

REVIEW ARTICLE OPEN ACCESS

Quality Upper Gastrointestinal Endoscopy in Australia and Aotearoa New Zealand: A Joint Position Statement

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Received: 15 December 2024 | **Revised:** 5 February 2025 | **Accepted:** 9 May 2025

Keywords: endoscopy | gastroscopy | quality

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 postprocedural. 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 pre-malignant conditions of the UGI tract are also presented. This GESA initiative was undertaken in collaboration with the RACS and endorsed by GESA, 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.

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1 | Introduction and Background

Quality assurance is essential for standardization, efficacy, and safety in endoscopic practice. Colonoscopy quality audit programs are well established, utilizing validated performance measures including adenoma detection rate, cecal intubation rate, and withdrawal time, which all correlate with reduced colorectal cancer risk and better patient outcomes [1, 2]. Conversely, upper gastrointestinal (UGI) endoscopy lacks a single validated quality indicator, with data linking quality indicators to UGI neoplasia detection limited. The spectrum of abnormalities in the esophagus, stomach, and duodenum makes identifying a single quality indicator challenging. The goal of UGI endoscopic procedures is to achieve high-quality, high-value procedures that enhance patient outcomes [3].

Standards for UGI endoscopy quality in Australia and Aotearoa New Zealand are needed to identify key quality indicators pertinent to the Australasian patient population, promoting equitable access to high-quality endoscopy for appropriate indications. The British Society of Gastroenterology (BSG) and the European Society of Gastrointestinal Endoscopy (ESGE) have issued guidelines to standardize quality assurance in UGI endoscopy [4, 5]. Key recommendations include thorough photo documentation, adequate examination time, standardized reporting terminology, and disease-specific biopsy protocols. The Asian consensus statement from Japan and Hong Kong mainly focuses on screening for UGI neoplasms [6].

Endoscopic practice in Australia and Aotearoa New Zealand is influenced by the diverse geographic settings (metropolitan, rural, or remote), service delivery (private or public sector), and endoscopists' expertise (general gastroenterologist, surgeon, interventional endoscopist, etc.). Both countries have large, multi-culturally diverse populations with up to 30% of the population born overseas [7, 8]. In both countries, there are Indigenous populations with high morbidity and mortality associated with gastrointestinal conditions. Indigenous populations are more likely to be diagnosed with gastric cancer at a younger age and experience poorer survival outcomes than non-indigenous patients, contributed to by inequitable access to healthcare [1]. Access to and provision of quality gastroscopy, tailored to cultural sensitivities, should be prioritized to improve outcomes for First Nations peoples.

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 preprocedural, intraprocedural, and postprocedural recommendations are relevant to both adult and pediatric practice.

2 | Methods

K.R. conceptualized and chaired the quality of UGI endoscopy working group. L.S.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.S.Y., A.H., B.A.H., B.D., M.R., N.M., M.L., N.G.B., S.J., and K.R.)

ensuring representation across the region. The body of evidence was reviewed and evaluated by all authors, and when there was insufficient clinical evidence to support a statement, expert consensus was used to reach the final recommendation. Each member of the group voted on each statement with $\geq 80\%$ agreement required for inclusion. Where consensus was not reached, statements were reviewed, modified, and re-evaluated using the Delphi process, until agreement was reached to either include or exclude the recommendation. This process was performed via email or videoconference over an 18-month period (Table 1; also see an abridged summary of key recommendations in Table 2). L.S.Y., A.H., B.A.H., B.D., M.R., M.L., Z.R., M.A., N.G.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).

3 | Recommendations

3.1 | 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) [9]. Appropriateness of the indication(s) should be assessed by the endoscopist, and the indication(s) documented in the procedure report.

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.

Before undergoing UGI endoscopy, patients' underlying medical conditions and medications should be evaluated by the referring clinician, endoscopist, preassessment nurse, or sedation provider. A standardized pathway should exist for identifying and assessing high anesthesia risk patients (e.g., BMI $> 40 \text{ kg/m}^2$, obstructive sleep apnea, or significant cardiorespiratory comorbidity). These high-risk patients should follow a documented pathway for further assessment. For patients with physical or intellectual disabilities, specific needs should be addressed to ensure a safe, nonthreatening, and dignified experience. Anesthesia risk should be evaluated in the context of the procedural indication, with the patient's ASA category considered and ideally recorded in the procedure report. Necessary changes to anticoagulation/antiplatelet therapy and diabetes medications, according to existing guidelines, should be well documented and clearly communicated to the patient before the endoscopy [10].

