Management of epithelial precancerous conditions and early neoplasia of the stomach (MAPS III): European Society

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MAIN RECOMMENDATIONS

At a population level, the European Society of Gastrointestinal Endoscopy (ESGE), the European *Helicobacter* and Microbiota Study Group (EHMSG), and the European Society of Pathology (ESP) suggest endoscopic screening for gastric cancer (and precancerous conditions) in high-risk regions (age-standardized rate [ASR] >20 per 100 000 person-years) every 2 to 3 years or, if cost–effectiveness has been proven, in intermediate risk regions (ASR 10–20 per 100 000 person-years) every 5 years, but not in low-risk regions (ASR <10).

ESGE/EHMSG/ESP recommend that irrespective of country of origin, individual gastric risk assessment and stratification of precancerous conditions is recommended for first-time gastroscopy.

ESGE/EHMSG/ESP suggest that gastric cancer screening or surveillance in asymptomatic individuals over 80 should be discontinued or not started, and that patients' comorbidities should be considered when treatment of superficial lesions is planned.

ESGE/EHMSG/ESP recommend that a high quality endoscopy including the use of virtual chromoendoscopy (VCE), after proper training, is performed for screening, diagnosis, and staging of precancerous conditions (atrophy and intestinal metaplasia) and lesions (dysplasia or cancer), as well as after endoscopic therapy. VCE should be used to guide the sampling site for biopsies in the case of suspected neoplastic lesions as well as to guide biopsies for diagnosis and staging of gastric precancerous conditions, with random biopsies to be taken in the absence of endoscopically suspected changes. When there is a suspected early gastric

neoplastic lesion, it should be properly described (location, size, Paris classification, vascular and mucosal pattern), photodocumented, and two targeted biopsies taken.

ESGE/EHMSG/ESP do not recommend routine performance of endoscopic ultrasonography (EUS), computed tomography (CT), magnetic resonance imaging (MRI), or positron emission tomography (PET)-CT prior to endoscopic resection unless there are signs of deep submucosal invasion or if the lesion is not considered suitable for endoscopic resection.

ESGE/EHMSG/ESP recommend endoscopic submucosal dissection (ESD) for differentiated gastric lesions clinically staged as dysplastic (low grade and high grade) or as intramucosal carcinoma (of any size if not ulcerated or ≤ 30 mm if ulcerated), with EMR being an alternative for Paris 0-IIa lesions of size ≤ 10 mm with low likelihood of malignancy.

ESGE/EHMSG/ESP suggest that a decision about ESD can be considered for malignant lesions clinically staged as having minimal submucosal invasion if differentiated and ≤ 30 mm; or for malignant lesions clinically staged as intramucosal, undifferentiated and ≤ 20 mm; and in both cases with no ulcerative findings.

ESGE/EHMSG/ESP recommends patient management based on the following histological risk after endoscopic resection:

Curative/very low-risk resection (lymph node metastasis [LNM] risk < 0.5 %–1 %): en bloc R0 resection; dysplastic/pT1a, differentiated lesion, no lymphovascular invasion, independent of size if no ulceration and ≤ 30 mm if ulcerated. No further staging procedure or treatment is recommended.

Curative/low-risk resection (LNM risk < 3 %): en bloc R0 resection; lesion with no lymphovascular invasion and: a) pT1b, invasion ≤ 500 µm, differentiated, size ≤ 30 mm; or b) pT1a, undifferentiated, size ≤ 20 mm and no ulceration. Staging should be completed, and further treatment is generally not necessary, but a multidisciplinary discussion is required.

Local-risk resection (very low risk of LNM but increased risk of local persistence/recurrence): Piecemeal resection or tumor-positive horizontal margin of a lesion otherwise meeting curative/very low-risk criteria (or meeting low-risk criteria provided

ABBREVIATIONS

AGREE	Appraisal of Guidelines for Research and Evaluation
AI	artificial intelligence
ASR	age-standardized rate
AUC	area under the curve
BLI	blue-laser imaging
BSG	British Society of Gastroenterology
CAG	chronic atrophic gastritis
COX-2	cyclo-oxygenase 2
CI	confidence interval
CT	computed tomography
CVID	common variable immunodeficiency
DALY	disability-adjusted life-year
EGD	esophagogastroduodenoscopy
EGGIM	endoscopic grading of gastric intestinal metaplasia
EHMS	European *Helicobacter* and Microbiota Study Group
EMR	endoscopic mucosal resection
ER	endoscopic resection
ESD	endoscopic submucosal dissection
ESDII	2022 update of the ESGE guideline on ESD
ESGE	European Society of Gastrointestinal Endoscopy
ESP	European Society of Pathology (ESP)
EUS	endoscopic ultrasonography
GC	gastric cancer
GIM	gastric intestinal metaplasia
GML	gastric MALT (mucosa-associated lymphoid tissue) lymphoma
GRADE	Grading of Recommendations, Assessment, Development, and Evaluation
HGD	high grade dysplasia
HM	horizontal margin
IM	intestinal metaplasia
KT	Kimura–Takemoto
LCI	linked-color imaging
LGD	low grade dysplasia
LNM	lymph node metastasis
MAPS	management of epithelial precancerous conditions and early neoplasia of the stomach
MDT	multidisciplinary team
MRI	magnetic resonance imaging
NBI	narrow-band imaging
NPV	negative predictive value
OLGA	operative link on gastritis assessment
OLGIM	operative link on gastric intestinal metaplasia
OR	odds ratio
PET	positron emission tomography
PG	pepsinogen
PICO	patient/population, intervention, comparison, outcomes
PPV	positive predictive value
RCT	randomized controlled trial
RR	relative risk
QALY	quality-adjusted life-year
VM	vertical margin
WHO	World Health Organization
WLI	white-light imaging

SOURCE AND SCOPE

This is an official statement of the European Society of Gastrointestinal Endoscopy (ESGE), the European *Helicobacter* and Microbiota Study Group (EHMSG), and the European Society of Pathology (ESP). Gastric adenocarcinoma (GC) represents a significant burden on patients, health systems, and society in general. Well-known risk factors and a slow stepwise pathway of carcinogenesis allow GC to be considered a potentially preventable disease. However, interventions should also be cost-effective including in their environmental impact. This Guideline provides the update of recommendations on screening, diagnosis, and management of precancerous conditions and early neoplasia of the stomach, namely the 2019 MAPS II Guideline and 2022 ESD Guideline.

Introduction

Gastric cancer (GC) represents a significant burden on patients, health systems, and society in general. In 2017, more than one million incident cases of GC occurred worldwide, and nearly 865 000 people died of stomach cancer, contributing to 19 million disability-adjusted life-years (DALYs) [1].

Given the several well-known risk factors and the slow stepwise pathway of carcinogenesis (the "Correa cascade"), the intestinal type of GC can be considered as a potentially preventable disease. Primary prevention of a proportion of cases can be achieved by eradication of *Helicobacter pylori*, promotion of healthy dietary habits, and smoking cessation [1]. The Correa cascade describes the progression of precancerous conditions, leading from the initial chronic mucosal inflammation to atrophy and gastric intestinal metaplasia (GIM), followed by subsequent dysplasia and intestinal-subtype carcinoma. Awareness of this sequence may permit measures that detect early cancerous lesions curable by resection or by the surveillance of individuals with precancerous conditions at risk of GC. Endoscopy with histology is the mainstay for the care of individuals harboring these mucosal changes [2]. Recommendations must be cost-effective and feasible and should have the minimum possible environmental impact [3].

No specific guidelines existed for the management of precancerous conditions until 2012 (MAPS I [4]). In 2015, the first guidelines concerning the role of endoscopy in the treatment of early GC were published in Europe [5]. Subsequently, various

position statements, guidelines, and quality metrics adopted or incorporated concepts expressed in those texts [6]. In 2024, the RE.GA.IN. (Real-world Gastritis Initiative) consensus, a legacy of the updated Sydney–Houston and Kyoto consensus, updated the diagnosis of gastritis emphasizing a reconciled message about the endoscopy–histology crosstalk [2]. Furthermore, a recent systematic review of all guidelines on the management of gastric precancerous conditions addressed the management of GIM, the need to deliver high quality endoscopy and pathology, the role of *H. pylori* eradication, and the means of stratification to determine which high-risk phenotypes should be considered for surveillance [6]. While the risk of precancerous conditions and cancer varies according to geography/ethnicity, there are no differences in the management between patient groups once a patient develops high-risk mucosal changes. The review also pointed out gaps and areas for improvement that we attempt to address and incorporate in this updated guideline, including the clarification of endoscopic and histological protocols and the management of specific situations and conditions. In line with guidelines for other organs (e. g., esophagus and Barrett's mucosa [7]), we decided to incorporate the management of early neoplastic lesions in the same document.

In 2023, the European Society of Gastrointestinal Endoscopy (ESGE), the European *Helicobacter* and Microbiota Study Group (EHMSG) and the European Society of Pathology (ESP) joined forces to review the new evidence and to provide a comprehensive modular guideline (MAPS III) on the management of epithelial precancerous conditions and early neoplasia of the stomach, updating both MAPS II and the ESGE endoscopic submucosal dissection (ESD) Guideline. MAPS III aims to provide guidance on: (a) screening criteria for early neoplasia and precancerous conditions; (b) diagnosis of early gastric neoplasia and relevant precancerous conditions; (c) endoscopic management of early cancerous lesions; (d) the role of endoscopy in the follow-up of precancerous conditions; (e) role of *H. pylori* eradication and (f) other nonendoscopic interventions for individuals diagnosed with early cancer lesions and precancerous conditions; and (g) management of precancerous conditions within specific situations. All modules can be individually updated without the need for a full revision of the Guideline. Finally, a perspective for uptake by ESGE national societies was incorporated. Moreover, three additional sections provide data on previous uptake of guidelines, on sustainability (the "green box"), and on a future research agenda.

Methods

The MAPS III recommendations were developed according to the Appraisal of Guidelines for Research and Evaluation (AGREE) process for the development of clinical practice guidelines [8]. In the last quarter of 2023, after an open call to ESGE individual members and national societies, ESGE, EHMSG, and ESP assembled a panel of European gastroenterologists and pathologists to update the previous MAPS II Guideline [9] and the updated 2022 ESGE Guideline on the role of ESD (ESDII) [10]. If applicable, other ESGE publications were used to provide a comprehensive manuscript. No specific national society was involved.

