

REGIONAL LOCAL HEALTH NETWORKS / RURAL SUPPORT SERVICE

Work Instruction

Title: Perioperative Diabetes Management

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Summary This work instruction aims to articulate the perioperative management of diabetes with diabetes.

Policy/procedure reference This work instruction supports the SA Health Digital Health Governance and Investment Framework Policy Directive (2020), the Australian National Diabetes Strategy (2016-2020) and the Rural Support Service Strategic Directions (202-2021).

Keywords Clinical, work instruction, LHN, perioperative, surgery, diabetes.

Document history Is this a new LHN work instruction? **Y**
Does this work instruction *amend or update* an existing work instruction? **N**
Does this work instruction *replace* an existing document? **N**

Applies to This work instruction applies to all regional LHN Executive, Nursing Directors, Perioperative Staff, Community Health Managers, Credentialed Diabetes Educators, Diabetes Educators, Diabetes Link Nurses and Rural Support Service Diabetes Service Staff.

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Version control and change history

Version	Date	Amendment	Amended/Approved by:
1.0	16/01/2022	Original version	Collette Hooper
2.0			

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1. Overview/ Description

This work instruction outlines the perioperative management of people with diabetes undergoing day surgery and/or fasting procedures at regional local health network (LHN) hospital and health services.

For major surgery (e.g. requiring one or more days in hospital), this work instruction to be used in conjunction with the regional LHN Protocol '*Intravenous Insulin Infusion in the adult with diabetes who is fasting, receiving perioperative or intrapartum care or who has hyperglycaemia*'.

This work instruction has been developed using the [Australian Diabetes Society Perioperative Diabetes Management Guidelines](#), metropolitan local health network protocols, private organisational guidelines and expert consensus.

During the perioperative period, there is a risk of **diabetic ketoacidosis** in the person with type 1 diabetes and **hyperosmolar hyperglycaemia state** in the person with type 2 diabetes.

In any person (type 1 or type 2 diabetes) prescribed a **sodium glucose co-transporter 2 (SGLT2) inhibitor**, there risk of **euglycaemic ketoacidosis**. **The current list of SGLT2 inhibitors are listed in the table below:**

SGLT2 inhibitor	Drug name	Brand name
	Dapagliflozin	Forxiga®
	Dapagliflozin and Metformin XR	Xigduo®
	Dapagliflozin and Saxagliptin	Qtern®
	Empagliflozin	Jardiance®
	Empagliflozin and Metformin	Jardiamet®
	Empagliflozin and Linagliptin	Glyxambi®

For minor surgery (e.g. day-stay procedures) that do not require bowel preparation, an SGLT2 inhibitor can be stopped on the day of procedure.

For major surgery (e.g. requiring one or more days in hospital), the SGLT2 inhibitor is to be ceased 2 days pre-procedure and on the day of procedure (e.g. 3 days). If the SGLT2 inhibitor is part of a fixed dose combination, this will lead to withdrawal of two glucose-lowering drugs unless the second medication is prescribed separately.

For procedures requiring bowel preparation (e.g. colonoscopy) with carbohydrate restriction commencing on the day prior to the procedure, the SGLT2 inhibitor is to be ceased 2 days pre-procedure and on the day of procedure (e.g. 3 days).

The **regional LHN:**

- **Blood Glucose & Blood Ketone Monitoring Chart (MR59H)** is to be used to monitor all people with diabetes and includes rapid detection and response instructions.
- **CSII (Insulin Pump) Inpatient Rate Record (MR-CIR)** is to be used by the person with diabetes to monitor and document the use of their insulin pump during admission.
- **Intravenous Insulin Infusion Type 1 Chart (MR-INF-T1D)** is to be used for people with type 1 diabetes receiving IV Insulin Infusion and includes rapid detection and response instructions.
- **Intravenous Insulin Infusion Type 2 Chart (MR-INF-T2D)** is to be used for people with type 2 diabetes receiving IV Insulin Infusion and includes rapid detection and response instruction.

