Hypoglycaemia in children with type 1 diabetes

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Key Amendments

Date	Amendment	Approved by: (name of committee or accountable director)
31.07.2012	Glucagon IM injection threshold changed from 12 years to 10 years	Dr Andrew Short
19.01.2016	Glucagon IM injection threshold changed back to 8 years from 12 years (ISPAD 2014)	Dr Naeem Ahmad
19.01.2016	References updated	Dr Naeem Ahmad
26.03.2018	Amount of Lucozade changed due to reduced glucose content	Dr Naeem Ahmad
14.01.2020	Changes to the flowchart "Management of Hypoglycaemia in children' on page 3, the amount of glucose depending on the patient's body weight	Dr Naeem Ahmad
14.01.2020	Inserted a table showing the amount of glucose in different drinks and other hypo treatment.	Dr Naeem Ahmad
14.01.2020	References updated	Dr Naeem Ahmad
19th Nov 2020	Document extended for one year	Dr J West/Paediatric QIM
26th March 2021	Document reviewed and approved for 3 years	Paediatric Guideline Review Meeting
23/01/2024	References updated	Dr Naeem Ahmad
09/02/24	Glucagon IM injection threshold changed back to 8 years from 12 years (ISPAD 2022). Document reapproved.	Dr Naeem Ahmad

DETAILS OF GUIDELINE

Definition

Hypoglycaemia is an episode of low blood glucose which can cause harm to the patient. It is defined as a blood glucose of **less than 4 mmol/l.** Send a blood sample to the laboratory to confirm a low blood glucose level.

Don't delay the treatment of hypoglycaemia for blood sampling and laboratory confirmation.

Symptoms

The symptoms of hypoglycaemia vary between individuals and may change with age. A child/adolescent may exhibit some of the symptoms below, while others may have no symptoms. The symptoms of hypoglycaemia can be autonomic, neuroglycopaenic or behavioural. These include shakiness/ feeling "wobbly", hunger, headache, abdominal pain, feeling "not right", pale, sweating and irritability. If not corrected early, children can become unco-operative, confused, have a seizure, fall into a coma, or even die. In young children a change in normal behaviour can indicate hypoglycaemia. Hypoglycaemia can be asymptomatic (documented blood glucose <4 mmol but no symptoms).
If you suspect a child/adolescent is experiencing a hypo their capillary blood glucose MUST still be checked

Classified

Episodes can be classed as being mild/moderate and severe.

Mild/moderate: child or caregiver recognises and responds to hypoglycaemia.

Severe: altered mental status and cannot assist in care.

Causes

A hypoglycaemic episode is caused by an imbalance between insulin and glucose. It is important to establish the cause of the hypoglycaemia. Causes include.

Extra or more than usual exercise (hypoglycaemia may occur 2-12 hours later)
Too much insulin
Missed/delayed meal
Illness
Alcohol intake

Treatment

Wash hands and test the blood glucose level. Follow the flow chart on page 3, as per protocol you will need to give 5 to 15 grams of glucose (0.3 g/Kg). For the suggested hypo treatment see the table on page 4 showing amounts of glucose in different cold drinks and hypo treatments. Patients on closed loop insulin pumps should have less glucose e.g. 5 -10 grams or half the amount of normal dose

Retest blood glucose level 10-15 minutes after the initial treatment. If the blood glucose level continues to be below 4 mmol/l repeat the glucose treatment above.

