

# Use of SGLT2-inhibitors for type 2 diabetes in acute inpatient care

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The information in this document should not replace a clinician's professional judgement.

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# At a glance

## SGLT2-i medicines should not be routinely initiated or continued for the management of diabetes in a hospital setting.

This clinical practice guide aims to inform the safe use of SGLT2-i medicines for people with type 2 diabetes receiving acute inpatient care.



### Step 1

- Obtain best possible medication history
- Establish and document any recent use of SGLT2-i medicine



### Step 2

- Withhold SGLT2-i medicine if the person requires a procedure or is at risk of diabetic ketoacidosis (DKA)
- Monitor for ketones



### Step 3

- Assess appropriateness of restarting SGLT2-i medicine when the person is eating and drinking normally, and is close to discharge
- Communicate the transfer of care plan to the patient and their general practitioner

# Use of SGLT2-inhibitors for type 2 diabetes in acute inpatient care

This guidance is only for people with type 2 diabetes. The aim is to develop clinical practice guidance on the use of sodium glucose co-transporter2-inhibitor (SGLT2-i) medicines for people with type 2 diabetes receiving acute inpatient care.

## Objectives

- To inform the safe use of SGLT2-i medicines for people with type 2 diabetes receiving acute inpatient care in NSW hospitals.
- To provide guidance on:
  - when to withhold SGLT2-i medicines
  - the recommencement of SGLT2-i medicines after they have been withheld
  - the use of SGLT2-i medicines in the periprocedural period
  - the commencement of SGLT2-i medicines in hospital (in circumstances where this is considered clinically important).
- To reduce the risk of SGLT2-i-induced diabetic ketoacidosis.
- To improve the early recognition and diagnosis of diabetic ketoacidosis (DKA), which may be euglycaemic.

## Intended audience

This guide is for all clinicians responsible for the care of people with type 2 diabetes in hospital. Specifically, it aims to support junior medical officers who are usually responsible for reviewing and prescribing medicines. Nursing staff, pharmacists, senior medical officers (in all disciplines), and allied health professionals will also benefit from being aware of the information in this guide.

## Background

SGLT2-i is a class of medicines used in the treatment of patients with type 2 diabetes. They inhibit the SGLT2 co-transporter protein and decrease glucose reabsorption by the kidney.<sup>1-3</sup> As a result, more glucose is excreted in the urine along with an increase of urine output. This class of medicine has been shown to reduce the progression of chronic kidney disease and reduce admissions to hospital with heart failure. See [Appendix 1](#) for a list of SGLT2-i medicines that were current at the time of writing.

### **SGLT2-i medicines are not approved for use in type 1 diabetes.**

While there is an indication for the use of SGLT2-i medicines in people with heart failure and renal disease without diabetes, euglycaemic ketoacidosis is unlikely, although hypotension and genital mycotic infections can occur.

Involve the diabetes team regarding continued use in hospital.

## Common adverse effects

Clinicians need to be aware that treatment can lead to adverse effects including:

- genital yeast infections
- urinary tract infections
- increased and/or painful urination
- constipation
- nausea
- thirst
- renal impairment
- low blood pressure.

The use of SGLT2-i medicine is associated with weight loss and there is an extremely low risk of hypoglycaemia when used alone, or with other agents that have a low risk of causing hypoglycaemia, such as metformin.

SGLT2-i medicines are associated with an increased risk of DKA that does not always occur with significantly elevated blood glucose levels.<sup>4</sup> That is, the DKA may occur in patients who are euglycaemic making it difficult to diagnose unless the clinician is aware of this risk. Refer to [Figure 1: Presentation to emergency department or pre-admission clinic flow chart](#) for risk factors.<sup>5-8</sup> The DKA may be severe and require admission to an intensive care or high dependency unit.

The risks for SGLT2-i-induced DKA appear to be greatest during periods of acute illness (with or without decreased oral intake) or during preparations for procedures and particularly peri-operatively.<sup>2,3,6,8-11</sup> In an inpatient setting, these situations are common. Nevertheless, periods of acute illness in the community may also be high-risk scenarios.