Working groups were formed according to the following topics (see Topics and Working groups, available online-only in **Supplementary Material**): **1** Screening and cost–effectiveness of interventions; **2** Diagnosis of precancerous conditions and early neoplasias of the stomach; **3** Endoscopic resection and management of superficial early cancer lesions; **4** Endoscopic follow-up of individuals with precancerous conditions; **5** Role of *H. pylori* eradication in the management of precancerous conditions and after early neoplasia resection; **6** Role of other non-*H. pylori* interventions; **7** Management of individuals in specific settings that also harbor precancerous conditions.

The evidence-based Delphi process was applied to develop consensus statements. First, key questions were agreed, and statements were proposed by guideline leaders, considering previous MAPS II and ESD Guideline statements and subsequent changes to previous recommendations. Secondly, each working group edited their statements and modified them according to the evidence if necessary. A literature search up till March 2024 was done using a PICO (patient/population, intervention, comparison, outcome) structure and PubMed queries (see **Supplementary Material**), with a focus on articles published after the production of previous guidelines. M.D.R. and T.G. rated the quality level of the available evidence and the strength of recommendations by using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) process [11, 12]. The coordinators evaluated and grouped every statement and the evidence in a document with the relevant bibliography. They then sent the document to every participant for online voting on each statement. At this stage, changes were made if necessary, and any statement with less than 80 % agreement was excluded. Every author then approved a final version with recommendations. Finally, a summary of previous uptake of MAPS guidelines and a "green section" was added and the manuscript was reviewed by two members of the ESGE Governing Board. It was then sent for further comments to the ESP and EHMSG boards and ESGE national societies and individual members. Suggestions were considered, and after agreement was reached on a final version, the manuscript was submitted for publication.

For each statement/recommendation, the Guideline records the strength of the recommendation and the quality of the evidence (and provides suggestions or recommendations accordingly) and the percentage agreement among participants; it is shown whether the statement/recommendation is unchanged, modified, or new, compared to the previous guidelines (MAPS II, ESDII). See ▶ **Table 1**.

The reader should consider these recommendations with the understanding that this guidance does not apply to diffuse cancer of the stomach (including the related hereditary syndromes) where the precancerous sequence of events in the Correa cascade is not observed [13]. Also, no recommendations will be made regarding primary prevention measures, screening in the context of diffuse hereditary cancer, management of advanced forms of GC [14], or training both for endoscopic recognition of lesions or ESD or regarding specific technical components of endoscopic classifications for ESD [15].

▶ **Table 1** Management of epithelial precancerous conditions and early neoplasia of the stomach (MAPS III) recommendations: updated from MAPS II [9] and previous endoscopic submucosal dissection (ESD) guideline [5].

MAPS II/ESDII		**MAPS III**	
Module **Recommendation**	**Strength of recommendation/ Quality of evidence**	***Module*** **Recommendation**	**Strength of recommendation/ Quality of evidence**
Screening for early gastric neoplasia and gastric precancerous conditions			
		1 ESGE/EHMSG/ESP suggest population-based endoscopic screening for gastric cancer (and precancerous conditions) every 2 to 3 years in high-risk regions (age-standardized rate [ASR] > 20 per 100 000 person-years) or every 5 years in intermediate-risk regions (ASR 10–20 per 100 000 person-years), if cost–effectiveness has been proven and resources are available. **New**	Conditional/Low
		2 ESGE/EHMSG/ESP suggest against population-based endoscopic screening for gastric cancer (and precancerous conditions) in low-risk regions (ASR < 10 per 100 000 person-years). **New**	Conditional/Low
(MAPS II) **8** For adequate staging of gastric precancerous conditions, a first-time diagnostic upper gastrointestinal endoscopy should include gastric biopsies both for *Helicobacter pylori* infection diagnosis and for identification of advanced stages of atrophic gastritis.	Strong/Moderate	**3** ESGE/EHMSG/ESP recommend that a diagnostic upper gastrointestinal endoscopy (endoscopic opportunistic diagnosis) should include screening for gastric cancer as well as the diagnosis and stratification of risk of precancerous conditions, irrespective of country of origin. **New**	Strong/Moderate
		4 ESGE/EHMSG/ESP suggest *H. pylori* non-invasive screening and eradication between the ages of 20 and 30 for first-degree relatives of patients with gastric cancer. **New**	Conditional/ Moderate
		5 ESGE/EHMSG/ESP suggest endoscopic screening for gastric cancer in first-degree relatives of patients with gastric cancer at the age of 45 years or 10 years before the age of diagnosis of the affected relative. **New**	Conditional/ Moderate
		6 ESGE/EHMSG/ESP suggest that gastric cancer screening or surveillance of precancerous conditions in asymptomatic individuals over 80 should be discontinued or not started. **New**	Conditional/Low
(MAPS II) **11** Low pepsinogen I serum levels or/ and low pepsinogen I/II ratio identify patients with advanced stages of atrophic gastritis and endoscopy is recommended for these patients, particularly if *H. pylori* serology is negative.	Strong/Moderate	**7** ESGE/EHMSG/ESP recommend endoscopic screening for precancerous conditions in individuals with low pepsinogen (PG) I serum levels or/and a low PG I/II ratio, particularly if *H. pylori* serology is negative. **Modified**	Strong/Moderate
Diagnosis of early neoplasia and precancerous conditions			
(MAPS II) **6** High definition endoscopy with chromoendoscopy (CE) is better than high definition white-light endoscopy alone for the diagnosis of gastric precancerous conditions and early neoplastic lesions.	High	**8** ESGE/EHMSG/ESP recommend a high quality endoscopy including virtual chromoendoscopy (VCE), for screening, diagnosis, and surveillance of gastric precancerous conditions and lesions. **Modified**	Strong/Moderate

▶ **Table 1** (Continuation)

MAPS II/ESDII		MAPS III	
Module **Recommendation**	**Strength of recommendation/ Quality of evidence**	***Module*** **Recommendation**	**Strength of recommendation/ Quality of evidence**
(MAPS II) **7** Whenever available and after proper training, virtual CE, with or without magnification, should be used for the diagnosis of gastric precancerous conditions, by guiding biopsy for staging atrophic and metaplastic changes and by helping to target neoplastic lesions.	Strong/Moderate	**9** ESGE/EHMSG/ESP recommend that VCE should be used to guide biopsies in the case of suspected neoplastic lesions. **Modified**	Conditional/ Moderate
		10 ESGE/EHMSG/ESP recommend guided biopsies with VCE for diagnosis and staging of gastric precancerous conditions, and random biopsies in the absence of endoscopically suspected precancerous conditions. **Modified**	Strong/Moderate
(MAPS II) **7** Whenever available and after proper training, virtual CE, with or without magnification, should be used for the diagnosis of gastric precancerous conditions, by guiding biopsy for staging atrophic and metaplastic changes and by helping to target neoplastic lesions.	Strong/Moderate	**11** ESGE/EHMSG/ESP recommend training in the endoscopic diagnosis of gastric precancerous conditions and lesions. **New**	Strong/Moderate
		12 ESGE/EHMSG/ESP suggest that real-time artificial intelligence (AI)-assisted detection and localization of gastric neoplastic lesions or staging of precancerous conditions may be used whenever available. **New**	Conditional/Low
(ESDII) **1** ESGE recommends that the evaluation of superficial gastrointestinal lesions should be made by an experienced endoscopist, using high definition white-light and chromoendoscopy (virtual or dye-based), and validated classifications when available.	Strong/High	**13** ESGE/EHMSG/ESP recommend that when there is suspicion of a neoplastic lesion, the lesion should be ▪ properly described (size, morphology according to Paris classification [namely, ulceration], location, vascular and mucosal patterns); ▪ photodocumented; and ▪ 2 targeted biopsies should be taken. **Modified**	Conditional/ Moderate
(ESDII) **3** ESGE suggests that when suspicious features for deep submucosal invasion are present, complete staging should be considered in order to exclude stage T2/T3 or lymph node metastasis (LNM).	Weak/Low		
(ESDII) **2** ESGE does not recommend routine performance of endoscopic ultrasonography (EUS), computed tomography (CT), magnetic resonance imaging (MRI), or positron emission tomography (PET)-CT prior to endoscopic resection except if there are signs suspicious of deep submucosal invasion or the lesion is not considered suitable for endoscopic resection.	Strong/Moderate	**14** ESGE/EHMSG/ESP do not recommend routine performance of endoscopic ultrasonography (EUS), computed tomography (CT), magnetic resonance imaging (MRI), or positron emission tomography (PET)-CT prior to endoscopic resection unless there are signs suspicious of deep submucosal invasion or the lesion is not considered suitable for endoscopic resection. **Unchanged**	Strong/Moderate
		15 ESGE/EHMSG/ESP suggest the use of validated endoscopic classifications of atrophy (e. g. Kimura–Takemoto) or gastric intestinal metaplasia (e. g. endoscopic grading of gastric intestinal metaplasia [EGGIM]) to endoscopically stage precancerous conditions and stratify risk for gastric cancer. **New**	Conditional/Low
(MAPS II) **9** Biopsies of at least two topographic sites (from both the antrum and the corpus, at the lesser and greater curvature of each) should be taken and clearly labelled in two separate vials. Additional biopsies of visible neoplastic suspicious lesions should be taken.	Strong/Moderate	**16** ESGE/EHMSG/ESP recommend biopsy of 2 fragments from the antrum/incisura and 2 from the corpus, guided by virtual chromoendoscopy (VCE), clearly labeled in two separate vials. Additional biopsy from the incisura is optional. **Modified**	Strong/Moderate

▶ **Table 1** (Continuation)

