Clinical Support Guide | Treatment of hypoglycaemia in patients with diabetes

Developed by: Diabetes Service
Approved by: CHSALHN, Clinical Governance Committee on: 30/06/2019
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Version control and change history

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Treatment of hypoglycaemia in patients with diabetes

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Indications: Blood glucose level (BGL) less than 4.0 mmol/L, irrespective of symptoms

Adults (including diabetes in pregnancy): on insulin and/or a sulphonylurea as per protocol below. Paediatric: on insulin as per protocol below. Consultation with paediatrician once patient is stabilised.

### A Safe to swallow (ie awake and co-operative)

- If on intravenous (IV) insulin infusion, suspend immediately.
- If using insulin pump, only disconnect if BCL less than 2.0 mmol/L.

### B Unconscious or unsafe to swallow

#### Child under 25kg
- Give 0.5mg glucagon IM (as per CHSA standing order, once only).
- Infant/child/adolescent
- IV / IO 10% Glucose in 100ml, 2ml/kg over 2 minutes.
- Followed by 5 - 10% Glucose infusion to maintain BGL 5.0 - 10.0 mmol/L.

#### GO TO B

- Commence maintenance IV glucose for prolonged hypoglycaemia and/or prevention of repeat episodes in high risk patients.

#### Give 15gm of fast acting carbohydrate. *For children, use 0.3gm of fast acting carbohydrate per kg of body weight, up to a maximum dose of 15gm.*

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

#### GO TO C

#### C Repeat BGL 10 - 15 minutes after treatment.

- If BGL is less than 4.0 mmol/L OR patient still has symptoms and is assumed to:
  - Safe to swallow – GO TO B
  - If BGL remains <4.0 mmol/L after 45 minutes or 3 oral cycles, NOTIFY DOCTOR.
  - If unsafe to swallow – GO TO A
- When BGL is 4.0 mmol/L or above AND symptoms are no longer present, give 15gm slow acting carbohydrate. Hypo Kit: 2 x sweet biscuit eg Arnotts 2 pack *(See below for alternative options)*
- Recheck BGL in 30 min.

#### GO TO D

#### D If BGL remains above 4.0 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 / withhold insulin for more than 1 hour.
- Continue to administer insulin as prescribed, withholding the next insulin dose may result in hyperglycaemia. Contact prescriber for advice.
- Beware of recurrent hypoglycaemia - resume QID BGL monitoring and include 0200 for first 24hrs.

*Alternatives for Hypo Kit
- Fast acting carbohydrate
  - 100ml Carbotest (50gm carbohydrate in 300ml)
  - OR
  - 60ml Luczacade (15gm equiv).
- Slow acting carbohydrate
  - 2 plain Milk Coffee. Arrowroot or similar OR
  - 6 Jazz crackers.

### 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 insulin (UI) should only be used by staff who are trained and have achieved clinical competency.
- If hypoglycaemia was severe (eg BGL less than 2.0 mmol/L, unconscious or assessed as unsafe to swallow) or prolonged (greater than 40mins) the patient should have hourly BGLs until medical review.
- Restock the Hypokit – discard all opened items.
1. Overview
This Clinical Support 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 level (BGL) less than 4.0 mmol/L irrespective of symptoms. Hypoglycaemia is a potentially life threatening emergency that requires immediate and appropriate treatment.

Who is at risk?
People with diabetes who are treated with insulin or are on certain diabetes medications, eg sulphonylureas are at risk of hypoglycaemia (low blood glucose).

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, and/or
> lack of concentration.

Signs and symptoms of moderate to severe hypoglycaemia include;
> behaviour change
> confusion
> slurred speech
> loss of coordination
> loss of consciousness, and/or
> seizure.

Causes and risk factors
> illness eg vomiting, diarrhoea, loss of appetite
> fasting
> too much insulin/diabetes tablets
Treatment of hypoglycaemia in patients with diabetes

Country Health SA Local Health Network

> 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, OR
> 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 that contains 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 intravenous (IV) Glucose are available in the emergency trolley.

*Glucagon* is a hormone that increases blood glucose levels. 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 if there is an adequate store of glycogen in the liver.

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

Hypo flow chart on inside of lid
1 bottle of Carbotest (75gm per 300ml)
60ml 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. Indication

The protocol should be used for all patients with diabetes who have a BGL less than 4.0 mmol/L irrespective of symptoms. If a patient complains of symptoms and BGL is greater than 4.0 mmol/L treat with a 15gm carbohydrate snack.

