

Clinical Support Guide | Treatment of hypoglycaemia in patients with diabetes

Developed by: Rural Support Service - Diabetes Service

Approved by: CHSALHN, Clinical Governance Committee on: 30/06/2019

Next review due: 30/06/2022

Version control and change history

Version	Date	Amendment	Amended by:
1.0	01/02/2016	Original version	Jane Giles
2.0	01/02/2019	New template	Jane Giles
3.0	30/06/2019	Update paediatric treatment	Jane Giles
4.0	17/04/2020	Discontinuation of Carbotest & new template	Jane Giles

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Treatment of hypoglycaemia in patients with diabetes

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Clinical Support Guide | Treatment of hypoglycaemia in patients with diabetes

 Government of South Australia SA Health		Regional Local Health Networks Protocol	
Treatment of hypoglycaemia in patients with diabetes			
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 patient 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 BG less than 2.0mmol/L.	Unconscious or unsafe to swallow <ul style="list-style-type: none"> Position patient on their side. If on intravenous (IV) insulin infusion - suspend immediately. If using an insulin pump – disconnect immediately. Notify doctor on call immediately (ie CODE BLUE). If no local doctor available call MedSTAR. Adults – Give 1mg glucagon IM (as per CHSA standing order, once only). <ul style="list-style-type: none"> If no response to glucagon within 10 minutes, the doctor may then order: 20 - 30ml IV / IO* 50% Glucose in 50ml (slow push - 3ml/min). Followed by 5 - 10% Glucose infusion to maintain BG 5.0 - 10.0mmol/L. 	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 BG 5.0 - 10.0mmol/L.
	GO TO B		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 15gm of fast acting carbohydrate. <i>For children, use 0.3gm of fast acting carbohydrate per kg of body weight, up to a maximum dose of 15gm.</i> Hypo Kit: 60ml GTT 75 [®] glucose drink (75gm per 300ml) (See below for alternative options)* GO TO C		
C	<ul style="list-style-type: none"> Repeat BG 10 - 15 minutes after treatment. If BG is less than 4.0mmol/L OR patient still has symptoms and is assessed as:- <ul style="list-style-type: none"> safe to swallow – GO TO B if BG remains <4.0mmol/L after 45 minutes or 3 oral cycles, NOTIFY DOCTOR. if unsafe to swallow – GO TO A When BG is 4.0mmol/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 BG in 30 mins. GO TO D		
D	<ul style="list-style-type: none"> 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. <ul style="list-style-type: none"> 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. Review carbohydrate intake. May need adjustment of insulin/diabetes medication. <ul style="list-style-type: none"> Continue to administer insulin as prescribed, withholding the next insulin dose may result in hyperglycaemia. Contact prescriber for dose adjustment advice. Beware of recurrent hypoglycaemia - resume QID BG monitoring and include 0200 for first 24hrs. [▲] 		
*Alternatives for Hypo Kit Fast acting carbohydrate <ul style="list-style-type: none"> 100ml GTT 50[®] glucose drink (50gm carbohydrate in 300ml) OR 90ml Lucozade (15gm equivalent). Slow acting carbohydrate <ul style="list-style-type: none"> 2 plain Milk Coffee, Arrowroot or similar OR 6 Jatz crackers. 		Important points – observe pulse and BP with event <ul style="list-style-type: none"> Ensure maintenance IV glucose and/or adequate carbohydrate with meals to replenish the liver glucose stores. * Intraosseous route (IO) should only be used by staff who are trained and have achieved clinical competency. [▲] If hypo was severe (eg BGL less than 2.0mmol/L, unconscious or assessed as unsafe to swallow) or prolonged (greater than 45mins) the patient should have hourly BG until medical review. Restock the Hypo Kit – discard all opened items. 	
Version: 3 Approved by: CHSA LHN Clinical Governance Committee Author: Jane Giles	Effective Date: February 2013 Last Review: June 2019 Next Reviewed: June 2022		

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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.

Definition¹

Hypoglycaemia is a blood glucose level (BGL) less than 4.0mmol/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
- > not eating enough carbohydrates eg mismatch between rapid insulin and carbohydrate in meal

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

60mL measure cup

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



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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.

Rural Support Service Diabetes Service, credentialed 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 4.0mmol/L **irrespective** of symptoms. If a patient complains of symptoms and BGL is greater than 4.0mmol/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. 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.
- > 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)

$$\frac{\text{Strength to be given}}{\text{Strength of stock}} \times \frac{\text{Stock volume}}{1} = \text{Volume to administer}$$
$$\frac{10}{75} \times \frac{300}{1} = 40\text{mls}$$

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- > 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 - 3.9mmol/L, do not disconnect the pump. Treat hypoglycaemia as per protocol. Only disconnect the insulin pump if BGL less than 2.0mmol/L
- > If BGL remains less than 4.0mmol/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 2.0mmol/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.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 5.0 - 10.0mmol/L.^{4,5}

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.^{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

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staff who are trained and have achieved clinical competency. For further information go [CHSALHN Guidelines for Emergency Trolley Contents 2018](#).

