POSITION STATEMENT

American Society for Gastrointestinal Endoscopy position statement on periendoscopic management of patients on glucagon-like peptide-1 receptor agonists and sodium-glucose cotransporter-2 inhibitors

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This document was reviewed and approved by the Governing Board of the American Society for Gastrointestinal Endoscopy.

This position statement was prepared by the Association of Bariatric Endoscopy and the Standards of Practice Committee of the American Society for Gastrointestinal Endoscopy using the current best available scientific evidence and considering a multitude of variables including but not limited to adverse events, patient values, and cost implications. The purpose of these statements is to provide the best practice recommendations that may help standardize patient care, improve patient outcomes, and reduce variability in practice.

We recognize that clinical decision-making is complex. Guidelines, therefore, are not a substitute for a clinician's judgment. Such judgements may, at times, seem contradictory to our guidance because of many factors that are impossible to fully consider by guideline developers. Any clinical decisions should be based on the clinician's experience, local expertise, resource availability, and patient values and preferences.

This document is not a rule and should not be construed as establishing a legal standard of care or as encouraging, advocating for, mandating, or discouraging any particular treatment. Our guidelines should not be used in support of medical complaints, legal proceedings, and/or litigation as they were not designed for this purpose.

Glucagon-like peptide-1 receptor agonists (GLP-1RAs) and sodium-glucose cotransporter-2 (SGLT-2) inhibitors are increasingly used for managing diabetes mellitus and obesity because of their efficacy in glycemic control, cardiovascular risk reduction, and additional benefits like appetite suppression.[1-3] GLP-1RAs work by reducing glucagon production, increasing insulin production, and inducing satiety. These medications are known to delay gastric emptying and potentially increase the risk of retained gastric solid food contents, raising concerns about aspiration and airway compromise during sedation or general anesthesia.[4]

Studies suggest that GLP-1RAs inhibit gastric peristalsis and increase pyloric contractions in a dose-dependent manner, impairing gastric motility. However, it is speculated that this effect may attenuate with repeated administration, potentially mitigating the theoretical increased periprocedural risk over time. Current consensus recommendations advise holding GLP-1RAs before procedures based on their half-life, although it is unclear whether this allows gastric motility to return to baseline. In fact, a recent meta-analysis demonstrated no substantial differences in gastric emptying when using methods reflective of liquid emptying, such as the acetaminophen absorption test, particularly at time points relevant to periprocedural care.[5] Data on solid gastric emptying over time remain unknown.

As the number of patients placed on GLP1RAs such as semaglutide and tirzepatide increases, there are growing concerns that GLP-1–mediated effects on GI motility may increase the risk of retained gastric solid food contents in anesthetized patients, potentially increasing the risk of aspiration and airway compromise.[6,7] In 2023 the U.S. Food and Drug Administration updated the warning label for semaglutide (Ozempic; Novo Nordisk, Bagsværd, Denmark) to include ileus as a potential side effect.[8]

SGLT-2 inhibitors have also been increasingly used for the treatment of diabetes, but a recent U.S. Food and Drug Administration warning was issued on the risk of ketoacidosis in patients undergoing surgery or a prolonged period of fasting with fluid shifts.[9] Euglycemic ketoacidosis is typically precipitated by insulin omission or dose

reduction, severe acute illness, dehydration, extensive exercise, surgery, low-carbohydrate diets, or excessive alcohol intake. The underlying mechanism of euglycemic ketoacidosis also involves reduced glucose availability and production during a fasting state (typically associated with some stressor) and/or increased urinary glucose excretion because of excess counter-regulatory hormones. Holding these medications for a few days before surgery may cause hyperglycemia, and coordination with endocrine specialists is imperative.

Following recommendations for preoperative management of patients on GLP-1RAs is crucial to mitigate the theoretical and/or potential risk of regurgitation and pulmonary aspiration during sedation or general anesthesia. Initial anecdotal reports of regurgitation and aspiration have raised safety concerns, leading the American Society of Anesthesiologists and other GI societies to provide consensus-based guidance on managing such patients preoperatively. Despite these recommendations, there continues to be ambiguity among practicing gastroenterologists regarding which endoscopic procedures should be performed or canceled and which procedures can be safely performed and in what manner.

