Treatment of hypoglycaemia in patients with diabetes

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Treatment of hypoglycaemia in patients with diabetes

Indications: Blood glucose level (BGL) less than 4 mmol/L irrespective of symptoms.

Adults (including diabetes in pregnancy): as per protocol below

Paediatric: see below & consider consultation with paediatric service once patient stabilised.

### A. Safe to swallow (i.e. awake and co-operative)

If on insulin infusion suspend immediately.
If using insulin pump, disconnect if BGL less than 2 mmol/L

<table>
<thead>
<tr>
<th>Unconscious or unsafe to swallow</th>
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<tbody>
<tr>
<td>Place in coma position (if on insulin infusion or using an insulin pump – suspend/disconnect immediately).</td>
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<tr>
<td>Notify doctor on call immediately (ie CODE BLUE). If no local doctor available call MedSTAR.</td>
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Adults – Give 1mg glucagon IM (as per CHSA standing order, once only).
If no response to glucagon within 10 mins the doctor may then order: 20-30 ml 5% D5W
Followed by 5-10% Glucose infusion to maintain BGL 5-10 mmol/L.

**Child under 25kgs**
Give 0.5 mg glucagon IM (as per CHSA standing order, once only).

**Infant/child/adolescent**
IV / IO 10% Glucose in 100mls, 2ml/kg over 2 minutes.
Followed by 5-10% Glucose infusion to maintain BGL 5-10 mmol/L.

When conscious and safe to swallow GO TO B
Commence maintenance IV glucose for prolonged hypoglycaemia and/or prevention of repeat episodes in high risk patients.

### B. Give 15g of fast acting carbohydrate.

Hypo Kit: 60ml Carbotest (75 grams per 300ml) *(See below for alternative options)*

GO TO C

### C. Repeat BGL 10 minutes after treatment.

- If BGL is less than 4 mmol/L OR patient still has symptoms and is assessed as:-
  - safe to swallow – GO TO B
  - if BGL remains <4.0mmol/L after 45 minutes or 3 oral cycles, NOTIFY DOCTOR.
  - if unsafe to swallow – GO TO A

- When BGL is 4 mmol/L or above AND symptoms are no longer present give 15g slow acting carbohydrate.
  Hypo Kit: 2 x sweet biscuit eg Arnotts 2 pack *(See below for alternative options)*
  Recheck BGL in 30 mins.

GO TO D

### D. If BGL remains above 4 mmol/L resume QID BGL monitoring and include 0200 for first 24hrs.

- If the Doctor was not notified, do so at appropriate time so diabetes treatment can be reviewed.
  - recommence insulin infusion/reconnect insulin pump as per medical instructions
  - (in type 1 diabetes do not suspend / hold insulin for more than 1 hour).
  - Continue to administer insulin as prescribed, contact prescriber if concerned.
  - Withholding the next insulin dose may result in hyperglycaemia.
  - Beware of recurrent hypoglycaemia – resume QID BGL monitoring and include 0200 for first 24hrs.

*Alternatives for Hypo Kit

**Fast acting carbohydrate**
- 100 ml Carbotest (50g carbohydrate in 300 ml) OR
- 90mls Lucozade (15g equiv).

**Slow acting carbohydrate**
- 2 plain Milk Coffee, Arrowroot or similar OR
- 8 Jatz.

**Important points** – observe pulse and BP with event

- Ensure maintenance IV glucose and/or adequate carbohydrate with meals to replenish the liver glucose stores.

* Intravenous route (IO) should only be used by staff who are trained and have achieved clinical competency.
* If hypo was severe (eg BGL less than 2mmol/L, unconscious or assessed as unsafe to swallow) or prolonged (greater than 45mins) the patient should have hourly BGLs until medical review.
* Restock the Hypokit – discard all opened items.
Treatment of hypoglycaemia

1. Overview/procedure description

This Clinical Practice Guide outlines the requirements for the management of hypoglycaemia in Country Health SA hospitals and aged care services. The Guide supports the attached ‘Treatment of hypoglycaemia in patients with diabetes’ protocol.

These guidelines are not appropriate for neonates, infants, children or adults who do not have diabetes and who present with hypoglycaemia from other causes. Seek specialist medical advice for patients without known diabetes.

Definition

Hypoglycaemia is a blood glucose levels less (BGL) than 4mmol/L irrespective of symptoms. Hypoglycaemia is a potentially life threatening emergency that requires immediate and appropriate treatment.