Figure 1: Presentation to emergency department or pre-admission clinic flow chart

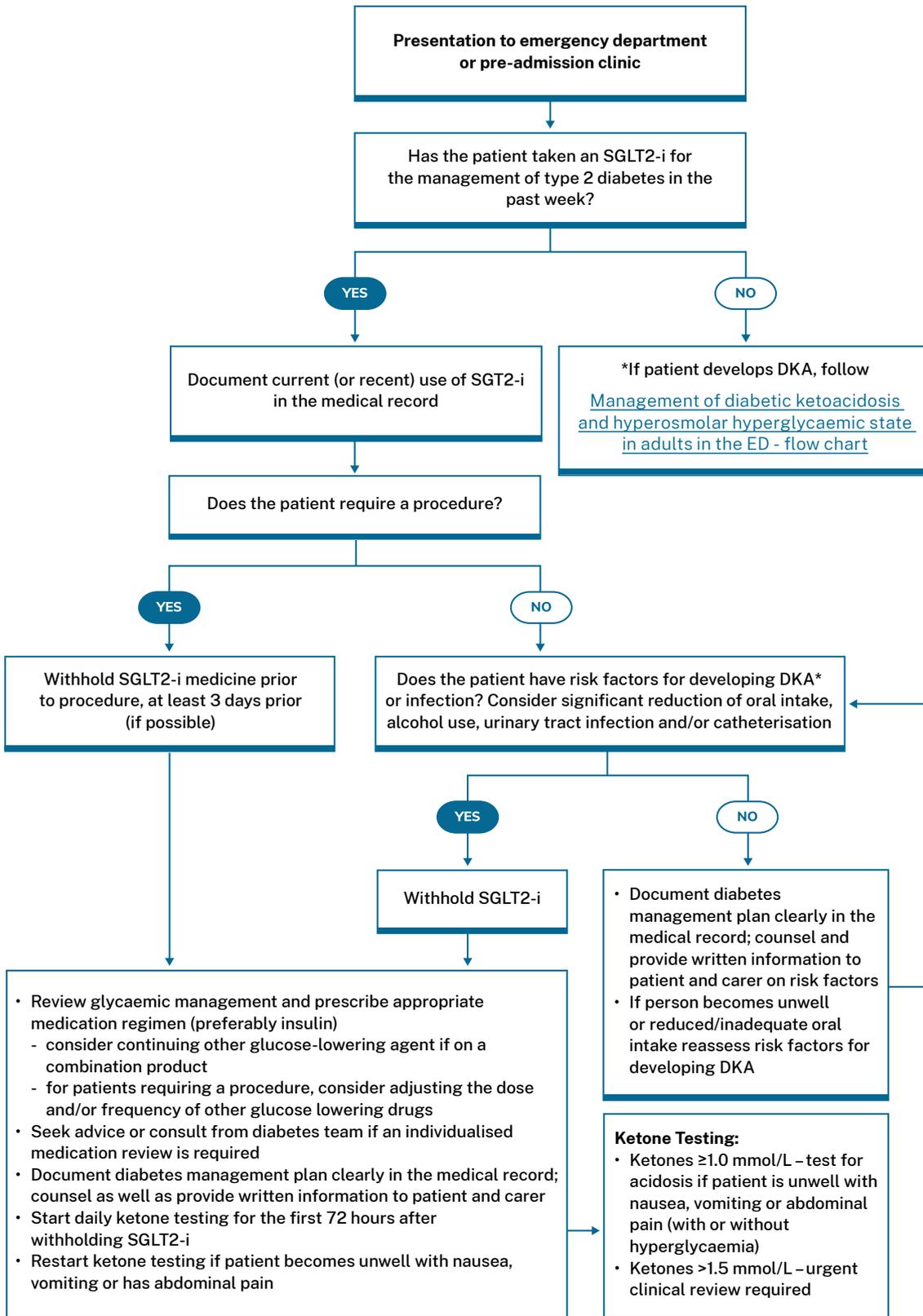
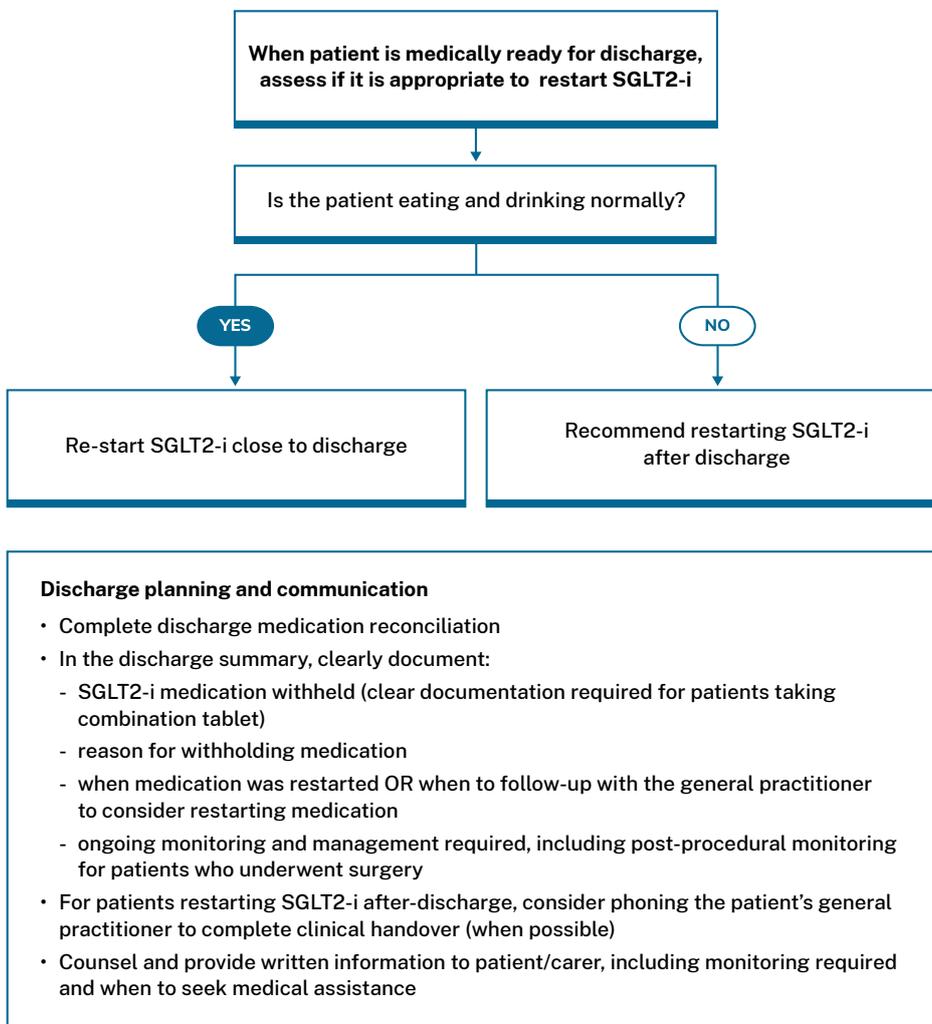