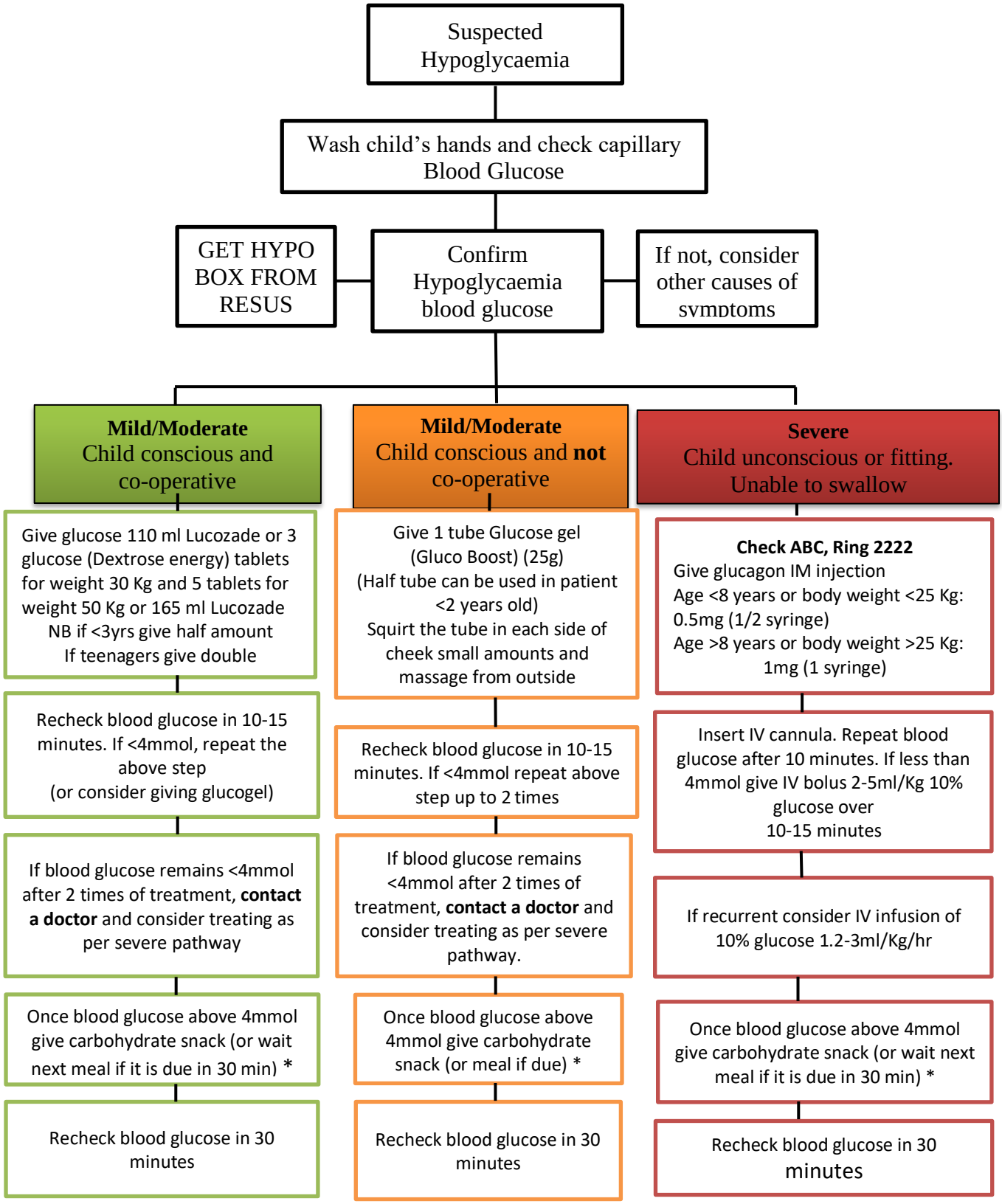
Give a starchy snack, less than 15 g carbohydrate, for sustained availability of carbohydrates.

Insulin pump users do not need a starchy snack. Suitable snacks:

-1 digestive biscuits / 2 Nice biscuits / oat based cereal bar (maximum 15 g carbs)
-1 slice of toast
-1 piece of fresh fruit (e.g. medium apple or small banana)
-1 glass of milk / 1 cup of yoghurt

Note: If recurrent episodes of hypoglycaemia are experienced contact the diabetes team to review insulin doses.

MANAGEMENT OF HYPOGLYCAEMIA IN CHILDREN



After the episode

*Monitor blood glucose closely initially every 15-30 minutes for 1st hour then every 2-4 hours.

- Establish cause of hypoglycaemia.
- Give the usual insulin doses. Do not give extra insulin if blood glucose high as this is an expected rebound after hypoglycaemic episode.

