

Peri-Procedure Management of Patients on Sodium-glucose cotransporter-2 (SGLT-2) Inhibitors

Disclaimer: This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson's specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient's care. This algorithm should not be used to treat pregnant women.

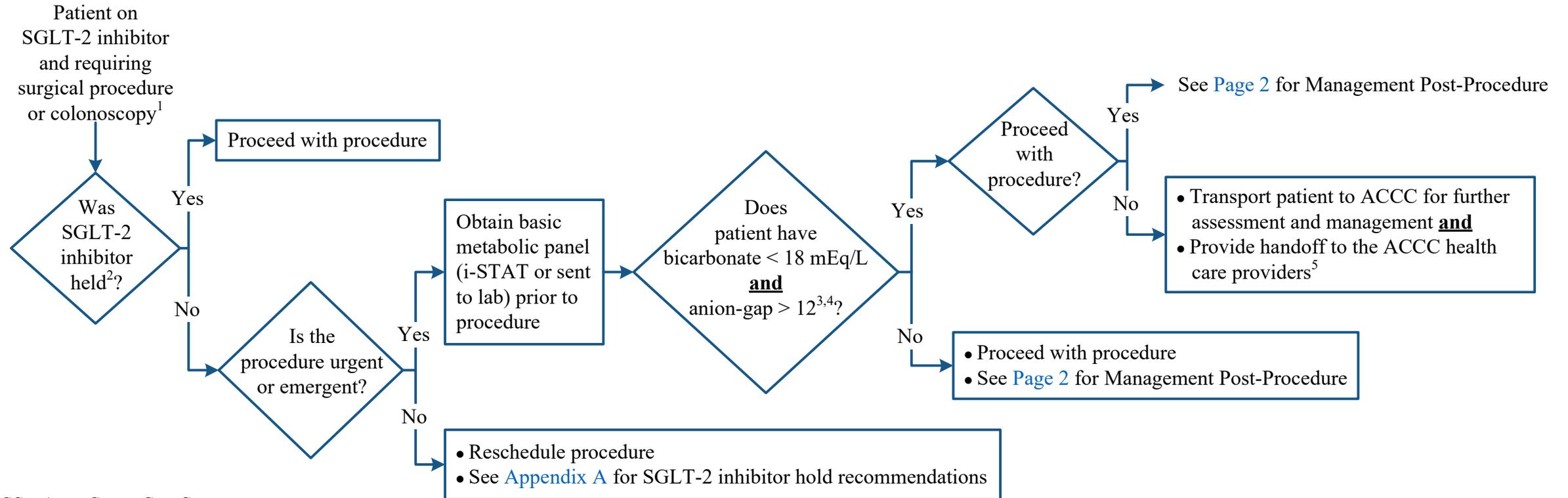
Note: Patients on SGLT-2 inhibitors have an increased risk of euglycemic (glucose < 250 mg/dL) and hyperglycemic diabetic ketoacidosis (DKA) during the peri-procedure period.

MANAGEMENT PRE-PROCEDURE

PRESENTATION

ASSESSMENT

EVALUATION



ACCC = Acute Cancer Care Center
 DKA = diabetic ketoacidosis

¹ There are insufficient data to make recommendations regarding the need to hold SGLT-2 inhibitors for procedures other than scheduled surgery or colonoscopy

² See [Appendix A](#) for SGLT-2 inhibitor hold recommendations

³ If patient has an anion gap > 12 [anion gap = sodium – (chloride + bicarbonate)] without a metabolic acidosis (bicarbonate < 18 mEq/L) **or** a normal anion gap metabolic acidosis (bicarbonate < 18 mEq/L and anion gap ≤ 12), DKA is not likely and other etiologies should be evaluated based on patient risk factors

⁴ If anion-gap metabolic acidosis based on i-STAT results, send STAT basic metabolic panel to lab for confirmation

