

REGIONAL LOCAL HEALTH NETWORKS

Protocol (clinical)

Title: Treatment of hypoglycaemia in people with diabetes in the hospital and community setting

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RMC LHN Clinical Oversight Governance Committee on: 14/12/2022 Y&N LHN Operational Clinical Governance Committee on: 14/12/2022

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Summary This protocol outlines responsibilities and actions required by nurses and midwives to

ensure the safety and quality of patient care.

Policy/procedure

reference

This protocol supports the SA Health Recognising and Responding to Clinical Deterioration Policy Directive, Controlled Substances Act 1984, SA Health Directive:

High Risk Medicines Management.

Keywords Clinical, protocol, LHN emergency care

Document history | Is this a new LHN protocol? N

Does this protocol amend or update an existing protocol? Y

Does this protocol replace an existing protocol Y

Treatment of hypoglycaemia in patients with diabetes, Clinical Support Guide 2020

Applies to This protocol applies to all hospital and community medical, nursing, midwifery and

community care worker staff.

Objective file number

2019 - 03920

Version control and change history

Version	Date	Amendment	Amended by:
1.0	06/11/2013	Original version	CHSA Diabetes Service
2.0	01/02/2016	Updated	CHSA Diabetes Service
3.0	01/02/2019	New template	Rural Support Service Diabetes Service
3.0b	30/06/2019	Update paediatric treatment	Rural Support Service Diabetes Service
4.0	17/04/2020	Discontinuation of Carbotest & new template	Rural Support Service Diabetes Service
5.0	01/10/2022	Inclusion of additional information regarding 'safe to swallow'.	Rural Support Service Diabetes Service
		Updated IV glucose recommendations for adults	

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Flowchart



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Regional Local Health Networks Flowchart

Treatment of hypoglycaemia in the hospital and community setting

Indications: Blood glucose (BG) less than 4.0mmol/L irrespective of symptoms.

Adults (including diabetes in pregnancy): on insulin and/or sulfonylurea as per protocol below. Paediatric: on insulin as per protocol below, consultation with paediatrician once stabilised.



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

If on intravenous (IV) insulin infusion, **suspend** immediately.

If using insulin pump, only disconnect if BG less than 2 0mmol/l

Unconscious or unsafe to swallow

- Position person on their side. If on intravenous (IV) insulin infusion suspend immediately. If using an insulin pump – disconnect immediately.
- Notify doctor on call immediately (i.e. CODE BLUE). If no local doctor available call MedSTAR on 137 827 or an ambulance.

Adults – Give 1mg glucagon IM (as per regional LHN standing order, once only).

 If no response to glucagon within 10 minutes, the doctor may then order: 150 - 200mL IV / IO# 10% glucose (slow push over 15min), or with extreme caution, 20 - 30mL IV / IO# 50% glucose (slow push 3mL/min).
 Followed by 5% or 10% glucose infusion to maintain BG 5.0 - 10.0mmol/L.

Child under 25kg

Give 0.5mg glucagon IM (as per regional LHN 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 BG 5.0 - 10.0mmol/L

When conscious and safe to swallow GO TO B

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



Give 15gm of fast acting carbohydrate based on any special dietary requirements*

For children, use 0.3gm of fast acting carbohydrate per kg of body weight, up to a maximum dose of 15gm OR 60ml GTT 75® glucose drink (75gm per 300ml) from the regional LHN 'Hypo Kit'.





- Repeat BG 10 15 minutes after treatment
- If BG is less than 4.0mmol/L OR person still has symptoms and is assessed as:-
 - safe to swallow GO BACK TO B and repeat
 if BG remains less than 4.0mmol/L after 45 minutes or 3 oral cycles, NOTIFY doctor on call
 immediately (i.e. CODE BLUE). If no registered nurse or local doctor available, call ambulance
 or MEDSTAR.
 - if unsafe to swallow GO TO A.
- When BG is above 4.0mmol/L AND symptoms are no longer present, give 15gm slow acting carbohydrate based on any special dietary requirements* OR two (2) sweet biscuits from the regional LHN 'Hypo Kit'.
- Recheck BG in 30 mins.





- If BG remains above 4.0mmol/L, resume QID BG 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).
- Investigate cause of hypoglycaemia and risk of recurrent hypoglycaemia. Review carbohydrate intake. May need adjustment of insulin/diabetes medication.
- Continue to administer insulin as prescribed, withholding the next insulin dose may result in hyperglycaemia. Contact doctor for dose adjustment advice.
- If BG remains above 4.0mmol/L after first 24hous BG monitoring frequency may be reduced.

