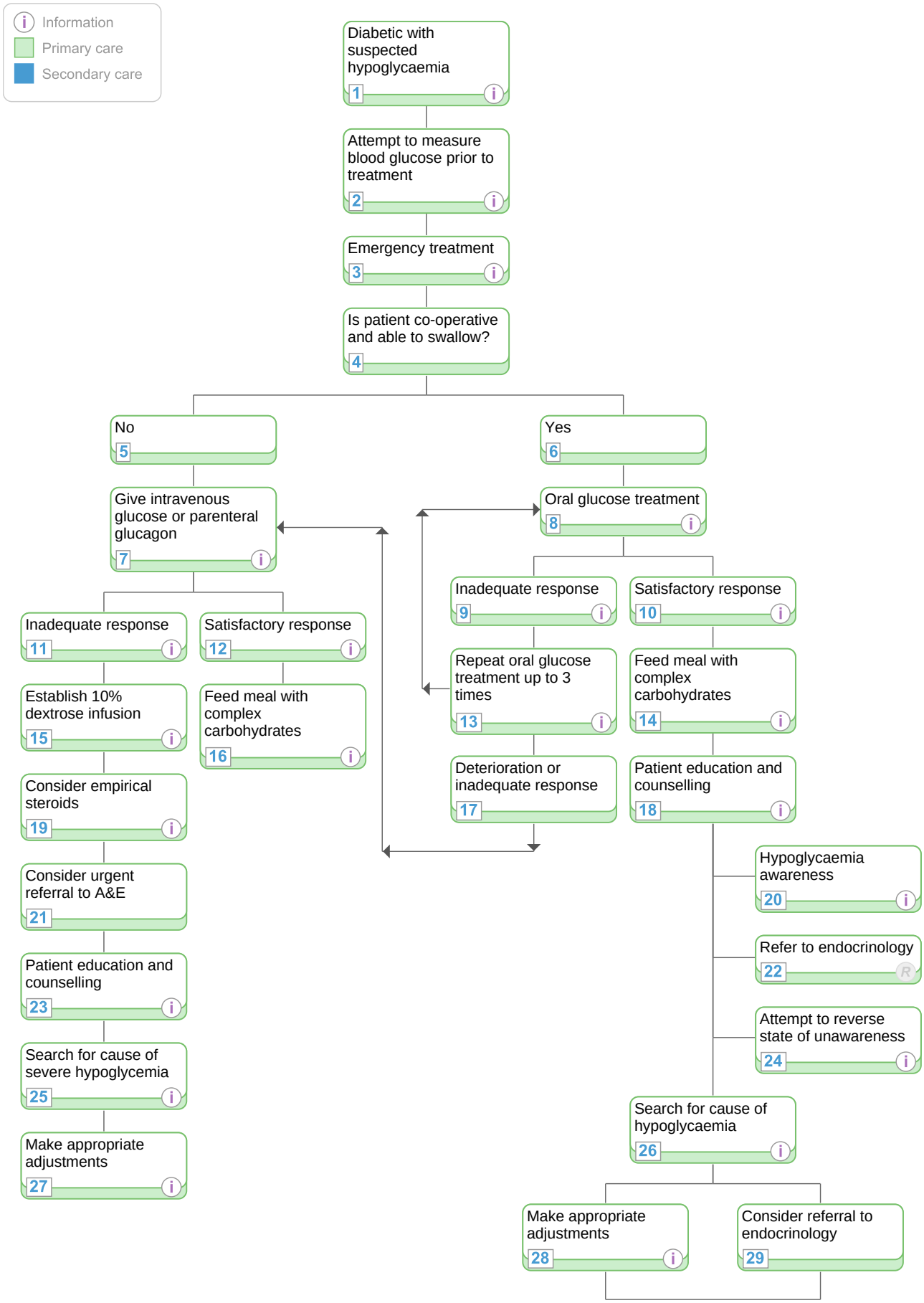
Hypoglycaemia - treatment in diabetic patients

http://healthguides.mapofmedicine.com/choices/map/hypoglycaemia4.html



Last reviewed: 30-Oct-2008 Due for review: 31-Aug-2010 Printed on: 20-Aug-2009

IMPORTANT NOTE
Last reviewed refers to the date of completion of the most recent review process for a pathway. All pathways are reviewed regularly every twelve months, and on an ad hoc basis if required.