5. Treatment post hypoglycaemia⁷

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 2.0mmol/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 5.0 - 10.0mmol/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.


Are you at risk of low blood glucose (hypoglycaemia)?

- > Yes, you are at risk of hypoglycaemia. This is because you are prescribed insulin therapy and/or a sulfonylurea (diabetes oral medication).
- > All hospitals have a special protocol to guide treatment in hospital and this is designed to keep you as safe as possible. This may be different to how you manage low blood glucose at home.
- > There are increased risks for low blood glucose in hospital such as: changes in food, changes in appetite, changes in activity levels, infection, recovering from surgery and different or changed medications.





- > In hospital, we have to treat low blood glucose when it is 4.0mmol/L or less – even if you do not feel 'low'. GTT 75® is a sweet drink that works very quickly to return blood glucose to a safe level. 60ml is used for a start.
- > Once blood glucose is back in a safe range, we then use a serve of plain biscuits to stop blood glucose going low again.
- > If low blood glucose happens again, the doctor may adjust the medication or insulin doses.

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Linked Documents

Document Name

[Treatment of Hypoglycaemia in Patients with Diabetes - Protocol, 2020](#)

References

Document Name

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6. The Society of Hospital Pharmacists of Australia, *Australian Injectable Drugs Handbook*, [cited March 2019]; 7th Edition: Available online at <http://aidh.hcn.com.au/index.php/component/content/article/1-drug-monographs-a-z/158-section-158?directory=3&Itemid=8>
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9. Australian Resuscitation Council, 2016, Guideline 12.6: *Techniques in paediatric advanced life support*, [cited March 2019]; Available online at <https://resus.org.au/guidelines/>
10. Australian Commission on Safety and Quality in Health Care, 2017, National Subcutaneous Insulin Chart [cited March 2019]; Available online at <https://www.safetyandquality.gov.au/publications/national-subcutaneous-insulin-chart/>

Accreditation Standards

National Safety and Quality Health Service Standards (NSQHSS)

1 <input checked="" type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input checked="" type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>	8 <input type="checkbox"/>	9 <input checked="" type="checkbox"/>	10 <input type="checkbox"/>
Governance for Safety and Quality in Healthcare	Partnering with Consumers	Preventing & Controlling Healthcare Associated Infections	Medication Safety	Patient Identification & Procedure Matching	Clinical Handover	Blood & Blood Products	Preventing & Managing Pressure Injuries	Recognising & Responding to Clinical Deterioration	Preventing Falls & Harm from Falls

Evaluation and Quality Improvement Program (EQIP)

11 <input checked="" type="checkbox"/>	12 <input checked="" type="checkbox"/>	13 <input type="checkbox"/>	14 <input type="checkbox"/>	15 <input type="checkbox"/>
Service Delivery	Provision of Care	Workforce Planning and Management	Information Management	Corporate Systems and Safety

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

1 <input checked="" type="checkbox"/>	2 <input checked="" type="checkbox"/>	3 <input type="checkbox"/>	<i>Specific criteria: (e.g. 1.5, 3.1)</i>
Effective Management	Appropriate Access and Service Delivery	Service User Rights and Responsibilities	

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

1 <input type="checkbox"/>	2 <input checked="" type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	<i>Specific criteria: (e.g. 1.1, 4.5)</i>
Management Systems, Staffing and Organisational Development	Health and Personal Care	Care Recipient Lifestyle	Physical Environment and Safe Systems	

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Consultation

Version	Consultation
1.0	SA Health Metropolitan Diabetes Services, Nurse Practitioner-Diabetes - Mt Gambier, Diabetes Specialist Nurse Network, CHSALHN Director of Endocrinology.
2.0	SA Health Metropolitan Diabetes Services, Adelaide Women's and Children's Endocrinology Department, CHSA Consultant Paediatrician, NP-Diabetes - Mt Gambier, Diabetes Specialist Nurse Network, Clinical Pharmacists.
3.0	SA Health Metropolitan Diabetes Services, Adelaide Women's and Children's Endocrinology Department, CHSA Consultant Paediatrician, NP-Diabetes - Mt Gambier, Diabetes Specialist Nurse Network, Clinical Pharmacists.
4.0	SA Health Metropolitan Diabetes Services, Clinical Pharmacists, Diabetes Specialist Nurse Network.