Regional Local Health Networks

Clinical Support Guide | Intravenous Insulin Infusion (MR-INF-A) (MR-INF-B)

Protocol author: Diabetes Service, Rural Support Service

Protocol sponsor: Drug & Therapeutics Advisor Committee

Approved by: Drug & Therapeutics Advisory Committee on: 13/12/2019

Next review due: 13/06/2021

Summary	This protocol outlines responsibilities and actions required by medical staff, 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 and Guideline, Diabetes Service Plan and Diabetes Inpatient Model of Care.
Keywords	Clinical, Protocol, medical, nursing, midwifery, emergency, safety, quality, standards.
Document history	Is this a new LHN Protocol? **N** Does this protocol *amend or update* an existing protocol? **Y** *Diabetic Ketoacidosis Management in Adults with Type 1 Diabetes, 2019* Does this protocol *replace* an existing protocol? **N**
Applies to	This protocol applies to all hospital medical, nursing and midwifery staff.
Objective File No.	2019 - to be updated

Version control and change history

Version	Date	Amendment	Amended by:
1.0	4/12/2015	Original version	Jane Giles
2.0	17/01/2019	Reviewed with no changes	Jane Giles
3.0	13/12/2019	Reviewed with no changes	Jane Giles

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Clinical Support Guide | Intravenous insulin infusion

This clinical support guide is only for the management and titration of intravenous (IV) insulin infusion. It does not explain dose titration for any other type of insulin or method of administration.

1. Background

Hyperglycaemia on general medical and surgical units is associated with an 18 fold increase in in-hospital mortality, longer length of stay and greater risk of infection.[1] The use of IV insulin to treat hyperglycaemia has been shown to reduce mortality, sepsis and acute renal failure by up to 45%.[2]

2. Purpose

The aim of this document is to support best practice in the titration and stabilisation of the person with diabetes requiring an IV infusion of insulin. The clinical guide is to be used in conjunction with the CHSA Intravenous Actrapid Infusion Protocols *(MR-INF-A Adult - DKA/Type 1 and MR-INF-B Adult – HHS/Type 2 protocols*). Actrapid is the insulin of choice for IV insulin infusion.[3]

3. Indications for IV insulin infusion

For the purposes of this clinical guide, indications for use in South Australian Regional hospitals are:

- Diabetic ketoacidosis (DKA), including euglycaemic DKA
- Hyperosmolar hyperglycaemic state (HHS).
- Surgical management of type 1 and 2 diabetes.
- Type 1 diabetes - patient not eating/fasting.

Careful consideration for use with:

- Hyperglycaemia on admission or persistent hyperglycaemia during hospitalisation.

Situations where these protocols are not in scope thus not approved are:

- Peri-partum management of diabetes (refer to SA Health Perinatal Guidelines for IV insulin protocol). Insulin and blood glucose are documented on the Partogram.
- Paediatric patients. Consultation with a paediatrician or paediatric service is recommended. A written medication authority from a medical practitioner is required.

4. Medication management

- Maintain basal insulin doses and cease rapid acting insulin.
- Review any oral medications and withhold if potential to worsen clinical state. Immediately cease sodium-glucose co-transporter-2.
- Review medications as part of discharge planning, and consider discontinuing the sodium-glucose co-transporter-2 in at risk patients.

5. Nursing considerations

Number of nursing staff and frequency of observations will be determined by patient stability and treatment intensity. There is a need for a 1:1 or 1:2 nurse:patient ratio if an IV insulin infusion is used as hourly observations are required.

Observations include:

- 2 intravenous lines setup plus syringe pump for IV insulin infusion
- capillary blood glucose and blood ketone monitoring
- fluid balance record (catheterisation and hourly measures) calculate and report deficit or positive fluid balance hourly
- pulse oximetry, temperature, pulse, respirations and blood pressure
- cardiac monitoring if hyperkalaemia or hypokalaemia
- level of consciousness - Glasgow coma scale (GCS).

5. Targets for blood glucose

The blood glucose (BG) target range during an intravenous insulin infusion is 7.0 – 10.0mmol/L for adult inpatients:

Figure 1: Target BG range

BGL Frequency	Dr's Name:	Target BGL range: (Please Circle)
☐ Hourly ☐ 2 Hourly* *(only if BGL is within target range for at least 6 hours. If any alteration in insulin infusion rate, IV fluids or TPN revert to hourly BGL's.)	Signature: ..... Pager No:	Adult Inpatient 7 to 10 mmol/L Obstetric Inpatient 6 to 10 mmol/L
	Review need for IV Insulin infusion daily before 12 pm. If continuing, rewrite on a new page.	

6. Frequency of blood glucose monitoring

All patients require hourly BG monitoring for the duration of the infusion unless BG has been within target range for at least six hours. In this situation, 2 hourly BG monitoring may be ordered by the medical practitioner. If there are any changes to the infusion rate, IV fluids or TPN, revert back to hourly monitoring.

7. Identifying the protocol type

There are two IV insulin infusion protocols. The required protocol should be specified by the medical practitioner.

- MR-INF-A (DKA/Type 1) is an adult protocol to be used for patients with type 1 diabetes and in conjunction with the CHSA Diabetic Ketoacidosis (DKA) protocol.
- MR-INF-B (HHS/Type 2) is also an adult protocol to be used for patients with type 2 diabetes and in conjunction with the CHSA Hyperglycaemia Hyperosmolar State (HHS) protocol.