Signs and symptoms of mild hypoglycaemia include

- Weakness, trembling or shaking
- Light-headed
- Excessive sweating, faintness
- Headache
- Tearful and crying
- Hunger
- Irritability
- Numbness around the lips and fingers
- Dizziness
- Lack of concentration

Signs and symptoms of moderate to severe hypoglycaemia include

- Behaviour change
- Confusion
- Slurred speech
- Loss of coordination
- Loss of consciousness
- Seizure

Causes

- illness eg vomiting, diarrhoea, loss of appetite
- fasting
- too much insulin/diabetes tablets
- not eating enough carbohydrates eg mismatch between rapid insulin and carbohydrate in meal
- missed or delayed meals eg no carbohydrate or not eating immediately after injecting rapid insulin
- unplanned physical activity
- more strenuous physical activity than usual
- excessive alcohol
Assessing swallowing

**Safe to swallow** means that the patient is alert and co-operative and can swallow fluids safely.

**Unsafe to swallow** means that the patient is either:

- unconscious
- fasting
- has previous swallowing difficulties eg restricted oral intake of thickened fluids
- shows current signs of inability to swallow, eg dribbling is noted, cannot cough

**Oral treatment of any kind in the above situations is not safe** (this includes the use of honey, thickened fluids, glucose gels etc).

Hypoglycaemia kits

**Hypo kit** refers to a clear plastic container which contains the oral treatment for hypoglycaemia. It is recommended that the hypo kit be kept next to the blood glucose monitoring equipment or with the emergency trolley. IM Glucagen® and the IV glucose are available in the emergency trolley.

*Glucagon* is a hormone that increases the blood glucose level. It does this by triggering the release of glucose from stored carbohydrate (glycogen) in the liver into the blood. Glucagon will only work to increase the blood glucose level if there is an adequate store of glycogen in the liver.

**Contents of ‘Hypo kit’** Restock the hypo immediately after use.

- Hypo flow chart on inside of lid
- 1 bottle of Carbotest (75 grams per 300 mls)
- 60 mL measure cup
- 2 packets of Arrowroot 2 biscuit serves (15g CHO each)

2. **Areas of responsibility**

It is the responsibility of nursing directors and senior nurses to ensure that all nursing staff are aware of this protocol and their responsibilities within it.

Country Health SA Diabetes Service, credentialled diabetes educators, diabetes educators and diabetes link nurses will be responsible for informing directors of nursing, clinical service coordinators and general nursing and medical staff of any relevant changes in practice.

Registered nurses and midwives, enrolled nurses, student nurses, midwives and allied health staff are responsible for ensuring they are familiar with the protocol.

The individual staff member involved in the hypoglycaemia event is responsible for management, notification of the doctor, documentation and restocking of the hypo kit.
3. Protocol details

Indication

The protocol should be used for all patients with diabetes who have a BGL less than 4 mmol/L irrespective of symptoms. If a patient complains of symptoms and BGL is greater than 4 mmol/L treat with a 15gm carbohydrate snack.2

Adults (including diabetes in pregnancy): follow protocol

Paediatrics: follow protocol and consider consultation with paediatric service once patient is stabilised. This will depend on severity.

Protocol flow chart

Assess if patient is safe to swallow and follow the protocol accordingly. A staff member must stay with the patient until the hypoglycaemia has resolved.

Safe to swallow, eg awake and co-operative

1. If receiving IV insulin/dextrose infusion, suspend insulin infusion until resolution of hypoglycaemia. Do not suspend the IV dextrose. In type 1 diabetes, do not suspend / withhold insulin for more than 1 hour.

2. If using an insulin pump and BGL between 2 – 3.9mmols/L, do not disconnect the pump. Treat hypoglycaemia as per protocol.

3. If BGL remains under 4mmol/L after 3 cycles of oral treatment or 45 minutes (patient is conscious) notify a doctor for review and to provide further instructions.

Unconscious or unsafe to swallow, eg uncooperative

1. If receiving IV insulin/dextrose infusion, suspend insulin infusion until resolution of hypoglycaemia. Do not suspend the IV dextrose. In type 1 diabetes, do not suspend / withhold insulin for more than 1 hour.

2. If using an insulin pump and BGL less than 2mmols/L, or patient is unconscious or conscious state impaired, disconnect insulin pump tubing from the infusion set immediately. In type 1 diabetes, do not suspend / withhold insulin for more than 1 hour.