The **blood glucose (BG)** target range for adults with any type of diabetes within the perioperative period is 5.0 – 10.0mmol/L.

The **blood ketone (BK)** target range in adults with type 1 diabetes and in any type of diabetes prescribed an SGLT2 inhibitor is less than 0.6mmol/L.

Any concerns to be discussed with the person with diabetes, surgeon, proceduralist and/or anaesthetist via the high-risk patient pathways.

Further information can be obtained from the SA Health Surgical Services SharePoint page at <https://sagov.sharepoint.com/sites/CHSA/clinical/surgical2/Pages/Elective-Surgery-Dashboard.aspx> or the regional LHN Policies and Procedures SharePoint page at <https://sagov.sharepoint.com/sites/CHSA/clinical/surgical2/Pages/Policies-&-Procedures.aspx>

2. Instruction Details

Pre-Admission

- 2.1 All people with diabetes should attend a pre-anaesthetic clinic (PAC) appointment prior to surgery.
- 2.2 At the PAC appointment, the PAC Registered Nurse (RN) will identify the relevant Perioperative Diabetes fact sheet for the person’s type of diabetes and surgery or fasting procedure.
- 2.3 The PAC RN to identify:
 - type of diabetes
 - current management (e.g. dietary and physical activity recommendations, oral and/or injectable (including insulin) diabetes medications)
 - use of continuous subcutaneous insulin infusion (CSII or insulin pump)
 - use of continuous glucose monitoring (CGM): CGM systems may be supported to remain insitu during surgery or fasting procedure, however, BG results are to be used for treatment changes, not CGM sensor glucose results.
 - complexity of the procedure and time being fasted
 - glycaemic control
 - HbA1c
 - blood glucose (BG)
 - blood ketone (BK) if type1 diabetes or if prescribed SGLT2 inhibitor
 - frequency and severity of hypoglycaemia
 - frequency and severity of hyperglycaemia.
- 2.4 Any concerns to be discussed with the person with diabetes and the anaesthetist via the high-risk patient pathways.

For **out-of-target-range BG**, refer to MR59H for Rapid Detection and Response Instruction.

For **out-of-target-range BK**, refer to table below:

Blood Ketone	Action
less than 0.6mmol/L	within target range, no action required.
0.6 – 1.5mmol/L	inform anaesthetist recheck blood glucose and ketones in 2-4 hours
1.5 – 3.0mmol/L	inform anaesthetist and follow interventions/instructions given.
greater than 3.0mmol/L	immediate anaesthetic notification.

- Any queries pertaining to glycaemic control, blood glucose and blood ketone monitoring, continuous glucose monitoring, continuous subcutaneous insulin infusion (CSII or insulin pump) management or oral and/or injectable (including insulin) diabetes medication can be discussed with the regional LHN Diabetes Specialist Nurse.
 - Additional information and/or support can be obtained the Rural Support Service (RSS) Diabetes Service via Health.DiabetesService@sa.gov.au
- 2.5 Any aspect of the consumer fact sheet that is not relevant to the individual is to be crossed out while explaining why and what is relevant information.
 - 2.6 All information and instructions provided to the person with diabetes is to be documented in the medical record.

2.7 The PAC RN is to discuss with the Theatre Nurse Unit Manager (NUM) and/or Assistant NUM the person with diabetes, position on the theatre list.

- if possible, the person with type 1 diabetes to be moved to first on the morning or afternoon lists. If this cannot occur, a discussion with the surgeon or proceduralist will determine alternative arrangements.