8. Preparation of insulin infusion - Equipment

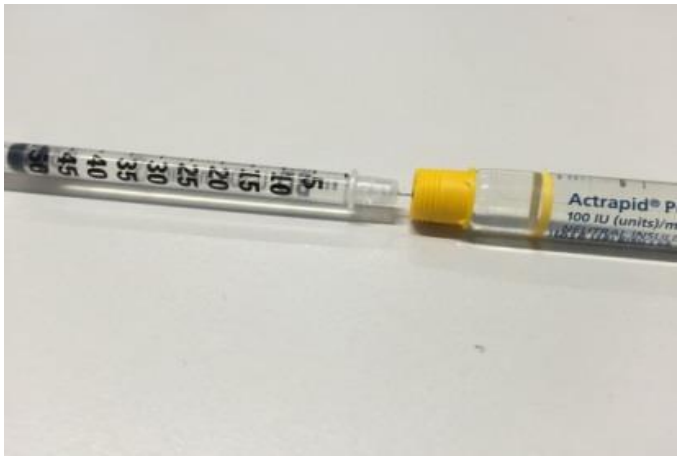
- Actrapid insulin cartridge
- Syringe driver pump
- 50 unit (0.5mls) insulin syringe
- 50ml leur lock syringe
- Blunt tip cannula
- 'Medication added' label

- Extension tubing
- IV fluids (usually normal saline at commencement)
- Giving set with anti-reflex valve

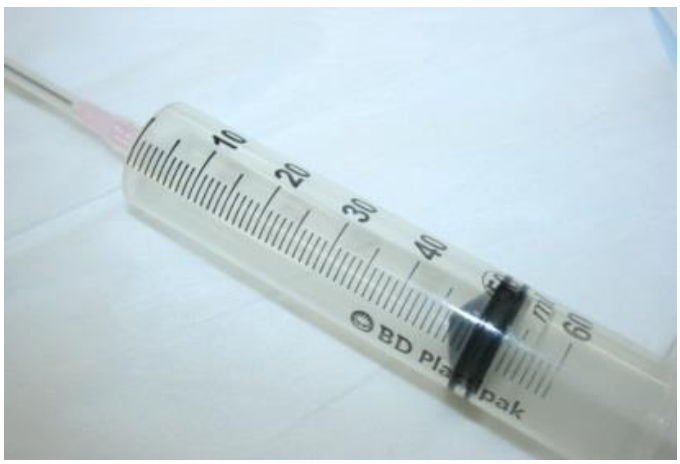
9. Preparation of insulin infusion

Equipment and supplies as per local instructions.

1. Draw up 50 units of Actrapid insulin in a subcutaneous insulin syringe.

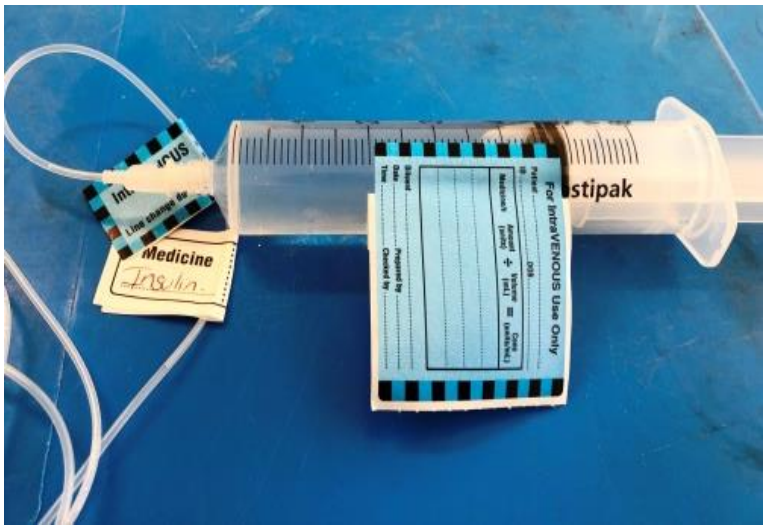


2. Draw up 49.5mls of 0.9% sodium chloride (normal saline) in a 50ml leur lock syringe.

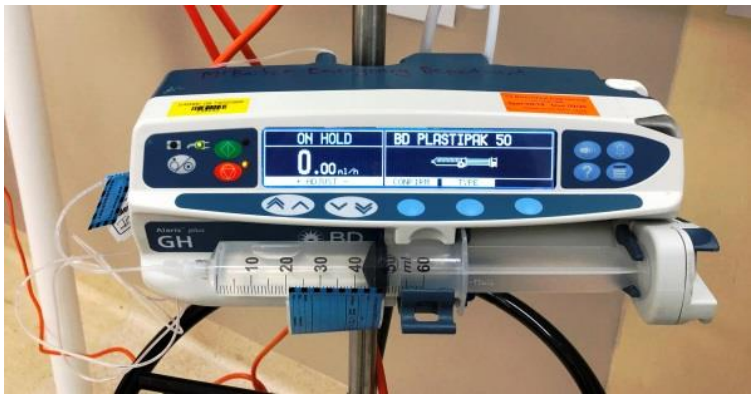


3. Leave enough space in the normal saline syringe and inject the insulin into the syringe. This will make the solution up to 50mls in total.
4. Apply a blunt tip cannula and mix gently.

5. Attach a ‘medication added’ label to the syringe stating the quantities added of each medication as above. Concentration = 1 unit insulin per 1 ml of normal saline, ie 50 units in 50mls.



