

## 1 **BNF for Children- Acute hypoglycaemia**

### 2 **Description of condition**

3 Hypoglycaemia results from an imbalance between glucose supply, glucose utilisation and  
4 existing insulin concentration.

5 Clinical hypoglycaemia is defined as a blood glucose concentration low enough (usually < 3  
6 mmol/L) to cause symptoms or signs of impaired brain function. In clinical practice, a  
7 glucose value of  $\leq 3.9$  mmol/L is used as the threshold value to initiate treatment for  
8 hypoglycaemia in diabetic children.

9 Symptoms of hypoglycaemia in the young include shakiness, pounding heart, sweatiness,  
10 headache, drowsiness and difficulty concentrating. In young children, behavioural changes  
11 such as irritability, agitation, quietness and tantrums may be prominent.

12 Short-term complications of severe hypoglycaemia include transient neurological  
13 symptoms, such as paresis, convulsions, encephalopathy, loss of consciousness and rarely,  
14 subsequent neurological damage and mild intellectual impairment. All other hypoglycaemic  
15 events are described as non-severe.

16 Diabetes mellitus, idiopathic ketotic hypoglycaemia, adrenal insufficiency, hyperinsulinism,  
17 fatty acid oxidation disorders, and glycogen storage disease may cause acute hypoglycaemia  
18 in children. Common clinical precipitants for hypoglycaemia in children with diabetes may  
19 include insufficient food consumption (i.e. missed meals, nocturnal hypoglycaemia),  
20 excessive insulin dosing, exercise, alcohol ingestion (in adolescents) and sulfonylureas  
21 [unlicensed].

### 22 **Treatment of acute hypoglycaemia**

23 Prompt treatment of hypoglycaemia in children from any cause is essential.

24 Hypoglycaemia caused by a sulfonylurea (although rarely used in children) or a long acting  
25 insulin may persist for up to 24—36 hours following the last dose, especially if there is  
26 concurrent renal impairment (rare in children). Close monitoring is required and hospital  
27 care should be considered.

[E]

### 28 ***Severe hypoglycaemia***

#### 29 *Intravenous management*

30 Hypoglycaemia which causes unconsciousness or seizures is an emergency. If the child is in  
31 hospital and rapid intravenous access is possible, severe hypoglycaemia should be treated  
32 with glucose intravenous infusion 10%.

[A]

- 33 A bolus dose using 10% glucose can be given prior to the glucose infusion. [E]
- 34 Glucose infusion 10% can be given intravenously into a large peripheral vein or a central [A]  
35 line. When a peripheral line is used, careful administration and close monitoring of the  
36 infusion site is required to prevent thrombophlebitis and extravasation that may cause  
37 tissue damage. Pain and phlebitis may occur during administration, particularly if infused  
38 too quickly. Glucose intravenous infusion 50% is not recommended as it increases the risk  
39 of extravasation injury, and is very viscous and hypertonic, making administration difficult.
- 40 *Oral and intramuscular management*
- 41 Severe hypoglycaemia outside of hospital or when rapid intravenous access is not [A]  
42 available, may be treated with concentrated oral glucose solution, as long as the child is  
43 **conscious and able to swallow**. Proprietary products of quick-acting carbohydrate (e.g.  
44 *GlucoGel<sup>®</sup>, DextroGel<sup>®</sup>, GSF-Syrup<sup>®</sup>, RapiLOSE<sup>®</sup> gel*) are available on prescription for the  
45 patient to keep at hand in case of severe hypoglycaemia.
- 46 If the child is **unconscious or unable to swallow**, intramuscular glucagon should be given. [A]  
47 Glucagon increases blood-glucose concentration by mobilising glycogen stored in the liver.  
48 The manufacturer advises that it is ineffective in patients whose liver glycogen is depleted,  
49 therefore should not be used in anyone who has fasted for a long period, has adrenal  
50 insufficiency, chronic hypoglycaemia, glycogen storage disorders or alcohol induced  
51 hypoglycaemia (in these cases intravenous glucose will be required).
- 52 As symptoms improve or normoglycaemia is restored, and the child is sufficiently awake, [A]  
53 oral complex long-acting carbohydrate should be given to maintain normal blood-glucose  
54 concentration and to restore liver glycogen.
- 55 The blood-glucose concentration should be re-checked repeatedly in children and young [A]  
56 people who have persistently reduced consciousness after a severe hypoglycaemic  
57 episode, to determine whether further glucose is needed.  
58 See Diabetic hypoglycaemia (*Medical emergencies in the community*)
- 59 *Advice for parents or carers*
- 60 Parents or carers of insulin-treated children should be trained and equipped to give [A]  
61 intramuscular glucagon for emergency use in severe hypoglycaemic attacks.
- 62 Parents or carers should be advised to seek medical assistance if glucagon is not effective [A]  
63 within 10 minutes as intravenous glucose is required.
- 64 ***Non-severe hypoglycaemia***

