QUALITY UPPER GASTROINTESTINAL ENDOSCOPY IN AUSTRALIA AND AOTEAROA NEW ZEALAND: A JOINT POSITION STATEMENT

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ABSTRACT

Quality standards for upper gastrointestinal (UGI) endoscopy are required to identify key quality indicators that are relevant to Australasian endoscopic practice and local patient populations. Such standards will promote equitable access to high-quality UGI endoscopy for appropriate indications across Australia and Aotearoa New Zealand.

The Gastroenterological Society of Australia (GESA) Endoscopy Faculty's quality of UGI endoscopy working group conducted a review of published guidelines on quality standards in UGI endoscopy. A literature search was performed using the MEDLINE database, with further references sourced from bibliographies of published papers. Recommendations from international guidelines and available evidence were reviewed, and their relevance to the Australian clinical context was assessed. The working group then formulated a position statement on quality assurance in UGI endoscopy in Australian practice. A further iterative process involving the Endoscopy Guidance Group for New Zealand (EGGNZ) and the Royal Australasian College of Surgeons (RACS) culminated in the final recommendations for practice in Australia and Aotearoa New Zealand.

The recommendations in this position statement are categorized into preprocedural, intraprocedural and post-procedural. As UGI endoscopy examines several anatomical structures and is performed for

a wider range of indications than colonoscopy, disease-specific intraprocedural recommendations for common benign and premalignant conditions of the UGI tract are also presented.

This GESA initiative was undertaken in collaboration with the RACS and endorsed by GESA, the RACS, the Royal Australasian College of Physicians and EGGNZ, membership of which includes the New Zealand Society of Gastroenterology, the New Zealand Association of General Surgeons and other local endoscopy stakeholders.

INTRODUCTION AND BACKGROUND

Quality assurance is important to ensure standardization, efficacy and safety in endoscopic practice. Quality audit programs are well established in colonoscopy, with validated performance measures including adenoma detection rate, cecal intubation rate and withdrawal time (1-4). These correlate with colorectal cancer risk reduction and improved patient outcomes (3,5,6). In contrast, there is no single validated quality indicator in upper gastrointestinal (UGI) endoscopy. Data on the association between quality indicators and detection of UGI neoplasia are limited. The variety of abnormalities that can occur in the esophagus, stomach and duodenum present a further challenge in identifying and validating a single quality indicator in UGI endoscopy. The aim of all UGI endoscopic procedures should be to perform a high-quality, high-value procedure that results in improved patient outcomes (7).

Australian and Aotearoa New Zealand standards for quality of UGI endoscopy are required to identify key quality indicators that are relevant to endoscopic practice in the Australasian patient population. Such standards will promote equitable access to high-quality UGI endoscopy for appropriate indications. The British Society of Gastroenterology (BSG) and the European Society of Gastrointestinal Endoscopy (ESGE) have developed guidelines to standardize quality assurance in UGI endoscopy (8,9). Key recommendations include detailed photo documentation, adequate examination time, standardized terminology in reporting and disease-specific biopsy protocols. An Asian consensus statement, from Japan and Hong Kong, has also been published, mainly focusing on screening for UGI neoplasms (10).

Provision of gastrointestinal health care in Australia and Aotearoa New Zealand has unique features. There is diversity in health care delivery and available resources influenced by clinical setting (metropolitan, rural or remote) and by private or public sector service delivery. Both countries have large, multiculturally diverse populations. People born overseas comprise 30% of the population in Australia and 27% in Aotearoa New Zealand (11,12). In both countries, there are Indigenous populations with high morbidity and mortality associated with gastrointestinal conditions. Aboriginal and Torres Strait Islander Australians are 1.5 times more likely than other Australians to be diagnosed with stomach cancer and 2.2 times more likely to be diagnosed with esophageal cancer. Survival rates for both these cancers are significantly lower for Indigenous Australians than for other Australians (1). The Indigenous Māori population is at two to three times greater risk of gastric cancer (particularly hereditary diffuse gastric cancer) than non-Māori New Zealanders, with cancer also tending to occur at younger ages in this group. Māori also experience poorer survival outcomes in other cancer groups and similar conditions to non-Māori, contributed to by inequitable access to healthcare. Access to and provision of quality gastroscopy, tailored to cultural sensitivities, should be prioritized to improve outcomes for Aboriginal and Torres Strait Islander Australians and Māori in Aotearoa New Zealand.

Ensuring equity of health care for all requires a strong focus on value-based care. Provision of low-value care has an impact on resource availability for patients who would benefit from earlier treatment.

Therefore, we aimed to review the current guidelines on quality of UGI endoscopy and prioritize key quality standards for the Australasian context. The disease-specific recommendations are particularly relevant to adult patients, whereas the pre-, intra- and post-procedural recommendations are relevant to both adult and pediatric practice.

METHODS

The Gastroenterological Society of Australia (GESA) Endoscopy Faculty formed a quality of UGI endoscopy working group. A medical literature search was undertaken using the online database MEDLINE up to January 2023, with the search terms "endoscopy", "upper gastrointestinal endoscopy", "gastroscopy", "esophago-gastroduodenoscopy" and "quality". Further references were sourced from bibliographies of identified published papers. The BSG, ESGE and Asian consensus guidelines were reviewed. Members of the working group reviewed the existing literature, published standards and available evidence for those standards. In formulating this position statement, the working group assessed the relevance and importance of each quality standard to Australian and Aotearoa New Zealand endoscopic practice and patients.

K.R. conceptualized and chaired the quality of UGI endoscopy working group. L.Y. and A.H. conducted the literature search, drafted the initial recommendation statements, and wrote the first draft of the position statement. The recommendations were reviewed and discussed by all authors (L.Y., A.H., B.H., B.D., M.R., N.M, M. L., N.B., S.J. and K.R.) at videoconference meetings. An iterative process was used to reach agreement on the final recommendation statements (Table 1; also see an abridged summary of key recommendations in Table 2). L.Y., A.H., B.H., B.D., M.R., M.L., Z.R., M.A., N.B., S.J. and K.R. revised the document to produce the final version. The recommendations were then reviewed and approved by the GESA Endoscopy Faculty and the Boards of GESA, the Endoscopy Guidance Group for New Zealand (EGGNZ), the Royal Australasian College of Surgeons (RACS) and the Royal Australasian College of Physicians (RACP).

RECOMMENDATIONS

Preprocedural recommendations

1. The indication for UGI endoscopy should be documented in the procedure report.

Indications for UGI endoscopy include gastrointestinal symptoms, screening or surveillance for premalignant conditions, iron deficiency anemia, clarification of abnormal radiology and unexplained weight loss (Table 3) (13). Appropriateness of the indication(s) should be assessed by the endoscopist, and the indication(s) documented in the procedure report. There should be clear guidance on appropriate indications and agreed referral pathways in place. UGI endoscopies that provide no

benefit to the patient or that present a risk of harm that is greater than the benefit should be avoided, and referrers should receive education updates.

We should aim to minimize "low-value care", with the caveat of clinical considerations. Low-value UGI endoscopy is defined as a procedure that provides no clinical benefit, a risk of harm that is greater than the benefit, or a benefit that is disproportionately low compared with the cost.