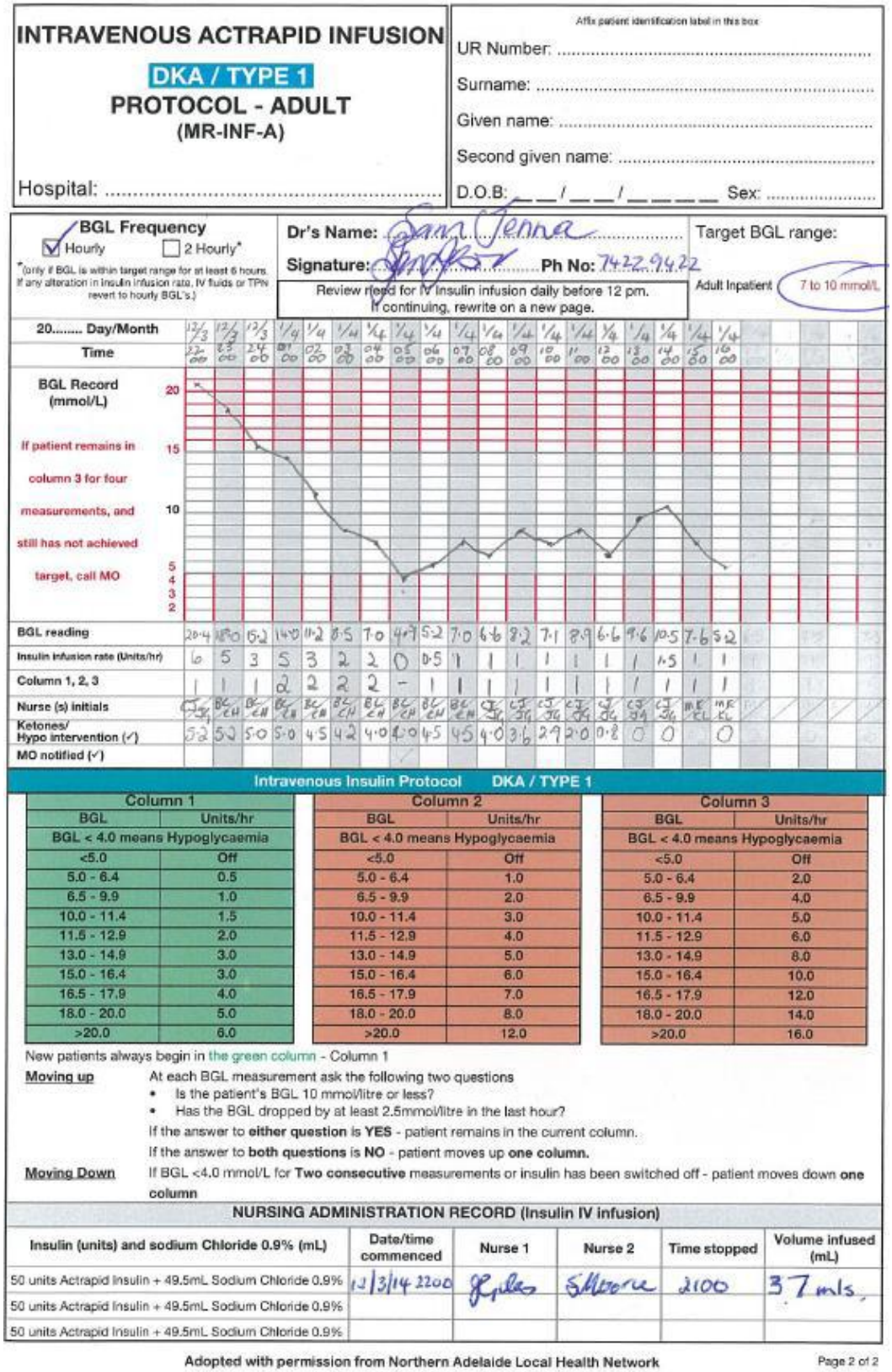
6. Attach extension tubing to the syringe and manually prime the line with the insulin/saline solution.
7. Position the syringe on a syringe driver pump ensuring the flange of the barrel and base of plunger are firmly engaged.



8. Assemble IV fluids as ordered (usually normal saline) using a giving set with an anti-reflux valve. Prime the line and attach to the patients IV cannula. The insulin infusion line MUST be attached via a side-line port below the anti-reflux valve on the giving set.
9. Commence infusions as ordered.

DKA/Type 1/ Protocol - Adult

Figure 2: Intravenous actrapid infusion – DKA/Type 1 protocol (Adult)



INTRAVENOUS ACTRAPID INFUSION

DKA / TYPE 1

PROTOCOL - ADULT

(MR-INF-A)

Hospital: .....

Affix patient identification label in this box

UR Number: .....

Surname: .....

Given name: .....

Second given name: .....

D.O.B: __ __ / __ __ / __ __ __ __ Sex: .....

BGL Frequency

☑ Hourly ☐ 2 Hourly*

*(only if BGL is within target range for at least 6 hours. If any alteration in insulin infusion rate, IV fluids or TPN revert to hourly BGL's.)

Dr's Name: Sam Jenna

Signature: ..... Ph No: 7422 9422

Review need for IV insulin infusion daily before 12 pm. If continuing, rewrite on a new page.

Target BGL range:

Adult Inpatient 7 to 10 mmol/L

20..... Day/Month	13/3	13/3	13/3	14/4	14/4	14/4	14/4	14/4	14/4	14/4	14/4	14/4	14/4	14/4	14/4	14/4	14/4	14/4	14/4	14/4
Time	22 00	23 00	24 00	01 00	02 00	03 00	04 00	05 00	06 00	07 00	08 00	09 00	10 00	11 00	12 00	13 00	14 00	15 30	16 00	
BGL reading	20.4	18.0	15.2	14.0	11.2	8.5	7.0	4.7	5.2	7.0	6.6	8.2	7.1	8.9	6.6	9.6	10.5	7.6	5.2	
Insulin infusion rate (Units/hr)	6	5	3	5	3	2	2	0	0.5	1	1	1	1	1	1	1	1.5	1	1	
Column 1, 2, 3	1	1	1	2	2	2	2	-	1	1	1	1	1	1	1	1	1	1	1	
Nurse (s) initials	CJ	BC CH	BC CH	BC CH	BC CH	BC CH	BC CH	BC CH	BC CH	BC CH	CJ JG	CJ JG	CJ JG	CJ JG	CJ JG	CJ JG	CJ JG	MR EL	MR EL	
Ketones/ Hypo intervention (✓)	5.2	5.2	5.0	5.0	4.5	4.2	4.0	4.0	4.5	4.5	4.0	3.6	2.9	2.0	0.8	0	0		0	
MO notified (✓)																				