To provide more specific guidance on triaging endoscopic procedures, we used a modified Delphi methodology to attain current expert consensus regarding procedural timing for all endoscopic procedures, regardless of whether patients stopped their medications or not, based on current available evidence. The Delphi method is a validated and structured technique to obtain expert consensus, particularly well suited for situations where there are limited outcome data, and guidance for procedural timing is urgently needed.[10,11]

New studies to assess outcomes related to the real effect of GLP-1RAs and SGLT-2 inhibitors are ongoing. These studies may ultimately reveal specific preprocedure dietary changes that may mitigate the need for medication cessation or that upper endoscopy and colonoscopy carry different risks because of the preparation required. Regardless, immediate interim action is needed. The Delphi method allows for timely formulation of expert consensus in a rigorous and systematic manner.

We also recognized that delaying procedures, as occurred during the coronavirus disease 2019 pandemic, not only has clinical implications but also moral and ethical ones. We therefore designed our study to emphasize both safety in endoscopy and taking into account patient outcomes while considering procedural timing.

METHODS

We used a modified Delphi process over 6 months (October 2023 to March 2024) to develop this expert panel consensus guideline.[11] The guideline proposal and methodology were approved by the American Society for Gastrointestinal Endoscopy (ASGE) Governing Board. Eleven experts from diverse backgrounds were invited as an expert panelist. The expert panel comprised 6 gastroenterologists (3 with a dedicated focus in bariatric endoscopy [A.R.S., R.Z.S., and M.T.] and 3 with expertise in guideline development and methodology [N.T., W.A., and N.M.]), 2 anesthesiologists (S.S. and D.A.), 2 endocrinologists (D.T.B. and A.P.S.), and 1 GI motility expert (W.W.C.). All participants on the panel who were invited to join in the survey agreed at the first invitation. Expert panelists participated in a 2-round process. The process was designed and moderated by the ASGE panel member experienced in methodology and guideline development (N.T.).

Development of the initial survey

We conducted an initial introductory meeting for all panelists to define important patient outcomes. Panelists discussed good clinical practice standards that should be followed for all patients and debated on 3 distinct patient care scenarios: emergency procedures in hospitalized patients, time-sensitive outpatient procedures (must be performed within 1 week), and elective procedures (can be different for several weeks without affecting patient outcomes). Based on the first meeting, a detailed survey was developed and circulated electronically. The panelists voted on optimal management of GLP-1RAs and SGLT-2 inhibitors in the pre-endoscopy period for various hypothetical patient scenarios. A consensus threshold for the overall survey response was set at 70%. In addition, we also reviewed consensus among clinical subspecialties (gastroenterology, anesthesiology, endocrinology, and GI physiology).

First voting conference and group discussion

We reviewed the results of all 4 elements (good clinical practice standards and 3 distinct patient care scenarios) of the survey in a virtual meeting (via Zoom, October 3, 2023). After the first round of voting and before round 2, panelists received a comprehensive literature review. At the virtual round 2 meeting, panelists agreed on the key definitions for hypothetical patient scenarios, reviewed the results from round 1 voting, and discussed personal experiences regarding optimal management of GLP-1RAs and SGLT-2 inhibitors in the pre-endoscopy period for various hypothetical patient scenarios.

Second voting conference and consensus recommendations

A second survey was then sent to the panelists electronically after a detailed review of the literature and group discussion. In the second virtual meeting (January 9, 2024), panelists reviewed the survey results. We considered consensus agreement had been reached when 75% of the members or more agreed on an option and without

discrepancy between various subspecialties (gastroenterology, endocrinology, anesthesiology, and GI physiology).

SUMMARY OF RECOMMENDATIONS

Good clinical practice standards

Statement 1. The ASGE recommends immediate preprocedure evaluation for GI symptoms (severe nausea, vomiting, regurgitation when lying supine, abdominal bloating, abdominal distention, and abdominal pain) suggestive of possible delayed gastric emptying for all patients on GLP-1RAs.

Discussion. All panel members reached a consensus on this statement that in addition to routine preendoscopy evaluation, clinicians must ask focused questions regarding the presence of GI symptoms in patients taking GLP-1RAs. Of the 12 panel members, 1 (8.3%) agreed with the statement and 11 (91.7%) strongly agreed with the statement. The statement is supported by the fact that the presence of symptoms before endoscopy (such as nausea, vomiting, regurgitation, abdominal bloating, abdominal distension, or abdominal pain) have been shown to correlate with residual gastric contents.[12] Thus, it is critical for the endoscopy team members (nursing staff, endoscopists, and/or anesthesiologists) to specifically ask patients on GLP-1RAs about digestive symptoms before endoscopy. The presence or absence of symptoms will guide sedation strategies as discussed later in the document.