Figure 2: Discharge process flow chart



## Recommendations for acute inpatient care

SGLT2-i medicines should not be routinely initiated or continued for the management of diabetes in a hospital setting. When it is considered clinically appropriate to prescribe SGLT2-i medicines in hospital, caution should always be used. The risk of DKA needs to be carefully assessed. Refer to [Figure 1: Presentation to emergency department or pre-admission clinic flow chart](#) for factors that could trigger this situation.<sup>5-8</sup>

### On admission

All patients admitted to hospital should have a [Best Possible Medication History](#) collected and documented in their medical record on presentation, or as early as possible in the episode of care. Current or recent use of SGLT2-i medicines should be clearly documented.

### During admission

If the decision is made to stop or withhold an SGLT2-i, a review and documentation of the patient's glycaemic management is required, including the need for insulin and additional monitoring. In patients on combination therapy – for example, an SGLT2-i + metformin or an SGLT2-i + a dipeptidyl peptidase-4 (DPP-4) inhibitor – the appropriateness of continuing the second non-SGLT2-i diabetes medicine separately will need to be assessed. **These decisions should be clearly documented in the medical record.**

To aid in the recognition and diagnosis of DKA, blood ketone monitoring should be performed:

- daily in any inpatient with type 2 diabetes who is continued on an SGLT2-i medicine

- daily for three days after an SGLT2-i medicine has been ceased
- any time a patient with type 2 diabetes who has been treated with an SGLT2-i medicine within the preceding week becomes unwell with nausea, vomiting or abdominal pain.

Normal blood ketones are 0.6 mmol/L or lower. If ketone concentration is  $\geq 1.0$  mmol/L or the patient is unwell with nausea, vomiting, or abdominal pain (with or without hyperglycaemia) increase frequency of ketone monitoring. Testing for acidosis may be indicated. Ketones  $>1.5$  mmol/L should prompt an urgent clinical review.

### On discharge or transfer of care level

The team should assess whether the SGLT2-i is a suitable ongoing therapy, and the appropriate timing of recommencement based on the patient's medical condition at the time of discharge.

### Patient and carer information and education

The patient and carer should be advised when to resume their SGLT2-i medicine (if evident at the time of discharge) and any follow up or monitoring that is required. To prevent confusion, particular care should be exercised for patients taking a SGLT2-i medicine as a part of a combination tablet prior to admission.

This counselling should be supplemented with written information in a patient-friendly format as well as a copy of the discharge summary. The NSW Therapeutic Advisory Group SGLT2-i medicine [consumer information leaflet](#) provides a section to document when a SGLT2-i medicine was stopped and when it can be restarted.