*Alternatives for regional LHN Hypo Kit are dependent on person's capacity to swallow and dietary requirements (e.g. texturemodified food, thickened fluids).

Fast acting carbohydrate: 100ml GTT 50[®] glucose drink (50gm carbohydrate in 300ml) OR 90ml Lucozade (15gm equivalent). Slow acting carbohydrate: two (2) plain Milk Coffee, Arrowroot OR six (6) Jatz 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.
- *Il o Should only be used by staff who are trained and have achieved clinical competency.
 *If hypo was severe (e.g. BG less than 2.0mmol/L, unconscious or assessed as unsafe to swallow) or prolonged (greater than 45mins) the person should have hourly BG until medical review.
- Restock the Hypo Kit discard all opened items

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 5
 Original version
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 Jane Giles
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1. Purpose and scope of use

This Protocol outlines the requirements for the management of hypoglycaemia in regional local health network (LHN) hospitals and community settings. The protocol is supported by resources including the flowchart and regional LHN hypoglycaemia kit.

It is the responsibility of nursing and community service directors to ensure that all medical, nursing, midwifery and allied health staff are aware of this protocol and their responsibilities within it.

Credentialled diabetes educators, diabetes educators and diabetes link nurses will be responsible for informing directors of nursing and community services, clinical service coordinators, general nursing and medical staff of any relevant changes in practice.

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

Individual staff members involved in the hypoglycaemia event are responsible for the management, notification of the doctor, documentation and restocking of the hypo kit.

This protocol is 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 people without known diabetes.

Indications

The protocol should be used for all people with diabetes who are treated with sulfonylureas or insulin and who have a BG less than 4.0mmol/L OR below the person's BG target range irrespective of symptoms.

If a person complains of symptoms and BG is greater than 4.0mmol/L, treat with a 15gm carbohydrate snack

Adults (including diabetes in pregnancy): follow protocol.

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

Definition

The definition of hypoglycaemia in the hospital and community care setting for people with diabetes who are treated with insulin and/or sulfonylureas is a **blood glucose (BG) less than 4.0mmol/L irrespective of symptoms.**

Hypoglycaemia is a potentially life threatening emergency that requires immediate and appropriate treatment. All preventative strategies should be actioned to minimise the risk of hypoglycaemia.

Who is at risk?

People with diabetes who are treated with sulfonylureas or insulin are at risk of hypoglycaemia (low blood glucose).

Sulfonylureas are oral diabetes medications and their mode of action is to stimulate endogenous insulin secretion. The table below lists the generic and brand names of sulfonylureas available in Australia.

Generic Names	Brand Names
Glibenclamide	Daonil
Glibenclamide with Metfomin (fixed-dose combination)	Glucovance
Gliclazide	Glyade, Diamicron, Nidem
Glimepiride	Amaryl, Dimirel, Diapride
Glipizide	Minidiab

In the hospital and community care setting, insulin is administered via intravenous (IV) or subcutaneous (subcut) injection. The mode of action of insulin is to increase/restore the person's ability to metabolise glucose to keep his/her blood glucose in their target range. Insulin profiles vary in strength and duration of action.

People with diabetes who are not treated with sulfonylureas or insulin but are prescribed other oral diabetes medication or injectables are NOT at risk of hypoglycaemia (low blood glucose).

Credentialled diabetes educator assistance is recommended on admission/referral to support decision making by the person, identify risk and duty of care, and recommend strategies to prevent/reduce adverse events. Outcomes and recommendations of the assessment should be documented in the individual's medical record.

Signs and symptoms of mild hypoglycaemia

Hypoglycaemia can develop quickly and the symptoms are not always recognised by the person with diabetes. Early signs and symptoms of 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.

If the early signs and symptoms of hypoglycaemia are not identified and treatment delayed, the BG will continue to fall.

Signs and symptoms of moderate to severe hypoglycaemia

Late signs and symptoms of hypoglycaemia include:

- > behaviour change
- > confusion
- > slurred speech
- > loss of coordination
- > loss of consciousness, and/or
- > seizure.