MAPS II/ESDII		MAPS III	
Module **Recommendation**	**Strength of recommendation/ Quality of evidence**	***Module*** **Recommendation**	**Strength of recommendation/ Quality of evidence**
(MAPS II) 2. Histologically confirmed intestinal metaplasia is the most reliable marker of atrophy in gastric mucosa.	High	**17** ESGE/EHMSG/ESP recommend high quality histopathologic reporting for all endoscopic biopsies that should include: ▪ presence and grade of dysplasia; ▪ presence and subtype of adenocarcinoma (Lauren and WHO classifications); ▪ presence and severity of atrophy; ▪ presence and severity of intestinal metaplasia; ▪ subtyping as complete or incomplete intestinal metaplasia; ▪ presence of *H. pylori* infection. **Modified**	Strong/Moderate
(MAPS II) **1** Patients with chronic atrophic gastritis or intestinal metaplasia are at risk for gastric adenocarcinoma.	High		
(MAPS II) **3** Patients with advanced stages of gastritis, that is atrophy and/or intestinal metaplasia affecting both antral and corpus mucosa, should be identified as they are considered to be at higher risk for gastric adenocarcinoma.	Strong/Moderate		
(MAPS II) **4** High grade dysplasia and invasive carcinoma should be regarded as the outcomes to be prevented when patients with chronic atrophic gastritis or intestinal metaplasia are managed.	Strong/Moderate		
(MAPS II) **10** Systems for histopathological staging (e. g. operative link on gastritis assessment [OLGA] and operative link on gastric intestinal metaplasia [OLGIM] assessment) can be used to identify patients with advanced stages of gastritis. If these systems are used to stratify patients, additional biopsy of the incisura should be considered	Weak/Moderate	**18** ESGE/EHMSG/ESP suggest that systems for histopathological staging of atrophy (operative link on gastritis assessment [OLGA]) or, preferably, intestinal metaplasia (operative link on gastric intestinal metaplasia [OLGIM]) can be used and integrated with endoscopic information in the management of patients. **Modified**	Conditional/ Moderate
		19 ESGE/EHMSG/ESP recommend against further subtyping intestinal metaplasia as type I to III because of risks to health care professionals. **New**	Strong/Moderate
		20 ESGE/EHMSG/ESP suggest that biopsies revealing dysplasia are reviewed by an expert gastrointestinal (GI) pathologist. **New**	Conditional/Low
Management of individuals with nonvisible dysplasia and those with superficial lesions with dysplasia/cancer			
(MAPS II) **13** In patients with dysplasia in the absence of an endoscopically defined lesion immediate high quality endoscopic reassessment with CE (virtual or dye-based) is recommended. If no lesion is detected in this high quality endoscopy, biopsies for staging of gastritis (if not previously done) and endoscopic surveillance within 6 months (if high grade dysplasia) to 12 months (if low grade dysplasia) are recommended.	Strong/Low	**21** ESGE/EHMSG/ESP suggest that patients with dysplasia (or indefinite for dysplasia) but no lesions seen on gastroscopy, are referred for a high-quality endoscopy (namely, high definition white-light endoscopy with virtual chromoendoscopy [VCE]), staging of precancerous conditions, and *H. pylori* testing if not previously performed. If no endoscopic lesions are again not seen, a follow-up high quality endoscopy is then needed, in 6 months for high grade dysplasia, or 12 months for low grade dysplasia/indefinite for dysplasia. **Modified**	Conditional/ Moderate
		22 ESGE/EHMSG/ESP suggest that patients with a diagnosis of indefinite for dysplasia (confirmed by an expert GI pathologist) and an endoscopic lesion are referred for a high quality endoscopy and, according to endoscopic findings, consideration for guided biopsies or resection. **New**	Conditional/Low

▶ **Table 1** (Continuation)

MAPS II/ESDII		MAPS III	
Module **Recommendation**	**Strength of recommendation/ Quality of evidence**	***Module*** **Recommendation**	**Strength of recommendation/ Quality of evidence**
		23 ESGE/EHMSG/ESP suggest that age and comorbidities should be taken into account when selecting patients for endoscopic treatment of an early gastric lesion. **New**	Conditional/Low
(MAPS II) **5** Patients with an endoscopically visible lesion harboring low or high grade dysplasia or carcinoma should undergo staging and treatment.	Strong/High	**24** ESGE/EHMSG/ESP recommend that patients with an endoscopically visible lesion harboring dysplasia (low grade or high grade) or carcinoma should undergo staging and treatment. **Unchanged**	Strong/Moderate
(ESDII) **4** ESGE recommends ESD as the treatment of choice for most gastric superficial lesions, mainly to provide an en bloc potentially curative resection with accurate pathologic staging	Strong/Moderate	**25** ESGE/EHMSG/ESP recommend endoscopic submucosal dissection (ESD) as the treatment of choice for most superficial gastric lesions. **Unchanged**	Strong/Moderate
(ESDII) **8** ESGE recommends ESD for differentiated gastric lesions clinically staged as dysplastic or as intramucosal carcinoma (of any size if not ulcerated and ≤ 30 mm if ulcerated), with EMR being an alternative for Paris 0-IIa lesions of size ≤ 10 mm with low likelihood of malignancy.	Strong/Moderate	**26** ESGE/EHMSG/ESP recommend ESD for differentiated gastric lesions clinically staged as dysplastic (low and high grade) or as intramucosal carcinoma (of any size if not ulcerated and ≤ 30 mm if ulcerated), with endoscopic mucosal resection (EMR) being an alternative for Paris 0-IIa lesions with size ≤ 10 mm with low likelihood of malignancy. **Unchanged**	Strong/Moderate
(ESDII) **9** ESGE suggests that gastric adenocarcinoma that are ≤ 30 mm, submucosal (sm1), and well differentiated, or ≤ 20 mm, intramucosal, and poorly differentiated type, both without ulcerative findings, can be considered for ESD, although decision should be individualized.	Weak/Low	**27** ESGE/EHMSG/ESP suggest that a decision about ESD can be considered for malignant lesions clinically staged as having minimal submucosal invasion if differentiated and ≤ 30 mm, or for lesions clinically staged as intramucosal, when undifferentiated and ≤ 20 mm; and in both cases with no ulcerative findings. **Unchanged**	Conditional/Low

▶ **Table 1** continuation on next page.

▶ **Table 1** (Continuation)

MAPS II/ESDII		MAPS III	
Module **Recommendation**	**Strength of recommendation/ Quality of evidence**	***Module*** **Recommendation**	**Strength of recommendation/ Quality of evidence**
(ESDII) **20** ESGE recommends that as en bloc R0 resection of a superficial gastric lesion with histology no more advanced than intramucosal cancer, well to moderately differentiated, with no lymphovascular invasion, should be considered a very low-risk (curative) resection, independently of size if without ulceration or of lesions ≤ 30 mm if ulcerated, and no further staging procedure or treatment is generally recommended.	Strong/Moderate	**28** ESGE/EHMSG/ESP recommends patient management based on the following histological risk after endoscopic resection: *Curative/very low-risk resection (LNM risk < 0.5 %–1 %)* En bloc R0 resection; dysplastic/pT1a, differentiated lesion, no lymphovascular invasion, independent of size if no ulceration and ≤ 30 mm if ulcerated: No further staging procedure or treatment is recommended. *Curative/low-risk resection (LNM risk < 3 %)* En bloc R0 resection; lesion with no lymphovascular invasion, and: a) pT1b, submucosal invasion ≤ 500 µm, differentiated, size ≤ 30 mm; or b) pT1a, undifferentiated, size ≤ 20 mm and no ulceration: Staging should be completed, and further treatment is generally not necessary after a multidisciplinary discussion. *Local-risk resection (very low risk of LNM but increased risk of persistence/recurrence*) ▪ Piecemeal resection or tumor-positive horizontal margin of a lesion otherwise meeting curative/very low-risk criteria; or ▪ Provided there is no submucosally invasive tumor at the resection margin in the case of piecemeal resection or tumor-positive horizontal margin, for otherwise low-risk pT1b lesion (submucosal invasion ≤ 500 µm, well-differentiated, size ≤ 30 mm, and VM0). Endoscopic surveillance/re-treatment is recommended rather than other additional treatment. *High-risk resection* (noncurative): Any lesion with any of the following: a) a positive vertical margin (if carcinoma) or lymphovascular invasion or deep submucosal invasion (> 500 µm from the muscularis mucosae); b) poorly differentiated lesions if ulceration or size > 20 mm; c) in pT1b differentiated lesions with submucosal invasion ≤ 500 µm with size > 30 mm d) in intramucosal ulcerative lesion with size > 30 mm. Complete staging and strong consideration for additional treatments (surgery) in multidisciplinary discussion. **Unchanged**	Strong/Moderate
(ESDII) **21** ESGE suggests that an en bloc R0 resection of a ≤ 30 mm gastric adenocarcinoma, with superficial submucosal invasion (sm1), that is well to moderately differentiated and with no lymphovascular invasion and no ulcer, should be considered a low-risk (curative) resection and no further treatment is generally recommended. [...]	Weak/Moderate		
(ESDII) **22** ESGE suggests that an en bloc R0 resection of a ≤ 20 mm gastric intramucosal poorly differentiated carcinoma, with no lymphovascular invasion or ulcer, should be considered a low-risk (curative) resection and no further treatment is generally recommended.	Weak/Moderate		
(ESDII) **23** ESGE recommends that a resection of a > 30 mm gastric adenocarcinoma with superficial submucosal invasion (sm1) or with ulceration should be considered a high-risk (noncurative) resection and complete staging should be done and strong consideration for additional treatments (surgery) should be given on an individual basis in a multidisciplinary discussion.	Strong/Moderate		

▶ **Table 1** (Continuation)

MAPS II/ESDII		MAPS III	
Module **Recommendation**	**Strength of recommendation/ Quality of evidence**	***Module*** **Recommendation**	**Strength of recommendation/ Quality of evidence**
(ESDII) **30** ESGE recommends scheduled endoscopic surveillance with high definition white-light and chromoendoscopy (virtual or dye-based) with biopsies of only the suspicious areas after a curative ESD.	Strong/Moderate	**29** ESGE/EHMSG/ESP suggest a surveillance high quality endoscopy at 3–6 months and then annually after a very low- or low-risk ESD resection or after a local-risk ESD resection without recurrence. Routine use of EUS, MRI, CT, or PET in the follow-up after very low-risk resections is not suggested but could be considered for higher-risk lesions. **Modified**	Conditional/Low
(ESDII) **32** ESGE suggested endoscopy at 3–6 months and then annually after a curative ESD resection or after a local-risk ESD resection without recurrence.	Weak/Low		
(ESDII) **34** ESGE does not suggest routine use of EUS, MRI, CT, or PET in the follow-up after a very low- or low-risk (curative) endoscopic resection […]	Weak/Low		
(ESDII) **23** ESGE recommends that a resection of a > 30 mm gastric adenocarcinoma with superficial submucosal invasion (sm1) or with ulceration should be considered a high-risk (noncurative) resection and complete staging should be done and strong consideration for additional treatments (surgery) should be given on an individual basis in a multidisciplinary discussion.	Strong/Moderate	**30** ESGE/EHMSG/ESP recommend that after a high-risk resection the need for additional treatment is decided in a multidisciplinary team (MDT) discussion taking into account LNM risk, age, comorbidities, and life expectancy. **Modified**	Strong/Moderate
Surveillance of individuals with precancerous conditions			
(MAPS II) **17** Patients with advanced stages of atrophic gastritis (severe atrophic changes or intestinal metaplasia in both antrum and corpus, OLGA/OLGIM III/IV) should be followed up with a high quality endoscopy every 3 years.	Strong/Low	**31** ESGE/EHMSG/ESP recommend that patients with extensive endoscopic changes (C3 + or EGGIM 5 +) or advanced histological stages of atrophic gastritis (severe CAG or GIM and/or significant changes in both antrum and corpus, OLGA/OLGIM III/IV) should be followed up with high quality endoscopy every 3 years. **Unchanged**	Strong/Moderate
(MAPS II) **25** In intermediate- to high-risk regions, identifications and surveillance of patients with precancerous gastric conditions is cost-effective.	Moderate	**32** ESGE/EHMSG/ESP recommend opportunistic risk stratification of precancerous conditions in all endoscopies, because endoscopic surveillance every 3 years in patients with high-risk premalignant conditions is cost-effective irrespective of country. **Modified**	Strong/Moderate
(MAPS II) **18** Patients with advanced stages of atrophic gastritis and with a family history of gastric cancer may benefit from a more intensive follow-up (e. g. every 1–2 years after diagnosis).	Weak/Low	**33** ESGE/EHMSG/ESP suggest that endoscopic features of extensive changes (C3 + or EGGIM 5 +) or histologically advanced stages of atrophic gastritis (severe atrophic changes or intestinal metaplasia in both antrum and corpus, OLGA/OLGIM III/IV) and with a first-degree relative with gastric cancer may benefit from a more intensive follow-up (e. g. every 1 to 2 years after diagnosis). **Modified**	Conditional/Low