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1 Diabetic with suspected hypoglycaemia

Quick info:

- combination of sympathomimetic and neurological clinical features
- hypoglycaemia is defined as a blood glucose less than 3mmol/L; however, hypoglycaemic symptoms can occur at a higher blood glucose level in those with diabetes
- symptoms of sympathetic drive:
  - sweating
  - anxiety
  - tremulousness
  - nausea
  - tachycardia
  - pallor
- symptoms of neuroglycopaenia:
  - fatigue and drowsiness
  - aggression
  - dizziness
  - visual disturbances
  - speech impairment
  - poor concentration
  - abnormal behaviour
  - confusion
  - loss of consciousness and seizures
- symptoms vary between patients but individuals tend to show the same manifestations with each episode
- patients may be unaware of hypoglycaemic symptoms
- symptoms may suggest hypoglycaemia but diagnosis depends on demonstration of hypoglycaemia and resolution by administration of glucose

2 Attempt to measure blood glucose prior to treatment

Quick info:

- rapid finger-prick bedside testing to check blood glucose level
- if the patient is not a diabetic on treatment, consider drawing extra blood (do not allow this to delay treatment) for:
  - insulin
  - C-peptide
  - cortisol
  - growth hormone
- never withhold therapy pending confirmation of bedside or laboratory testing

3 Emergency treatment

Quick info:

- medical emergency
- patients with poorly-controlled diabetes experience hypoglycaemic symptoms at a higher sugar level than in those with well-controlled diabetes
- autonomic neuropathy in longstanding diabetes may impair adrenergic and glucagonergic response

7 Give intravenous glucose or parenteral glucagon

Quick info:

- intravenous (IV) glucose:
  - 25mL glucose 50%; or
  - 50mL glucose 20%; or
  - 100mL glucose 10%; or
- glucagon 1mg (IV, intramuscular or subcutaneous)
- IV glucose is irritant, especially if more concentrated solutions are used or extravasation occurs
- ensure that the cannula is properly inserted and patent prior to infusion

- glucagon can take 5-10 minutes to work, but may be a preferred option if IV access can not be obtained, it has short duration of action (15-20 minutes)

References:

Emergency Care Specialist Library, Joint Royal Colleges Ambulance Liaison Committee (JRCALC). Glycaemic emergencies. Coventry: Emergency Care Specialist Library, JRCALC; 2004.

British National Formulary (BNF). Treatment of hypoglycaemia. London: BNF; 2004.

8 Oral glucose treatment

Quick info:

- 10-20g glucose
- 120mL of orange juice (10-15g glucose); consider adding granulated sugar (teaspoon = 5g glucose)
- glucose tablets (usually 5g/tablet)
- honey or maple syrup

References:

Emergency Care Specialist Library, Joint Royal Colleges Ambulance Liaison Committee (JRCALC). Glycaemic emergencies. Coventry: Emergency Care Specialist Library, JRCALC; 2004.

British National Formulary (BNF). Treatment of hypoglycaemia. London: BNF; 2004.

9 Inadequate response

Quick info:

- glucose should be administered until blood glucose level is at least 5.0 mmol/L

10 Satisfactory response

Quick info:

- glucose should be administered until blood glucose level is at least 5.0 mmol/L

11 Inadequate response

Quick info:

- glucose should be administered until blood glucose level is at least 5.0 mmol/L

12 Satisfactory response

Quick info:

- glucose should be administered until blood glucose level is at least 5.0 mmol/L

13 Repeat oral glucose treatment up to 3 times

Quick info:

Reference:

Emergency Care Specialist Library, Joint Royal Colleges Ambulance Liaison Committee (JRCALC). Glycaemic emergencies. Coventry: Emergency Care Specialist Library, JRCALC; 2004.

14 Feed meal with complex carbohydrates

Quick info:

- ensures longer lasting effect of hypoglycaemia treatment

Reference:

British National Formulary (BNF). Treatment of hypoglycaemia. London: BNF; 2004.

15 Establish 10% dextrose infusion

Quick info:

- 3mL/Kg body weight/hour

16 Feed meal with complex carbohydrates

Quick info:

- ensures longer lasting effect of hypoglycaemia treatment

Reference:

British National Formulary (BNF). Treatment of hypoglycaemia. London: BNF; 2004.

18 Patient education and counselling

Quick info:

Discuss with the patient:

- any modification in medications to reduce the risk of further hypoglycaemia
- how to recognise the symptoms of hypoglycaemia
- the role of alcohol in increasing the risk of hypoglycaemia
- the effect of exercise on blood glucose levels and glucose and insulin intake in relation to this
- the effect of illness on blood glucose levels
- the importance of regular meals

Reference:

PRODIGY. Diabetes Type 2 – blood glucose management. Newcastle upon Tyne: PRODIGY; 2005.