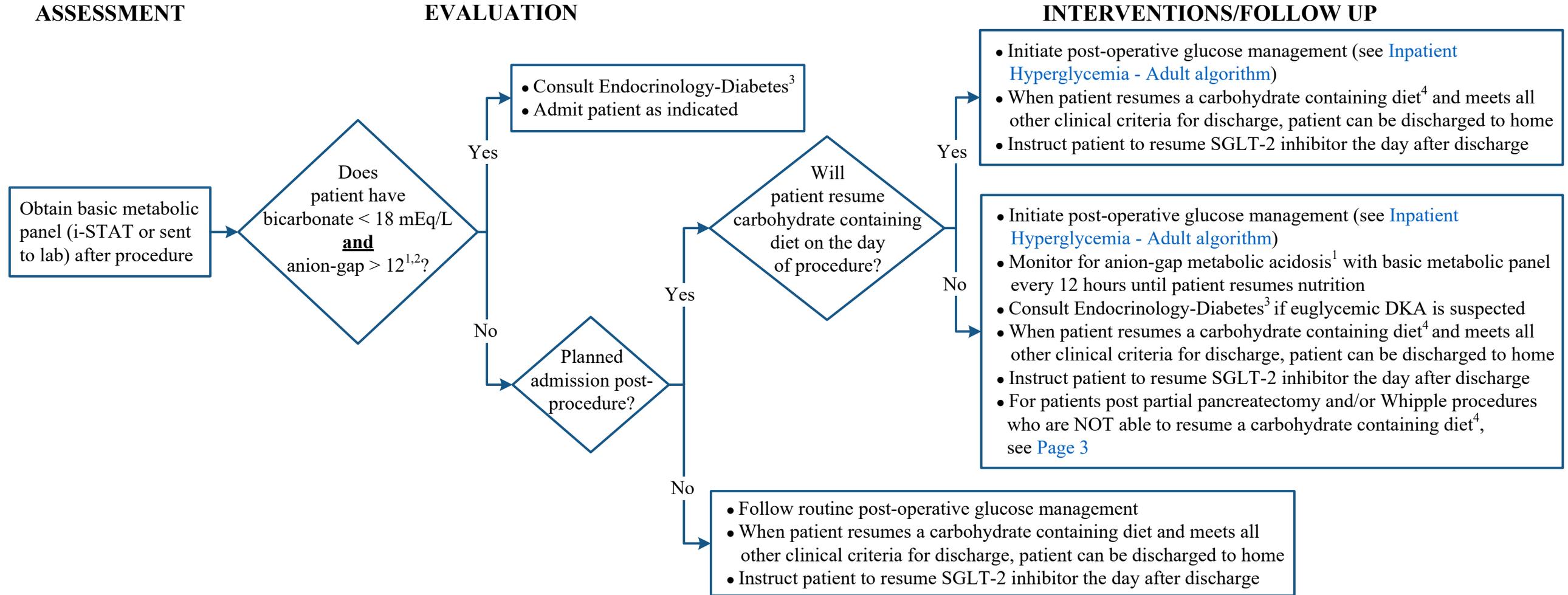
⁵ Refer to the Hand-Off Communication Policy (#CLN0513)

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MANAGEMENT POST URGENT/EMERGENT PROCEDURES



¹ If patient has an anion gap > 12 [anion gap = sodium – (chloride + bicarbonate)] without a metabolic acidosis (bicarbonate < 18 mEq/L) or a normal anion gap metabolic acidosis (bicarbonate < 18 mEq/L and anion gap ≤ 12), DKA is not likely and other etiologies should be evaluated based on patient risk factors

² If anion-gap metabolic acidosis based on i-STAT results, send STAT basic metabolic panel to lab for confirmation

³ Consult the inpatient Endocrinology-Diabetes Team A by the on-call system with direct provider to provider communication

⁴ Carbohydrate containing diet includes enteral nutrition and/or total parenteral nutrition delivered at a goal rate

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PRESENTATION

ASSESSMENT

TREATMENT/FOLLOW-UP

Post partial pancreatectomy and/or Whipple procedure **and** NOT able to resume a carbohydrate containing diet¹

Obtain C Peptide and glucose on post-operative day 2 or 3

Is glucose ≥ 150 mg/dL?

Yes
No

A
Is C Peptide ≥ 1 ng/mL?

Yes
No

- When patient meets all other clinical criteria for discharge, patient can be discharged to home
- Repeat C Peptide and glucose 1 to 2 weeks post discharge

Is glucose ≥ 150 mg/dL?

Yes
No

Is C Peptide ≥ 1 ng/mL?