Adults (including diabetes in pregnancy): follow protocol

Paediatrics: follow protocol and consider consultation with paediatric service for advice, especially if impaired conscious state or hypoglycaemia is prolonged or repeated.

4. 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 event has resolved.

Safe to swallow, eg awake and co-operative

> Adults and children over 50kg are treated with 15gm of fasting acting carbohydrate. Carbotest is the product of choice. 15gm of carbohydrate = 60ml of Carbotest (75gm per 300ml).

> Children weighing less than 50kg can be treated with 0.3gm of fasting acting carbohydrate per kilogram body weight, up to a maximum dose of 15gm.

> Example, for a child weighing 33kg the dose of carbohydrate is 10gm. 10gm of carbohydrate = 40ml of Carbotest (75gm per 300ml).

\[
\text{Carbotest is 75gm in 300 ml}
\]

\[
\text{Dose needed is 10 gm}
\]

\[
\text{Volume to administer}
\]

\[
\frac{10}{75} \times 300 = 40 \text{ml Carbotest}
\]
Treatment of hypoglycaemia in patients with diabetes

> 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 IV insulin for more than 1 hour.

> If using an insulin pump, and BGL between 2.0 - 3.9 mmol/L, do not disconnect the pump. Treat hypoglycaemia as per protocol. Only disconnect the insulin pump if BGL less than 2.0 mmol/L.

> If BGL remains less than 4.0 mmol/L after 3 cycles of oral treatment or 45 minutes (patient is conscious), suspect prolonged hypoglycaemia and notify a doctor for review and possible IV Glucose order.

Unconscious or unsafe to swallow, eg uncooperative, impaired conscious state, history of swallowing difficulties.

> 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 IV insulin for more than 1 hour.

> If using an insulin pump and BGL less than 2.0 mmol/L, disconnect insulin pump tubing from the infusion site immediately. In type 1 diabetes, do not withhold insulin for more than 1 hour.

> Notify doctor on call immediately (eg CODE BLUE). MedStar for other sites.

> Administer IM Glucagon as per CHSA standing order (one dose only). To access the standing order go to: https://sagov.sharepoint.com/sites/CHSA/clinical/drugtherapeutics/Pages/CHSA-Standing-Drug-Orders.aspx

**IM glucagon dosage**

- Adults - 1mg
- Children under 25kg - 0.5mg

Ensure the emergency trolley is easily accessible. After administration of glucagon a doctor must be consulted (eg by phone) and updated on the patients’ blood glucose levels and conscious state. If any concerns, the patient should be reviewed by a doctor for possible commencement of 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 50ml, administer 20 - 30ml is recommended. This should be given as a slow push (3ml/min). Be aware that 50% Glucose is a hypertonic solution which can cause local pain, vein irritation, and thrombophlebitis. 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 5.0 - 10.0 mmol/L.

**IV or IO in infants/children/adolescents**

IV / IO 10% Glucose in 100ml, administer 2ml/kg over 2 minutes. Followed by a 5 or 10% Glucose infusion to maintain BGL 5.0 - 10.0 mmol/L.

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.
supply and forms part of the peripheral circulation. When drugs are administered they attain the same plasma concentrations as those injected intravenously.\textsuperscript{6} IO route should only be used by staff who are trained and have achieved clinical competency. For further information go CHSALHN Guidelines for Emergency Trolley Contents 2018.

5. Treatment post hypoglycaemia\textsuperscript{7}
Following a hypoglycaemic 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 2.0 mmol/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;\textsuperscript{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 5.0 - 10.0 mmol/L.

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

6. Evaluation and audits
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.

7. Staff orientation and training
Staff training is recommended at orientation and at increments that maintains competency.
Moodle presentation is available at https://www.saheducation.com/moodle/course/view.php?id=502

8. 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 support education of patients and their families about the risk of hypoglycaemia in hospital and the treatment used. Having an informed patient will lower their anxiety about their care.

**Linked Documents**

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<td>Treatment of Hypoglycaemia in Patients with Diabetes Protocol, 2019</td>
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**References**

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Accreditation Standards

National Safety and Quality Health Service Standards (NSQHSS)

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Evaluation and Quality Improvement Program (EQuIP)

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Australian Aged Care and Quality Agency (AACQA) – Home Care Common Standards

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Australian Aged Care and Quality Agency (AACQA) – Residential Aged Care Standards

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Consultation

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