2. All patients who are referred for a diagnostic UGI endoscopy should undergo a screening fitness assessment before the procedure.

Patients should undergo an assessment of underlying medical conditions and medications before having a UGI endoscopy. The assessor can be the referring clinician, endoscopist, pre-assessment nurse/nurse practitioner or sedation provider. There should be a standardized pathway for identifying and assessing patients with a high anesthesia risk (e.g. those with a body mass index >40 kg/m^2, obstructive sleep apnea or significant cardiorespiratory comorbidity). High-risk patients should have an agreed pathway for further assessment before the procedure. For patients with physical or intellectual disabilities, attention should be paid to any specific requirements to ensure a safe, non-threatening and dignified clinical experience. Consideration should also be given to any required modifications to pre-, intra- or post-procedural protocols to ensure respectful attention to patients' cultural or religious observances. Anesthesia risk should be assessed in the context of the procedural indication, and the patient's American Society of Anesthesiologists (ASA) category should be considered (and ideally recorded on the procedure report). Necessary changes to anticoagulation or antiplatelet therapy and diabetes medications, according to existing guidelines, should be well documented and clearly communicated to the patient before the endoscopy (14).

3. Patients should receive appropriate information about UGI endoscopy before undergoing the procedure, including fasting instructions and required medication changes.

Patients should receive a combination of written and verbal information about the proposed procedure and should understand the associated risks and benefits so they can give informed consent. Preprocedural instructions, including instructions for fasting and withholding medications, should be clearly communicated and well documented.

4. Informed consent should be obtained and documented before performing a UGI endoscopy.

Obtaining informed consent (medical and financial) is a legal, ethical and professional requirement on the part of all treating health care professionals, as outlined by the Australian Commission on Safety and Quality in Health Care (15) and the Medical Council of New Zealand. As UGI endoscopy involves sedation and procedural risk, written consent should be obtained. Clinicians with sufficient knowledge of the procedure, including its potential adverse events, should obtain informed consent. For elective procedures, the patient should be given appropriate time to provide informed consent. Where an absence of capacity is demonstrated, clinicians should follow the established legal frameworks in their state, territory or region for obtaining consent.

5. A safety checklist should be completed before starting a UGI endoscopy.

Preprocedural safety checklists have been shown to reduce preventable post-procedural adverse events. The patient's correct name, procedure and consent need to be documented on the report, as per the World Health Organization surgical safety checklist (16). Based on previous studies of endoscopy checklist tools, the recommended domains to be checked before starting a UGI endoscopy include (but are not limited to):

- team introduction
- patient identifiers (name, hospital number, date of birth)
- correct procedure
- indication
- completion of consent form
- allergies
- medications, including antiplatelet and antithrombotic agents, or conditions that may preclude interventions
- significant comorbidities.

Intraprocedural recommendations

6. Only certified endoscopists with appropriate training and competencies, who perform UGI endoscopy as part of their routine practice, should independently perform this procedure.

In Australia, adequacy of UGI endoscopy training is assessed by the Conjoint Committee for the Recognition of Training in Gastrointestinal Endoscopy (CCRTGE), a national body comprising representatives from GESA, the RACP and the RACS. Competency is recognized after the performance of 200 diagnostic procedures, followed by a summative assessment using a structured objective assessment tool (17). A similar process is available in Aotearoa New Zealand for endoscopists to gain conjoint recognition. Accredited proceduralists are credentialed to perform UGI endoscopy by their health system jurisdiction.

7. UGI endoscopy should be performed with high-definition video endoscopy systems, with the ability to capture images, and with access to equipment and devices necessary to perform diagnostic and therapeutic interventions.

Diagnostic UGI endoscopy should be performed with endoscopes that have the capacity to produce high-definition images with image-enhanced endoscopy. There should be a facility to capture and store digital endoscopic images. Carbon dioxide is the preferred gas to insufflate the gastrointestinal tract. A foot pump-controlled water jet for adequate cleaning and mucosal visualization should be available. The endoscope should have an adequate accessory channel to facilitate the passage of biopsy forceps and other devices needed for diagnostic and therapeutic interventions.

8. A complete UGI endoscopy should examine all relevant anatomical landmarks.

A complete UGI endoscopy procedure should examine and document a standardized set of anatomical landmarks. The examination should start at the upper esophageal sphincter and reach the second part

of the duodenum as a minimum, while specifically interrogating the upper, mid and lower esophagus; gastroesophageal junction; fundus; gastric body; incisura; antrum; duodenal bulb; and distal duodenum (8). Close attention should be paid to the vocal cords for symmetry and the cricopharynx for bars or webs. The upper esophagus should be carefully examined to exclude a Zenker's diverticulum. Where possible, attempts should be made to visualize the major papilla, which can be aided by cap-assisted endoscopy (18). The fundus and cardia should be inspected by retroflexion in the stomach in all patients. The diaphragmatic pinch of a hiatus hernia, if present, should also be inspected in retroflexion (8). All relevant anatomical landmarks should be appropriately described and documented, including the Z-line, top of the gastric folds and, ideally, hiatus hernia measurement (especially when associated with esophageal malignancy).

9. Relevant anatomical landmarks and any detected lesions should be photo documented.

Photo documentation provides evidence of the examination and is helpful for accurate communication of endoscopic findings to patients and clinicians. It provides a framework for endoscopists to perform a complete examination of all relevant anatomical landmarks and encourages mucosal cleansing and thorough inspection. The ESGE guidelines recommend a systematic approach to photo documentation of eight anatomical landmarks (Figure 1): the upper esophagus, gastroesophageal junction, fundus in retroflexion, body of the stomach, incisura in retroflexion, gastric antrum, duodenal bulb and distal duodenum (7). It is recommended to photo document more extensively in surveillance procedures, such as those for Barrett's esophagus (e.g. one photo per centimeter of Barrett's esophagus) or gastric premalignant conditions (9).

10. Effort should be made to achieve optimal mucosal visualization using a combination of carbon dioxide insufflation, suction and mucosal cleansing techniques. Where adequate quality of mucosal visualization cannot be achieved, this should be documented in the procedure report.

Optimal mucosal visualization, free from food debris and bubbles, can improve detection of lesions (19,20). The quality of the views obtained during UGI endoscopy should be documented in the body of the procedure report (8). If mucosal views are inadequate, the procedure report should reflect this, with a recommendation regarding whether the procedure should be repeated.

Numerous techniques can be employed to attain clear views of the mucosa. Washing the mucosal surface by flushing water through an accessory channel of the endoscope via a foot pump-controlled water jet is convenient and allows simultaneous use of accessories through the working channel. We recommend the routine use of mucolytic or defoaming agents, such as simethicone, *N*-acetylcysteine or Pronase, to optimize mucosal visualization (20). Premedication with a swallowed mucolytic 10 to 30 minutes before the procedure can reduce the procedure time while improving mucosal views (8,21). GESA has published a position statement on the use of simethicone in gastrointestinal endoscopy (20).