Statement 2. The ASGE recommends a detailed discussion regarding possible risk of aspiration with all patients on GLP-1RAs undergoing endoscopic evaluation.

Discussion. All panel members reached a consensus on this statement addressing the need to inform patients on GLP-1RAs about the potential of pulmonary aspiration during endoscopy. Of the 12 panel members, 3 (25%) agreed with the statement and 9 (75%) strongly agreed with the statement. Although case reports of perioperative pulmonary aspiration occurring in patients on GLP-1RAs have been published, larger cohort studies have not yet demonstrated an increased risk of pulmonary aspiration in the periendoscopic period.[13-15] Although there remains a need for larger studies to evaluate the risk of pulmonary aspiration in patients taking GLP-1RAs, the panel agreed that these patients should be informed of the possible risk of pulmonary aspiration in the periendoscopic period.

Statement 3. The ASGE suggests a liquid diet 24 hours before endoscopic procedure for all patients on GLP-1RAs.

Discussion. All panel members reached a consensus on this statement that a liquid diet should be maintained before all endoscopic procedures in patients on GLP-1RAs. Of the 12 panel members, 6 (50%) strongly agreed and 4 (33.3%) agreed with the statement. Delays in gastric emptying with GLP-1RAs have been observed in randomized controlled trials on scintigraphy,[16-22] which generally uses radiolabeled solid test meals and thereby provides information on solid emptying. Compared with placebo, GLP-1RAs were consistently associated with a prolonged emptying half-time on scintigraphy in most clinical trials. However, only a few studies used the current accepted standard of diagnosing delayed gastric emptying, defined by an increase in proportion of retained foods (>10%) at 4 hours on scintigraphy, and the results vary. A study by Jensterle et al[16] on semaglutide at weekly dosing found an increase in gastric retention at 4 hours from 7% to 37% after 13 weeks of therapy. In a recent meta-analysis of randomized controlled trials published to date, the pooled delay in gastric emptying half-time was 36 minutes.[5] Furthermore, a few retrospective studies of patients undergoing upper endoscopy also found evidence of increased gastric content retention among those taking GLP-1RAs,[12,23,24] although prolonged fasting and a preprocedural clear liquid diet appeared to be protective.[25,26] Overall, these studies appear to suggest that GLP-1RA use may be linked to a delay in gastric emptying of solid foods, although the severity may be impacted by specific formulations used.

On the other hand, results from studies of liquid-phase emptying appeared to be more mixed. The acetaminophen absorption test is often used for the assessment of gastric emptying in pharmacokinetic studies, and its results tend to be reflective of liquid-phase gastric emptying. Studies using this method have shown a variety of results, with a few demonstrating mildly prolonged absorption[27,28] and others finding no significant delay.[29-33] Moreover, significant liquid retention on endoscopic evaluations associated with GLP-1RA use has not been reported. Overall, study modalities that reflect liquid emptying did not seem to suggest significant delayed emptying or gastric retention. Hence, a liquid diet on the day before endoscopic procedures appears to be safe when combined with the standard preprocedure fasting. Therefore, until more definitive evidence concerning solid-food emptying becomes available, we suggest a liquid-only diet and avoidance of solid foods 24 hours before endoscopic procedure for all patients using GLP-1RAs as the most prudent approach to avoid sedation adverse events.

Urgent or emergent procedures in hospitalized patients

Figure 1 provides a flowchart for urgent or emergent endoscopic procedures in hospitalized patients on GLP-1RAs and SGLT-2 inhibitors.

Statement 4. The ASGE recommends against delaying required diagnostic or therapeutic urgent or emergent endoscopy for hospitalized patients who are on GLP-1RAs.

Discussion. All panel members reached a consensus on this statement addressing that delaying procedures that are urgent or emergent in hospitalized patients on GLP-1RAs is not recommended. Of the 12 panel members, 1 (8.3%) agreed with the statement and 11 (91.7%) strongly agreed with the statement. Although studies using various forms of diagnostic modalities have demonstrated possible delayed gastric emptying associated with GLP-1RAs, the clinical impact and implication of these findings remain unclear.