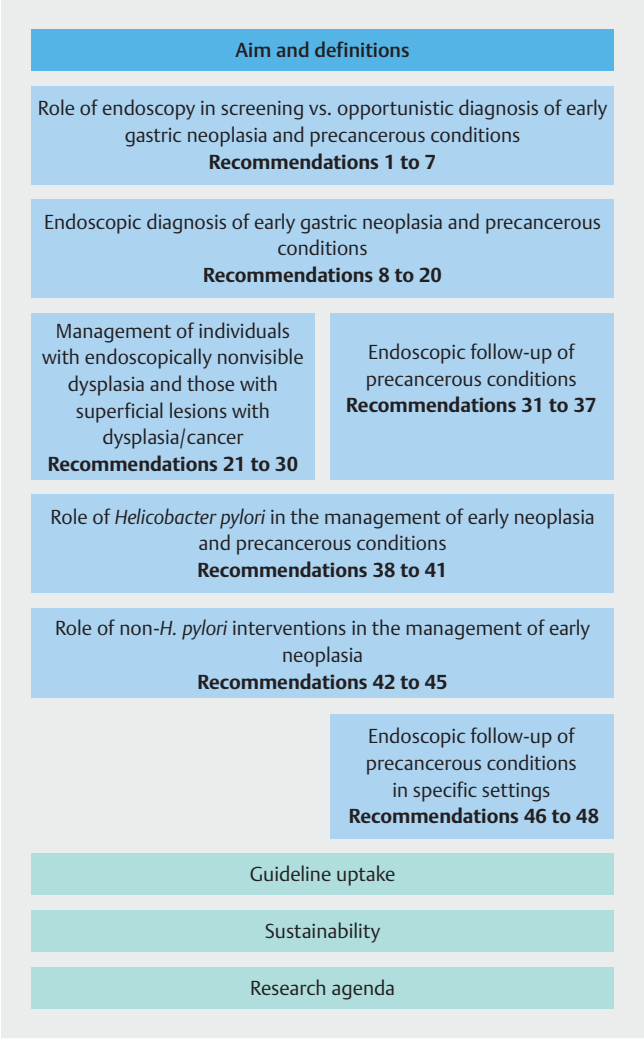
▶ **Table 1** (Continuation)

MAPS II/ESDII		MAPS III	
Module **Recommendation**	**Strength of recommendation/ Quality of evidence**	***Module*** **Recommendation**	**Strength of recommendation/ Quality of evidence**
(MAPS II) **14** For patients with mild to moderate atrophy restricted to the antrum there is no evidence to recommend surveillance.	Strong/Moderate	**34** ESGE/EHMSG/ESP recommend no surveillance endoscopy to patients with mild to moderate chronic atrophic gastritis (CAG) or gastric intestinal metaplasia (GIM) restricted to the antrum, in the absence of endoscopic signs of extensive lesions or other risk factors (family history, incomplete intestinal metaplasia or persistent *H. pylori* infection). This group constitutes most individuals found in clinical practice. **Modified**	Strong/Moderate
(MAPS II) **15** Patients with IM at a single location have a higher risk of gastric cancer. However, this increased risk does not justify surveillance in most cases, particularly if a high quality endoscopy with biopsies has excluded advanced stages of atrophic gastritis.	Strong/moderate		
(MAPS II) **16** In patients with IM at a single location but with a family history of gastric cancer, or with incomplete IM, or with persistent *H. pylori* gastritis, endoscopic surveillance with chromoendoscopy and guided biopsies in 3 years' time may be considered.	Weak/Low	**35** ESGE/EHMSG/ESP suggest that in patients with gastric intestinal metaplasia at a single location but with a family history of gastric cancer, or with incomplete intestinal metaplasia, or with persistent *H. pylori* gastritis, high quality endoscopic surveillance every 3 years may be considered. **Unchanged**	Conditional/Low
(MAPS II) **12** Even though diverse studies assessed age, gender, and *H. pylori* virulence factors, as well as host genetic variations, no clinical recommendation regarding diagnosis and surveillance can be made for targeted management based on these factors.	Weak/Low	**36** ESGE/EHMSG/ESP recommend against any tailored surveillance strategy based on genetic status, birthplace, or ethnicity in patients with gastric precancerous conditions. **Modified**	Conditional/Low
		37 ESGE/EHMSG/ESP suggest that random biopsies are not required during surveillance of cases with advanced OLGA/OLGIM stages at baseline endoscopy once no superficial lesions are observed. **New**	Conditional/Low
Role of H. pylori in patients with precancerous conditions and cancer			
(MAPS II) **20** *H. pylori* eradication heals nonatrophic chronic gastritis, may lead to regression of atrophic gastritis, and reduces the risk of gastric cancer in patients with nonatrophic and atrophic gastritis, and, therefore, it is recommended in patients with these conditions.	Strong/High	**38** ESGE/EHMSG/ESP recommend *H. pylori* eradication in individuals with nonatrophic chronic gastritis and atrophic gastritis to reduce the risk of gastric cancer. **Modified**	Strong/High
(MAPS II) **21** In patients with established IM, *H. pylori* eradication does not appear to significantly reduce the risk of gastric cancer, at least in the short term, but reduces inflammation and atrophy and, therefore, it should be considered.	Weak/Low	**39** ESGE /EHMSG/ESP recommend that *H. pylori* eradication should be considered in patients with established gastric intestinal metaplasia. **Unchanged**	Conditional/ Moderate
(MAPS II) **22** *H. pylori* eradication is recommended for patients with gastric neoplasia after endoscopic therapy.	Strong/High	**40** ESGE/EHMSG/ESP recommend *H. pylori* eradication for patients with gastric neoplasia after endoscopic or surgical therapy. **Modified**	Strong/Moderate
		41 ESGE/EHMSG/ESP recommend against testing for microbiota other than *H. pylori* for preventing or treating gastric precancerous conditions. **New**	Strong/Moderate

▶ **Table 1** (Continuation)

MAPS II/ESDII		MAPS III	
Module **Recommendation**	**Strength of recommendation/ Quality of evidence**	***Module*** **Recommendation**	**Strength of recommendation/ Quality of evidence**
Role of non H. pylori interventions			
		42 ESGE/EHMSG/ESP recommend smoking cessation in individuals with precancerous conditions or after endoscopic treatment of superficial lesions. **New**	Strong/Low
		43 ESGE/EHMSG/ESP suggest that patients with an appropriate indication for proton pump inhibitors (PPIs) or histamine (H2) receptor antagonists (H2RAs) should not discontinue the medication. **New**	Conditional/Low
(MAPS II) **24** Low dose daily aspirin may be considered for prevention of various cancers, including gastric cancer, in selected patients.	Weak/Moderate	**44** ESGE/EHMSG/ESP suggest that low-dose daily aspirin can be considered for prevention of gastric cancer in selected individuals with high risk for cardiovascular events. **Unchanged**	Conditional/Low
(MAPS II) **23** Even though cyclo-oxygenase (COX)-1 or COX-2 inhibitors may slow progression of gastric precancerous conditions, they cannot be recommended specifically for this purpose.	Weak/Low	**45** ESGE/EHMSG/ESP recommend against the use of other specific drugs or supplements (including probiotics) for chemoprevention in any clinical setting outside of clinical studies. **Modified**	Conditional/Low
Special situations			
		46 ESGE/EHMSG/ESP suggest that in individuals with hereditary syndromes with increased risk of gastric cancer, endoscopic surveillance should follow recommendations for the specific syndrome or according to the gastric mucosal changes, whichever interval is shorter. **New**	Conditional/Very low
(MAPS II) **19** Patients with autoimmune gastritis may benefit from endoscopic follow-up every 3–5 years	Weak/Low	**47** ESGE/EHMSG/ESP suggest that patients with autoimmune gastritis should have high quality endoscopic follow-up every 3 years to detect gastric cancer and neuroendocrine tumors. **New**	Conditional/Low
		48 ESGE/EHMSG/ESP suggest that patients with common variable immunodeficiency (CVID) should have a high quality endoscopy at the time of diagnosis and then should be followed up according to staging of precancerous conditions and/or presence of autoimmune gastritis. **New**	Conditional/Very Low

EHMSG, European *Helicobacter* and Microbiota Study Group; ESGE, European Society of Gastrointestinal Endoscopy; ESP, European Society of Pathology; GC, gastric cancer; WHO, World Health Organization



▶ **Fig. 1** Schematic outline of guideline on endoscopic management of epithelial precancerous conditions and early neoplasia of the stomach: the MAPS III Guideline.

This Guideline was issued in 2025 and will be considered for review and update in 2030, or sooner if new and relevant evidence becomes available. Any updates to the Guideline in the interim will be noted on the ESGE website: https://www.esge.com/esge-guidelines.html.

Outline, aim, and definitions

Outline of the Guideline

Following the presentation of the aim and scope of the guideline, definitions are provided before the main sections are presented. The sequence of topics is as follows: (a) indications for screening in general populations and on an individual basis; (b) the endoscopic diagnosis of both early gastric neoplasia and precancerous conditions; (c) management of early gastric neoplasia if diagnosed; (d) endoscopic follow-up and surveillance of precancerous conditions; (e) the role of *H. pylori* eradication; (f) the role of other nonendoscopic interventions for individuals with early gastric neoplasia and precancerous conditions; and (g) management of precancerous conditions in the context of specific situations (▶ **Fig. 1**).