11. The minimum procedure time in a routine UGI endoscopic examination should be 7 minutes.

Procedure time is defined as the time taken from intubation of the oropharynx to the extubation of the endoscope. A complete UGI endoscopy starts with intubation of the upper esophageal sphincter,

and withdrawal starts after reaching the distal duodenum. Inspection time refers to the time taken in observing a defined abnormality (e.g. Barrett's esophagus). Several studies have shown that longer inspection or procedure time in UGI endoscopy correlates with improved diagnostic yield (22-25). A study from Singapore reported a mean procedure time of 6.6 minutes for a normal UGI endoscopic examination, defined as a procedure without endoscopic abnormalities or biopsy sampling (23). Using 7 minutes as a reference standard, slow endoscopists were more likely than fast endoscopists to detect gastric intestinal metaplasia (GIM), gastric dysplasia and cancer (odds ratio, 2.50; 95% CI, 1.52–4.12 for high-risk lesions and 3.42; 95% CI, 1.25–10.38 for neoplastic lesions). In patients with Barrett's esophagus, a minimum inspection time of 1 minute per centimeter of Barrett's length has been shown to increase the likelihood of dysplasia detection (26).

The current recommendation for minimum inspection time in routine UGI endoscopic examinations is 7 minutes in the ESGE and BSG guidelines and 8 minutes in the Asian consensus statement. ESGE specifies the 7-minute requirement for patients undergoing their first diagnostic UGI endoscopy, those without previous endoscopy within the past 3 years and those having follow-up endoscopy for GIM. It is best practice to record the inspection time in the procedure report.

12. Standardized terminology and classification systems should be used in the UGI endoscopy report when describing and documenting detected abnormalities.

Endoscopy reports with written and photographic documentation of endoscopic findings are a vital means of communication between endoscopists, patients and other clinicians. They are also formal medico-legal documents, recording completeness of the examination. Use of standardized terminology and classification systems is key to high-quality reporting, facilitating effective and accurate communication between clinicians. Recognizing the importance of systematic reporting of endoscopic abnormalities, ESGE recommends the use of standardized terminology in endoscopy reports as a key performance measure of UGI endoscopy. The most commonly used endoscopic classification systems are summarized in Table 4 (8,27-35).

13. Neoplastic lesions detected during UGI endoscopy should be photo documented and a minimum of six targeted biopsy samples obtained.

Photo documentation provides evidence of positive findings and facilitates accurate communication of endoscopic findings. Reporting of lesions suspicious for malignancy should describe their location, distance from a fixed landmark (e.g. incisors, gastroesophageal junction), number, size and morphology. Estimation of lesion size may be assisted by placing an endoscopic device of known size, such as an open biopsy forceps, alongside the lesion. It is recommended to take at least six representative biopsy samples of the lesion, where clinically appropriate (36). For lesions that are potentially amenable to endoscopic resection, only one to two targeted biopsy samples are recommended, to prevent any compromise to subsequent endoscopic resection.

Disease-specific recommendations

14. Protocol biopsy samples should be taken for disease-specific conditions, such as eosinophilic esophagitis, Barrett's esophagus, gastric atrophy or intestinal metaplasia and celiac disease.

Disease-specific biopsy protocols are shown in Figure 2 (37).

Esophagus

Barrett's esophagus

15. For inspection of Barrett's mucosa, a mucosal inspection time of more than 1 minute per centimeter of Barrett's mucosa is recommended.

A mucosal inspection time of more than 1 minute per centimeter of Barrett's mucosa correlates with a higher detection rate of high-grade dysplasia and adenocarcinoma (38). In best practice, the time taken to inspect the segment of Barrett's mucosa should be documented.

16. The length of a Barrett's segment should be reported according to the Prague classification.

The Prague classification describes the maximal length and circumferential extent of the Barrett's segment, measured from the gastroesophageal junction. Its use in reporting the length of a Barrett's segment is advocated by ESGE, BSG, Asian consensus and the American Society for Gastrointestinal Endoscopy (ASGE) (8-10,39).

17. Lesions identified within the Barrett's segment should be described using the Paris classification, and their location documented by distance from the incisors and circumferential position. Targeted biopsy samples should be taken.

Suspicious areas within a Barrett's segment should be photographed and biopsied before obtaining non-targeted Seattle protocol biopsy specimens (8-10,39). Targeted biopsy samples should be discussed at a multidisciplinary team meeting that includes a gastrointestinal pathologist, or the patient should be referred to a specialist center for further management.

18. Non-targeted biopsy specimens should be taken from Barrett's mucosa according to the Seattle protocol.

Dysplastic change within a Barrett's segment may not always be visible endoscopically (40). Adhering to a systematic biopsy protocol throughout a non-dysplastic Barrett's segment is associated with greater detection of dysplasia and is recommended by multiple international guidelines. The Seattle protocol involves sampling Barrett's segment with four-quadrant biopsy specimens taken at 1–2 cm intervals.

19. Surveillance UGI endoscopy for Barrett's esophagus should be performed at intervals recommended by national and international guidelines using high-definition white-light endoscopy and image-enhanced endoscopy or acetic acid chromoendoscopy.

Endoscopic surveillance of Barrett's esophagus aims to detect dysplasia or neoplasia at an early stage, but subtle lesions may be missed when only high-definition white-light inspection is performed. In a recent meta-analysis of 14 chromoendoscopy studies involving 843 patients, routine use of virtual or dye-based chromoendoscopy was found to improve the detection of dysplasia and neoplasia by 34%, with no significant differences between the two modalities (41). Multiple studies of virtual chromoendoscopy, such as narrow-band imaging (NBI), blue-light imaging (BLI) and linked color imaging (LCI), have validated increased detection of intestinal metaplasia and dysplasia in patients with Barrett's esophagus, compared with white-light endoscopy. Image-enhanced endoscopy highlights the mucosal pattern and superficial vasculature of Barrett's mucosa. The Barrett's International NBI Group (BING) classification of regular and irregular villous patterns has been validated for use, with high accuracy (85%) and specificity (>90%) in dysplasia prediction (42-45). Emerging data have also shown high sensitivities for the detection of Barrett's neoplasia using other classification systems, such as the Blue Light Imaging for Barrett's Neoplasia Classification (BLINC) and iScan Optical Enhancement (45,46).

To ensure the highest yield of dysplasia detection, we recommend the routine use of high-definition white-light and image-enhanced endoscopy (virtual or dye-based chromoendoscopy), followed by targeted biopsy of suspicious lesions and segmental quadrantic specimens, according to the Seattle protocol (47).

Acetic acid chromoendoscopy involves spraying dilute acetic acid (2–3%) onto Barrett's mucosa. This causes an initial reversible aceto-whitening reaction, with vascular congestion and focal erythema, which is exaggerated in neoplasia (48). Tandem endoscopy studies with white-light and acetic acid chromoendoscopy have demonstrated the feasibility and applicability of acetic acid chromoendoscopy (49,50). A meta-analysis of nine studies using acetic acid chromoendoscopy showed high pooled sensitivity of 0.92 (95% CI, 0.83–0.97) and specificity of 0.96 (95% CI, 0.85–0.99) for the detection of high-grade dysplasia and adenocarcinoma (51).