Yes
No

Restart SGLT-2 inhibitors if indicated

- Do not restart SGLT-2 inhibitors
- Consult Endocrinology-Diabetes for recommendations on restarting SGLT-2

- Do not restart SGLT-2 inhibitors
- Refer to treating primary care physician (PCP)/endocrinologist to re-evaluate use of SGLT-2 inhibitor

Obtain post prandial C Peptide and glucose

Is glucose ≥ 150 mg/dL?

Yes
No

See Box A on this page

Consult Endocrinology-Diabetes for recommendations on restarting SGLT-2

¹ Carbohydrate containing diet includes enteral nutrition and/or total parenteral nutrition delivered at a goal rate

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APPENDIX A: SGLT-2 Inhibitors¹ and Recommended Hold Times

Note: Holding SGLT-2 inhibitors prior to surgery increases the risk for hyperglycemia.

- During the period when SGLT-2 inhibitors are held, it is essential that patients monitor their blood glucose prior to breakfast (fasting) and at bedtime (2 times daily)
- Patients should be instructed to contact their procedural/surgical team and treating primary care physician (PCP)/endocrinologist IMMEDIATELY for any glucose value > 250 mg/dL
- If a patient is either unable to reach the treating PCP/endocrinologist or the PCP/endocrinologist is uncomfortable with management, an URGENT Endocrinology-Diabetes referral should be placed. For urgent Endocrinology-Diabetes referrals, page the outpatient team through the on-call system.

Require holding for 3 days (72 hours)

- Bexagliflozin (Brenzavvy™)
- 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)
- Sotagliflozin (Inpefa™)

Require holding for 4 days (96 hours)

- Ertugliflozin (Steglatro™)
- Ertugliflozin/metformin (Segluromet™)
- Ertugliflozin/sitagliptin (Steglujan™)

¹ All SGLT-2 inhibitors are non-formulary

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SUGGESTED READINGS

- Blau, J. E., Tella, S. H., Taylor, S. I., & Rother, K. I. (2017). Ketoacidosis associated with SGLT2 inhibitor treatment: Analysis of FAERS data. *Diabetes/Metabolism Research and Reviews*, 33(8), e2924. <https://doi.org/10.1002/dmrr.2924>
- Burke, K. R., Schumacher, C. A., & Harpe, S. E. (2017). SGLT2 inhibitors: A systematic review of diabetic ketoacidosis and related risk factors in the primary literature. *Pharmacotherapy*, 37(2), 187-194. <https://doi.org/10.1002/phar.1881>
- Chacko, B., Whitley, M., Beckmann, U., Murray, K., & Rowley, M. (2018). Postoperative euglycaemic diabetic ketoacidosis associated with sodium–glucose cotransporter-2 inhibitors (gliflozins): A report of two cases and review of the literature. *Anaesthesia and Intensive Care*, 46(2), 215-219. <https://doi.org/10.1177/0310057X1804600212>
- Hoffman, C., Green, M., & Megafu, O. (2017). Sodium-glucose linked transporter 2 inhibitor-associated perioperative euglycaemic diabetic ketoacidosis: A case for a perioperative guideline. *Anaesthesia and Intensive Care*, 45(6), 758-759. <https://doi.org/10.1177/0310057X1704500617>
- Meyer, E. J., Mignone, E., Hade, A., Thiruvankatarajan, V., Bryant, R. V., & Jesudason, D. (2020). Peri-procedural euglycemic diabetic ketoacidosis associated with sodium-glucose cotransporter 2 inhibitor therapy during colonoscopy. *Diabetes Care*, 43(11), e181-e184. <https://doi.org/10.2337/dc20-1244>
- Milder, D. A., Milder, T. Y., & Kam, P. C. A. (2018). Sodium-glucose co-transporter type-2 inhibitors: Pharmacology and peri-operative considerations. *Anaesthesia*, 73(8), 1008-1018. <https://doi.org/10.1111/anae.14251>
- Singh, A. K. (2015). Sodium-glucose co-transporter-2 inhibitors and euglycemic ketoacidosis: Wisdom of hindsight. *Indian Journal of Endocrinology and Metabolism*, 19(6), 722-730. <https://doi.org/10.4103/2230-8210.167554>

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DEVELOPMENT CREDITS

This practice consensus statement is based on majority opinion of the Peri-Procedure Management of Patients on SGLT-2 workgroup at the University of Texas MD Anderson Cancer Center for the patient population. These experts included:

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