Causes and risk factors

Hypoglycaemia can be caused by:

- > illness (e.g. vomiting, diarrhoea, loss of appetite)
- > fasting or interruption of enteral or parenteral feedings
- > too much sulfonylurea or basal insulin
- > not eating enough carbohydrates (e.g. mismatch between rapid insulin and carbohydrate in the meal)
- > missed or delayed meals (e.g. no carbohydrates or not eating immediately after injecting rapid insulin
- > unplanned physical activity or more strenuous physical activity than usual
- > excessive alcohol and
- > altered ability to report symptoms (e.g. impaired hypoglycaemia awareness).

By avoiding or managing the causes, the risk of hypoglycaemia for a person with diabetes can be reduced.

Assessing swallowing

Safe to swallow means that the person with diabetes is alert and co-operative and can swallow regular diet and fluids safely.

Unsafe to swallow means that the person with diabetes is either;

- > unconscious
- > fasting
- > has previous swallowing difficulties or dysphagia (e.g. restricted oral intake of texture-modified food or thickened fluids)
- > shows current signs of inability to swallow (e.g. dribbling is noted, slurred speech, weak voice, 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 'Hypo' Kit

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 BG monitoring equipment or with the emergency trolley. IM glucagon and IV glucose are available in the emergency trolley.

Contents of 'Hypo Kit' - Restock the kit immediately after use.

Hypo flowchart on inside of the lid

1 GTT 75[®] glucose drink bottle (75gm per 300mL)

60mL measure cup

2 packets of Arrowroot 2 biscuit serves (15g CHO each)



Regional LHN Hypoglycaemia 'Hypo' Kit

GlucaGen Hypo Kit®

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

A **GlucaGen Hypo Kit** - GlucaGen[®] (glucagon) will also be available in the emergency trolley and can be prescribed by the treating doctor for the person at risk of hypoglycaemia. To access the standing order go to: https://sagov.sharepoint.com/sites/CHSA/clinical/drugtherapeutics/Pages/CHSA-Standing-Drug-Orders.aspx

The GlucaGen Hypo Kit contains glucagon 1mg/mL for intramuscular or subcutaneous injection and is indicated in severe hypoglycaemia. **Glucagon** is a hormone that increases blood glucose levels and its mode of action is to trigger the release of glucose from stored carbohydrates (glycogen) in the liver into the blood.

1mg glucagon IM as per medication order is given once only by a registered nurse. Glucagon will only work to increase blood glucose if there is an adequate store of glycogen in the liver.



1.1 Protocol flowchart instructions

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

Safe to swallow, e.g. awake and co-operative

- > Adults and children over 50kg are treated with 15gm of fast acting carbohydrates. GTT 75[®] glucose drink is the product of choice. 15gm of carbohydrate = 60ml of GTT 75[®] glucose drink (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.
- > For example, for a child weighing 33kg, the dose of carbohydrate is 10gm. 10gm of carbohydrate = 40ml of GTT 75[®] glucose drink (75gm per 300ml).

Childs weight 33kg

(the child needs 0.3gm fast acting carbohydrate per kg body weight)

33 x 0.3 = 9.9 (round up to 10gm)

Dose needed is 10gm of GTT 75° glucose drink (GTT 75° glucose drink is 75gm in 300mls)

$$\frac{\text{Strength to be given}}{\text{Strength of stock}} \quad X \quad \frac{\text{Stock volume}}{1} = \text{Volume to administer}$$

$$\frac{10}{75} \quad X \quad \frac{300}{1} = 40\text{mls}$$

Calculations for child weighing 33kg example

- > 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 BG between 2.0 3.9mmol/L, do not disconnect the pump. Treat hypoglycaemia as per protocol. Only disconnect the insulin pump if BGL is less than 2.0mmol/L.
- > If BG remains less than 4.0mmol/L after 3 cycles of oral treatment or 45 minutes (person is conscious), suspect prolonged hypoglycaemia and notify a doctor for review and possible IV glucose order.

Unconscious or unsafe to swallow, e.g. 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 BG less than 2.0mmol/L, disconnect the insulin pump tubing from the infusion site immediately. In type 1 diabetes, do not withhold insulin for more than 1 hour.
- > Notify the doctor on call immediately (e.g. CODE BLUE). If a doctor is unavailable, call an ambulance to transfer to the emergency department or MedStar for up-transfer.
- > Administer IM glucagon as per regional LHN 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 (e.g. by phone) and updated on the person with diabetes' BG levels and conscious state. If any concerns, the person with diabetes 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 vomiting. Always give adequate follow up oral carbohydrate or maintenance IV glucose after IM glucagon as glycogen stores in the liver needs to be replenished. Repeat episodes of hypoglycaemia are common. Monitor BG closely as per the flow chart.