Esophageal squamous dysplasia

20. When squamous neoplasia is suspected, assessment with image-enhanced endoscopy (virtual chromoendoscopy or Lugol's chromoendoscopy) is recommended.

Population-based screening for squamous dysplasia is not currently recommended in low-prevalence regions of Western countries. However, screening of high-risk populations, including patients with head and neck cancer, achalasia or a history of caustic injury to the esophagus, has been suggested (8).

A combination of image-enhanced endoscopy and Lugol's chromoendoscopy should be used in high-risk patients. Squamous neoplasia often appears similar to normal squamous epithelium, especially in its early stages, and Lugol's chromoendoscopy has been shown to effectively highlight areas of abnormality and increase the detection of dysplasia (52-54). A Lugol-voiding lesion is characteristic of squamous dysplasia, as iodine binds reversibly to glycogen, which is less abundant in dysplastic squamous epithelium. This absence of staining in dysplastic and inflammatory mucosa allows for targeted biopsies. Recent studies have provided evidence of vastly improved specificity of squamous

cell carcinoma detection using virtual chromoendoscopy, compared with Lugol's chromoendoscopy, but with no differences in sensitivity (55,56). If using Lugol's iodine, we recommend a concentration of 1% to minimize chest discomfort, although the published concentration range is 1–3%. The iodine solution may cause mucosal irritation and needs to be used with caution, with proximal application to avoid oropharyngeal or pulmonary irritation from aspiration (57).

Reflux esophagitis

21. A repeat UGI endoscopy is recommended for patients with erosive esophagitis (LA grade B, C or D) after 6–8 weeks of high-dose proton pump inhibitor therapy. Biopsy samples should be taken from discrete esophageal ulcers and if persistent inflammation or Barrett's esophagus is identified.

In patients with moderate to severe esophagitis (LA grade B, C or D), a repeat endoscopy should be performed 6–8 weeks after treatment with high-dose proton pump inhibitor therapy, to exclude underlying malignancy or Barrett's esophagus (31,58,59). Barrett's esophagus can be seen in up to 27% of patients with moderate to severe reflux esophagitis at follow-up endoscopy, with the length of erosive esophagitis being a significant predictor of the length of the underlying Barrett's segment (60). Non-healing esophagitis and any observed esophageal ulcer, defined as a discrete break in the esophageal mucosa measuring at least 5 mm, should be biopsied. In a recent systematic review and meta-analysis of post-endoscopy UGI cancers, esophagitis was the most common finding (26%) in apparently cancer-negative index endoscopies (61).

Hiatus hernia

22. The presence of a hiatus hernia and its measurements should be reported and documented.

A hiatus hernia can be measured by establishing the distance between the top of the gastric folds and diaphragmatic pinch or by using the Hill classification (30). Close attention should be given to assessing for Cameron erosions in patients with a hiatus hernia, as they are a commonly missed cause of iron deficiency (30,62).

Eosinophilic esophagitis

23. In patients presenting with dysphagia or food bolus obstruction or retention, biopsy samples should be obtained from at least two different regions of the esophagus, to exclude eosinophilic esophagitis.

A minimum of six biopsy samples should be taken from at least two areas of the esophagus (lower, mid or upper third) during index endoscopy, provided it is safe to do so, to increase the diagnostic yield of eosinophilic esophagitis (63,64).

Inlet patch

24. The presence of an inlet patch, its distance from the incisors and its size should be documented. Routine biopsies of the inlet patch are not necessary.

An inlet patch is an island of heterotopic gastric mucosa located in the proximal esophagus. Endoscopically, inlet patches are typically well-circumscribed, salmon-colored oval lesions of varying size just below the upper esophageal sphincter. Inlet patches are not pathological (58). Their reported prevalence during UGI endoscopy is about 14.5% (65). Although biopsies can confirm heterotopic

gastric mucosa, an inlet patch is not considered to be a premalignant condition, and there is no evidence to support routine biopsies or surveillance for this condition. Detection of an inlet patch may be a surrogate maker for a complete examination of the esophagus. As inlet patches are most often located just below the upper esophageal sphincter, the endeavor to detect and report an inlet patch can encourage slow withdrawal of the endoscope in the upper esophagus.

Stomach

Gastric polyps

25. The presence, number (or "multiple polyps" where there are more than five), size, anatomical location and morphology (using the Paris classification) of gastric polyps should be described in the UGI endoscopy report, and biopsy samples taken where appropriate.

Gastric polyps should be examined using high-definition white-light and virtual chromoendoscopy to assess for dysplasia. If there is any suspicion, such as size greater than 1 cm, abnormal pit pattern or ulceration, representative biopsies should be performed (8). A single biopsy of the polyp (using forceps) is usually sufficient and has been found to be as accurate as polypectomy in 97.3% of cases (66).

Gastric ulcers

26. Gastric ulcers should be biopsied at index UGI endoscopy, where clinically appropriate, and re-evaluated after 6–8 weeks of proton pump inhibitor therapy. Helicobacter pylori *infection should be diagnosed and eradicated where indicated.*

The size and location of a gastric ulcer encountered during a UGI endoscopy should be documented. The Forrest classification should be used to describe its endoscopic appearance (29). A repeat endoscopy should be performed after a period of 6–8 weeks from the index procedure to ensure healing has occurred (8,67). *H. pylori* infection status should be assessed by gastric biopsies or rapid urease testing, and eradication therapy should be prescribed if indicated. In the case of non-healing ulcers with endoscopic suspicion for neoplasia, UGI endoscopy review is advised until complete ulcer healing is documented, if clinically appropriate.

In patients undergoing UGI endoscopy, testing for *H. pylori* infection should be done in patients presenting with:

- dyspepsia (68-71)
- gastric mucosa-associated lymphoid tissue (MALT) lymphoma (72-74)
- endoscopic findings of gastritis, peptic ulcer disease, gastric atrophy or GIM (75-79)
- risk factors for gastric cancer, such as Māori, Pasifika or Asian ethnicity or family history of gastric cancer (75-79)
- refractory *H. pylori* infection requiring antimicrobial susceptibility testing (75-79).

Rapid urease testing and/or histology are the recommended endoscopic methods for diagnosing *H. pylori* infection (80-82).

Although *H. pylori* infection is most often localized to the antrum, biopsy samples should be obtained from both the antrum and gastric body (83). This ensures a higher diagnostic yield, as the use of acid-suppressing medications and conditions such as atrophic gastritis or GIM can result in *H. pylori* colonization of the proximal stomach (84).

Routine culture for *H. pylori* is not indicated. Sampling gastric tissue for culture and antimicrobial susceptibilities may be useful for guiding salvage therapy for resistant *H. pylori* infection.

Culture has high specificity for *H. pylori* infection, reaching 100%, but inferior sensitivity compared with histology and rapid urease testing (85,86). It is also costly and time-consuming for routine identification of *H. pylori* infection. In practice, culture should be used primarily for antibiotic susceptibility testing for patients in whom first- and second-line therapies have failed.