Correlations between gastric emptying study findings and clinical symptoms in patients with gastroparesis have been shown to be poor.[34] Moreover, gastric emptying scintigraphy findings may not be reproducible in up to 30% of patients with gastroparesis symptoms.[35] Therefore, whether the prolonged gastric emptying associated with GLP-1RAs identified on a single test during clinical studies truly translates to significant aspiration and sedation risks remains unclear. Indeed, despite some retrospective studies demonstrating increased identification of retained food residue on upper endoscopy among GLP-1RA users, an association between GLP-1RA use and incidence of sedation adverse events or aspiration has not been conclusively established.[12,23,24] Two large claims database studies published to date on this issue have yielded conflicting results: 1 study demonstrated a slight increase in incidence of postprocedural aspiration among GLP-1RA users (increase of 32 events out of >30,000 patients), whereas the other study showed no significant difference among over 3500 users and 20,000 nonusers of GLP-1RAs.[4,36] Therefore, in the inpatient setting when an urgent or emergent endoscopic procedure is required, the benefits (and thus the risk) of delaying such procedures would outweigh the theoretical aspiration and sedation risk, regardless of whether the GLP-1RA medication was held.

Statement 5. The ASGE suggests obtaining an anesthesia consult for hospitalized patients who are on GLP-1RA medication requiring urgent or emergent endoscopy.

A. *If a patient has symptoms suggestive of delayed gastric emptying, the ASGE suggests using aspiration, "full stomach" precautions (general anesthesia with a rapid sequence induction and intubation with cuffed endotracheal tube), or avoid deep sedation.*

B. *If a patient does not have symptoms suggestive of delayed gastric emptying, point of care gastric US, when available, may be used to determine the gastric volume.*

Discussion. All panel members reached a consensus on this statement to proceed with general anesthesia using "rapid sequence" induction and a cuffed endotracheal tube if symptoms of delayed gastric emptying are present for urgent or emergent endoscopy and using gastric US to assess gastric volume, when available, if the patient does not have symptoms. Of the 12 panelists, 6 (50%) strongly agreed, 4 (33%) agreed, and 2 (16%) neither agreed nor disagreed. The statement is aligned with the recommendations of the American Society of Anesthesiologists in terms of strategy and applies whether or not the patient has stopped the medication. It is irrespective of the NPO status, because of the delayed gastric emptying effect of GLP-1RAs.[37,38] Prospective observational studies on gastric US seem to suggest delayed gastric emptying on patients taking GLP-1RAs,[39] and although larger, randomized studies are needed, this remains a useful assessment tool. The determination of the urgency or emergency status of the endoscopy procedures is based on the recommendations of the ASGE but should be also individualized to each patient.[40]

Time-sensitive outpatient procedures

Figure 2 provides a flowchart for time-sensitive outpatient endoscopic procedures in patients on GLP-1RAs and SGLT-2 inhibitors.

Statement 6. The ASGE recommends against delaying time-sensitive outpatient diagnostic or therapeutic endoscopy for patients who are on GLP-1RAs.

Discussion. All panel members reached a consensus on this statement against delaying time-sensitive outpatient endoscopic procedures for patients who are on GLP-1RAs. Of the 12 members, 10 (83.3%) strongly agreed and 2 (16.6%) agreed with the statement. Time-sensitive procedures, such as evaluation, surveillance, and treatment of premalignant or malignant conditions and staging of malignancy before chemotherapy or surgery, should not be delayed because of GLP-1RA use. However, an individualized approach to each patient is prudent, because other circumstances could require a prompt approach.[40] Most major institutions have established protocols and guidance with respect to GLP-1RAs, yet a multidisciplinary discussion in specific cases might be necessary as well as a discussion with patients regarding risks and benefits of the available options.

Statement 7. The ASGE suggests anesthesia consultation for patients who are on GLP-1RAs requiring time-sensitive outpatient endoscopy.

Discussion. All panel members reached a consensus on this statement suggesting anesthesia consultation for patients who are on GLP-1RAs requiring time-sensitive outpatient endoscopy. Of the 12 panel members, 6