19 Consider empirical steroids

Quick info:

- IV bolus of hydrocortisone 1-2mg/kg every 6 hours
- consider adrenal insufficiency

20 Hypoglycaemia awareness

Quick info:

- failure to sense warning signs of impending hypoglycaemia
- unable to pre-empt progression by taking glucose
- hypoglycaemia-associated autonomic failure may facilitate hypoglycaemic unawareness – defective glucose counter-regulation (loss of glucagon and sympathetic responsiveness)
- in intensive treatment regimens, lower blood glucose levels may be required to elicit autonomic responses

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- the effect of exercise on blood glucose levels and glucose and insulin intake in relation to this
- the effect of illness on blood glucose levels
- the importance of regular meals

Reference:

PRODIGY. Diabetes Type 2 – blood glucose management. Newcastle upon Tyne: PRODIGY; 2005.

24 Attempt to reverse state of unawareness

Quick info:

- scrupulous avoidance of iatrogenic hypoglycaemia for a few weeks:
  - may restore state of awareness
  - partially restore adrenergic response to hypoglycaemia

Reference:

Colquitt JL, Green C, Sidhu MK et al. Clinical and cost-effectiveness of continuous subcutaneous insulin infusion for diabetes. Health Technol Assess 2004; 8: iii-171.

25 Search for cause of severe hypoglycemia

Quick info:

Causes include:

- accidental or intentional excessive insulin
- over-intensive attempts to control glycaemia
- reduced calorie intake or malabsorption
- excessive exercise
- infection with anorexia
- vomiting
- increased insulin sensitivity with weight loss
- drugs increasing insulin sensitivity (eg. Biguanides and glitazones)
- drugs impairing hyperadrenergic response to hypoglycaemia (eg. beta blockers)
- impaired hepatic gluconeogenesis or glycogenolysis (eg. alcohol)
- reduced insulin clearance in renal failure
- adrenal insufficiency

References:

Emergency Care Specialist Library, Joint Royal Colleges Ambulance Liaison Committee (JRCALC). Glycaemic emergencies. Coventry: Emergency Care Specialist Library, JRCALC; 2004.

British National Formulary (BNF). Treatment of hypoglycaemia. London: BNF; 2004.

National Institute for Clinical Excellence (NICE). Clinical guidelines for type 2 diabetes – management of blood glucose. London: NICE; 2005.

PRODIGY. Diabetes Type 2 – blood glucose management. Newcastle upon Tyne: PRODIGY; 2005.

International Diabetes Center (IDC). Type 2 diabetes practice guidelines. Minneapolis (MN): IDC; 2000.

Institute for Clinical Systems Improvement (ICSI). Management of type 2 diabetes mellitus. Bloomington (MN): ICSI; 2004.

Campbell A. Glycaemic control in type 2 diabetes. Clin Evid 2005; In press.

26 Search for cause of hypoglycaemia

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27 Make appropriate adjustments

Quick info:

- treat the cause of the hypoglycaemia if possible (eg. antibiotics for infection)
- modify dose, type and mode of delivery of insulin or oral hypoglycaemic agent if appropriate
- two systematic reviews indicate that some insulin analogues may be associated with a decreased rate of hypoglycaemic episodes compared to human insulin
- however, two other systematic reviews indicate no difference in the frequency of hypoglycaemic episodes between human and animal insulin
- subcutaneous insulin infusion pumps may reduce the frequency of hypoglycaemic episodes; however, they may increase the frequency of ketoacidosis if the pump fails or is blocked
- intensive insulin treatment may increase frequency of hypoglycaemic episodes
- combining oral hypoglycaemics increases the risk of a hypoglycaemic episode

References:

Campbell A. Glycaemic control in type 1 diabetes. Clin Evid 2005; 660-68.

Colquitt JL, Green C, Sidhu MK et al. Clinical and cost-effectiveness of continuous subcutaneous insulin infusion for diabetes. Health Technol Assess 2004; 8: iii-171.

Richter B, Neises G. 'Human' insulin versus animal insulin in people with diabetes mellitus. Cochrane Database Syst Rev 2003; CD003816.

Airey CM, Williams DR, Martin PG et al. Hypoglycaemia induced by exogenous insulin - 'human' and animal insulin compared. Diabet Med 2000; 17: 416-32.

Haycox A. Insulin aspart: An evidence-based medicine review. Clin Drug Investig 2004; 24: 695-717. Campbell A. Glycaemic control in type 2 diabetes. Clin Evid 2005; In press.

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- two systematic reviews indicate that some insulin analogues may have a decreased rate of hypoglycaemic episodes compared to human insulin

- two systematic reviews indicate no difference in the frequency of hypoglycaemic episodes between human and animal insulin
- subcutaneous insulin infusion pump may reduce the frequency of hypoglycaemic episodes (though it may increase the frequency of ketoacidosis which can occur if the pump fails or blocks)
- intensive insulin treatment by multiple does injection may increase frequency of hypoglycaemic episodes
- combining oral hypoglycaemics increases the risk of a hypoglycaemic episode

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Campbell A. Glycaemic control in type 1 diabetes. Clin Evid 2005; 660-68.