Gastric atrophy or intestinal metaplasia

27. Imaged-enhanced endoscopy with virtual or dye-based chromoendoscopy is recommended for high-risk patients with gastric atrophy or GIM.

Extensive gastric atrophy or intestinal metaplasia is a risk factor for progression to gastric high-grade dysplasia or cancer. Classification of the severity of gastric atrophy or GIM requires an assessment of the topographic extent of disease and its histological severity. In general, histologically mild or moderate atrophy or intestinal metaplasia limited to the antrum is at lower risk of progression.

The Sydney biopsy protocol is recommended for staging of gastric atrophy and GIM. We recommend that patients with features of chronic atrophic gastritis on image-enhanced endoscopy have biopsy samples taken from areas where imaging discloses GIM, as well as areas without GIM (i.e. two non-targeted biopsy samples from the antrum and body and one sample from the incisura, in addition to targeted biopsies) (8,87). We recommend that biopsy samples are taken from at least two topographic sites of the stomach (antrum and body) in two separate vials.

Recommendations in the updated *Management of epithelial precancerous conditions and lesions in the stomach* (MAPS II) guidelines indicate that high-definition white-light endoscopy with chromoendoscopy is better than high-definition white-light endoscopy alone in guiding targeted biopsies for staging of gastric atrophy and GIM (88,89). The extent of the GIM is graded by systematic biopsies. Virtual chromoendoscopy visualizes GIM with a high degree of accuracy (sensitivity of 89% and specificity of 93% with the light blue crest sign) (10).

28. Sydney biopsy protocol samples should be obtained in patients who are suspected or known to have chronic gastritis with gastric atrophy or GIM.

Patients in whom Sydney biopsy protocol samples should be taken include those with:

- endoscopic features of gastric atrophy or GIM
- risk factors for gastric atrophy or GIM (Asian/Hispanic/African ethnicity, family history of gastric cancer, refractory *H. pylori* infection) (90,91).

Where GIM has already been detected on a previous biopsy, Sydney protocol biopsies should be used to determine the extent of GIM (extensive *vs* limited).

For extensive GIM or limited GIM with risk factors, 3-yearly UGI endoscopy is recommended.

Duodenum

Celiac disease

29. If celiac disease is suspected, a minimum of four biopsy samples should be taken from the duodenum, including at least one from the duodenal bulb.

A minimum of four biopsy samples taken from different locations throughout the duodenum, including the bulb, are required to improve the diagnostic yield, as villous atrophy may occur in a patchy distribution (92,93). To avoid a false-negative result, patients should adhere to a gluten-rich diet for at least 6 weeks before their index procedure (94).

Duodenal ulcers

30. Duodenal ulcers should be described according to the Forrest classification. Patients with duodenal ulcers should be tested and, if indicated, treated for H. pylori *infection.*

Duodenal ulcers should be described according to the Forrest classification (29). Serology, a rapid urease test or histology should be used to test for *H. pylori* infection in people with duodenal ulcers, and it should be eradicated if present. Biopsy and/or repeat endoscopy is not routinely recommended unless clinically indicated (e.g. where there is suspicion of duodenal malignancy).

Familial adenomatous polyposis

31. In patients with familial adenomatous polyposis, the Spigelman classification should be used to describe duodenal polyps. Examination of the major papilla using a duodenoscope is recommended.

The Spigelman classification should be used to describe duodenal polyps in patients with familial adenomatous polyposis (33). Examination of the major papilla using a duodenoscope, where available, is recommended, as the major papilla cannot be adequately visualized with a cap-assisted forward-viewing UGI endoscope (18).

Other disease-specific conditions

Subepithelial lesions

32. Subepithelial lesions in the esophagus, stomach and duodenum should be described in the UGI endoscopy report, including size, shape, location, color, mobility, pulsation, consistency and presence of erosion or ulceration in the overlying mucosa. The lesion(s) should be photo documented and referred for endoscopic ultrasonography if indicated.

A subepithelial lesion of the gastrointestinal tract is an elevated lesion that is usually covered by normal-appearing mucosa. Maneuvers using the biopsy forceps can reveal diagnostic signs, including the “pillow sign” (a central depression when forceps are pushed into the lesion) characteristic of

lipomas, and bite-on-bite tunnelling biopsies can be used to unroof the lipoma (95). Tunnelling biopsies are not recommended for lesions that may be suitable for endoscopic resection due to inducement of fibrosis. Pancreatic rests are benign subepithelial lesions of the stomach, commonly located in the antrum. Typical features include a central umbilication, lesion measurement of 6–10 mm in diameter and a location 2–6 cm from the pylorus along the greater curvature (96). Esophageal granular cell tumors are benign submucosal lesions of neurogenic origin, most commonly found in the distal two-thirds of the esophagus (97). Endoscopic features include a sessile, white-to-grey elevated lesion with a smooth overlying mucosa (98).

We recommend endoscopic ultrasound to characterize subepithelial lesions that have features of a gastrointestinal stromal tumor or leiomyoma (firm consistency, negative pillow sign), that are >10 mm in size or that have high-risk stigmata (e.g. bleeding and ulceration) (99). The ASGE/American College of Gastroenterology and ESGE guidelines provide details of different types of subepithelial lesions and their endoscopic characteristics (39,100).

Iron deficiency

33. In patients with iron deficiency with or without anemia, biopsy samples should be taken from the duodenum to exclude celiac disease, and from the gastric antrum and body to exclude gastric atrophy.

Gastric atrophy could be due to *H. pylori*-related chronic atrophic gastritis or autoimmune gastritis (101).

Gastric antral vascular ectasia can lead to chronic gastrointestinal bleeding, resulting in iron deficiency anemia (102). Correct endoscopic diagnosis can facilitate early endoscopic therapy.

Chronic liver disease and portal hypertension

34. In patients with chronic liver disease and portal hypertension, varices present in the esophagus and stomach should be graded appropriately, photo documented and recorded in the UGI endoscopy report.

Esophageal varices should be graded using the Baveno classification (i.e. small, medium or large) (27). Gastric varices should be graded using the Sarin classification (i.e. gastroesophageal varix [GOV] type 1, GOV type 2, isolated gastric varix [IGV] type 1 or IGV type 2) (103).

35. The presence of portal hypertensive gastropathy (which can cause acute and chronic gastrointestinal bleeding) should be recorded and photo documented in the UGI endoscopy report.

A “snake-skin” mosaic pattern and red marks or spots resembling vascular ectasias in the proximal stomach are typical findings of portal hypertensive gastropathy on endoscopy (104).

Post-procedural recommendations

36. Patients should be monitored after the procedure and discharged in accordance with defined protocols.

Post-procedural review should occur to assess patients for procedural adverse events and to evaluate their recovery from sedation and appropriateness for discharge. Guidelines on sedation and recovery are included in the Australian and New Zealand College of Anaesthetists guideline PG09 (105).

37. Key patient-friendly information about the UGI endoscopy findings and recommendations, as well as a copy of the procedure report summarizing these, should be provided to the patient before discharge.

