



Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive



PAEDIATRICS



ROYAL
COLLEGE OF
PHYSICIANS
OF IRELAND

NATIONAL CLINICAL GUIDELINE

**Title: Identification and Management of Hypoglycaemia
in Children with Type 1 Diabetes**

Clinical Design and Innovation

Health Service Executive

Publication date: March 2019

Guideline Update Approved: April 2021

Guideline reference: CDI007/2021

Guideline Review: April 2024

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1.0 Aim of Guideline

The aim of this guideline is to provide clear and standardised guidelines for all staff caring for paediatric patients with type 1 diabetes in relation to the recognition and management of hypoglycaemia.

2.0 Purpose and Scope

- 1.1 The purpose of this guideline is to improve the management of paediatric hypoglycaemia in insulin treated patients. It applies to children with diabetes on insulin therapy with a blood glucose ≤ 3.9 mmol/L.
- 1.2 This guideline is intended for healthcare professionals, particularly those in training, who are working in HSE-funded paediatric and neonatal services. It is designed to guide clinical judgement but not replace it.
- 1.3 In individual cases a healthcare professional may, after careful consideration, decide not to follow a guideline if it is deemed to be in the best interests of the child.

3.0 Background and Introduction

- 3.1 Hypoglycaemia is the most frequent acute complication of type 1 diabetes either due to excess insulin or illnesses causing nausea, vomiting or diarrhoea and decreased oral intake.
- 3.2 Prolonged or recurrent hypoglycaemia, especially when associated with symptoms and signs can cause long term neurological damage or death. Thus, prompt recognition and treatment are essential.

4.0 Legislation/other Related Policies

- 4.1 Model of Care for All Children and Young People with Type 1 Diabetes (2015)
<http://www.hse.ie/eng/about/Who/clinical/natclinprog/paediatricsandneonatology/paedsmoc.pdf>

5.0 Glossary of terms and definitions

BG	Blood Glucose
CHO	Carbohydrate
CSII	Continuous Subcutaneous Insulin Infusion (pump therapy)
Hypoglycaemia	For the purpose of this guideline hypoglycaemia is defined as children with diabetes and on insulin therapy with a blood glucose ≤ 3.9 mmol/L

6.0 Roles and Responsibilities

6.0 This guideline should be reviewed by each hospital's senior management team to appropriately plan implementation. This will ensure that the inpatient care of children admitted to their facility is optimised irrespective of location.

6.1 Neonatal diabetes is specialised and a specific tailored management plan should be prescribed for neonates with insulin treated diabetes.

7.0 Clinical Guideline

The goal is to return the blood glucose level to normal (target 5.5 mmol/L) identify cause and plan to prevent recurrence of hypoglycaemia

7.1 Identify the severity of hypoglycaemia episode:

7.1.1 Mild (adrenergic response only)

- tremor
- sweating
- hunger
- palpitations
- pallor

7.1.2 Moderate (plus neuro-glycopenic symptoms)

- headache
- confusion
- irritability
- sleepiness
- weakness

7.1.3 Severe (loss of consciousness)

- coma or seizures

7.2 Immediate management

7.2.1 Mild

Give glucose drink (not Diet drink) or glucose tablets that will give patient approx.

0.3 g/kg (10g Carbohydrate for child less than 35 kg child and 15 g for child greater than 35 kg child) – see **Table 1**.

Table 1

Drink	To provide 10g carbohydrate	To provide 15g carbohydrate
Lift Glucose Drink (25g carbs per 100mls)	40ml (2/3 bottle)	60ml (full bottle)
Sugar water (Dissolve 1g table sugar in 1ml cooled boiled water e.g. make up 50mls i.e. 50g sugar in 50mls water in container). Mix on each use. 1ml = 1g carbs.	10ml (1 dessertspoon)	15ml (1 tablespoon)
Apple Juice 11g carbs per 100mls	90ml	140ml
Orange juice 9g carbs per 100mls	110ml	165ml
Sweets		
Lift Glucose Tablets (3.7g carbs per tablet)	2 ½ tablets	4 tablets
Dextro Energy (2.97g carbs per tablet)	3 ½ tablets	5 tablets