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 the 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. Efforts 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 min. 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 min/cm 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. Nontargeted 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. <i>Helicobacter pylori</i> 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 biopsy protocol samples should be obtained in patients who are suspected or known to have chronic gastritis with gastric atrophy or GIM.

(Continues)

TABLE 1 | (Continued)

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 <i>H. pylori</i> 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.
Postprocedural 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 postendoscopy UGI cancer.

Abbreviations: 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, <i>N</i> -acetylcysteine, and pronase, is useful to optimize mucosal visualization.
5. The minimum procedure time in a routine UGI endoscopic examination should be 7 min.
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.

Note: 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 postendoscopy UGI cancer.

TABLE 3 | Common indications for upper gastrointestinal endoscopy [9].

• 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	
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 understand the associated risks and benefits for informed consent. Preprocedural instructions, including instructions for fasting and withholding medications, should be clearly communicated and 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 [11] and the Medical Council of New Zealand. As UGI endoscopy involves sedation and procedural risk, written consent should be obtained. 5. A safety checklist should be completed before starting a UGI endoscopy. The patient's correct name, procedure, and consent need to be documented on the report, as per the World Health Organization surgical safety checklist [12]. 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, and 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.	part of their routine practice should independently perform this procedure. In each country, a national body comprising representatives from GESA or NZSG, RACP, and RACS assesses adequacy of training: the Conjoint Committee for the Recognition of Training in Gastrointestinal Endoscopy (CCRTGE). Competency is recognized after the performance of 200 diagnostic procedures, followed by a summative assessment using a structured objective assessment tool [13]. Endoscopists who have had their training and competency recognized by the CCRTGE may then be accredited to perform UGI endoscopy by their health system jurisdiction. 7. UGI endoscopy should be performed with high-definition video endoscopy systems. Diagnostic UGI endoscopy should be performed with high-definition endoscopes with image enhancement and capability to capture and record digital 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/devices 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 [4]. Close attention should be paid to the vocal cords for symmetry and 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 [14]. 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 [4]. 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.
3.2 Intraprocedural Recommendations 6. Only endoscopists who have met national standards for training and competency and perform UGI endoscopy as	

Photo documentation provides evidence of the examination and aids in clearly conveying endoscopic findings to patients and clinicians. It offers a framework for endoscopists to thoroughly examine all relevant anatomical landmarks, encouraging mucosal cleansing and detailed 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 [3]. 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 [5].

- 10. Efforts should be made to achieve optimal mucosal visualization. The quality of mucosal views should be documented in the procedure report.

Various techniques can ensure clear mucosal views. Using a foot pump-controlled water jet to flush water through the endoscope's accessory channel is convenient and allows simultaneous use of other accessories. Routine use of mucolytic or defoaming agents, such as simethicone, *N*-acetylcysteine, or pronase, is recommended for optimal visualization [15]. Premedicating with a swallowed mucolytic 10–30 min before the procedure can reduce procedural time and improve views [4, 16]. GESA has published a position statement on using simethicone in gastrointestinal endoscopy [15].

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

Procedure time is defined from oropharynx intubation to endoscope extubation. A complete UGI endoscopy begins with intubation of the upper esophageal sphincter and ends with withdrawal after reaching the distal duodenum. Inspection

time is the period spent observing specific abnormalities (e.g., Barrett's esophagus). Several studies indicate that longer inspection or procedure times in UGI endoscopy enhance diagnostic yield [17–20]. In a Singaporean study with an average procedure time of 6.6 min, slow endoscopists using a 7-min reference standard were more likely to detect gastric intestinal metaplasia (GIM), 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) [21]. In Barrett's esophagus patients, a minimum inspection time of 1 min/cm of Barrett's length improves dysplasia detection [21]. Current international guidelines (ESGE and BSG) recommend a minimum inspection time of 7 min for routine UGI endoscopic examinations. Recording inspection time in the procedure report is considered best practice.

- 12. Standardized terminology and classification systems should be used in the UGI endoscopy report.

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. The most commonly used endoscopic classification systems are summarized in Table 4 [4, 22–30].

