gently squirt tube contents into the side of each cheek (buccal) evenly and massage gently from outside enabling glucose to be swallowed and absorbed quickly.

DO NOT use Dextrose Gel in an unconscious or fitting child

After 15 minutes – wash patient's hands, dry thoroughly and recheck blood glucose level:

1. If child feeling better and blood glucose ≥4.0mmol/L follow box 3 (see below)
2. If still low (<4.0mmol/L) and able to take oral fluids or dextrose tablets, repeat Box 1 until ≥4mmol/L. If clinical deterioration consider following Box 2 or proceed to Box 4 in severe hypoglycaemia treatment flowchart
3. If still low (<4.0mmol/L) and refuses to take oral treatment but is conscious, follow box 2 above and continue to treat until ≥4.0mmol/L. If clinical deterioration proceed to Box 4 in severe hypoglycaemia treatment flowchart
4. If child deteriorates then proceed to Box 4 in severe hypoglycaemia treatment flowchart

Box 3.

If patient feeling better and blood glucose level ≥4.0mmol/L recheck blood glucose in 20-30minutes. If the hypo occurred at bedtime, overnight or pre/during/post exercise, please give patient a 10-15g carb snack without insulin such as:

One small slice of bread or toast with margarine/butter
Glass of milk (approx. 200ml)
One small piece of fruit (apple, half large banana)
One plain digestive biscuit or two from a packet of three on the ward

At any other time, no additional carbohydrate snack is required.

If the hypo occurs just before a meal (when insulin would be given), the hypo should be treated first and once the blood glucose is ≥4.0mmol/L the insulin for the meals should be given as usual. DO NOT OMIT INSLIN, especially important with an early morning hypo.

Review the history of hypoglycaemia – if possible, the cause should be identified.

E.g. for early morning/night time hypo's ask about extra exercise the evening before and details of bedtime snacks/insulin injections. Is the patient completing their meals? Is the carbohydrate counting accurate?

Table 1. Fast acting glucose treatment

Blood glucose <4mmol and below								
Kg	**Approximate Age (years)**	**Amount of fast acting glucose needed (0.3g/kg)**	**Glucotab (4g/tablet) (number)**	**Dextrose/ Glucose tablets (number)**	**Fruit Juice**	**LIFT GLUCOSE SHOT Glucojuice**	**Glucose/ Dextrose powder**	**Dextrose Gel**
Up to 10kg	0-2	6g	-	-	-	25ml	2 level tsp in water	½ tube
10 to 20kg	2-6	6g	1-2	2	60ml	30ml	2 level tsp in water	½ tube
20-30kg	7-9	9g	2	3	90ml	30ml	-	1 tube
30-40kg	9-12	12g	3	4	120ml	50ml	-	1½ tube
40-50kg	12-14	15g	4	5	150ml	60ml	-	1½ tube
50-60kg	14-18	18g	4	6	180ml	60ml	-	2 tubes
Over 60kg	Over 18	21g	5	7	200ml	90ml	-	2 tubes

Treatment of Severe Hypoglycaemia

Use if child unconscious or fitting (also if not responded to above management)

- This is an emergency situation – Fast bleep Paediatric registrar (2222)
- Place in the recovery position if possible and assess Airway, Breathing, Circulation
- DO NOT attempt to give any oral fluid or fast acting Dextrose Gel
- If on IV insulin infusion – STOP it – while hypoglycaemia is being treated
- If IV access is present go straight to Box 5 instead of Box 4

Box 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.
- Dose:
  - If age <8 or bodyweight <25kg: 0.5ml (half syringe)
  - If age ≥8yrs or bodyweight >25kg: 1.0ml (whole syringe)

Glucagon is a fast acting drug and the child/adolescent should respond after 5/10 minutes

After the child has regained consciousness, place him/her on their side as a common side effect of glucagon is vomiting/nausea

Box 5.
IV 10% Glucose
If recovery is not adequate after a dose of glucagon or IV access is readily available, then administer 10% Dextrose as slow IV bolus (2mls/kg, maximum amount 50ml but can be repeated).
NOTE: If alcohol causes or contributes to hypoglycaemia, glucagon may be ineffective (as hepatic stores of glycogen depleted) and intravenous glucose will be required