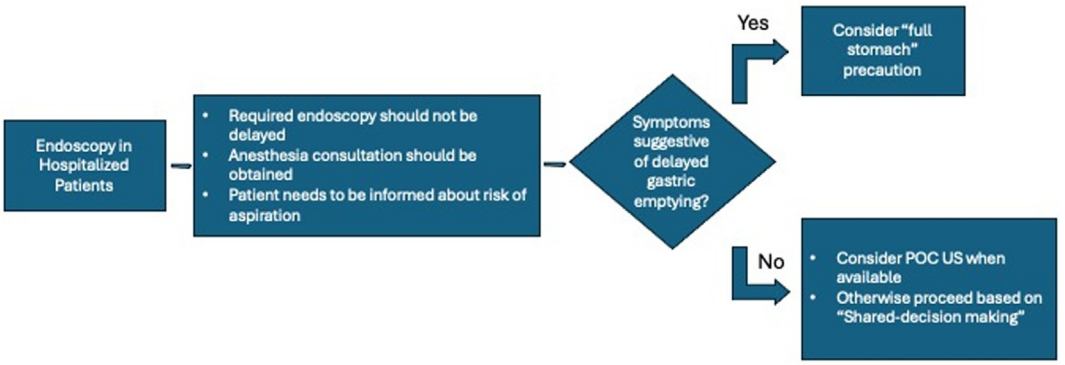

Figure 1. Flowchart for urgent or emergent endoscopic procedures in hospitalized patients taking glucagon-like peptide-1 receptor agonists and sodium-glucose cotransporter-2 inhibitors. *POC*, Point of care.

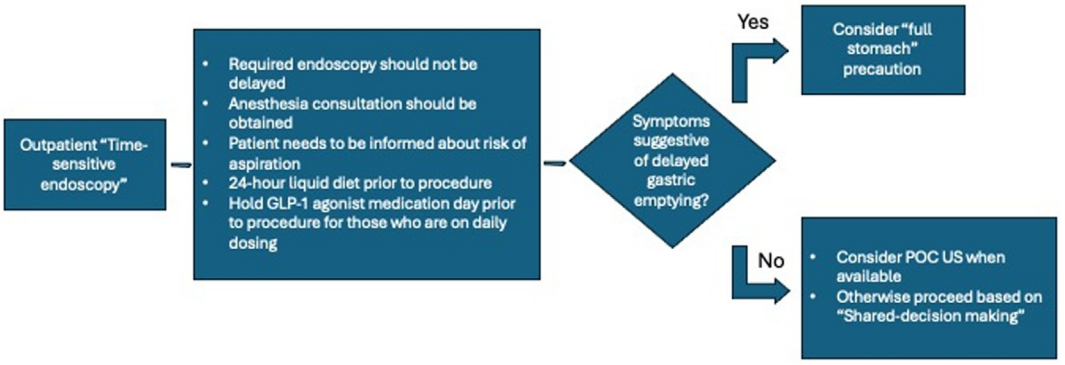

Figure 2. Flowchart for time-sensitive outpatient endoscopic procedures in patients taking glucagon-like peptide-1 receptor agonists and sodium-glucose cotransporter-2 inhibitors. *POC*, Point of care; *GLP-1*, glucagon-like peptide-1.

(50%) strongly agreed, 5 (42%) agreed, and 1 (8%) neither agreed nor disagreed with the statement. It is advised to adopt a personalized approach for patients on GLP-1RAs who necessitate outpatient endoscopy within a time frame shorter than 7 days, emphasizing the urgency of the procedure. Notably, GI symptoms commonly associated with GLP-1RAs, such as nausea, vomiting, dyspepsia, and early satiety indicative of delayed gastric emptying, should be carefully considered before any procedure. If patients exhibit symptoms suggestive of delayed gastric emptying, the ASGE suggests that endoscopy should be performed under "full stomach" precautions, including general anesthesia with a cuffed endotracheal tube and rapid sequence intubation. However, it may not be feasible to implement these precautions in office-based or ambulatory settings, necessitating the performance of endoscopy in hospital-based settings for such patients.

In cases where patients do not manifest symptoms indicative of delayed gastric emptying, the use of point of care gastric US, if available, may be considered to assess the necessity for "full stomach" precautions, provided there is adequate clinical expertise and equipment available. However, the evidence supporting the routine use of this modality in clinical practice remains limited.

Statement 8. The ASGE suggests holding GLP-1RAs 24 hours before the procedure for patients who are on daily dosing of GLP-1RAs and require outpatient time-sensitive endoscopy.

