



Perioperative Management of Patients Treated with SGLT-2 Inhibitors (SGLT2i)

In patients with no history of diabetes mellitus and a fasting blood glucose <100 mg/dl, proceed with surgery regardless of whether the SGLT2i was held; check BMP after surgery and q12h until PO intake or enteral/parenteral nutrition is resumed. If anion gap metabolic acidosis present, add-on beta-hydroxybutyrate (BOHB) STAT and consult diabetes/endocrinology.

In patients with diabetes mellitus or a fasting blood glucose \geq 100 mg/dl or whose medical history is unknown:

If SGLT2i was held for \geq 3 days (\geq 4 days for ertugliflozin): proceed with surgery; check BMP after surgery and q12h until PO intake/EN/PN resumed. If anion gap metabolic acidosis present, add-on BOHB STAT and consult diabetes/endocrinology.

If SGLT2i was *not* held for \geq 3 days (\geq 4 days for ertugliflozin):

1. Urgent/Emergent surgery:

- Check either BMP and BOHB or VBG preoperatively or as soon as practical perioperatively:
 - o if anion gap metabolic acidosis and/or elevated BOHB, consult diabetes/endocrinology; proceed with surgery if risk acceptable; begin insulin infusion as soon as possible.
 - o if no anion gap metabolic acidosis or elevated BOHB, proceed with surgery. Consider administering insulin in the OR.
- Postoperative monitoring as described in #3 below depending on whether patient will be discharged or admitted postoperatively
- Consult diabetes/endocrinology in the postoperative period to help guide management

2. Elective surgery:

- **Surgery should be postponed** unless the risk of euDKA is judged to be acceptably low (*see specific criteria below*), in which case surgery can proceed, as per Urgent/Emergent surgery pathway (see #1 above).
 - o **Factors suggesting lower risk:** pre-op A1c <8, pre-op blood glucose <150, not on insulin as outpatient, minor surgery (ex. local anesthesia, short MAC case), no significant background comorbidity, NPO <12 h pre-op.
 - o **Factors suggesting higher risk:** pre-op A1c >8, pre-op blood glucose >150, on insulin as outpatient, major surgery, background significant comorbidity (eg, trauma, obesity, MI, etc), NPO >24 h pre-op.

- Preoperative management of the patient's diabetes should be done in conjunction with the patient's endocrinologist and/or the diabetes/endocrinology consult service while SGLT2i is held
3. If surgery is done when SGLT2i was **not held for ≥ 3 days (≥ 4 days for ertugliflozin)**, diabetes/endocrinology consult should be obtained and postoperative monitoring should include:
- **If patient is being admitted postoperatively:**
 - fingerstick glucose within 1 hour postop, then per unit protocol. Treat hyperglycemia per unit protocol.
 - basic metabolic panel and serum beta-hydroxybutyrate within 1 hour postop
 - BMP and BOHB 4 h after immediate postop labs and then continuing q 8 hours for the first 24 hours
 - after 24 hours, decrease lab frequency to q 12 hours. Include BOHB if still NPO; if tolerating diet/EN/PN, check only BMP. Continue lab monitoring until the patient has been tolerating solid diet or EN/PN at goal rate for >24 hours.
 - If bicarb ≤ 18 or pH < 7.3 and calculated AG ≥ 12 , add on STAT serum BOHB (if not already included) and check serum lactate level.
 - If carbohydrate-containing nutrition will not be resumed on the day of procedure (the patient will remain NPO), consider dextrose infusion (D5 or D10) with IV or scheduled subcutaneous insulin, particularly if the patient was on insulin preoperatively.

If patient is being discharged postoperatively:

- The patient must tolerate a carbohydrate-containing PO diet/EN/PN before discharge from the PACU. Once tolerating diet/EN/PN and all other clinical criteria for discharge are met, patient may be discharged.
 - If unable to tolerate PO/EN/PN, check BMP and BOHB postoperatively.
 - if anion gap metabolic acidosis and/or elevated BOHB, admit and consult diabetes/endocrinology.
 - Check fingerstick glucose in the PACU
 - If fingerstick glucose >150 mg/dl, treat with correction scale subcutaneous insulin and check BMP and BOHB. If no acidosis or ketosis, the patient may still be discharged.
 - The patient should be instructed to return to the ED if nausea, vomiting, abdominal pain, confusion, or inability to tolerate diet/nutrition develop, or if fingerstick glucose is >250 (if patient self-monitors blood glucose).
 - The patient should be instructed to resume SGLT2i the day after discharge as long as able to eat and drink (or tolerate EN/PN) without problems.
4. If patient is diagnosed with euglycemic DKA, treat according to the DKA pathway; do not use boluses.

Definitions/abbreviations:

SGLT2i:

- Canagliflozin (Invokana®)
- Canagliflozin/metformin (Invokamet®)
- Canagliflozin/metformin XR (Invokamet® XR)
- Dapagliflozin (Farxiga®)
- Dapagliflozin/metformin XR (Xigduo®)



- Dapagliflozin/metformin XR (Xigduo® XR)
- Dapagliflozin/saxagliptin (Qtern®)
- Dapagliflozin/saxagliptin/metformin (Qternmet® XR)
- Empagliflozin (Jardiance®)
- Empagliflozin/metformin (Synjardy®)
- Empagliflozin/metformin XR (Synjardy® XR)
- Empagliflozin/linagliptin (Glyxambi®)
- Empagliflozin/linagliptin/metformin XR (Trijardy® XR)
- Ertugliflozin (Steglatro™)
- Ertugliflozin/metformin (Segluromet™)
- Ertugliflozin/sitagliptin (Steglujan™)

BMP: Basic metabolic panel

Anion gap metabolic acidosis: bicarbonate <18 mEq/L **and** anion gap >12

BOHB: Beta-hydroxybutyrate

euDKA: euglycemic diabetic ketoacidosis

ED: emergency department

EN: enteral nutrition

MI: myocardial infarction

PN: parenteral nutrition