Further monitoring after a severe hypo:

- Do not omit normal insulin unless instructed to do so by diabetes team
- Check blood glucose after 5 minutes, 15 minutes, then half hourly until blood glucose stable above 5mmol/L
- Continue to monitor baseline observations: oxygen saturations, pulse, blood pressure, temperature
- Record presence or absence of ketones and document management
- Inform paediatric diabetes team by email or telephone

If blood glucose ≥4mmol/L and child able to tolerate oral fluids:

- Offer clear fluids, and once tolerating clear fluids offer carbohydrates, such as toast, crackers, biscuit (see box 3)
- Try to identify the cause of the hypoglycaemia and discus with patient/family
- Refer to diabetes team for review of treatment, advice and/or education

If child not improving: consider HDU/close monitoring:

- Inform paediatric consultant on call
- If the patient has protracted vomiting and is unable to tolerate oral fluids, admit and IV glucose infusion must be considered
- Consider this particularly 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 blood glucose consider cerebral oedema, head injury, adrenal insufficiency, alcohol or drug overdose

Additional Notes:

- If frequent unexplained hypoglycaemia consider evaluation for other causes such as unrecognised coeliac disease or adrenal insufficiency e.g. Addison's disease
- Refer to pump guidelines (CH CLIN D 14 for Derby, WC/NP/89P for Burton) for if the child/young person is on an insulin pump and is hypoglycaemic secondary to an illness e.g. gastroenteritis
- Refer to diabetes intercurrent illness guidelines (CH CLIN D02 for Derby, WC/NP/91P for Burton) for if the child/young person is hypoglycaemic secondary to an illness e.g. gastroenteritis
- Discuss any concerns with the consultant on call, if the consultant on call is still concerned they can speak to the Burton/Derby diabetes team or if they are unavailable then the on call endocrine consultant for East Midlands Endocrine rota through switchboard.

References (including any links to NICE Guidance etc.)

BSPED endorsed Association of Children's Diabetes Clinicians. Management of hypoglycaemia in children and young people with type 1 diabetes. Version 4, 2018.

ISPAD Clinical Practice Consensus Guidelines 2018: Assessment and management of hypoglycaemia in children and adolescents with diabetes.

NICE guidance NG18, updated 2016. Hypoglycaemia in children and young people with type 1 diabetes.

Document Controls

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<tr><td>Reference Number

CH CLIN D 05</td><td colspan="2">Version:
V009</td><td>Status

Final</td><td></td></tr>
<tr><td rowspan="2">Version / Amendment History</td><td>Version</td><td>Date</td><td>Author</td><td colspan="2">Reason</td></tr>
<tr><td>V009</td><td>September 2022</td><td>Dr Richard Lloyd-Nash</td><td colspan="2">Guideline required renewal and merging with Burton guideline for Hypoglycaemia</td></tr>
<tr><td colspan="6">Intended Recipients: All paediatric staff across RDH and Burton</td></tr>
<tr><td colspan="6">Training and Dissemination: Training has been completed for ward staff members – provided by the PDSNs</td></tr>
<tr><td colspan="6">Development of Guideline: Dr Richard Lloyd-Nash
Job Title: Paediatric and Diabetic consultant</td></tr>
<tr><td colspan="6">Consultation with: All both RDH and QHB diabetes consultants and nurses</td></tr>
<tr><td colspan="6">Linked Documents: Paediatric Diabetes pump guidelines, diabetes intercurrent illness guidelines</td></tr>
<tr><td colspan="6">Keywords: Hypo, Hypoglycaemia, Hypoglycaemic, paediatric diabetes</td></tr>
<tr><td colspan="3">Business Unit Sign Off</td><td colspan="3">Group: Paediatric Guidelines Group
Date: 06/09/2022</td></tr>
<tr><td colspan="3">Divisional Sign Off</td><td colspan="3">Group: Women’s and Children’s Clinical Governance Group
Date: 25/10/2022</td></tr>
<tr><td colspan="3">Date of Upload</td><td colspan="3">September 2022</td></tr>
<tr><td colspan="3">Review Date</td><td colspan="3">September 2025</td></tr>
<tr><td colspan="3">Contact for Review</td><td colspan="3">Dr Richard Lloyd-Nash</td></tr>
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