## Clinical handover

The patient's general practitioner (GP) should be involved in discharge planning. For patients with risk factors, a clinical handover should be made over the phone with the patient's usual GP, practice nurse or practice manager (when possible). At minimum, the written discharge summary should include:

- the name of the SGLT2-i medication withheld
- why the medication was withheld
- clear instructions on when it should be recommenced.

Ideally, the patient's community pharmacist should be provided with a copy of the discharge summary.

## Specific guidance for peri-procedural care

The Australian Diabetes Society (ADS) and The Australian and New Zealand College of Anaesthetists<sup>12</sup> recommend withholding SGLT2-i medicines at least three days before a procedure (two days prior to surgery or the procedure and the day of surgery or the procedure). This may require adjusting the dose and frequency of other glucose-lowering medicines. If the SGLT2-i medicine is part of a fixed-dose combination, this will lead to withdrawal of two glucose lowering drugs unless the second drug is continued separately. For day-stay procedures, SGLT2-i can be stopped just for the day of the procedure. Minimise the duration of fasting before and after the procedure.

Postponement of non-urgent surgery should be considered if SGLT2-i medicines have not been stopped before surgery and either blood ketones are >1.0mmol/L and base excess <5, or HbA1c is >9.0%.

Ensure the plan regarding stopping medicine before a procedure is well documented and clearly communicated to patients and care providers. Provide the [consumer information leaflet](#) or similar. For patients taking, or recently taking, an SGLT2-i medicine, there should be a:

- medication reconciliation and medication review during hospitalisation
- clearly documented plan for pre- and post-procedural monitoring
- clearly documented plan for restarting the SGLT2-i medicine.

SGLT2-i medicines should be restarted post-procedurally only when the patient has normal oral intake and is close to discharge and after careful risk assessment.<sup>2,3,6</sup> For patients where renal function has deteriorated, kidney function should be reviewed before restarting SGLT2-i. SGLT2-i medicines may need to be restarted after discharge. If so, there should be clear communication to the patient and carer and their GP.

## Implementation considerations

This is a list of considerations for hospital governance committees.

- Provide education to staff on best practice management of patients on SGLT2-i medicines and the signs and symptoms of DKA.<sup>3</sup>
- Implement mechanisms that identify and alert the care team that a patient is on an SGLT2-i medicine. This could include using alerts in the Electronic Medication Management (EMM) system and bedside signage.
- If an SGLT2-i medicine is prescribed during the admission, consider an alert in the EMM system with the following wording:
  - "Withhold this medication when fasting for a procedure, or in cases of dehydration or acute illness."
  - Consider including the potential for an increased risk of urinary tract infection in patients who have a bladder catheter in situ or if one is planned.
  - Add an 'additional charting element' for **bedside blood ketone testing** to all SGLT2-i medication orders to alert nurses to measure and document the blood ketone concentration before the administration of the SGLT2-i medicine.
- Facilities should use local governance structures to monitor adverse incidents relating to SGLT2-i medicines. This may include using the IMS+ notification system and reporting through the patient safety and drug and therapeutics committees to ensure appropriate management has occurred, including medication reconciliation.

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## Appendix 1. SGLT2-i medicines

Active ingredient name	Brand name
Dapagliflozin	Forxiga
Dapagliflozin + metformin	Xigduo
Empagliflozin	Jardiance
Empagliflozin + linagliptin	Glyxambi
Empagliflozin + metformin	Jardiamet
Ertugliflozin	Steglatro
Ertugliflozin + metformin	Segluromet
Ertugliflozin + sitagliptin	Steglujan

# Additional resources

## Patient information leaflets

- [SGLT2 inhibitor medicines for diabetes – Consumer information leaflet](#)
- Search for Consumer Medicines Information leaflet at the [Therapeutic Goods Administration](#).

## SGLT2-i and perioperative period

- Position statement by ADS, ADEA, DA, NZSSD and ANZCA: Alert: Perioperative Diabetic Ketoacidosis (DKA) with SGLT2 Inhibitor Use. Find it at the [Australian Diabetes Society](#).

## Drug monographs for SGLT2-i medicines available in Australia

- [Australian Medicines Handbook \(AMH\): Sodium-glucose co-transporter 2 inhibitors](#)
- Search for Product Information at the [Therapeutic Goods Administration](#).

## eLearning and Clinical decision support

- The Agency for Clinical Innovation Diabetes and Endocrine Network, [Inpatient Management of Diabetes Mellitus, Building Capability in Inpatient Diabetes Management](#)

## Guidelines

- [Therapeutic Guidelines: Diabetes](#)

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