Aim

A cascade of mucosal changes towards the intestinal subtype of gastric adenocarcinoma occurs multifocally in the stomach, comprising progression from normal mucosa to chronic inflammation, atrophy and GIM, dysplasia, and adenocarcinoma. This progressive nature permits potential interventions for early diagnosis and management of cancer, thus improving GC survival rates and, in addition, action to prevent gastric high grade dysplasia and invasive adenocarcinoma by intervention at the precancerous stages. Therefore, the present Guideline is organized (a) to provide guidance on the potential use of endoscopy to screen for precancerous conditions or early neoplasia, in the general population and also by targeted or opportunistic diagnosis, and (b) to provide recommendations on the diagnosis of patients identified with precancerous conditions or early neoplasia of the stomach, and their management, including *H. pylori* and non-*H. pylori* interventions.

Population-based versus targeted versus opportunistic screening for GC and precancerous conditions

Population-based screening for GC or precancerous conditions and lesions should be interpreted as their identification in the asymptomatic general population, whereas *targeted screening* of GC or precancerous conditions and lesions is their identification in specific subsets of the general population defined by a priori high-risk variables (e. g., family history, hereditary syndromes). *Opportunistic screening* refers to the individual GC risk stratification of each patient undergoing an esophagogastroduodenoscopy (EGD), by the careful assessment of the presence and stage of precancerous conditions. The management of superficial GC or precancerous conditions comprises the guidance on endoscopic and nonendoscopic interventions for the care of patients with diagnosed superficial GC or precancerous lesions or conditions. It should be assumed that endoscopic GC screening always includes the endoscopic assessment of precancerous conditions. *Surveillance* refers to the scheduled care using endoscopic assessment, after treatment of a superficial lesion or if precancerous conditions merit that specific care.

Endoscopic versus histological definitions

Fundamental to the application of this Guideline is the assumption that both the endoscopy performed and pathological examination provided are of high quality. The term *endoscopic superficial lesions* refers to lesions in the digestive tract in which the endoscopic appearance predicts that neoplastic changes are limited to the mucosa and submucosa [16]. Endoscopic descriptors can be used to predict lymph node metastasis and to make decisions about cancer management.

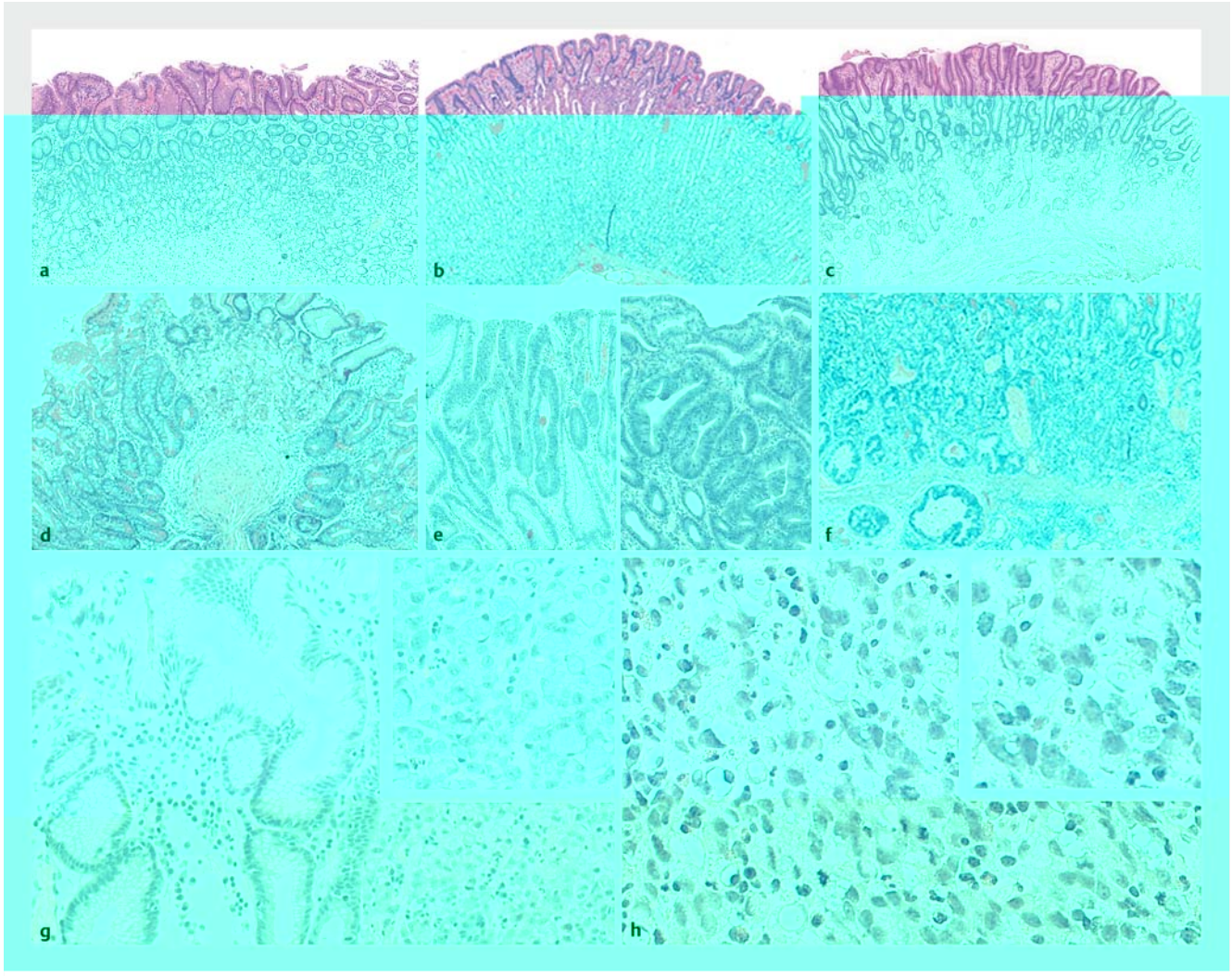
These endoscopic lesions when biopsied often reveal the so-called gastric precancerous conditions (chronic atrophic gastritis [CAG] and/or gastric intestinal metaplasia [IM]), precancerous lesions (*intraepithelial neoplasia/dysplasia*), or even cancer. In this paper the designation of early neoplasia of the stomach

► **Table 2** Correspondences between common classification systems for gastric cancer histology. This table summarizes the common gastric cancer histology classifications. In the endoscopic pre-therapy and post-therapy approach for early golomeeen,(cati)-6w(t).7204.u1(e)-9sea4(I)-.9(n)-204.8(d6(o)-7.)-289.e4(

applies to early gastric cancer and dysplasia/intraepithelial neoplasia. The World Health Organization (WHO) classifies gastric dysplasia or intraepithelial neoplasia as histologically unequivocal neoplastic epithelium characterized by variable cellular and architectural atypia without evidence of stromal invasion. It encompasses *low grade intraepithelial neoplasia/dysplasia* and *high grade intraepithelial neoplasia/dysplasia*, that are precursors of *intramucosal invasive neoplasia/intramucosal carcinoma*. *Low grade dysplasia* shows minimal or mild architectural disarray and mild to moderate cytological atypia. *High grade intraepithelial neoplasia/dysplasia* comprises neoplastic cells that are often cuboidal, rather than columnar, with a high nucleus-to-cytoplasm ratio and prominent amphophilic nucleoli. The nuclei frequently extend into the luminal half of the cell, and nuclear polarity is usually lost. Mitotic figures are more numerous than in low grade dysplasia and may be atypical. There is more pronounced architectural disarray. *Intramucosal invasive neoplasia/intramucosal carcinoma* shows unequivocal invasion of the lamina propria or muscularis mucosae (mucosa). Features that help to distinguish it from intraepithelial neoplasia/dysplasia include stromal desmoplastic changes (that can be minimal or absent), marked glandular crowding, excessive branching, budding, and fused or cribriform glands. The diagnosis of intramucosal carcinoma means that there is an increased risk of lymphatic invasion and lymph node metastasis, although with certain features this risk is absent or minimal (described later).

The above definitions refer to conventional (adenomatous/intestinal) type dysplasia, which is by far the most likely type to occur in the setting of chronic atrophic gastritis (CAG) with GIM. Other types of dysplasia can also occur in the stomach and, in comparison with conventional dysplasia, have different morphological features and, often, have different criteria for classification as low grade or high grade.

Sometimes, superficial lesions harbor a carcinoma that invades beyond the mucosa into the submucosa. Diverse



▶ **Fig. 2** **a** Normal antral mucosa. **b** Normal oxyntic mucosa. **c** Antral mucosa: mild glandular atrophy. **d** Oxyntic mucosa: severe glandular atrophy and extensive intestinal metaplasia. **e** Left: Low grade dysplasia. Right: High grade dysplasia. **f** Gastric adenocarcinoma: tubular type (WHO)/intestinal type (Laurén). **g** Gastric adenocarcinoma: poorly cohesive carcinoma, signet ring cell (WHO)/diffuse carcinoma (Laurén). **h** Gastric adenocarcinoma: poorly cohesive carcinoma, not otherwise specified (WHO)/diffuse carcinoma (Laurén).

features may be related to the risk of lymph node metastasis and, therefore, the need for further surgery, and the risk of death.

Moreover, for managing early GC, in the pre- and post-therapy approaches, we will refer to the Nakamura classification, as most studies evaluating the risk of lymph node metastasis and the guidelines concerning the endoscopic management of early GC use this classification. It divides GC into two types: differentiated (corresponding to well or moderately differentiated tubular or papillary adenocarcinoma) and undifferentiated (corresponding to poorly differentiated tubular adenocarcinoma or poorly cohesive carcinoma including the signet ring cell phenotype) (▶ **Table 2** [17–21]).

Precancerous conditions should be considered as CAG and/or GIM because these constitute the main background in which dysplasia and intestinal subtype adenocarcinoma may occur, and they independently confer an increased risk of development of GC. CAG should be diagnosed and graded based on the presence of chronic inflammatory cells, including lymphocytes and plasma cells that expand the lamina propria, and the disappearance of the normal glands. In the gastric body and fundus, this is associated with a loss of specialized cells and thus a reduction of gastric secretory functions. The severity of gland loss (atrophy) should be graded. *Intestinal metaplasia* may be classified as "complete" or "incomplete" as this has management relevance. Complete intestinal metaplasia displays goblet and absorptive cells, decreased expression of gastric mucins (MUC1, MUC5AC, and MUC6), and expression of MUC2, an intestinal mucin. Incomplete intestinal metaplasia displays goblet and columnar nonabsorptive cells, in which gastric mucins (MUC1, MUC5AC, and MUC6) are co-expressed with MUC2. Further classification into types I, II, and III was based on the detection of sialomucin and sulphomucin by high iron diamine–alcian blue staining but was discontinued because of

the toxicity of the reagents. Specific guidelines for diagnosis of intestinal metaplasia have been published [2], supporting a comprehensive approach that includes both endoscopy and endoscopic biopsies, and risk stratification that takes account of the endoscopic and histological extension of the changes to different gastric compartments (antrum and corpus).