On Admission

2.8 Registered Nurse (RN)/Registered Midwife (RM) to check within 1 hour of admission:

- blood glucose (BG) should be attended hourly during the fasting period and procedure except for people with type 2 diabetes with a pre pre-operative HbA1c of less than 7.0% (less than 53mmol/mol) and who are managed on Metformin alone. In this instance, 2 hourly BG monitoring is adequate.
- blood ketone (BK) if type1 diabetes or if prescribed an SGLT2 inhibitor
- that the preoperative plan has been followed
- if there have been any hypoglycaemia or hyperglycaemia events during preparation
- if continuous glucose monitor (CGM) system in use, check sensor location is not close to surgical site
- do not use CGM glucose results for treatment changes, measure and use capillary BG results
- if treated with an insulin pump, and it is to stay connected, check Teflon (not steel) cannula has been changed in the previous 24 hours and that its location is not close to surgical site.

2.9 RN/RM to advise medical staff if:

- the SGLT2 inhibitor has not been omitted for 3 days (e.g. 2 days prior to surgery and the day of surgery) OR if the SGLT2 inhibitor has been taken on the day of surgery / procedure. The course of action is dependent on the following table.

The suggested management for CLINICALLY WELL person with diabetes who has NOT ceased SGLT2 inhibitor is outlined in the table below:

Blood ketones	Standard base excess (SBE)	Comments
less than 1.0mmol/L	greater than 5.0mmol/L	No ketosis and no metabolic acidosis. Consider proceeding with day surgery: hourly monitoring of blood ketones during the procedure, and 2nd hourly following the procedure until eating and drinking normally or discharged. Where blood gas analysis is not available proceed only if added risk is consistent with goals of care. More extensive surgery: consider goals of care and collaboration with endocrinology and critical care. Perioperative insulin and glucose infusion may reduce risk.
greater than 1.0mmol/L	greater than 5.0mmol/L	Ketosis without metabolic acidosis. Seek endocrinology or general medicine advice. Ketosis without acidosis may reflect starvation, particularly in individuals with HbA1c less than 9% (less than 75 mmol/mol). Consider proceeding, but with perioperative insulin and glucose infusion to reduce risk of ketoacidosis.
greater than 1.0mmol/L	less than 5.0mmol/L	Ketosis with metabolic acidosis. Postpone non-urgent surgery. Urgent surgery to proceed with insulin and glucose infusion and ketone monitoring. Seek urgent advice from MedStar on 137 827. Recommend transfer to an appropriate HDU or ICU.

- any out of target BG and BK results. Refer to MR59H for Rapid Detection and Response Instruction
- BG needs to be checked hourly if an intravenous (IV) Insulin Infusion is required
- any concerns to be discussed with the person with diabetes and the anaesthetist via the high-risk patient pathways.

In Theatre

2.10 RN/RM to continue monitoring:

- blood glucose (BG) should be attended hourly during the procedure except for people with type 2 diabetes with a pre pre-operative HbA1c of less than 7.0% (less than 53mmol/mol) and who are managed on Metformin alone. In this instance, 2hourly BG monitoring is adequate.
- blood ketone (BK) if type1 diabetes or if prescribed SGLT2 inhibitor as instructed by the anaesthetist.

2.11 RN/RM to advise anaesthetist of any out of target BG and BK results.

At any point during the surgery or procedure, if the BK is great than 1.0mmol/L in an unwell person with diabetes who has been prescribed an SGLT2 inhibitor or insulin, arterial or venous blood gases to measure (SBE) is recommended.

Recovery

2.12 RN/RM to check:

- blood glucose (BG) should be attended hourly until transfer to ward except for people with type 2 diabetes with a pre pre-operative HbA1c of less than 7.0% (less than 53mmol/mol) and who are managed on Metformin alone. In this instance, 2hourly BG monitoring is adequate
- blood ketone (BK) if type 1 diabetes or if prescribed SGLT2 inhibitor

on arrival to recovery room and as regularly as the anaesthetist indicates.

2.13 RN/RM to advise anaesthetist of any out of target BG and BK results.

At any point after a procedure, if the BK is greater than 1.0mmol/L in an unwell person with diabetes who has prescribed an SGLT2 inhibitor or insulin, arterial or venous blood gases to measure (SBE) is recommended.