The endoscopy report should include the extent of the examination, duration, relevant findings, photos of anatomical landmarks and any abnormalities, a record of histology samples obtained and the proposed management plan, including the need for further follow-up consultation. Any changes made to the patient's medication after endoscopy need to be documented in the endoscopy report (8), as do post-procedure dietary instructions. Patients should also be given contact details for advice if they have post-procedure concerns or unanticipated adverse events.

38. A method must be in place to ensure follow-up of histology results arising from the UGI endoscopy.

Histology results arising from the procedure should be reviewed by the endoscopist, and relevant actions taken, in a timely manner (8). This may include discussion at multidisciplinary team meetings for complex cases or where otherwise appropriate.

39. The patient, referrer and all medical practitioners involved in the patient's care should receive the procedure report and biopsy results promptly.

Important findings should be communicated to the patient on the day of the procedure, with opportunity for verbal discussion and answering of questions, as well as providing the patient with a written report. Copies of the report should be promptly provided to the referring and/or primary care clinicians. Once histology reports are reviewed, additional information should be promptly communicated to the patient and the primary care clinician.

40. The rate of missed lesions (cancer diagnosed within 3 years of UGI endoscopy) should be audited. A root cause analysis should be performed for all identified cases of post-endoscopy UGI cancer.

Post-endoscopy UGI cancer is defined as any UGI malignancy diagnosed within 3 years of a UGI endoscopy that was negative for cancer (8). A recent meta-analysis found that post-endoscopy UGI cancers account for up to 11% of all UGI cancers (61). Root cause analyses of missed cancers have shown that up to 70% of these cancers may have been preventable (106-108). Post-endoscopy UGI cancers are typically diagnosed a mean of 17 months after the initial procedure (61). They tend to present as subtle and smaller lesions, occurring more often in the upper esophagus and gastric body than in the gastroesophageal junction and gastric antrum. The most frequent abnormalities found at

index examination of post-endoscopy UGI cancers are esophagitis and stricture for esophageal cancer, and hypertrophic gastritis and GIM for gastric cancers.

In addition to detailed inspection of the UGI tract to identify subtle premalignant and malignant abnormalities, systems should be implemented to audit and minimize the rate of post-endoscopy UGI cancer. The post-endoscopy UGI cancer rate can be obtained by dividing the number of UGI cancers diagnosed at 6–36 months after a UGI endoscopy that is negative for cancer by the total number of UGI cancers diagnosed at 0–36 months. Internal audits of performance data (every 3 years) are recommended to target a post-endoscopy UGI cancer rate of less than 10%.

CONCLUSION

These recommendations provide a framework, tailored to Australasian endoscopic practice and patients, for endoscopists to improve and measure the quality of UGI endoscopy. Implementation of quality standards in UGI endoscopy will allow identification of key performance indicators linked to patient outcomes that can be measured and audited to ensure high-quality and safe UGI endoscopy services across Australia and Aotearoa New Zealand.

ACKNOWLEDGEMENTS

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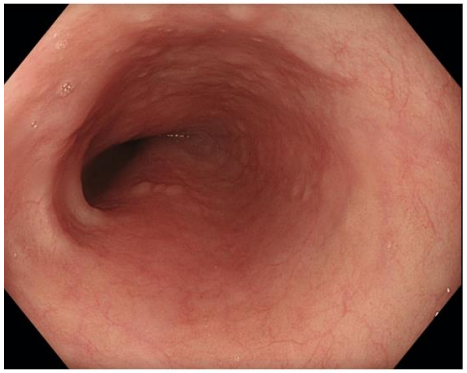
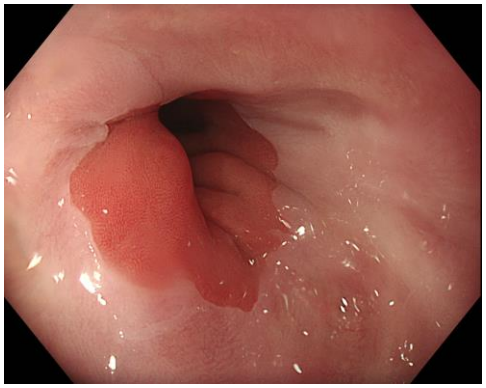
FIGURES

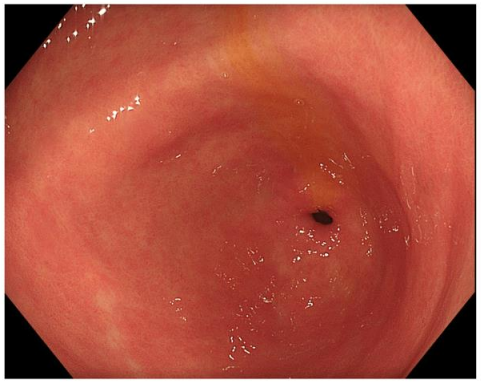
Figure 1. Anatomical landmarks for photo documentation in diagnostic upper gastrointestinal endoscopy



