Burton Hospitals
NHS Foundation Trust

Title: Hospital Management of Hypoglycaemia in Paediatric Diabetes		**Policy No: WC/NP/92P** **Version No: 3**
Document Type:	**Corporate / Directorate:**	**Effective from:**
Clinical Guideline	Directorate	15th June 2018
Responsibility:	**Essential Reading for:**	**Information for:**
Paediatric Diabetes Team	All Paediatricians All Paediatric Nursing Staff All ED Doctors All ED Nursing Staff	
Original Issue Date:	**Date of Last Review:**	**Next Review Date:**
January 2013	June 2018	June 2021
Reason for amendment:		
Routine review and update		
Linked Trust Policies:	**Consulted:**	**Stored:**
	All Paediatricians All Paediatric Nursing Staff All ED Doctors All ED Nursing Staff Senior Nursing Managers	Division of Women & Children's Guideline Intranet Server
Approved by: **Clinical Director for Surgery**	 **……** **Clinical Director** **Date: 15th June 2018**	

Audit and Monitoring Process		
Frequency of Audit	Every 3 years or sooner as required	
Audit Management Group	Paediatric Diabetes Team	
Audit Criteria to include:		
Compliance below 100%	Action plan to improve compliance. Action plan to include: • Actions required • Target date for completion • Identified lead for each action • Referral to other groups as appropriate • How lessons learned will be disseminated	
Monitoring of actions arising	• Completion of an audit trail form within three months of presentation to the departmental audit meeting • Actions identified as a result of referral to another group will be monitored by that group • It is the responsibility of the departmental clinical audit lead to review progress of actions on the audit trail form. The timescale for review of the action plan will be stipulated as part of the action plan.	

Burton Hospitals NHS Foundation Trust
Department of Paediatrics

Hospital Management of Hypoglycaemia in Paediatric Diabetes

1.0 Introduction

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 little or no symptoms.

The signs and symptoms can be classified into 3 groups:

- autonomic,
- neuroglycopaenic
- 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
• Pale • Sweating/clammy • Hungry • Tremor • Restlessness	• Headache • Confusion • Weakness • Glazed expression • Lethargy • Visual/speech disturbances • Seizures • Unconsciousness	• Irritability • Mood change • Erratic behaviour • Nausea • Combative behaviour

2.0 Management of Hypoglycaemia

Hypoglycaemia should be classed as an emergency situation and action should be taken immediately. The child/young person should not be moved unless they are in an unsafe area – hypo's should be treated wherever they occur. Do not leave a child/adolescent with hypoglycaemia alone.
The treatment of a hypo varies with the degree of severity. Treat the severity of the symptoms of the hypoglycaemic attack and not the figures on the meter.

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.

Wherever possible, remember to check the blood glucose before initiating treatment, and in asymptomatic patients, retest. However, if for some reason you are unable to test the blood glucose level but they are showing signs and symptoms of a "hypo" the rule is:- "if in doubt treat as a hypo"

Mild or Moderate Hypoglycaemia: the child/young person is able to tolerate oral fluids or Dextrose Gel.

Severe Hypoglycaemia: The child/young person is unconscious or is convulsing and they require parenteral therapy - IM glucagon or IV glucose.

The following flow charts cover the treatment of all stages of hypoglycaemia in children and young people in hospital.

Depending on the child/young person's condition follow the flow chart for either:-

- 'Treatment of Mild/Moderate Hypoglycaemia'

Or

- 'Treatment of Sever Hypoglycaemia.'

If the mild or moderate hypo progresses to severe you may find you need to move to the flow chart for '**Treatment for a Severe Hypoglycaemia'**

Please remember to inform the Paediatric Diabetes Nurses of all children/young people presenting with hypoglycaemic episodes especially if presenting in ED and not admitted.

Treatment of Mild or Moderate Hypoglycaemia

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

Give fast acting oral carbohydrate. Calculate the amount depending on the weight – See table below.