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

Reporting of lesions suspicious for malignancy should describe their location, distance from a fixed landmark (e.g., incisors and gastroesophageal junction), number, size, and morphology. Estimation of lesion size may be assisted by placing an endoscopic

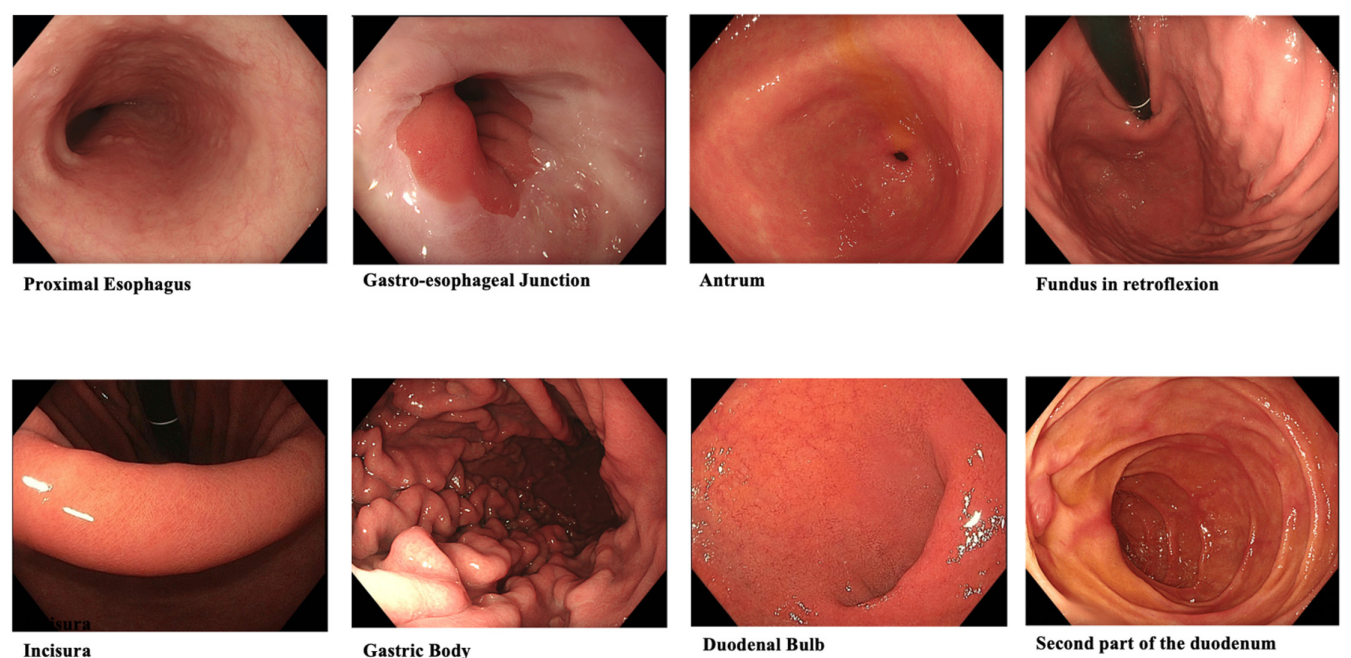


FIGURE 1 | Anatomical landmarks for photo documentation in diagnostic upper gastrointestinal endoscopy.

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 [31]. For lesions potentially amenable to endoscopic resection, only

one to two targeted biopsy samples are recommended, to prevent any compromise to subsequent endoscopic resection.

3.3 | Disease-Specific Recommendations

- 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 [32].

3.4 | Esophagus

3.4.1 | Barrett's Esophagus

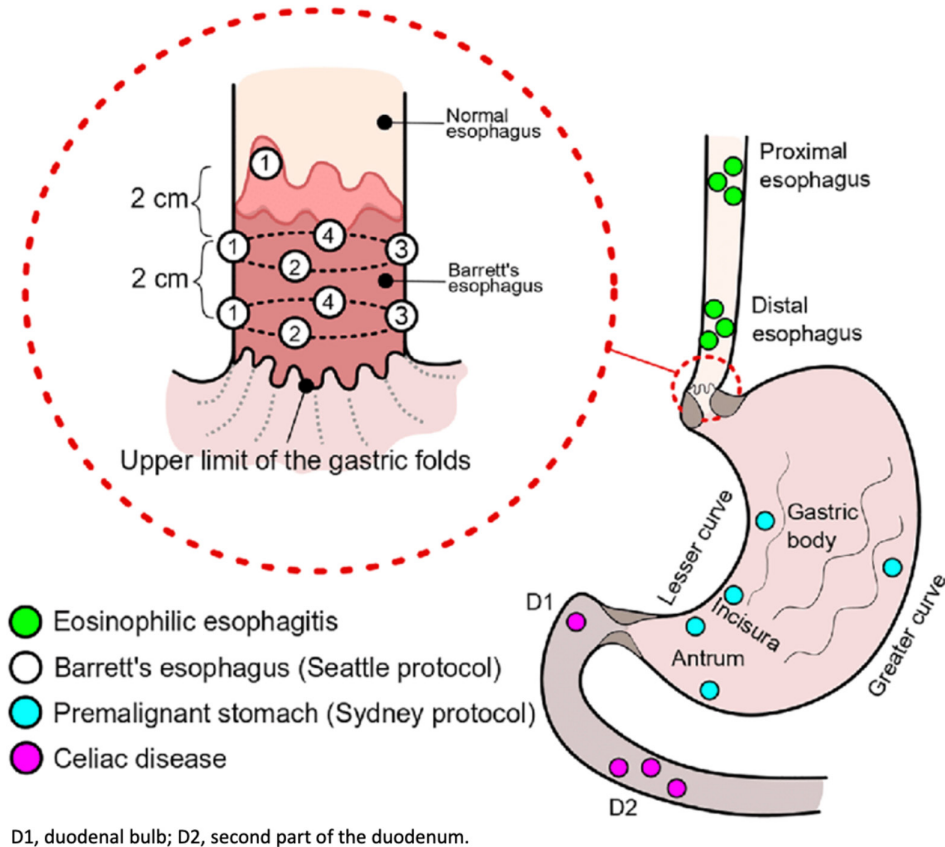
- For inspection of Barrett's mucosa, a mucosal inspection time of more than 1 min/cm of Barrett's mucosa is recommended.