▶ **Fig. 2** presents in brief the histological appearances representing the spectrum of changes from normal gastric mucosa to adenocarcinoma.

Screening for early gastric neoplasia and gastric precancerous conditions

Population-based screening for GC is only performed in high-risk areas. In a meta-analysis, it was shown that a 40 % risk reduction in GC mortality can be achieved by endoscopic screening in the high-risk Asian population [22]. Data from the South Korean National Screening Program showed a > 20 % reduction in GC mortality in the screened population. This was mostly seen in those screened by endoscopy compared to upper gastrointestinal series with barium meal, which did not show any benefit [23]. Currently, in Asia, the intervals for endoscopic GC screening programs are every 2–3 years at a starting age of 40 or 50 years [24]. The cost–effectiveness of these programs depends mainly on the costs of an upper endoscopy [24–27] (▶ **Fig. 3**).

Although the benefit of GC screening in intermediate-risk regions is still unknown, there is some evidence that GC screening is cost-effective if combined with colonoscopy screening in individuals between 50 to 75 years [24, 28]. Introduction of AI-assisted upper endoscopy may even improve cost–effectiveness in low–intermediate-risk areas by lowering the miss rate for detection of early GC and precancerous gastric lesions. This was shown in an effectiveness analysis using a Markov model, indicating that screening colonoscopy combined with AI-assisted upper endoscopy may improve the cost–effectiveness of GC screening in low–intermediate-risk countries in Europe [29]. As well as cost–

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RECOMMENDATION

3 ESGE/EHMSG/ESP recommend that a diagnostic upper gastrointestinal endoscopy (endoscopic opportunistic diagnosis) should include screening for gastric cancer as well as the diagnosis and stratification of risk of precancerous conditions, irrespective of country of origin. [New]
Strong recommendation/Moderate quality; 92 % agreement.

Although the overall incidence of GC in low-risk countries is low, the diagnosis of early gastric neoplasia represents a significant benefit at an individual level. Even though some patients are at high risk of GC development and endoscopists may also consider pre-endoscopically determining the GC risk for that specific individual, the opportunity to impact significantly on an individual's life by diagnosing GC or precancerous conditions that warrant further surveillance should be considered in all endoscopies. In British Society of Gastroenterology (BSG) guidelines, the term "endoscopic GC screening" (including the stratification of precancerous conditions) is used, and it is suggested for patients aged ≥ 50 years and with other high-risk features such as pernicious anemia, male sex, smoking, and/or a positive family history of GC (i. e., targeted screening) [30]. In the Maastricht VI/Florence consensus, endoscopic gastric screening at the age of 45 years is suggested for asymptomatic individuals with a family history of GC [31]. Besides these risk factors, ethnicity in combination with *H. pylori* infection may add information to identify individuals with a high pretest probability of GC, contributing to a cost-effective approach to endoscopic GC screening in intermediate- and low-risk countries [32]. Although most of the data on the identification of the high-risk population in low-risk regions comes from the US, the risk factors found may also apply for other low-risk regions [33]. Therefore, individuals at an increased risk for GC development include those ≥ 50 years of age with at least one of the following additional risk factors: pernicious anemia, ethnic propensity, *H. pylori* infection, and/or a positive family history of GC.

Worldwide, estimates of the prevalence of gastric precancerous conditions are highly variable [34–37]. A systematic review and meta-analysis incorporating data exclusively from European countries found an overall pooled prevalence of gastric precancerous conditions of 20.1 % (95 % confidence intervals [95 %CI] 15.6 %–24.6 %), with the prevalence being higher in selected versus unselected populations (22.3 %, 95 %CI 17.3 %–27.3 % vs. 17.0 %, 95 %CI 11.1 %–22.9 %), and in endoscopic versus serology-based studies (23.4 %, 95 %CI 19.3 %–27.4 % vs. 9.2 %, 95 %CI 4.6 %–13.9 %). Prevalence of CAG and GIM was 12.2 %–22.0 % and 17.6 %–36.8 %, respectively. Of note, the estimated prevalence of extensive gastric precancerous conditions was previously reported to be 16.2 % for CAG and 13.2 % for GIM, respectively [37]. This shows that precancerous conditions are frequent in Europe, and thus, opportunistic screening of precancerous conditions should be considered.

In almost all international guidelines, endoscopic surveillance every 3 years is recommended in those with extensive GIM/CAG. This strategy appeared to be cost-effective [32, 38, 39]. In a recent Markov analysis from the US [40] different surveillance intervals in patients with GIM were compared. Intervals of 5 years, 3 years, 2 years, and 1 year were compared with surveillance at 10 years. All modeled surveillance intervals yielded a greater life expectancy (87–190 undiscounted life-years gained per 1000) than surveillance at 10 years. The 5-year surveillance interval was associated with the greatest number of life-years gained and was the most cost-effective strategy ($40 706/quality-adjusted life-year [QALY]) in all patients with GIM. In individuals with a family history of GC or extensive, incomplete-type GIM, a 3-year surveillance was cost-effective (incremental cost–effectiveness ratio $28 156/QALY and $87 020/QALY, respectively). The consequence of this is that stratification of individuals with precancerous conditions according to GC risk must be performed in all gastroscopies to identify individuals who benefit from surveillance.

RECOMMENDATION

4 ESGE/EHMSG/ESP suggest *H. pylori* noninvasive screening and eradication between the ages of 20 and 30 for first-degree relatives of patients with gastric cancer. [New]
Conditional recommendation/Moderate quality; 100 % agreement.

RECOMMENDATION

5 ESGE/EHMSG/ESP suggest endoscopic screening for GC in first-degree relatives of patients with gastric cancer, at the age of 45 years or at 10 years before the age of diagnosis of the affected relative. [New]
Conditional recommendation/Moderate quality; 100 % agreement.

Patients with first-degree relatives with GC have a higher risk of developing GC. Indeed, a recent meta-analysis of 21 studies underscores a substantial correlation between GC risk and first-degree relatives with GC, with odds ratio (OR) of 2.92 (95 %CI 2.402–3.552, $P < 0.001$; $I^2 = 81.85\%$, $P < 0.001$) [41]. This risk is further substantiated by earlier meta-analyses indicating a doubled risk of GC among individuals with a family history of GC without specifying the degree of relationship (relative risk [RR] 2.00, 95 %CI 1.83–2.20, $P < 0.001$; OR 2.35, 95 %CI 1.96–2.81; and OR 1.84, 95 %CI 1.64–2.04, $P < 0.001$) [42–44]. Despite significant heterogeneity among studies, of approximately 80 %–90 %, these consistent findings advocate for a proactive endoscopic screening approach. It could prove pivotal to conduct noninvasive screening and eradication of *H. pylori* at the age of 20–30 and endoscopy at the age of 45 years to identify precancerous gastric conditions or lesions or early-stage GC in first-

degree relatives of GC patients. This proactive approach remains significant even in regions with low GC incidence, as it facilitates timely detection and intervention to reduce the mortality associated with GC. After screening, the management and follow-up will be according to mucosal status and *H. pylori* infection persistence (see later sections of this Guideline).

The benefit of screening the general population may be limited by age and comorbidities, both of which reduce the life expectancy of the patient and increase the risks and complications of invasive procedures. Screening is unlikely to significantly modify life expectancy when this is less than 10 years due to an individual's underlying disease. For all these reasons, it is suggested that GC screening be discontinued, i. e., surveillance stopped or not started, at 80 years of age or when the individual's life expectancy is clearly less than 10 years [45, 46]. The age cutoff of 80 is arbitrary and is based on average life expectancy and the lifetime likelihood of further progression of precancerous conditions, according to current data on average life expectancy.

There are no new data suggesting modification of the approach proposed in MAPS II. Most of the studies show similar results regarding the performance of pepsinogens (PGs) in atrophic gastritis prediction, and a meta-analysis published in 2019 found a high specificity (0.89, 95 %CI 0.70–0.97) but a modest sensitivity (0.59, 95 %CI 0.38–0.78) [47] for CAG. For GC, pooled specificity was 0.73 (95 %CI 0.64–0.81) and pooled sensitivity was 0.59 (95 %CI 0.50–0.670 [47–64]. Hence, given the high specificity for CAG and moderate for GC, endoscopy is recommended for patients with low PG I serum levels (≤ 70 ng/mL) or low PG I/II ratio (≤ 3).

Regarding combined testing (combination of PG I, PG II, gastrin-17, *H. pylori* serology), a recent meta-analysis showed a pooled sensitivity of 0.70 (95 %CI 0.64–0.76) and pooled specificity of 0.93 (95 %CI 0.90–

88]. Of note, dedicated training in gastric neoplasia detection has also been shown to improve detection rates [71, 89–92].

Since the last revision of the MAPS guidelines, there has been new evidence supporting use of VCE (particularly narrow-band imaging [NBI], blue-laser imaging [BLI] and linked-color imaging [LCI]) for the detection of early lesions and precancerous conditions. NBI and BLI showed superiority over white-light imaging (WLI) in a meta-analysis for the diagnosis of early GC, without significant differences between NBI and BLI [93]. Some studies, including two randomized controlled trials (RCTs), also showed the superiority of LCI over WLI for the detection of gastric neoplastic lesions [94–97]. Two single-arm meta-analyses showed that NBI has a sensitivity of 79 %–80 % and a specificity of 91 %–93 % for the diagnosis of GIM [98, 99], and a meta-analysis including 6 studies showed that LCI has high accuracy for diagnosis of GIM, with sensitivity and specificity of 87 % and 86 %, respectively [100]. A meta-analysis of comparative studies also confirmed the superiority of NBI versus WLI for GIM detection [101]. Although the evidence is more limited, some studies also showed superiority of BLI, i-scan optical enhancement [102], and LCI [103] for GIM diagnosis when compared with WLI.