If ward incapable of managing a diabetes emergency (e.g. diabetic ketoacidosis or hyperosmolar state) or maintain an IV Insulin Infusion, contact MedSTAR immediately on 137 827 to arrange transfer to appropriate HDU or ICU.

Prior to Discharge

2.14 RN/RM to ensure that the person with diabetes and/or carer:

- is tolerating oral intake
- understands how to manage diabetes overnight
- meets the DSU discharge criteria
- blood glucose (BG)
- blood ketone (BK) if type1 diabetes or if prescribed SGLT2 inhibitor.

2.15 RN/RM to advise anaesthetist immediately if BG is greater than 15.0mmol/L or BK greater than 1.0mmol/L.

3. Quality Checking of Abbott Freestyle Neo H Glucose and Ketone Meters

3.1 A mandatory requirement for all iCCnet SA sites is running quality external and internal control samples at regular intervals. All sites must run the minimum number of quality control samples each month and submit results to the iCCnet SA office via fax on (08) 7117 0635. Quality control results should be faxed to the iCCnet SA office during the first week of each month.

3.2 Internal quality control glucose samples should be tested daily, alternating between the HI and LO solutions. Example: Monday you would complete the HI quality check and then the Tuesday you would check the LO quality check (weekdays only).

3.3 Internal quality control ketone samples need to be checked once a week (Tuesdays), alternating quality solutions week to week. This has been approved by ICCnet SA as of 10/05/2022.

3.4 External quality control glucose and ketone samples need to be checked monthly and are provided by ICCnet SA. The results of these tests are unknown, and results obtained need to be communicated to ICCnet.

3.5 Orientating new nursing/midwifery staff/students to the quality policy is essential to ensure the correct process is taking place.

3.6 Technical Support available during office hours Monday to Friday via:

- Phone: (08) 7117 0600
- Fax: (08) 7117 0635
- Website: www.iccnetsa.org.au
- After hours (24 hrs / 7 days a week) – (08) 8378 2208.

4. Related documents

Diabetes fact sheets

1. [Colonoscopy and type 1 diabetes \(insulin pump\)](#)
2. [Endoscopy and type 1 diabetes \(insulin pump\)](#)
3. [Colonoscopy and type 1 diabetes \(insulin injections\)](#)
4. [Endoscopy and type 1 diabetes \(insulin injections\)](#)
5. [Colonoscopy and type 2 diabetes](#)
6. [Endoscopy and type 2 diabetes](#)
7. [Surgery and type 1 diabetes \(insulin pump\)](#)
8. [Surgery and type 1 diabetes \(insulin injections\)](#)
9. [Surgery and type 2 diabetes](#)

[Regional LHN Blood Glucose & Blood Ketone Monitoring Chart \(MR59H\) – Example](#)

[Regional LHN CSII \(Insulin Pump\) Inpatient Rate Record \(MR-CIR\) – Example](#)

[Regional LHN Intravenous Insulin Infusion Type 1 Chart Adults \(MR-INF-T1D\) – Example](#)

[Regional LHN Intravenous Insulin Infusion Type 2 Chart Adults \(MR-INF-T2D\) – Example](#)

iCCnet SA Abbott Freestyle Optium Neo Bench Method and Quality Control Policy

<https://www.iccnetsa.org.au/Data/Sites/1/iccnetsa/pointofcaretesting/instruments/optiumneoh/04-abbott-freestyle-optium-neo-h-full-method-v2.pdf> and <https://www.iccnetsa.org.au/Data/Sites/1/iccnetsa/pointofcaretesting/instruments/optiumneoh/06-abbott-freestyle-optium-neo-h-qc-policy-v2.pdf>

5. References

ACORN Australian College of Perioperative Nurses; *Standards for Perioperative Nursing in Australia; 15th Edition. Position Statement – medication safety.*

Norgine; Plenvu instruction sheet.