A mucosal inspection time of more than 1 min/cm of Barrett's mucosa correlates with a higher detection rate of high-grade dysplasia and adenocarcinoma [33]. In best practice, the time

TABLE 4 | Common endoscopic classification systems in upper gastrointestinal endoscopy.

Condition	Classification
Abnormal mucosa or lesion	Paris classification [22]
Adenomas in FAP	Spigelman classification [23]
Erosive esophagitis	LA classification [24]
Barrett's esophagus	Prague classification [25]
Caustic esophagitis	Zargar classification [26]
Gastric varices	Sarin classification [27]
Hiatus hernia	Measurement from the GEJ [4] Hill classification [28]
Esophageal varices	Baveno classification [29]
Peptic ulcers	Forrest classification [30]

Abbreviations: FAP, familial adenomatous polyposis; GEJ, gastroesophageal junction.



* Figure produced by Medical Illustrations Department, Royal Perth Hospital.

FIGURE 2 | Recommended biopsies in diagnostic upper gastrointestinal endoscopy. D1, duodenal bulb; D2, second part of the duodenum. *Note:* Figure produced by Medical Illustrations Department, Royal Perth Hospital.

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) [4–6, 34].

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 nontargeted Seattle protocol biopsy specimens [4–6, 34]. 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 dysplasia assessment–management.

18. Nontargeted 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 [35]. The Seattle protocol involves sampling Barrett's segment with four-quadrant biopsy specimens taken at 1- to 2-cm intervals.

19. Surveillance UGI endoscopy for Barrett's esophagus should be performed at intervals recommended by national and international guidelines.

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 [36]. 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 [37–40]. 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 [40, 41].

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 [42].

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 [43]. 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 [44].

3.4.2 | 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 [4].

In high-risk patients, image-enhanced endoscopy combined with Lugol's chromoendoscopy is recommended [45]. A Lugol-voiding lesion signifies squamous dysplasia, as iodine binds to glycogen, which is less abundant in dysplastic epithelium, allowing targeted biopsies. Recent studies indicate virtual chromoendoscopy has higher specificity for detecting squamous cell carcinoma than Lugol's chromoendoscopy, with similar sensitivity [46]. A 1% Lugol's iodine concentration is advised to minimize chest discomfort, although the range is 1%–3%. The iodine solution can irritate mucosa and should be used with caution and applied proximally to avoid oropharyngeal or pulmonary irritation from aspiration [47].

3.4.3 | 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.

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 [24, 48]. 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 [49]. Nonhealing esophagitis and any observed esophageal ulcer, defined as a discrete break in the esophageal mucosa measuring at least 5 mm, should be biopsied.

3.4.4 | 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 [28]. Close attention should be given to assessing for Cameron erosions in patients with a hiatus hernia; a commonly missed cause of iron deficiency [28, 50].

3.4.5 | 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 [51].

3.4.6 | 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 a heterotopic gastric mucosa in the proximal esophagus, appearing endoscopically as well-circumscribed, salmon-colored oval lesions below the upper esophageal sphincter. These patches are not pathological and have a reported prevalence of 14.5% during UGI endoscopy [52].

3.5 | Stomach

3.5.1 | 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.

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 [4]. 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 [53].