BGL < 4.0 means Hypoglycaemia

Intravenous Insulin Protocol DKA / TYPE 1

Column 1 BGL	Column 1 Units/hr	Column 2 BGL	Column 2 Units/hr	Column 3 BGL	Column 3 Units/hr
<5.0	Off	<5.0	Off	<5.0	Off
5.0 - 6.4	0.5	5.0 - 6.4	1.0	5.0 - 6.4	2.0
6.5 - 9.9	1.0	6.5 - 9.9	2.0	6.5 - 9.9	4.0
10.0 - 11.4	1.5	10.0 - 11.4	3.0	10.0 - 11.4	5.0
11.5 - 12.9	2.0	11.5 - 12.9	4.0	11.5 - 12.9	6.0
13.0 - 14.9	3.0	13.0 - 14.9	5.0	13.0 - 14.9	8.0
15.0 - 16.4	3.0	15.0 - 16.4	6.0	15.0 - 16.4	10.0
16.5 - 17.9	4.0	16.5 - 17.9	7.0	16.5 - 17.9	12.0
18.0 - 20.0	5.0	18.0 - 20.0	8.0	18.0 - 20.0	14.0
>20.0	6.0	>20.0	12.0	>20.0	16.0

New patients always begin in the green column - Column 1

Moving up At each BGL measurement ask the following two questions
- Is the patient's BGL 10 mmol/litre or less?
- Has the BGL dropped by at least 2.5mmol/litre in the last hour?

If the answer to **either question** is **YES** - patient remains in the current column.

If the answer to **both questions** is **NO** - patient moves up **one column.**

Moving Down If BGL <4.0 mmol/L for **Two consecutive** measurements or insulin has been switched off - patient moves down **one column**

NURSING ADMINISTRATION RECORD (Insulin IV infusion)

Insulin (units) and sodium Chloride 0.9% (mL)	Date/time commenced	Nurse 1	Nurse 2	Time stopped	Volume infused (mL)
50 units Actrapid Insulin + 49.5mL Sodium Chloride 0.9%	13/3/14 2200	J Giles	S Moore	2100	37 mls
50 units Actrapid Insulin + 49.5mL Sodium Chloride 0.9%					
50 units Actrapid Insulin + 49.5mL Sodium Chloride 0.9%					

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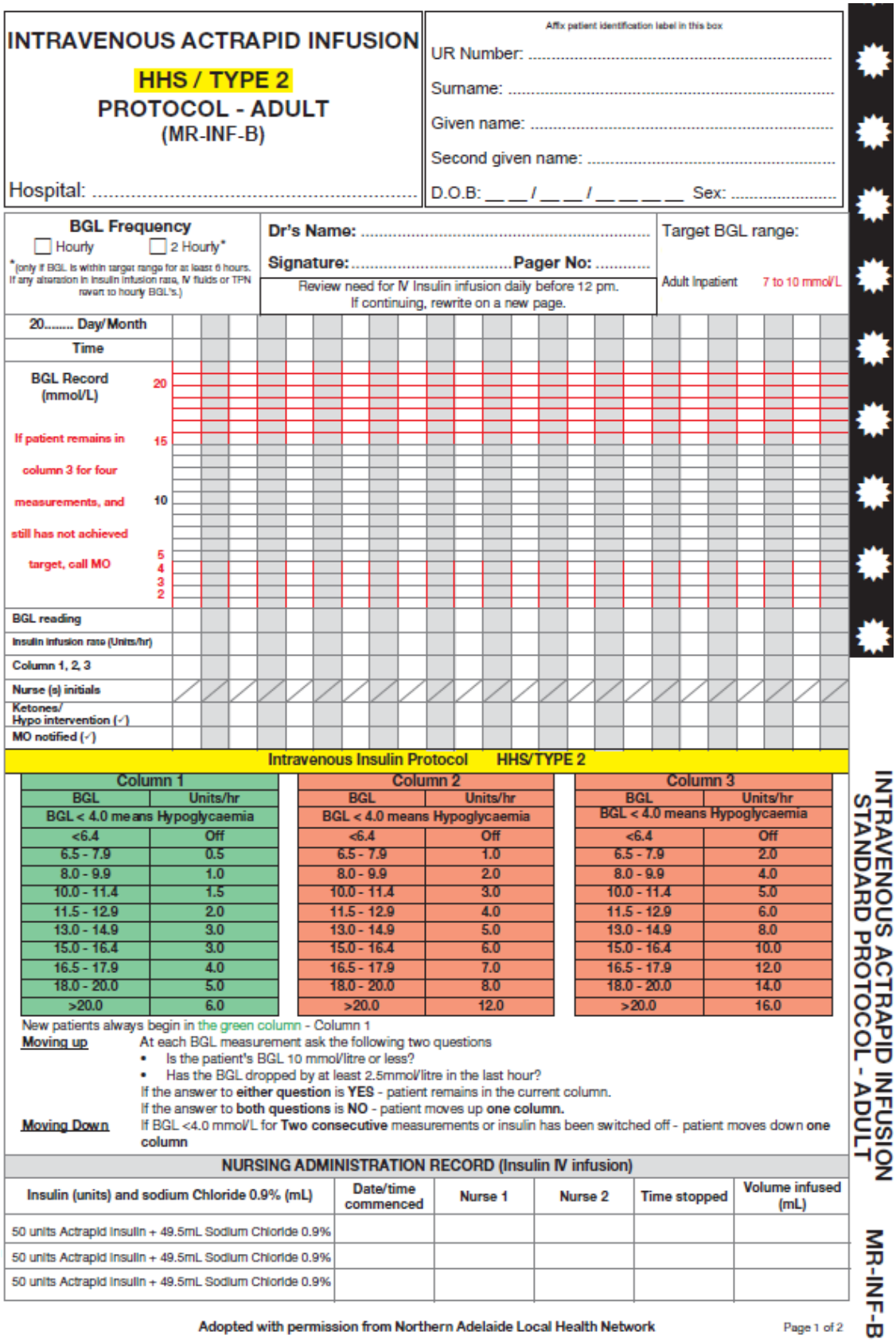
Figure 3: Intravenous actrapid infusion – HHS/Type 2 protocol (Adult)