Colquitt JL, Green C, Sidhu MK et al. Clinical and cost-effectiveness of continuous subcutaneous insulin infusion for diabetes. Health Technol Assess 2004; 8: iii-171.

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Key Dates

Due for review: 31-Aug-2010
Last reviewed: 30-Oct-2008, by International
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Accreditations

The editorial process used to create this pathway is accredited by:

NHS Institute for Innovation and Improvement:

Accreditation attained: 31-Jan-2009

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Disclaimer

Certifications

The evidence for this pathway is certified by:

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Due for review: 31-Jan-2010

Disclaimer

Evidence summary for Hypoglycaemia - treatment in diabetic patients

The pathway is based on our interpretation of the following guidelines (1, 2). All of these guidelines have been graded for quality and prioritised for inclusion based on their methodological quality. All intervention nodes (i.e. those concerning therapy and therapeutic advice) have been graded for the quality of the evidence underlying them (see table 1).

Search date: Nov-2005

Evidence grades:

- 1 Intervention node supported by level 1 guidelines or systematic reviews
- 2 Intervention node supported by level 2 guidelines
- E Intervention node based on expert clinical opinion
- U Non-intervention node, not graded

Evidence grading:

Graded node titles that appear on this page	Evidence grade	Reference IDs
Give intravenous glucose or parenteral glucagon	2	1, 2
Search for cause of severe hypoglycemia	1	1, 2, 3, 4, 5, 6, 12
Make appropriate adjustments	1	8, 11, 9, 10, 7, 12
Oral glucose treatment	2	1, 2
Repeat oral glucose treatment up to 3 times	E	1
Feed meal with complex carbohydrates	2	2
Patient education and counselling	E	4
Attempt to reverse state of unawareness	1	8
Search for cause of hypoglycaemia	1	1, 2, 3, 4, 5, 6, 12
Make appropriate adjustments	1	8, 11, 9, 10, 7, 12

References

This is a list of all the references that have passed critical appraisal for use in the pathway Hypoglycaemia

ID	Reference
1	Joint Royal Colleges Ambulance Liaison Committee (JRCALC). Glycaemic emergencies. London: JRCALC; 2004.
2	British National Formulary (BNF). Treatment of hypoglycaemia. London: BNF; 2004. http://www.bnf.org/bnf/bnf/current/noframes/4195.htm
3	NICE. Clinical guidelines for type 2 diabetes - management of blood glucose. London: National Institute for Clinical Excellence; 2005.
4	PRODIGY. Diabetes Type 2 - blood glucose management. Newcastle upon Tyne: PRODIGY; 2005.
5	International Diabetes Center (IDC). Type 2 diabetes practice guidelines. Minneapolis, MN: IDC; 2000. http://www.guideline.gov/summary/summary.aspx?ss=15&doc_id=4159&nbr=3187
6	Institute for Clinical Systems Improvement (ICSI). Management of type 2 diabetes mellitus. Bloomington, MN: ICSI; 2004.
7	Campbell A. Glycaemic control in type 1 diabetes. Clin Evid 2005; 660-668.
8	Colquitt JL, Green C, Sidhu MK et al. Clinical and cost-effectiveness of continuous subcutaneous insulin infusion for diabetes. Health Technol Assess 2004; 8: 1-171. http://www.d4pro.com/IDM/site/csii_vs__mdi_insights_from___.htm
9	Richter B, Neises G. 'Human' insulin versus animal insulin in people with diabetes mellitus. Cochrane Database Syst Rev 2003; CD003816. http://mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD003816/frame.html
10	Airey CM, Williams DR, Martin PG et al. Hypoglycaemia induced by exogenous insulin - 'human' and animal insulin compared. Diabet Med 2000; 17: 416-432. http://www.blackwell-synergy.com/doi/abs/10.1046/j.1464-5491.2000.00304.x?journalCode=dme
11	Haycox A. Insulin aspart: An evidence-based medicine review. Clin Drug Investig 2004; 24: 695-717. http://pt.wkhealth.com/pt/re/dri/fulltext.00044011-200424120-00002.htm jsessionid=LtFBFV6GSFLwNSK1wKYM1Tq2n1L6p9jvrZfTlyh7CrR2y885V1Sn!-2121125135!181195628!8091!-1
12	Campbell A. Glycaemic control in type 2 diabetes. Clin Evid 2005; 474-490.

Disclaimers