Discussion. Nearly all panel members reached a consensus on this statement addressing holding GLP-1RAs 1 day before outpatient time-sensitive endoscopy for patients who are on daily dosing. Of the 12 panel members, 5 (41.7%) strongly agreed, 4 (33.3%) agreed, 2 (16.7%) maintained a neutral stance, and 1 (8.3%) expressed disagreement with the statement. Although a clear majority (75%) of the Delphi group (either strongly agreed or agreed) was reached, the presence of dissenting opinions and neutral stances indicates that the panel is not entirely uniform in its position. The consensus among members corresponds to the guidance put forth by the American Society of Anesthesiologists.[37] The recommendation aligns with the society's suggestion that patients on daily dosing of the drug should consider withholding it on the day of the procedure.

Daily dosed drugs such as exenatide IR (Byetta; AstraZeneca Pharmaceuticals LP, Wilmington, Del, USA), liraglutide 3 mg (Saxenda; Novo Nordisk A/S, Bagsværd,

Denmark), liraglutide 1.2 mg/1.8 mg (Victoza; Novo Nordisk A/S, Bagsværd, Denmark), and lixisenatide (Adlyxin; Sanofi S.A., Paris, France) have short half-lives of 2.4, 13, 13, and 3 hours, respectively.[41] Given their short half-lives, holding these once-daily drugs 1 day before a time-sensitive endoscopy is practical.

The presence of disagreements and a neutral stance was attributed to oral semaglutide (Rybelsus; Novo Nordisk, Bagsværd, Denmark), which has a half-life like subcutaneous semaglutide of 7 days. Oral semaglutide undergoes absorption in the stomach, and the presence of food might impede this process. Therefore, it is advised to administer the oral form of semaglutide in a fasting state. The extended half-life of semaglutide is advantageous because it may help minimize day-to-day variations in exposure associated with oral administration. There is greater variability in semaglutide plasma concentrations after daily oral intake; however, this variability does not affect its effectiveness.[42] The ASGE suggests holding oral semaglutide a day before the procedure. It is essential to emphasize that the presented position is a consensus view shaped by the collective expertise of the Delphi group. Future research and clinical evidence may further refine our understanding of the optimal management of once-daily oral GLP-1RAs.

Elective procedures

Figure 3 provides a flowchart for elective endoscopic procedures in patients on GLP-1RAs and SGLT-2 inhibitors.

Statement 9. The ASGE suggests holding GLP-1RAs before elective endoscopy procedures for patients who are on GLP-1RAs as follows:

A. *For patients who are on daily dosing, the ASGE suggests holding GLP-1RAs at least 24 hours before the procedure.*
B. *For patients who are on weekly dosing, the ASGE suggests holding GLP-1RAs at least 7 days before the procedure.*
C. *The ASGE suggests moderate sedation or anesthesia-directed sedation for patients who have stopped GLP-1RAs at the recommended time interval and have no symptoms suggestive of delayed gastric emptying.*
D. *The ASGE suggests anesthesia consultation and multidisciplinary discussion for patients who either did not stop GLP-1RAs at the recommended time interval or have symptoms suggestive of delayed gastric emptying despite holding medication appropriately.*

Discussion. All panel members reached a consensus on this statement addressing holding GLP-1RAs before elective endoscopic procedures. Of the 12 panel members, 9 (75%) agreed or strongly agreed with this statement and 3 (25%) neither agreed nor disagreed with the statement. As noted previously in this document, GLP-1RAs delay gastric emptying and increase the rate of retained food on upper endoscopy, although the increased risk of aspiration has been debated.[13,14,23,24,43]

For urgent or time-sensitive procedures (see statements 4-8), the benefit of proceeding with a procedure likely outweighs the risk. For elective procedures, however, the decision is more nuanced. If GLP-1RAs are held and the patient reports no symptoms, the risks of residual gastric content and/or pulmonary aspiration are likely low, and the physician may proceed with the procedure with their anesthesia of choice. There may be increased risk if patients fail to stop GLP-1RAs or if symptoms suggestive of delayed gastric emptying are present. As such, an anesthesia consultation or discussion with the patient can be suggested in these scenarios. The duration of holding GLP-1RAs is based on pharmacodynamics of these medications, and further studies are needed to understand the effect of holding GLP-1RAs for various time periods.

Statement 10. The ASGE suggests consideration for bridging the antidiabetic therapy for patients who will be stopping GLP-1RAs 1 week before elective endoscopy.