INTRAVENOUS ACTRAPID INFUSION

HHS / TYPE 2

PROTOCOL - ADULT

(MR-INF-B)

Hospital: .....

Affix patient identification label in this box

UR Number: .....

Surname: .....

Given name: .....

Second given name: .....

D.O.B: __ __ / __ __ / __ __ __ __ Sex: .....

BGL Frequency

☐ Hourly ☐ 2 Hourly*

*(only if BGL is within target range for at least 6 hours. If any alteration in insulin infusion rate, IV fluids or TPN revert to hourly BGL's.)

Dr's Name: .....

Signature: ..... **Pager No:** .....

Review need for IV Insulin infusion daily before 12 pm. If continuing, rewrite on a new page.

Target BGL range:

Adult Inpatient 7 to 10 mmol/L

20..... Day/Month																														
Time																														
BGL Record (mmol/L) 20																														
If patient remains in 15																														
column 3 for four																														
measurements, and 10																														
still has not achieved																														
target, call MO 5																														
4																														
3																														
2																														
BGL reading																														
Insulin infusion rate (Units/hr)																														
Column 1, 2, 3																														
Nurse (s) initials																														
Ketones/ Hypo intervention (✓)																														
MO notified (✓)																														

Intravenous Insulin Protocol HHS/TYPE 2

Column 1	
BGL	Units/hr
BGL < 4.0 means Hypoglycaemia	
<6.4	Off
6.5 - 7.9	0.5
8.0 - 9.9	1.0
10.0 - 11.4	1.5
11.5 - 12.9	2.0
13.0 - 14.9	3.0
15.0 - 16.4	3.0
16.5 - 17.9	4.0
18.0 - 20.0	5.0
>20.0	6.0

Column 2	
BGL	Units/hr
BGL < 4.0 means Hypoglycaemia	
<6.4	Off
6.5 - 7.9	1.0
8.0 - 9.9	2.0
10.0 - 11.4	3.0
11.5 - 12.9	4.0
13.0 - 14.9	5.0
15.0 - 16.4	6.0
16.5 - 17.9	7.0
18.0 - 20.0	8.0
>20.0	12.0

Column 3	
BGL	Units/hr
BGL < 4.0 means Hypoglycaemia	
<6.4	Off
6.5 - 7.9	2.0
8.0 - 9.9	4.0
10.0 - 11.4	5.0
11.5 - 12.9	6.0
13.0 - 14.9	8.0
15.0 - 16.4	10.0
16.5 - 17.9	12.0
18.0 - 20.0	14.0
>20.0	16.0

New patients always begin in the green column - Column 1

Moving up At each BGL measurement ask the following two questions

- Is the patient's BGL 10 mmol/litre or less?
- Has the BGL dropped by at least 2.5mmol/litre in the last hour?

If the answer to **either question** is **YES** - patient remains in the current column.
If the answer to **both questions** is **NO** - patient moves up **one column.**

Moving Down If BGL <4.0 mmol/L for **Two consecutive** measurements or insulin has been switched off - patient moves down **one column**

NURSING ADMINISTRATION RECORD (Insulin IV infusion)

Insulin (units) and sodium Chloride 0.9% (mL)	Date/time commenced	Nurse 1	Nurse 2	Time stopped	Volume infused (mL)
50 units Actrapid Insulin + 49.5mL Sodium Chloride 0.9%					
50 units Actrapid Insulin + 49.5mL Sodium Chloride 0.9%					
50 units Actrapid Insulin + 49.5mL Sodium Chloride 0.9%					

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INTRAVENOUS ACTRAPID INFUSION STANDARD PROTOCOL - ADULT MR-INF-B

10. Important points of difference between charts

> Check title of chart to ensure you have the correct one.

INTRAVENOUS ACTRAPID INFUSION DKA / TYPE 1 PROTOCOL - ADULT (MR213) Hospital:	INTRAVENOUS ACTRAPID INFUSION HHS/TYPE 2 PROTOCOL - ADULT (MR-INF-B) Hospital: .....

> Column values for BG and infusion rate are different.

> Recording methods for all information are identical.

11. Documenting on the BG monitoring section

> Document the date and time in the appropriate column

> The BG is graphed with a dot (·) in the centre of the square which coincides with the BG level. Eg 16.1 or 16.8mmol/L is a dot in the box that corresponds to 16. Connect to the previous dot with a straight line.

> Document the numerical value of the BG in the designated row below the graph.

> Record IV insulin infusion rate as it relates to BGL. New patients always begin in the **green column** (column 1).