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

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

Give fast acting Dextrose Gel

Each tube of Gel 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 Dextrose Gel 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 (twice)
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)
4. If better and blood glucose > 4.0 mmol/L follow Box 3 (see below)

3. If feeling better and blood glucose level >4.0mmol/L, give 10 -15g slow acting carbohydrate snack (or normal meal if it is meal time) within 10 minutes such as:

- One small/thin slice of toast
- One piece of fresh fruit or a small mini sized banana.
- A small cereal bar (max 15g CHO)
- One plain digestive or hobnob biscuit
- Glass of milk (200ml)

(Patients on insulin pumps **do not** require some slow acting carbohydrates after a hypo. See Pump Guidelines for detailed treatment of Hypos with Continuous Subcuatous Insulin Infusions)

Retest **20-30 minutes** later to confirm target glucose (>4.0 mmol/L) is maintained.

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 >4.0 mmol/L the insulin for the meal should be given as usual. **DO NOT OMIT INSULIN,** especially important with an early morning hypo.

Review history of hypoglycaemia - If possible, the cause should be identified
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 snacks/insulin injections etc.

Hypoglycaemia treatment

The table is a guide for the oral treatment of hypoglycaemia in a conscious child/young person with a BG ≤ 4.0.

weight	Up to 10kg	20kg	30kg	40kg	50kg	60kg	70kg+
CHO required in grams	3	6	9	12	15	18	21
Glucose/ Dextrose powder	1 level tsp in water	2 level tsp	3 level tsp	-	-	-	-
Glucogel 10g/tube	½ tube	½ tube	1 tube	1½ tubes	1½ tubes	2 tubes	2 tubes
Gluco-Juice 25g/100mls. 1 bottle 60mls = 15gCHO	12 mls	24 mls	36 mls	48 mls	60 mls (1 bottle)	72 mls	84 mls
Dextrose tabs 3g/tablet	Not suitable	2	3	4	5	6	7
Glucotabs 4g/tablet	Not suitable	1.5	2	3	4	4.5	5
Lucozade Energy 8.9/100ml	Not suitable	70 ml	100 ml	140 ml	170 ml	200 ml	240 ml
Cola 10.6g/100ml	Not suitable	50 ml	90 ml	110 ml (⅓can)	140 ml	170 ml (½can)	200 ml
Ribena carton 4.8g/100mls	Not suitable	120mls	180ml	240 ml	Not suitable	Not suitable	Not suitable
Apple Juice 10g/100mls	Not suitable	60mls	90mls	120mls	150mls	180mls	210mls

Green section is Gold Standard for hypo treatment.

10g starchy carb snack post treatment once BG is >4.0 (if required – not for insulin pump users) will raise BG by 3-5mmol approx

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 treated.
- 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 in the thigh.

Dose: Age < 8 yrs or body weight <25 kg: 0.5 ml (half syringe)
Age > 8 yrs or body weight >25 kg: 1.0 ml (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 one side as one of the common side effects of glucagon is vomiting/nausea.

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 (maximum 5mls/kg).

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:

- Check blood glucose after 5 minutes, 15 minutes, then half hourly until BG stable above 5 mmol/l
- Continue to monitor baseline observations: oxygen saturations, pulse, blood pressure, temp.
- Record presence or absence of ketones.
- Document management.
- Inform Paediatric diabetes team.
- Do not omit normal insulin unless instructed to do so by diabetes team.

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

- **Offer clear fluids, and once tolerating clear fluids offer simple carbohydrates, such as toast, crackers (see box 3)**
- **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 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 or drug overdose.**

- If frequent hypoglycaemia and /or recurrent seizures especially if at young age, the 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 to aim to prevent hypoglycaemia.

References:

NICE Clinical Guideline: Diabetes (type 1 and type 2) in children and young people: diagnosis and management, 2015.

ISPAD Clinical Practice Consensus Guidelines. Assessment and management of hypoglycaemia in children and adolescents with diabetes, 2014.

ACDC guidelines on management of Hypoglycemia

APLS: The practical approach, 5th edition, ALSG, 2011.

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Updated May 2018