Discussion. All panel members reached a consensus on the statement addressing the need for bridging antidiabetic therapy for patients who will be stopping GLP-1RAs 1 week before elective endoscopy. Of the 12 panel members, 12 (100%) agreed with the statement and 12 (100%) strongly agreed with the statement. GLP-1RAs are medications used for obesity and diabetes that slow gastric emptying, reduce hunger, reduce weight, lower the risk of major adverse cardiac events, and reduce glucose levels (both fasting plasma glucose and Hb_{A1c}).[42,44] Given that GLP-1RAs slow gastric emptying, performing endoscopy while patients are taking these agents poses a risk for aspiration when precautions are not taken. Therefore, it has been recommended previously to hold short-acting GLP-1RAs for at least 24 hours and long-acting GLP-1RAs for at least 7 days before endoscopy to prevent the risk of aspiration.[37] GLP-1RAs are known to be associated with basal insulin reductions of up to 10% to 20%, and prandial insulin requirements may reduce by 10% to 40%, with up to 54% of people able to come off prandial insulin altogether.[45,46]

Given the potential significant changes in insulin and glycemic management associated with holding GLP-1RAs, there was consensus within the group to have a bridging plan for antidiabetic therapy for patients who will be stopping GLP-1RAs 7 days before elective endoscopy. It is anticipated that this bridging plan will allow for optimization of glycemic control and an improvement in safety before

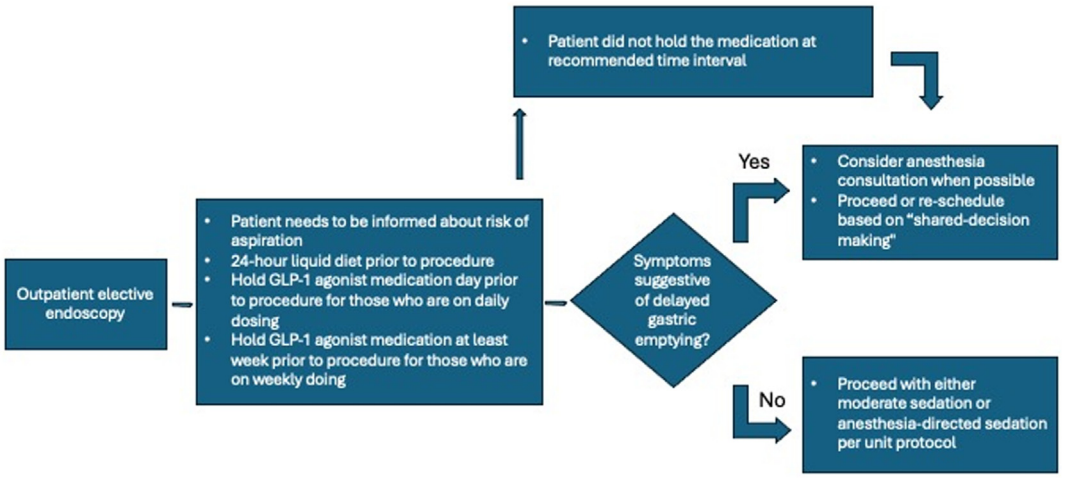

Figure 3. Flowchart for elective endoscopic procedures in patients taking glucagon-like peptide-1 receptor agonists and sodium-glucose cotransporter-2 inhibitors. *GLP-1*, Glucagon-like peptide-1.

undergoing endoscopy. We anticipate that as more data accumulate, we and the medical community at large will be able to strengthen and/or revise these recommendations and provide more specific recommendations for individual scenarios in the future.

Statement 11. The ASGE suggests holding SGLT-2 inhibitors 3 to 4 days before elective endoscopy procedures. The ASGE suggests either rescheduling the procedure or obtaining a basic metabolic panel before the procedure to evaluate for anion gap acidosis for patients who did not hold the medication as per the recommendation.

Discussion. All panel members reached a consensus on the statement addressing holding SGLT-2 inhibitors 3 to 4 days before elective endoscopy and rescheduling or obtaining laboratory tests to evaluate for anion gap acidosis for patients who did not hold the medication. Of the 12 panel members, 12 (100%) agreed with the statement. SGLT-2 inhibitors should be held at least 72 hours before scheduled endoscopic procedures (Table 1). For patients who did not hold the medication as per the recommendation, suggested options included rescheduling the procedure or obtaining a basic metabolic panel to evaluate for anion gap acidosis before and after the procedure.