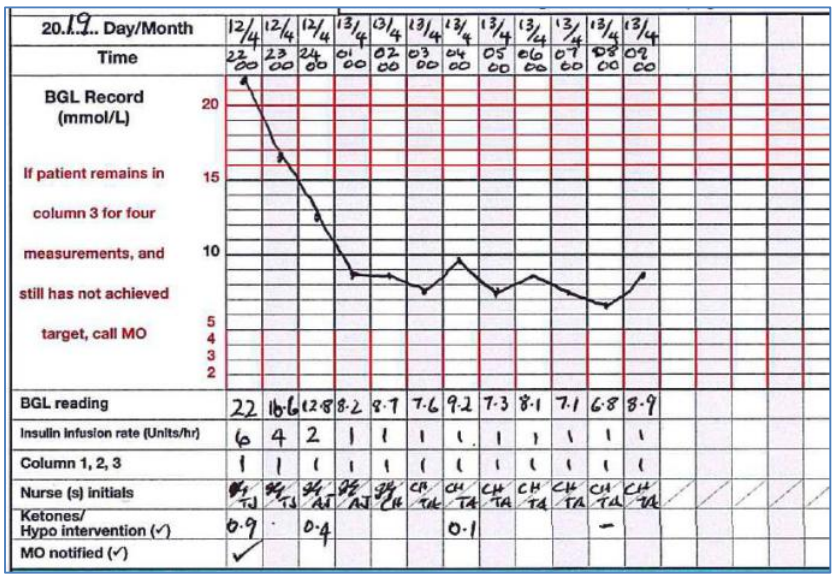
> Record the column being used to titrate the infusion at that point in time eg column 1, 2 or 3.

> Nurse taking and recording BGL to initial in allocated box.

> If the Hypoglycaemia Protocol (see appendix 1) is initiated or a medical practitioner is contacted, tick the corresponding box on the chart.

> Medical practitioner to be contacted if the patient remains in column 3 for four (4) measurements and has still not achieved target BGL.

Figure 4: example of how to chart the information



12. Intravenous insulin protocol

- New patients always begin in the green column – Column 1.
- **Moving up** – At each BG measurement ask the following two questions.
  - Is the patient's BG 10.0mmol/L or less?
  - Has the BG dropped by at least 2.5mmol/L in the last hour?
  - If the answer to **either question** is **YES** - patient remains in the current column.
  - If the answer to **both questions** is **NO** - patient moves up **one column**.
- **Moving down**
  - If BG <4.0mmol/L for **two consecutive** measurements or insulin has been switched off – patient moves down **one column.**

13. Nursing medication administration record

At commencement of IV insulin infusion and with EACH syringe change, two nurses to check and sign the nursing administration record as per example below:

Figure 5: Example of how to complete the nursing administration record

Insulin (units) and sodium Chloride 0.9% (mL)	Date/time commenced	Nurse 1	Nurse 2	Time stopped	Volume infused (mL)
50 units Actrapid Insulin + 49.5mL Sodium Chloride 0.9%	12/4/19 2200	T Jones	H Fowles		
50 units Actrapid Insulin + 49.5mL Sodium Chloride 0.9%					
50 units Actrapid Insulin + 49.5mL Sodium Chloride 0.9%					

IV insulin infusion hourly rate is to be checked by two nurses and both initials are to be documented as per the example below:

Figure 6: Example of how to complete the nursing administration hourly rate record

BGL reading	22	16.6	12.8	8.2	8.7	7.6	9.2	7.3	8.1	7.1	6.8	8.9				
Insulin infusion rate (Units/hr)	6	4	2	1	1	1	1	1	1	1	1	1				
Column 1, 2, 3	1	1	1	1	1	1	1	1	1	1	1	1				
Nurse (s) initials	TJ	TJ	AJ	AJ	CH	CH TA	CH TA	CH TA	CH TA	CH TA	CH TA	CH TA				
Ketones/ Hypo intervention (✓)	0.9		0.4				0.1				–					
MO notified (✓)	✓															

14. Pump and line management

- Senior nurse to check the order and settings on the syringe driver at the commencement of their shift AND with each syringe change.
- Check the IV insertion site and connections at commencement of each shift AND at each syringe/line change.
- Always check the rate changes with a second nurse.
- Change the Leur Lock Syringe every 24 hours. Lines replaced every 4 days.[4]

15. What can go wrong?

- If the patient remains in column 3 for four (4) BG measurements, and still has not achieved target, call the supervising medical practitioner immediately.
- Remember that this protocol has adjustments built in so that moving up and down will adjust for each person's individual insulin sensitivity. Hypoglycaemia, although always a possibility, will occur less frequently than with subcutaneous sliding scales.
- At any time, a registered nurse should contact the prescribing medical practitioner if they have any concerns related to the IV insulin infusion or blood glucose results.

16. When to Stop/Suspend infusion

- If hypoglycaemia occurs:
  - suspend infusion and follow hypoglycaemia protocol
  - notify the medical practitioner if infusion is suspended for >45 minutes.

17. Discharge planning

- Once the patient has remained in the same column for 10-12 hours with target BG achieved, the medical practitioner can review for transition to alternate and appropriate therapy in preparation for discharge.

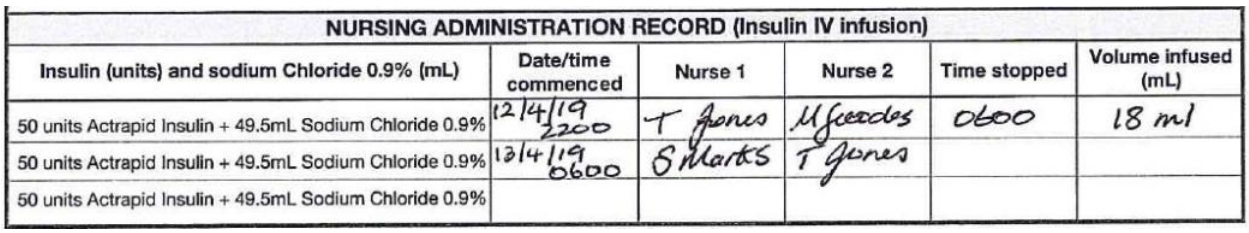
18. Transition off IV insulin infusion

IV insulin can only be discontinued once subcutaneous basal insulin has been on board for 4 hours.