Australian Diabetes Society (2012). *Perioperative diabetes management guidelines.* Sydney, Australian Diabetes Society (ADS): 1-29. Available at <https://diabetessociety.com.au/documents/PerioperativeDiabetesManagementGuidelinesFINALCleanJuly2012.pdf>

ADS (2020). *ALERT Perioperative Diabetic Ketoacidosis (DKA) with SGLT2 Inhibitor Use.* September. Available at: https://diabetessociety.com.au/downloads/20201015%20ADS_DKA_SGLT2i_Alert_update_Sept_2020.pdf

ADS (2022). *Perioperative Diabetic Ketoacidosis (DKA) with SGLT2 Inhibitor Use.* January. Available at: https://diabetessociety.com.au/downloads/20220209%202021%20ADS_DKA_SGLT2i_Alert_highlighted%20changes_Jan%2022%20.pdf

Meyer, E, Gabb, G and Jesudason, D 2018. SGLT2 Inhibitor - Associated euglycemic diabetic ketoacidosis: A South Australian clinical case series and Australian spontaneous adverse event notifications. *Diabetes Care* 41: e47-e49. Available at: <https://diabetesjournals.org/care/article/41/4/e47/36883/SGLT2-Inhibitor-Associated-Euglycemic-Diabetic>

SA Health (2019). <i>Pathway for Pre-Operative Assessment for Adult Elective Surgery</i> . SA Health. Available at: https://www.sahealth.sa.gov.au/wps/wcm/connect/315c9931-6799-45bc-b54c-d5574371b56c/20190214+FINAL+Pre-op+Pathway.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-315c9931-6799-45bc-b54c-d5574371b56c-nJJfdij
ADA (2022). <i>Diabetes Care in the hospital: Standards of medical care in diabetes; Perioperative care</i> . Available at: https://diabetesjournals.org/care/article/45/Supplement_1/S244/138924/16-Diabetes-Care-in-the-Hospital-Standards-of
Central Adelaide Local Health Network (2021 and 2022) CALHN Endoscopy and Colonoscopy Consumer Information. Available at: eCentral (had.sa.gov.au)
North Adelaide Local Health Network (2019) NALHN Perioperative Diabetes Guidelines and (2021) Post-operative Diabetes Guidelines and (2018) Colonoscopy Consumer Information. Available at: NALHNPPG (had.sa.gov.au)
Nunyarra House Specialist Medical Centre (Not dated) Having a Colonoscopy Consumer Information.
SALHN (2021) Colonoscopy Clinical Protocol and (2022) Preadmission Perioperative Medication Guideline. Available at: %20Inside%20SALHN%20(sahs.sa.gov.au)">Search by A - Z > Inside SALHN (sahs.sa.gov.au)
Surgery SA (Not dated) Preparation for you Colonoscopy Consumer Information.
Regional Local Health Networks (2018) Continuous Glucose Monitoring (CGM) and Flash Glucose Monitoring (FGM) in the Inpatient setting, available at https://sagov.sharepoint.com/sites/CHSAX/procedures/Documents/CHSALHN%20Prot%20Continuous%20Glucose%20%26%20Flash%20Glucose%20Monitoring%20Ambulatory%20Service.pdf#search=CGM

6. Accreditation Standards

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



1. Clinical Governance



2. Partnering with Consumers



3. Preventing and Controlling Healthcare Associated Infections



4. Medication Safety



5. Comprehensive Care



6. Communicating for Safety



7. Blood Management



8. Recognising and Responding to Acute Deterioration



7. Consultation

Version	Consultation
1.0	RSS Diabetes Service, PAC Gawler Nurses, Theatre Nurses Gawler, Gawler Anaesthetists, Gawler Surgeons, Gawler Diabetes Educator, DDMS BHFLHN, DONM BHFLHN, MEAC Gawler.

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