*NB if on insulin pump child does not require (starchy) carbohydrate once blood glucose >4 mmol/L

Treatment of hypoglycaemia should increase the blood glucose by about 3 - 4 mmol/L
Table of carbohydrate content of different cold drinks and hypo treatment:

Drinks for hypo treatment	**Carbs per 100ml**	**Volume needed to approximately provide:**		
		5g carbs	**10 g carbs**	**15g carbs**
Coca cola	10.6g	50 ml	100 ml	150 ml
Pepsi	11.6g	45 ml	90 ml	130 ml
Dr Pepper	4.9g	100 ml	200 ml	300 ml
Iron Bru	4.8g	105 ml	210 ml	315 ml
Sprite (not good for hypos)	3.3g	150 ml	300 ml	450 ml
Fanta	4.6g	110 ml	220 ml	330 ml
Oasis	4.1g	120 ml	240 ml	360 ml
Schweppes Lemonade	4.2g	120 ml	240 ml	360 ml
Tango	4.3g	115 ml	230 ml	345 ml
Appletiser	10.5g	50 ml	100 ml	150 ml
Ribena (ready to drink)	4.6g	110 ml	220 ml	330 ml
Ribena squash diluted 1 part with 4 parts water	4.6g	110 ml	220 ml	330 ml
Lucozade energy	8.9g	55 ml	110 ml	165 ml
Lucozade sport	6.4g	80 ml	160 ml	240 ml
Lucozade sport lite (not good for hypos)	2g	-	-	-
Powerade	4.1g	120 ml	240 ml	365 ml
Apple juice*	11.4g*	45 ml	90 ml	135 ml
Orange Juice*	10.6g*	50 ml	100 ml	150 ml
Other carbs for hypo treatment	**Per portion**			
Glucojuice per bottle	15g	1/3 bottle	2/3 bottle	Full bottle
Glucogel 1 tube	10g	½ tube	1 tube	1 ½ tube
1 x GlucoTabs tablet	4g	1	2	3
1 x Dextro energy tablet	3g	1.5	3	5
1 x Lucozade energy tablet	2.6g	2	4	6
Haribo fun size packet	12g	½ pack	1 pack	1 ½ pack
1 x jelly Bassetts Jelly Baby	5g	1	2	3

*Treating hypoglycaemia with fruit juice or sugar requires a greater amount to provide the same increase in blood glucose compared to oral glucose, for example 10g of oral glucose results in approximately the same raise in blood glucose as 20g of carbohydrate from fruit juice.

Chocolate, milk and other foods that contain fat will cause blood glucose to be absorbed more slowly and should be avoided as the initial treatment of hypoglycaemia.

If the 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, then mealtime insulin should be given as usual.

If using a closed loop system and having repeated hypos adjust the exercise/activity mode. Here are the suggested settings for the different systems :

- Omnipod 5: target glucose level 8.3 mmol/l
- Medtronic 780G: temp target 8.3 mmol/l
- T:slim: target level 6.1mmol/l but reduces basal insulin below 6.7 mmol/l and suspends basal insulin at 4.4 mmol/l

MONITORING TOOL

How will monitoring be carried out? Clinical Audit
Who will monitor compliance with the guideline? Paediatric Clinical Governance Committee

STANDARDS	%	CLINICAL EXCEPTIONS
Confirm blood glucose <4 mmol/l in patients with symptoms of hypoglycaemia	100%	None
Recheck blood glucose in 10-15 minutes after initial treatment	100%	None
All patients who are able to eat and drink will receive starchy carbohydrate (unless using an insulin pump)	100%	None

REFERENCES

NICE guidelines: Diabetes (type 1 and type 2) in children & young people: Diagnosis and management NG15 May 2023.

Assessment and management of hypoglycaemia in children and adolescents with diabetes. ISPAD 2022

Clinical guideline: Hypoglycaemia in diabetes, Association of Children Diabetes Clinicians (ACDC), August 2022

Assessment and management of hypoglycaemia in children and adolescents with diabetes. Clarke, W. et al. Pediatric diabetes 9(2) 165-174, 2008

CONTRIBUTION LIST

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