Diabetic ketoacidosis (DKA) is a rare adverse event of SGLT-2 inhibitors and may present with elevated or near-normal blood glucose levels, termed euglycemic DKA (euDKA). Risk factors for euDKA include fasting, a low-carbohydrate diet, intercurrent infections or illnesses, dehydration, relative insulin deficiency, and surgical stress. Colonoscopy poses a particular risk for euDKA in SGLT-2 inhibitor users because of the required bowel preparation including a long relative fasting period. Patients with lower body mass indices may be at higher risk.[47] Several cases reported in the literature involve patients who did not withhold SGLT-2 inhibitors before colonoscopic procedures.[48,49] On the other hand, upper GI endoscopy, which requires a short fasting period, has not been reported to increase the risk of euDKA except in a rare emergent case, although data are limited at this time.[50]

FUTURE DIRECTIONS

With the increasing use of GLP-1RAs and SGLT-2 inhibitor medications, further accrual of data will allow risk stratification among different endoscopic procedures, unique patient populations, and individual medications. These factors will facilitate more specific recommendations. Additional data may also shed light on the appropriate duration for preprocedure liquid protocols (such as a 24-hour clear liquid protocol for all upper endoscopic procedures) in various patient populations and whether a liquid diet will ultimately negate the need to hold the GLP-1RAs. In addition, more data are required to determine whether patients undergoing colonoscopy will require extended bowel preparation.

SUMMARY AND CONCLUSION

At the current time, this ASGE position statement used the best available evidence to make recommendations on the management of GLP-1RAs and SGLT-2 inhibitors. We acknowledge the paucity of data, and as new publications emerge, these recommendations may change. While making decisions regarding whether these medications should be held, it is important to note that the ASGE recommendations are based on different scenarios, including emergency procedures in hospitalized patients, time-sensitive emergent procedures, and elective procedures. Management of

TABLE 1. GLP-1RA medications and their half-life with the suggested recommended hold

Name of medication	Route of administration	Half-life	Duration to hold before EGD
Sodium-glucose cotransporter-2 (SGLT-2) inhibitors			
Empagliflozin	Oral	12.4 h	3 days
Dapagliflozin	Oral	12.9 h	3 days
Canagliflozin	Oral	10.6 h	3 days
Ertugliflozin	Oral	16.6 h	4 days
GLP-1RAs			
Liraglutide	Subcutaneous	~13 h	24 h
Lixisenatide	Subcutaneous	~3 h	24 h
Exenatide (immediate release)	Subcutaneous	2.4 h	24 h
Exenatide (extended release)	Subcutaneous	~2 wk	1 wk
Dulaglutide	Subcutaneous	~5 days	1 wk
Semaglutide	Subcutaneous and oral	~1 wk	1 wk
Dual glucose-dependent insulinotropic polypeptide–GLP-1RAs			
Tirzepatide	Subcutaneous	~5 days	1 wk

GLP-1RA, Glucagon-like peptide-1 receptor agonist.

these medications should be individualized as part of shared medical decision-making based on a multidisciplinary discussion regarding the risk of aspiration or euDKA versus delaying an endoscopic intervention.

GUIDELINE UPDATE

ASGE guidelines are reviewed for updates approximately every 5 years or if new data may influence a recommendation. We anticipate newer guidelines may emerge with ongoing research. Updates follow the same ASGE guideline development process.

DISCLOSURE

The following authors disclosed financial relationships: R. Z. Sharaiha: Consultant for Boston Scientific, Olympus, Cook Medical, and Surgical Intuitive. A. P. Shukla: Consultant for Sun Pharmaceuticals; research support from Eli Lilly and Company and Novo Nordisk. D. T. Broome: Research support from Fractyl Health Laboratories, Rhythm Pharmaceuticals, Novo Nordisk, Caswell Diabetes Institute, the National Institutes of Health. N. Marya: Consultant for Boston Scientific. W. Abidi: Consultant for Boston Scientific and Ambu Inc; research support from GI Dynamics. W. W. Chan: Scientific advisory board for Regeneron Pharmaceuticals and Sanofi Pharmaceuticals. N. Thosani: Consultant for Boston Scientific Corp, Pentax America, and Ambu USA; speaker for Abbvie. A. R. Schulman: Consultant for Boston Scientific, Olympus, MicroTech, and Fractyl; research support from GI Dynamics and Fractyl. All other authors disclosed no financial relationships.

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Abbreviations: ASGE, American Society for Gastrointestinal Endoscopy; DKA, diabetic ketoacidosis; euDKA, euglycemic diabetic ketoacidosis; GLP-1RA, glucagon-like peptide-1 receptor agonist; SGLT-2, sodium-glucose cotransporter-2.

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