Previous studies showed that guided biopsies are useful for the identification and staging of gastric precancerous conditions in combination with random mapping biopsies [104, 105]. However, mapping biopsies still have a role since chromoendoscopy-targeted biopsies plus mapping biopsies have been shown to be superior to targeted biopsies alone in some studies [104, 106, 107]. Thus, VCE should guide the biopsies for suspicious areas, but additional random biopsies may increase the identification of patients with GIM at least in less experienced operators.

However, the strategy of targeted biopsy alone with chromoendoscopy (resulting in fewer specimens and vials) may be considered as an alternative if there is experience with VCE. According to the ESGE curriculum for optical diagnosis training [108], endoscopists are encouraged to participate in training courses that utilize validated classifications, such as the vessel plus surface classification system (VSCS) for VCE with magnification [109, 110] or the simplified NBI classification for high definition NBI endoscopy [111], since there is some evidence that training (namely using online models) increases the accuracy of optical diagnosis [89, 112–117].

Despite the increasing number of EGDs performed annually, the rate of missed GC is constant [65, 66]. In recent years AI in gastrointestinal endoscopy has also been developed for detection of early neoplasia in the stomach [118–141]. Most of the studies are retrospective and rely on the assessment of still images. In the meta-analysis by Arribas et al., AI systems had 88 % sensitivity and 89 % specificity in gastric adenocarcinoma detection [140]. In another recent meta-analysis including 17 studies, the pooled area under the curve (AUC) was 0.94 with 87 % sensitivity and 88 % specificity [134]. The real-time use of the Endoangel system resulted in sensitivity and specificity of 91.8 % and 92.4 %, respectively [124]. This system was also shown to significantly decrease blind spots during EGD, in a single RCT [126], and to decrease the neoplasia miss rate (RR 0.224, 95 %CI 0.068–0.744; $P = 0.015$) [141]. Several systems have also been developed for the diagnosis of CAG and GIM with promising results [142–152]. In a recent meta-analysis, assessment of images by AI resulted in 94 %, 96 %, and 0.98 for sensitivity, specificity, and AUC, respectively [150]. ESGE recommends that the threshold of 90 % should be achieved for detection of both cancer and precancerous conditions [153] and therefore, whenever available, AI-assisted systems may be used.

Successful endoscopic resection (ER) of gastric neoplasia depends on proper characterization and assessment of the indication for ER (▶ **Fig. 3**). This includes evaluation of the size (characterization of the horizontal extent of the lesion with VCE) and morphology (Paris classification) 66(o)3t.u7e8Tc542 naite-ligh

performing 2 biopsies in early lesions (prior to ER) and 6 biopsies in the case of advanced lesions [157, 159].

When a lesion is found the endoscopist should also evaluate whether there are endoscopic signs of deep submucosal invasion or risk factors for noncurative resection (in addition to size, morphology, and differentiation). Risk factors for noncurative resection confirmed in meta-analyses include poor differentiation [160–165], greater tumor size (≥20 mm, OR 3.66–3.94; ≥30 mm, OR 5.01) [160, 166], ulceration (OR 2.69–3.92) [160, 166], depressed-type morphology (OR 1.49), and tumor location in the upper third of the stomach (OR 1.49) [160]. Other observational studies have shown other findings for noncurative resection of early GC, including: convergence, clubbing, or abrupt cutting of gastric folds; absence of mucosal nodularity; and spontaneous bleeding/friability [167–169].

Risk factors for submucosal invasion include lesion size >30 mm [170], tumor location in the upper third of the stomach, marked margin elevation [170], uneven surface/nodularity [170], remarkable redness [170], fusion of converging folds [162, 171], irregular/nodular surface depression with fusion of converging folds [171], enlarged gastric folds [172], and the nonextension sign [173, 174].

A proforma endoscopy report is suggested in ▶ **Appendix A**.

RECOMMENDATION

14 ESGE/EHMSG/ESP do not recommend routine performance of endoscopic ultrasonography (EUS), computed tomography (CT), magnetic resonance imaging (MRI), or positron emission tomography (PET)-CT prior to endoscopic resection unless there are signs suspicious of deep submucosal invasion or the lesion is not considered suitable for endoscopic resection. [Unchanged]

Strong recommendation/Moderate quality; 100 % agreement.

The risk of lymph node metastasis (a priori risk) is low in early gastric lesions considered for ER. Given that the curative resection rate after ESD is around 80 %, there is interest in improving lesion selection and in more accurate staging. Only a few studies have evaluated the role of CT or PET-CT in the prediction of invasion depth/lymph node metastasis/curability of early GC by ER. The accuracy of CT for early GC stage (early 0-IA vs. advanced IB-IIIC) was 60 %. The sensitivity for advanced GC was 61.1 % and specificity for N + was 75 % (PPV 62.5 %), corresponding to overstaging rates of 16.6 % and understaging rates of 36.8 % [175]. CT using a gastric window has been later found to improve the accuracy for T1/T2 differentiation and to decrease the rates of overstaging (7 %–8 % in T1), but the accuracy for differentiating T1a and T1b was modest (67 %–69 %) [176].

Concerning PET-CT, a study by Chung et al. [177] published in 2019 found that PET-CT had an accuracy of 85 % regarding endoscopic curability, with a sensitivity of 79 %, specificity of 91 %, PPV of 81 %, and negative predictive value (NPV) of 89 % for noncurative resection.

Regarding the role of EUS, a meta-analysis was published by Shi et al. [178], analyzing the accuracy of invasion depth prediction by EUS with a sensitivity of 87 % and specificity of 67 %. The overall overstaging rate of mucosa/submucosa 1 (M/SM1) was 13.3 % and for submucosa (SM) it was 32.8 %, while the overall understaging for SM was 29.7 %. Lee et al. [179] described an EUS overestimation rate in early GC of 26.5 % and underestimation of 6.9 %. In a similar study, Li et al. [180] described overestimation in 33.6 % and underestimation in 10.4 %, respectively.

Many studies described the risk factors for EUS misdiagnosis [178, 180–182]. Kim et al. [182] demonstrated risk factors for lower EUS accuracy including lesion size, presence of ulceration, and non-flat lesion (lesion size >20 mm and ≤30 mm, OR 3.59, $P = 0.001$; lesion size >30 mm, OR 5.47, $P = 0.001$; ulceration, OR 6.62, $P = 0.003$; non-flat lesion, OR 2.94, $P = 0.029$).

The overall EUS accuracy for invasion depth of early GC varies from 55.9 % to 95 % [173, 175, 179–186]; however, the results from the studies range mostly from around 66 % to 79 % [173, 175, 179, 182, 184, 186].

It should be noted that endoscopy alone (even without chromoendoscopy) has almost 80 % accuracy in determining curability by ER, with several prediction models described to decide between ESD or surgery, with good results published in the literature [163, 168, 187]. Moreover, ESD does not preclude the possibility of subsequent surgery and should be seen as the most definitive T-staging modality.

To conclude, EUS, CT, or PET-CT do not significantly add to endoscopic evaluation alone: they have significant rates of over- and understaging, and cannot be recommended routinely, particularly for lesions that are considered endoscopically resectable. Although the accuracy of PET-CT is in line with that of endoscopic prediction (~80 %), in lesions with suspicion of submucosal invasion/noncurative resection, its high PPV for noncurative resection may be helpful and aid the decision between endoscopic or surgical treatment.

RECOMMENDATION

15 ESGE/EHMSG/ESP suggest the use of validated endoscopic classifications of atrophy (e. g. Kimura–Takemoto) or gastric intestinal metaplasia (e. g. endoscopic grading of gastric intestinal metaplasia [EGGIM]) to endoscopically stage precancerous conditions and stratify risk for gastric cancer. [New]

Conditional recommendation/Low quality; 96 % agreement.

The EGGIM scoring system has been shown to stratify GC risk during endoscopy based on nonmagnified VCE without the need of routine biopsies, achieving high concordance with the gold standard for high-risk GIM phenotypes (operative link on gastritis assessment [OLGIM] III–IV) [188]. A meta-analysis of comparative studies (4 diagnostic studies and 3 case–control) showed that EGGIM accurately identifies OLGIM III/IV with pooled sensitivity and specificity of 92 % (95 %CI 86 %–96 %) and 90 % (95 %CI 88 %–93 %), and an AUC of 0.9702. Moreover,

patients with higher EGGIM scores (5–10) were found to be at higher risk for early GC (OR 7.46, 95 %CI 3.41–16.310 [189]. In another meta-analysis assessing the role of VCE in prediction of GIM severity, EGGIM achieved a high predictive value for the severity of GIM under different modes of digital chromoendoscopy. Moreover, for high-risk GIM, the combined endoscopic prediction sensitivity of this method was 93 % (95 %CI 87–96, specificity 91 % (95 %CI 88%–93%), and AUC 0.9728 [190].

Similarly, grading endoscopic atrophy using white-light endoscopy (WLE) according to the Kimura–Takemoto classification can accurately assess the risk of gastric neoplasia development. In a meta-analysis of 14 retrospective studies, the pooled risk ratio (RR) for developing gastric neoplasms was 3.89 (95 %CI 2.92–5.17) among unselected patients with severe endoscopic atrophy (O2–O3), and 7.27 (95 %CI 1.64–32.33) among those with open-type endoscopic atrophy [191].

In summary, patients with endoscopic identification of extensive precancerous conditions (EGGIM ≥ 5 and/or Kimura–Takemoto open-type) are at higher risk of GC and the endoscopic staging may also guide management.

A proforma endoscopy report is suggested in ▶ **Appendix A**.

RECOMMENDATION

16 ESGE/EHMSG/ESP recommend biopsy of 2 fragments from the antrum/incisura and 2 from the corpus, guided by VCE, clearly labeled in two separate vials. Additional biopsy from the incisura is optional. [Modified]

Strong recommendation/Moderate quality; 96 % agreement.

Previous European guidelines for the management of epithelial precancerous conditions in the stomach (MAPS II) advocated biopsies of at least two topographic sites (from both the antrum and corpus, at lesser and greater curvature) to enable histopathological assessment according to the updated Sydney system. Although the incisura is the anatomical location where the highest incidence and severity of IM has been traditionally noted, addition of an incisura biopsy has shown small additional diagnostic yield in identifying patients in high-risk stages (OLGA/OLGIM III/IV) [192–194]. Ten prospective studies evaluated the role of the incisura angularis biopsy in the staging of precancerous conditions including further GC risk stratification [192–201]. Addition of an incisura angularis biopsy did not increase the identification of high-risk OLGA stages (OR 1.15, 95 %CI 0.99–1.34; I^2 0 %), but significantly increased the detection of high-risk OLGIM stages (OR 1.46, 95 %CI 1.17–1.84; I^2 0 %). However, subgroup analysis including of studies originating exclusively from Europe showed that – for Europe – addition of an incisura angularis biopsy changed neither grading from low- to high-risk OLGA nor from low- to high-risk OLGIM stages.