65 In children who are able to swallow, non-severe hypoglycaemia should be treated with [A]  
66 approximately 300mg/kg body-weight of fast-acting carbohydrate by mouth, preferably in  
67 liquid form (which may be taken more easily). Oral glucose solutions should not be used if  
68 consciousness is reduced as this could be dangerous (risk of choking).

69 Approximately 10–20g of oral fast-acting carbohydrate is available from 2–4 teaspoonful [A]  
70 of sugar added to a cup of water or other drink, 90–180 mL of fizzy drink or squash (not  
71 sugar-free or reduced sugar versions) or 3–6 glucose tablets. Chocolates and biscuits should  
72 be avoided if possible because they have a lower sugar content and their high fat content  
73 may delay stomach emptying.

74 Administration of fast-acting carbohydrates may need to be in frequent small amounts [A]  
75 because hypoglycaemia can cause vomiting.

76 Blood-glucose concentrations should rise within 5 to 15 minutes; if hypoglycaemia persists [A]  
77 after 15 minutes repeat the fast acting glucose.

78 As symptoms improve or normoglycaemia is restored, a complex long-acting carbohydrate [A]  
79 snack (e.g. two biscuits, one banana), or a meal must be given, to prevent blood-glucose  
80 concentration from falling again, unless the child is receiving a continuous subcutaneous  
81 insulin infusion.

## 82 **Neonatal hypoglycaemia in term babies**

83 Infants at risk of impaired metabolic adaptation and hypoglycaemia include infants of  
84 diabetic mothers (including gestational diabetes), whose mothers have taken beta-blockers  
85 and those with intrauterine growth restriction.

86 Severe or persistent hypoglycaemia requires urgent medical review. [E]

87 Asymptomatic neonatal hypoglycaemia at birth may be treated by increasing breast- [A]  
88 feeding frequency, supplementing with a breast milk substitute (i.e. donor breast milk or  
89 formula), or intravenous glucose therapy.

90 Buccal glucose gel may be used in conjunction with a feeding plan. [E]

91 When feeding interventions are offered, blood-glucose concentrations should be [A]  
92 rechecked in one hour to ensure there has been a response. If feeding interventions are  
93 not effective, glucose intravenous infusion 10% should be given and blood-glucose retested  
94 within half an hour.

95 Symptomatic hypoglycaemic neonates should be treated immediately with a glucose [A]  
96 intravenous infusion.

- 97 If there is a delay in obtaining intravenous access, consider either intramuscular glucagon [E]  
98 or buccal glucose gel. If blood glucose <1mmol/L buccal glucose should only be used as an  
99 interim measure while arranging treatment with intravenous glucose infusion.
- 100 Neonates requiring 12mg/kg/min or more of glucose to maintain normoglycaemia, should [E]  
101 be investigated for congenital hyperinsulinism.

## **BNF Publications Evidence Grading System**

### **Levels of Evidence**

<b>Level</b>	<b>Type of study</b>
1++	High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1+	Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias
4	Expert advice or clinical experience from respected authorities

### **Grades of recommendation**

<b>Grade</b>	<b>Strength</b>	<b>Evidence type</b>
A	High	NICE-accredited guidelines Other guidelines that pass AGREE II assessment At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; <i>or</i> A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results
E	Practice point	Evidence level 4

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