7.2.1.1 Re check BG in 10-15 mins;

If recheck BG is still < 4 mmol/L, repeat 7.2.1 and 7.2.1.1

7.2.1.2 Glucogel (contains 10g carbohydrate) can be very useful in young children who may not agree to take a drink (on command) **but should never be used if patient is unconscious/obtunded due to risk of aspiration**

7.2.1.3 When BG > 4 mmol/L, give a snack of approx 10-15 gram slower acting CHO (e.g. banana, 2 grain crackers, wholegrain bread, milk or fruit) to prevent recurrence of hypoglycaemia (if event is not at a mealtime)

7.2.2 Moderate

7.2.2.1 Give Glucogel tube x 1-2 (10g CHO per tube)

Glucogel should never be used if patient is unconscious/obtunded due to risk of aspiration

7.2.2.2 Then treat as above with glucose drink

7.2.2.3 Recheck BG after 10-15 mins and repeat this step if BG is not >4mmol/L .When BG > 4 mmol/L, give a snack of approx. 10-15 gram slower acting CHO (e.g. banana, 2 grain crackers, wholegrain bread, milk or fruit) to prevent recurrence of hypoglycaemia (if event is not at a mealtime)

7.2.3 Severe

GLUCAGON
0.1-0.3 mg/kg to a maximum of 1.0 mg im/sc without delay. Weight ≤ 25 kg: ½ vial= 0.5mg Weight > 25 kg: full vial= 1mg

- 7.2.3.1 If IV line in situ (in hospital) give 2 ml/kg 10% glucose over 10 minutes IV
- 7.2.3.2 May vomit after glucagon in recovery phase
- 7.2.3.3 An episode of severe hypoglycaemia requiring glucagon requires evaluation in ED

7.3 Why did hypoglycaemic episode occur?

- 7.3.1 It is important to identify why hypoglycaemic episode occurred. Common causes include delayed meal/snack, insufficient carbohydrate consumed, exercise, illness with decreased absorption (gastroenteritis).
- 7.3.2 Evaluate the hypo-awareness of the child and provide tailored re-education if required.
- 7.3.3 Insulin dose adjustment may be required. This must be done in conjunction with the diabetes team or local paediatrician. Decrease appropriate insulin dose by approximately 10% next day if hypoglycaemic episode is unexplained

7.4 Recurrent hypoglycaemia

- 7.4.1 Consider rarer causes:
 - Addison's disease
 - Coeliac disease
 - Alcohol
 - Undisclosed self-administration of insulin

7.5 Management of Hypoglycaemia on CSII

- 7.5.1 Hypoglycaemia may also occur in children using insulin pumps.
- 7.5.2 Treatment is with fast acting carbohydrates (e.g. 1 lift glucose drink as per table 1) or glucogel as per 7.2.2.1. and recheck in 10-15 minutes to ensure blood glucose has normalized
- 7.5.3 When using a pump, a follow up slower release carbohydrate snack is **not** generally required but Carbohydrate eaten post hypo when BG has returned to the normal range must be bolused for.
- 7.5.6 Severe hypoglycaemia with seizure is unusual in children using pumps but should be managed as for all insulin treated children see 7.2.3
- 7.5.7 Pump suspension pending normalisation of BG level may be considered in this unusual scenario.

7.6 Insulin Administration Safety Alert

INSULIN ADMINISTRATION SAFETY ALERT
<p>INSULIN ERRORS CAN HAVE EXTREMELY SERIOUS CONSEQUENCES-always act on patient/family/HCP concerns re doses and recheck</p> <ul style="list-style-type: none">• Overdoses can cause severe hypoglycaemia, seizures, coma and even death• Under dosage can result in diabetic ketoacidosis.
<p>Please INDEPENDENTLY <u>DOUBLE CHECK</u> doses at each stage-</p> <ul style="list-style-type: none">• When making up an infusion (an insulin syringe graduated in units to measure insulin must be used)• When infusing via a pump• When administering via pen (pens and cartridges are SINGLE PATIENT USE ONLY)
<p>ALWAYS CHECK PRESCRIPTION:</p> <ul style="list-style-type: none">• Reconfirm order with the prescriber if unsure/ concerned about the insulin dose• Avoid abbreviations; insulin should be prescribed in units• Do not administer an unclear prescription-Prescription MUST be rewritten• Only use an insulin pen or an insulin syringe graduated in units to measure insulin