- Patients **must not** have their IV insulin infusion discontinued until 4 hours after commencement of basal (e.g. glargine) subcutaneous insulin.
- IV insulin (actrapid) has a half-life of only 7 minutes with duration of only 1 hour.
- IV insulin can only be discontinued once basal insulin has been on-board for 4 hours.
- IV insulin adjustments can continue based on blood glucose levels as this ensures adequate insulin coverage during transition.

At discontinuation of IV insulin infusion, two nurses to sign the nursing administration record as per example below:

Figure 7: Example of the nursing administration record when ceasing the IV insulin infusion



NURSING ADMINISTRATION RECORD (Insulin IV infusion)					
Insulin (units) and sodium Chloride 0.9% (mL)	Date/time commenced	Nurse 1	Nurse 2	Time stopped	Volume infused (mL)
50 units Actrapid Insulin + 49.5mL Sodium Chloride 0.9%	12/4/19 2200	T Jones	M Geeedes	0600	18 ml
50 units Actrapid Insulin + 49.5mL Sodium Chloride 0.9%	13/4/19 0600	S Marks	T Jones		
50 units Actrapid Insulin + 49.5mL Sodium Chloride 0.9%					

19. Switching from IV to the Basal Bolus Insulin protocol

- Ensure long-acting insulin has been on board for a minimum of 4 hours before IV infusion is discontinued.
  - Calculate total insulin required over the last 6 hours and multiply this amount by 4 (=TDD)
    - 50% of TDD is given as basal insulin
    - 50% of TDD is given in three divided doses with meal.

- Continue to follow the protocol as outlined in the Regional Hyperglycaemia Management Protocol and Basal Bolus Insulin Chart MR62A.

20. Switching from IV to pre-mixed insulin

- If pre-mixed insulin (twice/day) is chosen, 2/3 TDD is given at breakfast and 1/3 is given with the evening meal. Continue supplemental insulin.

21. Switching from IV to continuous subcutaneous insulin infusion (CSII) or insulin pump

- A patient's endocrinologist should be consulted if transitioning to insulin pump therapy.
- Insulin pump therapy is to be recommenced at the previous basal rate settings with the IV Infusion running concurrently.
- IV Insulin Infusion rate will be titrated down based on blood glucose levels.
- If a meal is due during the 4 hours of transition, the insulin pump's advanced settings are to be used to calculate the meal-related bolus.

  The insulin pumps' advanced settings consider the pre meal blood glucose test result, blood glucose target, insulin sensitivity factor, insulin:carbohydrate ratio and insulin action time (also known as 'insulin on board') to suggest a meal-related bolus dose to be delivered.

  The patient can self-administered this suggested meal-related bolus dose or administer a reduction in the suggested dose if concerned about post prandial hypoglycaemia.

  The CSII Inpatient Rate Record (MR-CIR) is to be used by the patient to document the meal-related bolus administered.
- After at least 4 hours of basal insulin via the insulin pump **AND** if the patient has tolerated food and fluid **AND** if the blood ketone remains less than 0.3mmol/L, the IV infusion can be discontinued.
- After the IV Infusion is discontinued, maintain insulin pump therapy (using both basal and advanced settings at main meal times). Continue hourly blood glucose for 2-4 hours then if stable, reduce blood glucose monitoring frequency to QID. The blood ketone should be rechecked in 1 hour and then as instructed by the medical officer.

22. Transitioning to oral medications

- Identify medications options that are safe for the patient. If reason for DKA was sodium-glucose co-transporter-2 use, then this medication should not be re-commenced.
- Assess pre admission HbA1c to inform discharge medication adjustment
  - On target - Recommence on usual diabetes treatment.
  - Above target - Will need assessment for increase in usual therapy; arrange follow up GP appointment and diabetes education follow up.