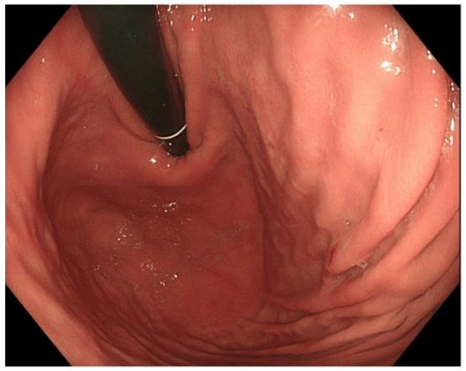
Proximal esophagus



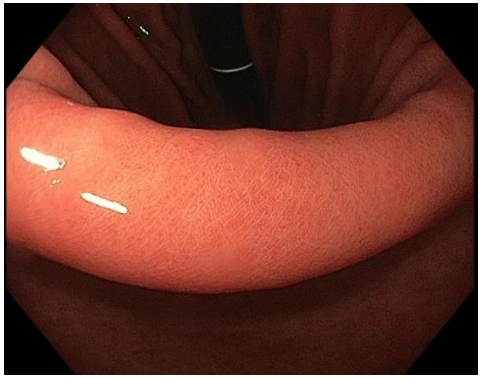
Gastroesophageal junction



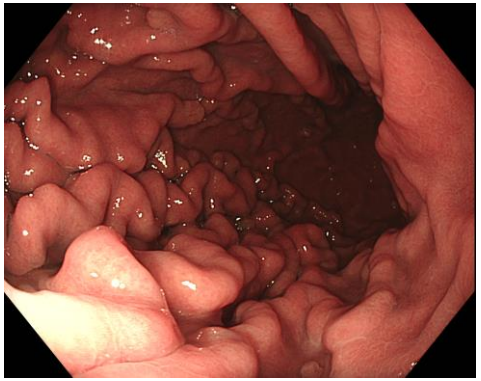
Antrum



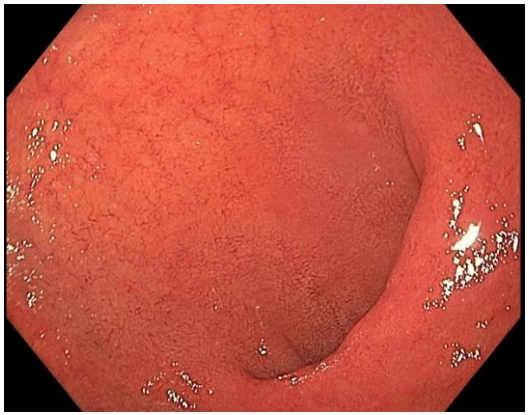
Fundus in retroflexion



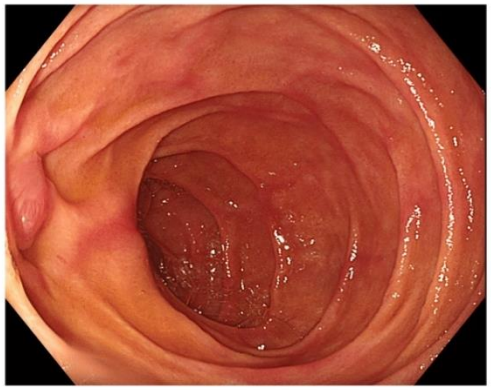
Incisura



Gastric body

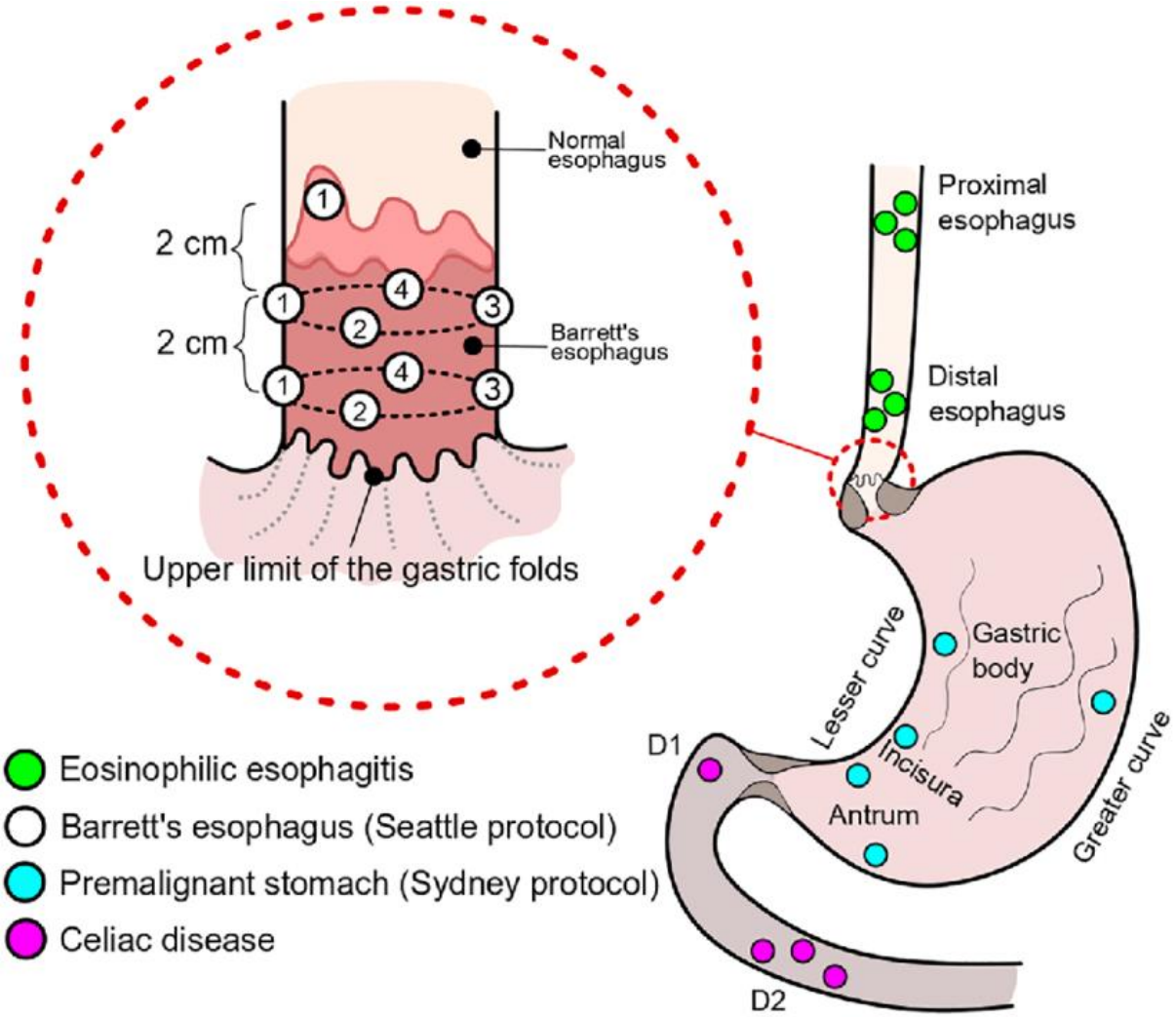


Duodenal bulb



Second part of the duodenum

Figure 2. Recommended biopsies in diagnostic upper gastrointestinal endoscopy*



D1, duodenal bulb; D2, second part of the duodenum.

* Reproduced from Januszewicz W, et al (37) under the terms of Creative Commons Non Commercial CC BY-NC 4.0 License (https://creativecommons.org/licenses/by-nc/4.0/).

TABLES

Table 1. Comprehensive summary of recommendations

Preprocedural recommendations
1. The indication for UGI endoscopy should be documented in the procedure report. 2. All patients who are referred for a diagnostic UGI endoscopy should undergo a screening fitness assessment before the procedure. 3. Patients should receive appropriate information about UGI endoscopy before undergoing the procedure, including fasting instructions and required medication changes. 4. Informed consent should be obtained and documented before performing a UGI endoscopy. 5. A safety checklist should be completed before starting a UGI endoscopy.
Intraprocedural recommendations
6. Only certified endoscopists with appropriate training and competencies, who perform UGI endoscopy as part of their routine practice, should independently perform this procedure. 7. UGI endoscopy should be performed with high-definition video endoscopy systems, with the ability to capture images, and with access to equipment and devices necessary to perform diagnostic and therapeutic interventions. 8. A complete UGI endoscopy should examine all relevant anatomical landmarks. 9. Relevant anatomical landmarks and any detected lesions should be photo documented. 10. Effort should be made to achieve optimal mucosal visualization using a combination of carbon dioxide insufflation, suction and mucosal cleansing techniques. Where adequate quality of mucosal visualization cannot be achieved, this should be documented in the procedure report. 11. The minimum procedure time in a routine UGI endoscopic examination should be 7 minutes. 12. Standardized terminology and classification systems should be used in the UGI endoscopy report when describing and documenting detected abnormalities. 13. Neoplastic lesions detected during UGI endoscopy should be photo documented and a minimum of six targeted biopsy samples obtained.