3.5.2 | 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 observed during a UGI endoscopy should be documented, using the Forrest classification to describe its endoscopic appearance [30]. A follow-up endoscopy should be conducted after 6–8 weeks to confirm healing [4]. *H. pylori* infection should be evaluated via gastric biopsies or rapid urease testing, and eradication therapy should be administered if indicated. For nonhealing ulcers with endoscopic suspicion for neoplasia, ongoing endoscopic review is recommended until complete healing is confirmed, if clinically appropriate.

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

- dyspepsia [54]
- gastric mucosa-associated lymphoid tissue (MALT) lymphoma [55]
- endoscopic findings of gastritis, peptic ulcer disease, gastric atrophy, or GIM [56–58]
- risk factors for gastric cancer, such as Māori, Pasifika, or Asian ethnicity or family history of gastric cancer [56–58]
- refractory *H. pylori* infection requiring antimicrobial susceptibility testing [56–58].

Rapid urease testing and/or histology are the recommended endoscopic methods for diagnosing *H. pylori* infection [58].

Although *H. pylori* infection is most often localized to the antrum, biopsy samples should be obtained from both the antrum and gastric body [59]. 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 [60].

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 [61]. 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.

3.5.3 | 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 nontargeted biopsy samples from the antrum and body and one sample from the incisura, in addition to targeted biopsies) [4, 62]. 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 [63]. 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) [6].

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, and refractory *H. pylori* infection) [64].

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.

3.6 | Duodenum

3.6.1 | 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 from different locations throughout the duodenum (at least three samples from D2 and one from D1) are required to improve the diagnostic yield, as villous atrophy may occur in a patchy distribution [65–67]. To avoid a false-negative result, patients should adhere to a gluten-rich diet for at least 6 weeks before their index procedure [67].

3.6.2 | Duodenal Ulcers

30. Duodenal ulcers should be described according to the Forrest classification.

Duodenal ulcers should be described according to the Forrest classification [30]. 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).

3.6.3 | 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 [23]. 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 [14].

3.7 | Other Disease-Specific Conditions

3.7.1 | 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 tunneling biopsies can be used to unroof the lipoma [68].

We recommend endoscopic ultrasound to characterize subepithelial lesions that have features of a gastrointestinal stromal tumor or leiomyoma (firm consistency and negative pillow sign), that are

> 10 mm in size or that have high-risk stigmata (e.g., bleeding and ulceration) [69]. The ASGE/American College of Gastroenterology and ESGE guidelines provide details of different types of subepithelial lesions and their endoscopic characteristics [5, 34].

3.7.2 | 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.

3.7.3 | 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) [29]. 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) [70].

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 [71].

3.8 | Postprocedural Recommendations

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

Postprocedural review should occur to assess patients for procedural adverse events and to evaluate their recovery from sedation and appropriateness for discharge (Australian and New Zealand College of Anesthetists guideline PG09).

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 detail the examination extent, duration, findings, anatomical landmark photos, abnormalities, histology samples, and the management plan, including follow-up needs. Any medication changes and dietary instruction post endoscopy require documentation in the report [4]. Patients should be provided with contact information for postprocedure concerns.

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 [4]. 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. Copies of the report should be promptly provided to the referring and/or primary care clinicians.

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 postendoscopy UGI cancer.

Postendoscopy UGI cancer refers to any UGI malignancy diagnosed within 3 years following a UGI endoscopy that was negative for cancer [4]. A meta-analysis reported that up to 11% of UGI cancers are postendoscopy cases. Root cause analyses indicate that up to 70% of these cancers could have been prevented [72–74]. These cancers are typically diagnosed around 17 months after the initial procedure and often appear as subtle, smaller lesions, predominantly in the upper esophagus and gastric body rather than the gastroesophageal junction and gastric antrum [75].

To identify subtle premalignant and malignant abnormalities, detailed inspection of the UGI tract is essential, along with implementing systems to audit and reduce the rate of postendoscopy UGI cancer. The postendoscopy UGI cancer rate can be obtained by dividing the number of UGI cancers diagnosed at 6–36 months postnegative endoscopy by the total number of UGI cancers diagnosed within 0–36 months. Internal audits every 3 years are recommended to maintain a postendoscopy UGI cancer rate below 10%.

4 | 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.

Acknowledgments

The authors thank GESA Endoscopy Faculty members Dr Saurabh Gupta, Dr Christine Welch, Dr Vipul Aggarwal, and Dr Nam Nguyen for their review of this position statement. Open access publishing facilitated by Curtin University, as part of the Wiley - Curtin University agreement via the Council of Australian University Librarians.

Conflicts of Interest

The authors declare no conflicts of interest.

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