3. Notify doctor on call immediately (eg CODE BLUE).


IM glucagon dosage

   Adults – 1mg

   Children under 25 kgs - 0.5mg

Ensure the emergency trolley is easily accessible. After administration of glucagon a doctor must be consulted (eg by phone) and depending on the patient’s condition and response to glucagon the doctor may order IV glucose. Important note: If IM glucagon is administered take note that the patient may feel nauseous and/or vomit. Always give adequate follow up oral carbohydrate or maintenance IV glucose after IM glucagon as glycogen stores in the liver need to be replenished. Repeat episodes of hypoglycaemia are common. Monitor BGLs closely as per flow chart.
IV or IO in adults

IV / IO 50% Glucose in 50mls, administer 20-30 mls is recommended. This should be given as a slow push (3mls/min). Be aware that 50% glucose is a hypertonic solution which can cause local pain, vein irritation, and thrombophlebitis.³ Side effects can be minimised by using a large peripheral vein and adhering to the recommended rate of 3ml/min.

Followed by a 5 or 10% Glucose infusion to maintain BGL 5-10 mmol/L.⁴ ⁵

IV or IO in infants/ children/adolescents

IV / IO 10% Glucose in 100mls, administer 2ml/kg over 2 minutes. Followed by a 5 or 10% Glucose infusion to maintain BGL 5-10 mmol/L.⁴ ⁵

IO – intraosseous injection and infusion is an acceptable alternative to intravenous injection as stated in the Australian Resuscitation Council guidelines. The bone marrow has a rich blood supply and forms part of the peripheral circulation. When drugs are administered they attain the same plasma concentrations as those injected intravenously.⁶ IO route should only be used by staff who are trained and have achieved clinical competency. For further information go to CHSA WIKI

Clinical Resources for Emergency Departments, and Australian Resuscitation Guidelines

Treatment post hypoglycaemia⁷

Following an event please review the patient’s diabetes management and wherever possible identify any avoidable causes. Beware of recurrent hypoglycaemia and monitor BGL as per Blood Glucose Monitoring Chart and include 0200 hours in the first 24 hours after last hypoglycaemic event. If hypoglycaemia was severe (eg BGL less than 2mmol/L, unconscious or assessed as unsafe to swallow) or prolonged, the patient should have hourly BGLs until medical review.

On insulin

a) if the cause is identified and found to be avoidable, eg missed meal, reduced carbohydrate intake, then insulin dose adjustment is not required unless loss of appetite is persistent or there is a risk of a repeat hypoglycaemic event

b) if the cause is not identified or cannot be corrected;⁷
   > if hypoglycaemia has occurred within 4 hours after a mealtime then reduce rapid acting insulin dose related to that mealtime on the next day
   > if hypoglycaemia has occurred outside 4 hours after a meal then reduce basal insulin dose

c) if eating normally, do not withhold subsequent mealtime or basal insulin post hypoglycaemia. However, if there is reduced carbohydrate intake (eg risk of repeat hypoglycaemia) consider reducing the mealtime insulin dose.

On a sulphonylurea, seek advice on management if hypoglycaemia is recurrent or prolonged:

a) If recurrent hypoglycaemia, commence IV glucose titrating rate to BGL between 5-10 mmol/L.

b) Withhold oral hypoglycaemic until recovered and review the dose or consider alternate therapy.

4. Evaluation criteria

This protocol will be monitored via an auditing process. Health units may be asked to complete an audit for a designated period of time each year.

5. Staff orientation and training

Staff training is recommended at orientation and at increments that maintains competency.

Click to access the Moodle presentation
6. **Patient education support**

Patients will often have their own 'hypo action plan' that they use at home or when out and about. These action plans are generally fine for when the person is well; however hospitalisation brings with it a number of increased risks for the person with diabetes. It is important that as health professionals we provide the best treatment available when caring for patients with diabetes. Part of this care is explaining to patients that sometimes their diabetes will be managed differently while in hospital.

The 'Hypo Info Card' can be used to explain to patients at risk of hypoglycaemia and their families, the treatment used in hospital. Having an informed patient will lower their anxiety about their care.

![Are you at risk of low blood glucose (hypoglycaemia)?](image)

7. **References**


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*Treatment of hypoglycaemia in patients with diabetes*  
*CHSA Diabetes Service 2015*  
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