Intraosseous injection (IO)

IO – intraosseous injection and infusion is an acceptable alternative to intravenous injection as stated in the Australian Resuscitation Council guidelines. 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. IO route should only be used by staff who are trained and have achieved clinical competency. For further information go to Regional LHN Guidelines for Emergency Trolley Contents – 2021.

IV or IO in adults

150 – 200mL IV / IO 10% glucose (slow push over 15min), or with extreme caution, 20 - 30mL IV / IO 50% glucose (slow push 3mL/min).

Be aware that 50% glucose is a hypertonic solution that can cause local pain, vein irritation, and thrombophlebitis. Side effects can be minimised by using a large peripheral vein (antecubital vein) and adhering to the recommended rate of 3mL/min.

Followed by a 5% or 10% glucose infusion to maintain BG 5.0 - 10.0mmol/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 - 10.0mmol/L.

1.2 Treatment after the hypoglycaemia is resolved

Repeat episodes of hypoglycaemia are common. Following a hypoglycaemic event, the person's diabetes management is to be reviewed by the doctor and wherever possible, identify any avoidable causes.

Beware of recurrent hypoglycaemia and monitor BG as per the MR59 Blood Glucose and Blood Ketone Monitoring Chart and include 0200 hours in the first 24 hours after the last hypoglycaemic event.

If hypoglycaemia was severe (e.g. BG less than 2.0mmol/L, unconscious or assessed as unsafe to swallow) or prolonged, the person with diabetes should have hourly BG monitoring until medical review.

On insulin

a) If the cause is identified and found to be avoidable (e.g. missed meal, reduced carbohydrate intake), insulin dose adjustment is not required unless a 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;
 - > if hypoglycaemia has occurred within 4 hours after a mealtime reduce rapid acting insulin dose that is related to that mealtime, on the next day
 - > if hypoglycaemia has occurred outside 4 hours after a meal 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 (e.g. risk of repeat hypoglycaemia), consider reducing the mealtime insulin dose.

On a sulfonylurea

- a) Seek advice on management if hypoglycaemia is recurrent or prolonged:
- b) Withhold oral diabetes medication until recovered and review the dose or consider alternate therapy.

1.3 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 each year.

1.4 Staff orientation and training package

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

Moodle presentation is available at https://www.saheducation.com/moodle/course/view.php?id=502

1.5 Education support

Hypoglycaemia Action Plans

Hypoglycaemia Action Plans can be developed with the person with diabetes by the credentialled diabetes educator.

These resources identify the individual's choice in target BG (e.g. a higher BG may be recommended in the aged, for impaired hypoglycaemia awareness or due to other medical conditions), definition of hypoglycaemia (with or without signs and symptoms) and preferred treatment concerning any special dietary requirements (e.g. texture-modified food or thickened fluid).









2. Linked Attachments

Treatment of Hypoglycaemia in the hospital and community setting - Flowchart, 2022

Regional LHN Guidelines for Emergency Trolley Contents - 2021

3. References

Regional LHN Guidelines for Emergency Trolley Contents - 2021

Joint British Diabetes Societies for Inpatient Care 2020, <u>The hospital management of hypoglycaemia in</u> adults with diabetes mellitus 4th Edition, JBDS-IP, London.

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Australian Resuscitation Council, 2021, Guideline 3 – Recognition and First Aid Management of the Unconscious Person. Available online at https://resus.org.au/guidelines/

4. Accreditation standards

National Safety and Quality Health Service Standards (2nd edition)

1	2 ⊠	3	4 ⊠	5 ⊠	6 ⊠	7	8
Clinical Governance	Partnering with Consumers	Preventing & Controlling Healthcare Associated Infection	Medication Safety	Comprehensive Care	Communicating for Safety	Blood Management	Recognising & Responding to Acute Deterioration

5. Consultation

Version	Consultation
5.0	SA Health Metropolitan Diabetes Services, LCLHN Division of Medicine, regional LHN diabetes specialist nurses, regional LHN visiting physicians, regional LHN clinical pharmacists, executive directors of medical services, emergency nurses, LCLHN Nurse Practitioner-Diabetes, Drug & Therapeutics Advisory Committee, regional medication nurse network.