8.0 Implementation Revision and Audit

- 8.1** Distribution to the CEO of each Hospital Group for dissemination through line management in all acute hospitals within their group.
- 8.2** Implementation through Senior Management Teams of each acute hospital.
- 8.3** Distribution to other interested parties and professional bodies
The NCPPN Diabetic Working group has agreed that this guideline will be reviewed on a 3 yearly basis.
- 8.4** Regular audit of implementation and impact of this guideline through outcome and process measures is recommended to support continuous quality improvement. It is the responsibility of each unit providing care for children with diabetes and intercurrent illness to audit the unit practise regularly in order to ensure that care in being provided in line with guidelines and that any deviations are clinically justified. The audit process should be coordinated in each paediatric unit under local paediatric clinical governance and should be taken from a multidisciplinary perspective where appropriate. Where the audit identifies areas for practise improvement, it is the responsibility of each individual unit to implement changes and re-audit to support continuous quality improvement.

9.0 References

- International Society for Paediatric and Adolescent Diabetes (2014) ISPAD Clinical Practice Consensus Guidelines 2014. <http://www.ispad.org/?page=ISPADClinicalPract>
- British Society of Paediatric Endocrinology and Diabetes (2012) BSPED Recommended DKA Guidelines 2012
- Irish Medication Safety Network (2020) Best Practice Guidelines for the Safe Use of Insulin in Irish Hospitals <https://imsn.ie/wp-content/uploads/2020/07/insulin-best-practice-March-2020-with-appendices.pdf>

10.0 Qualifying Statement

- 10.1** These guidelines have been prepared to promote and facilitate standardisation and consistency of practice, using a multidisciplinary approach.
- 10.2** Clinical material offered in this guideline does not replace or remove clinical judgement or the professional care and duty necessary for each child.
- 10.3** Clinical care carried out in accordance with this guideline should be provided within the context of locally available resources and expertise.
- 10.4** This Guideline does not address all elements of standard practice and assumes that individual clinicians are responsible for:
- Discussing care with the child, parents/guardians and in an environment that is appropriate and which enables respectful confidential discussion.
 - Advising children, parents/guardians of their choices and ensure informed consent is obtained.
 - Meeting all legislative requirements and maintaining standards of professional conduct.
 - Applying standard precautions and additional precautions, as necessary, when delivering care.
 - Documenting all care in accordance with local and mandatory requirements.

11.0 Appendices

11.1 Appendix 1 Acknowledgements

This guideline has been developed by the National Clinical Programme for Paediatrics and Neonatology Diabetes Working Group. The members of this group include medical, nursing and dietetic representatives from paediatric diabetes services. The Diabetes Working Group also wish to thank those who provided input and feedback on draft versions of this guideline throughout development, and those who provided valuable input during the consultation process and revision of the guideline including Ms. Ciara Kirke, Clinical Lead, National Medication Safety Programme, HSE and Mr. Donal Burke, Clinical Pharmacist, CHI, Crumlin.

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11.2 Appendix 2 Approval Process

Sign Off

Sign off by Paediatric Diabetes Working Group	November 2018
Sign off by Paediatric Clinical Advisory Group	December 2018
Sign off by HSE CSPD Senior Management Team	January 2019
Guideline Update approved by Paediatric Working Group	November 2020
Guideline update approved by Paediatric Clinical Advisory Group	March 2021
Guideline update approved by National Clinical Advisory Group Lead	April 2021

11.3 Appendix 3 Guideline Update November 2020

1. Addition of insulin safety alert
2. Change of wording to units rather than iu for insulin
3. Normal saline changed to 0.9% w/v sodium chloride
4. Dextrose changed to glucose
5. Edits applied to Hypoglycaemia Treatment Table on page 5