Disease-specific recommendations

14. Protocol biopsy samples should be taken for disease-specific conditions, such as eosinophilic esophagitis, Barrett's esophagus, gastric atrophy or intestinal metaplasia and celiac disease.

Esophagus

15. For inspection of Barrett's mucosa, a mucosal inspection time of more than 1 minute per centimeter of Barrett's mucosa is recommended.
16. The length of a Barrett's segment should be reported according to the Prague classification.
17. Lesions identified within the Barrett's segment should be described using the Paris classification, and their location documented by distance from the incisors and circumferential position. Targeted biopsy samples should be taken.
18. Non-targeted biopsy specimens should be taken from Barrett's mucosa according to the Seattle protocol.
19. Surveillance UGI endoscopy for Barrett's esophagus should be performed at intervals recommended by national and international guidelines using high-definition white-light endoscopy and image-enhanced endoscopy or acetic acid chromoendoscopy.
20. When squamous neoplasia is suspected, assessment with image-enhanced endoscopy (virtual chromoendoscopy or Lugol's chromoendoscopy) is recommended.
21. A repeat UGI endoscopy is recommended for patients with erosive esophagitis (LA grade B, C or D) after 6–8 weeks of high-dose proton pump inhibitor therapy. Biopsy samples should be taken from discrete esophageal ulcers and if persistent inflammation or Barrett's esophagus is identified.
22. The presence of a hiatus hernia and its measurements should be reported and documented.
23. In patients presenting with dysphagia or food bolus obstruction or retention, biopsy samples should be obtained from at least two different regions of the esophagus, to exclude eosinophilic esophagitis.
24. The presence of an inlet patch, its distance from the incisors and its size should be documented. Routine biopsies of the inlet patch are not necessary.

Stomach

25. The presence, number (or "multiple polyps" where there are more than five), size, anatomical location and morphology (using the Paris classification) of gastric polyps should be described in the UGI endoscopy report, and biopsy samples taken where appropriate.
26. Gastric ulcers should be biopsied at index UGI endoscopy, where clinically appropriate, and re-evaluated after 6–8 weeks of proton pump inhibitor therapy. *Helicobacter pylori* infection should be diagnosed and eradicated where indicated.
27. Imaged-enhanced endoscopy with virtual or dye-based chromoendoscopy is recommended for high-risk patients with gastric atrophy or GIM.
28. Sydney protocol biopsy samples should be obtained in patients who are suspected or known to have chronic gastritis with gastric atrophy or GIM.

Duodenum

29. If celiac disease is suspected, a minimum of four biopsy samples should be taken from the duodenum, including at least one from the duodenal bulb.
30. Duodenal ulcers should be described according to the Forrest classification. Patients with duodenal ulcers should be tested and, if indicated, treated for *H. pylori* infection.
31. In patients with familial adenomatous polyposis, the Spigelman classification should be used to describe duodenal polyps. Examination of the major papilla using a duodenoscope is recommended.

Other disease-specific conditions

32. Subepithelial lesions in the esophagus, stomach and duodenum should be described in the UGI endoscopy report, including size, shape, location, color, mobility, pulsation, consistency and presence of erosion or ulceration in the overlying mucosa. The lesion(s) should be photo documented and referred for endoscopic ultrasonography if indicated.
33. In patients with iron deficiency with or without anemia, biopsy samples should be taken from the duodenum to exclude celiac disease, and from the gastric antrum and body to exclude gastric atrophy.
34. In patients with chronic liver disease and portal hypertension, varices present in the esophagus and stomach should be graded appropriately, photo documented and recorded in the UGI endoscopy report.
35. The presence of portal hypertensive gastropathy (which can cause acute and chronic gastrointestinal bleeding) should be recorded and photo documented in the UGI endoscopy report.

Post-procedural recommendations

36. Patients should be monitored after the procedure and discharged in accordance with defined protocols.
37. Key patient-friendly information about the UGI endoscopy findings and recommendations, as well as a copy of the procedure report summarizing these, should be provided to the patient before discharge.
38. A method must be in place to ensure follow-up of histology results arising from the UGI endoscopy.
39. The patient, referrer and all medical practitioners involved in the patient's care should receive the procedure report and biopsy results promptly.
40. The rate of missed lesions (cancer diagnosed within 3 years of UGI endoscopy) should be audited. A root cause analysis should be performed for all identified cases of post-endoscopy UGI cancer.

GIM, gastric intestinal metaplasia; UGI, upper gastrointestinal.

Table 2. Abridged recommendation summary for upper gastrointestinal (UGI) endoscopy

1. Informed consent should be obtained and documented before performing a UGI endoscopy.
2. UGI endoscopy should be performed with high-definition video endoscopy systems, with the ability to capture images, and with access to equipment and devices necessary to perform diagnostic and therapeutic interventions.
3. A complete UGI endoscopy should examine and photo document all relevant anatomical landmarks.
4. Use of mucolytic or defoaming agents, such as simethicone, *N*-acetylcysteine and Pronase, is useful to optimize mucosal visualization.
5. The minimum procedure time in a routine UGI endoscopic examination should be 7 minutes.
6. Standardized terminology and classification systems should be used in the UGI endoscopy report when describing and documenting detected abnormalities.
7. Neoplastic lesions detected during UGI endoscopy should be photo documented and a minimum of six targeted biopsy samples obtained.
8. Protocol biopsy samples should be taken for disease-specific conditions, such as eosinophilic esophagitis, Barrett's esophagus, gastric atrophy or intestinal metaplasia and celiac disease.
9. Endoscopists should refer to the disease-specific recommendations for conditions detected during UGI endoscopy.
10. Key patient-friendly information about the UGI endoscopy findings and recommendations, as well as a copy of the procedure report summarizing these, should be provided to the patient before discharge.
11. A method must be in place to ensure follow-up of histology results arising from the UGI endoscopy.
12. The rate of missed lesions (cancer diagnosed within 3 years of UGI endoscopy) should be audited. A root cause analysis should be performed for all identified cases of post-endoscopy UGI cancer.

Table 3. Common indications for upper gastrointestinal endoscopy (13)

- Abdominal symptoms, particularly symptoms that persist after an appropriate trial of therapy or are associated with features of serious organic disease (e.g. unexplained weight loss)
- Esophageal reflux symptoms that persist despite appropriate therapy
- Surveillance for malignancy (e.g. in patients with premalignant conditions, such as Barrett's esophagus)
- Dysphagia or odynophagia
- Investigation of iron deficiency anemia
- Endoscopic and histological confirmation of radiologically visualized abnormality

Table 4. Common endoscopic classification systems in upper gastrointestinal endoscopy

Condition	Classification
Abnormal mucosa or lesion	Paris classification (28)
Adenomas in FAP	Spigelman classification (33)
Erosive esophagitis	LA classification (31)
Barrett's esophagus	Prague classification (34)
Caustic esophagitis	Zargar classification (35)
Gastric varices	Sarin classification (32)
Hiatus hernia	Measurement from the GEJ (8) Hill classification (30)
Esophageal varices	Baveno classification (27)
Peptic ulcers	Forrest classification (29)

FAP, familial adenomatous polyposis; GEJ, gastroesophageal junction.

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