23. Documentation

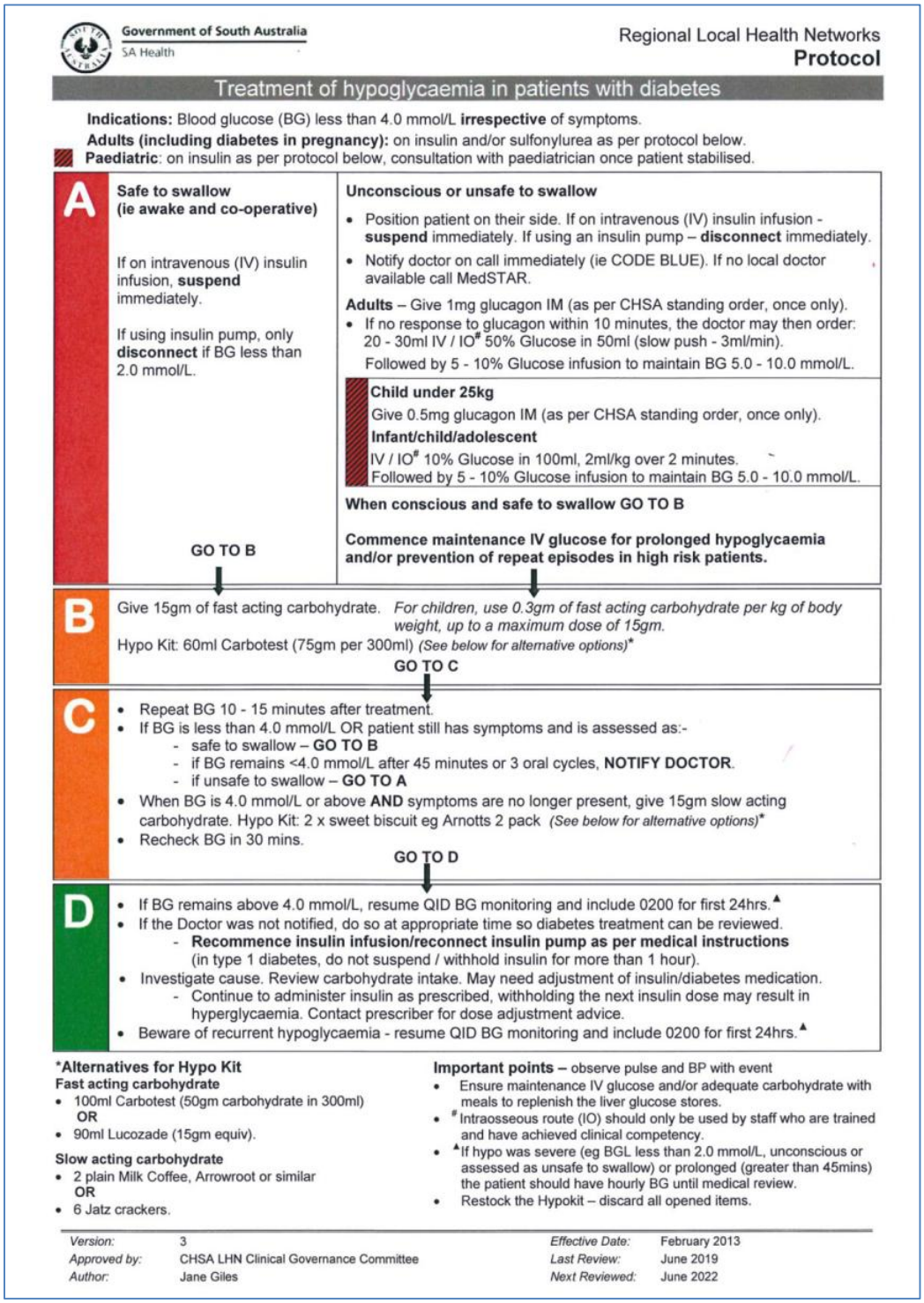
- Capillary BG levels
- Insulin doses/infusion rate and any IV fluid therapy
- Capillary blood ketone levels
- Hypo treatments
- Rate changes
- Medical practitioner notifications

Appendix 1

Hypoglycaemia management

The hypoglycaemia protocol below has been developed to standardise the management of hypoglycaemia in hospitals and aged care facilities. Two pathways are included on the flowchart (safe to swallow/unconscious or unsafe to swallow). This protocol still applies for patients on an insulin infusion.

Figure 8: Hypoglycaemia protocol



Government of South Australia
SA Health

Regional Local Health Networks
Protocol

Treatment of hypoglycaemia in patients with diabetes

Indications: Blood glucose (BG) less than 4.0 mmol/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 2.0 mmol/L.

GO TO B

Unconscious or unsafe to swallow

- 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).

- 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 - 10.0 mmol/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 - 10.0 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 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 BG 10 - 15 minutes after treatment.
- If BG is less than 4.0 mmol/L OR patient still has symptoms and is assessed as:-
  - safe to swallow – **GO TO B**
  - if BG remains <4.0 mmol/L after 45 minutes or 3 oral cycles, **NOTIFY DOCTOR**.
  - if unsafe to swallow – **GO TO A**
- When BG 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 BG in 30 mins.

GO TO D

D

- If BG remains above 4.0 mmol/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. 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 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
- 100ml Carbotest (50gm carbohydrate in 300ml)
  OR
- 90ml Lucozade (15gm equiv).

Slow acting carbohydrate
- 2 plain Milk Coffee, Arrowroot or similar
  OR
- 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.
- # 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 2.0 mmol/L, unconscious or assessed as unsafe to swallow) or prolonged (greater than 45mins) the patient should have hourly BG until medical review.
- Restock the Hypokit – discard all opened items.

Version:	3	*Effective Date:*	February 2013
Approved by:	CHSA LHN Clinical Governance Committee	*Last Review:*	June 2019
Author:	Jane Giles	*Next Reviewed:*	June 2022

1. Attached Documents

Document Name
Treatment of hypoglycaemia in patients with diabetes protocol (2019)

2. References

Document Name
1. Australian Diabetes Society, *Guidelines for routine glucose control in hospital*. 2012, Australian Diabetes Society: Sydney.
2. American Diabetes Association, 2015 *Standards of medical care in diabetes.* Diabetes Care. 38 (Supp 1).
3. Northern Adelaide Local Health Network, *The management of intravenous insulin infusions*. 2019, Lyell McEwin Hosptial: Adelaide.
4. National Health & Medical Research Council, *Australian guidelines for the prevention and control of infection in healthcare* 2010, Commonwealth of Australia: Canberra.

3. Accreditation Standards

***National Safety and Quality Health Service Standards* (NSQHSS)**

1 ☒	2 ☐	3 ☐	4 ☒	5 ☐	6 ☒	7 ☐	8 ☒	9 ☒	10 ☐
Governance for Safety and Quality in Healthcare	Partnering with Consumers	Preventing & Controlling Healthcare Associated Infections	Medication Safety	Patient Identification & Procedure Matchng	Clinical Handover	Blood & Blood Products	Preventing & Managing Pressure Injuries	Recognising & Responding to Clinical Deterioration	Preventing Falls & Harm from Falls

***Evaluation and Quality Improvement Program* (EQuIP)**

11 ☒	12 ☒	13 ☐	14 ☐	15 ☐
Service Delivery	Provision of Care	Workforce Planning and Management	Information Management	Corporate Systems and Safety

4. Consultation

Version	Consultation
1.0	CHSA Diabetes Specialist Nurse Network, CHSA Clinical Nurse Consultants and emergency department staff.
2.0	CHSA Diabetes Specialist Nurse Network, CHSA Clinical Nurse Consultants and emergency department staff.
3.0	Regional Diabetes Specialist Nurse Network, Regional Nurse Unit Managers and emergency department staff.