In other terms, the absolute increase in the proportion of patients with OLGA/OLGIM III/IV due to the additional incisura biopsy is small, with a number needed to treat (NNT) of 59 overall (and a NNT of 70 if only studies performed in unselected populations are considered) [193, 197], meaning that fewer than 1 of 59 patients will not be correctly included in a high-risk group if the incisura biopsy is not taken. Moreover, in the era of high definition endoscopy and VCE, the chance of missing IM at the incisura is even lower. Our literature search on this topic revealed no data regarding biopsy-related costs and workload. Based on these considerations, we recommend taking at least 2 biopsies from the antrum/incisura and 2 biopsies from the corpus, guided by VCE. Addition of the incisura angularis biopsy can be considered on a case-by-case basis to potentially increase the detection rate of precancerous conditions or when VCE is not available, and OLGA and OLGIM grading systems are implemented.

Regarding the number of vials, in the absence of a typical endoscopic pattern of severe atrophy/IM using VCE, use of a single vial to place all biopsy specimens (for *H. pylori* diagnosis) or even complete abstinence from biopsies can be applied (if *H. pylori* status is known or not considered clinically relevant) if expertise exists regarding both endoscopists and pathologists involved [198].

RECOMMENDATION

17 ESGE/EHMSG/ESP recommend high quality histopathological reporting for all endoscopic biopsies, that should include:

- presence and grade of dysplasia;
- presence and subtype of adenocarcinoma (Laurén and WHO classifications);
- presence and severity of atrophy;
- presence and severity of intestinal metaplasia;
- subtyping as complete or incomplete intestinal metaplasia;
- presence of *H. pylori* infection.

[Modified]

Strong recommendation/Moderate quality; 100 % agreement.

RECOMMENDATION

18 ESGE/EHMSG/ESP suggest that systems for histopathological staging of atrophy (operative link on gastritis assessment [OLGA]) or, preferably, intestinal metaplasia (operative link on gastric intestinal metaplasia [OLGIM]) can be used and integrated with endoscopic information in the management of patients. [Modified]

Conditional recommendation/Moderate quality; 100 % agreement.

RECOMMENDATION

19 ESGE/EHMSG/ESP recommend against further subtyping intestinal metaplasia as type I to III because of risks to health care professionals. [New]

Strong recommendation/Moderate quality; 100 % agreement.

RECOMMENDATION

20 ESGE/EHMSG/ESP suggest that biopsies revealing dysplasia are reviewed by an expert gastrointestinal pathologist. [New]

Conditional recommendation/Low quality; 96 % agreement.

All superficial lesions harboring dysplasia or more severe changes should be staged and managed by resecting them. ESGE/EHMSG/ESP recommends that patients who undergo resection of malignant lesions are treated by multidisciplinary teams (MDTs), with the recommendations for management based on endoscopic and pathology reports as detailed. Thus, handling of specimens must follow rigorous standards (see ▶ **Appendix B**). In some cases, biopsy findings are "indeterminate/indefinite for dysplasia" (IND). This refers to a borderline lesion that presents a challenge for definitive histopathological diagnosis as either regenerative or neoplastic from endoscopic forceps biopsy samples. Limited data indicate a relatively high frequency of high grade dysplasia (5 %) or invasive carcinoma (23 %–29 %) [202–204], with about 40 % being histologically upgraded upon review. Only 9 % of cases show recurrent gastric IND upon repeat biopsy [204]. Thus, it may be reasonable for reassessment of the diagnosis by a pathologist expert in GI pathology and to repeat endoscopic assessment.

Precancerous conditions. The risk for developing cancer seems to be related to the extent (particularly when affecting both antrum and corpus), severity, and subtype of IM. In MAPS I and MAPS II, the OLGA and OLGIM systems were proposed for staging of atrophy and IM, respectively. A meta-analysis of comparative studies (6 case–control studies and 2 cohort studies) including 2700 patients demonstrated a significant association between advanced OLGA and OLGIM stages III/IV and the risk of GC (both intestinal and diffuse type: OR for OLGA 2.64, 95 %CI 1.84–3.79, I^2 60 %; OR for OLGIM 3.99, 95 %CI 3.05–5.21, I^2 0 %) [205, 206]. We identified 18 observational studies [207–224]. Meta-analyses comprising data exclusively from 8 prospective studies with long-term follow up [209, 210, 216, 218–222] showed that OLGA/OLGIM stages III/IV are associated with the development of not only GC (OR 44.21, 95 %CI 8.32–235.01; I^2 63 %) but also low grade dysplasia (OR 14.49, 95 %CI 1.91–109.26; I^2 92 %) and high grade dysplasia (OR 16.57, 95 %CI 5.71–48.07; I^2 21 %). Based on these predictive properties, OLGA and OLGIM systems can be used to histologically assess GC risk. However, the diagnosis of atrophic gastritis needs grading of severity of gland loss – which shows poor inter- and intraobserver agreement. Therefore, we suggest that OLGIM could be preferred whenever the aim is staging of mucosal transformation. OLGIM has lower technical requirements regarding orientation of biopsy samples (compared with the assessment of atrophy for OLGA). However, the concept of extensive precancerous conditions (their presence in the antrum and body, independently of severity) is easier to use in clinical practice, widely available, and also correlates with GC risk. In fact, RE.GA.IN. suggested that OLGIM III/IV be regarded as equivalent to changes being present both in antrum and corpus, in line with the recommendations from MAPS I and II [2].

Extent of the mucosal changes seems also to be more relevant and easier to apply than subtyping of GIM. One exception may be the classification of GIM as complete or incomplete. Some studies indicate a positive correlation between the degree of incomplete GIM and the extent of GIM, which should be considered when managing these patients. However, the approach of subtyping GIM into types I, II and III was discontinued because of the toxicity of the reagents used for the necessary staining.

An example of completeness of reporting is provided in ▶ **Appendix B**. Also ▶ **Fig. 4** shows a general approach. ▶ **Fig. 5** and ▶ **Fig. 6** provide endoscopic images of superficial lesions and ▶ **Fig. 7** shows gastric images with no neoplastic lesions present but different stages of suspected precancerous conditions.

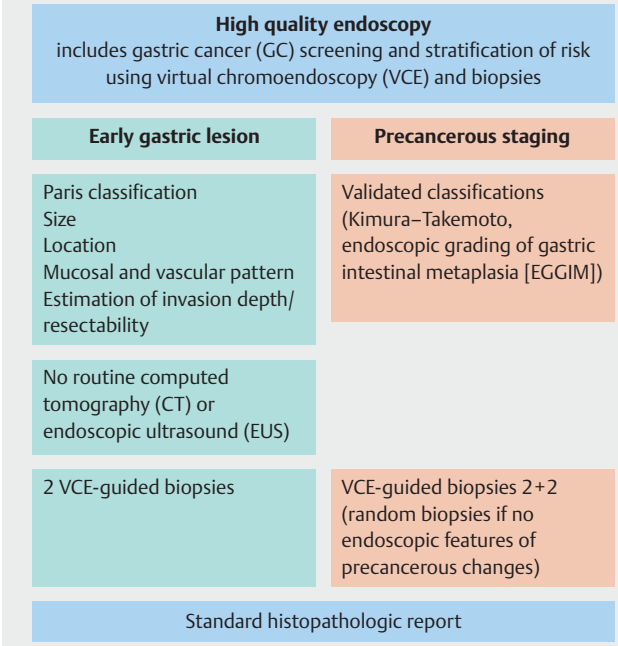
Management of individuals with endoscopically nonvisible dysplasia and those with superficial lesions with dysplasia/cancer

RECOMMENDATION

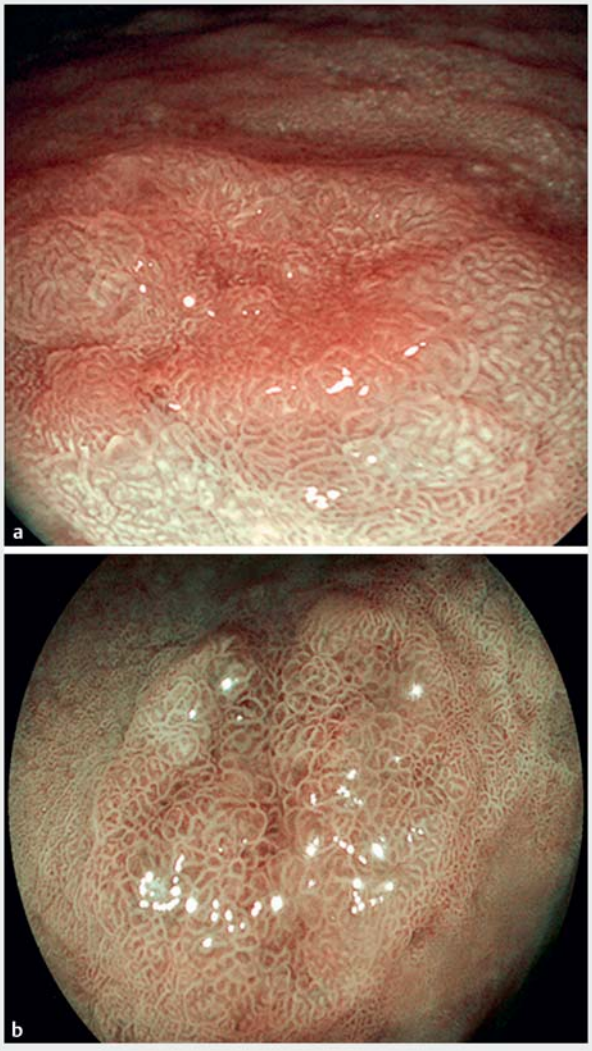
21 ESGE/EHMSG/ESP suggest that patients with dysplasia (or indefinite for dysplasia) but no lesions seen on gastroscopy, are referred for a high quality endoscopy (namely, high definition white-light endoscopy with virtual chromoendoscopy [VCE]), staging of precancerous conditions, and *H. pylori* testing if not previously performed. If endoscopic lesions are again not seen, a follow-up high quality endoscopy is then needed, in 6 months for high grade dysplasia, or 12 months for low grade dysplasia/indefinite for dysplasia. [Modified]

Conditional recommendation/Moderate quality; 100 % agreement.

High quality endoscopy (high definition WLE with VCE or conventional dye-based chromoendoscopy) improves the detection and demarcation of early GC or premalignant lesions in comparison with standard definition WLE [99, 225–227]. Some studies have questioned the added value of VCE compared to high definition WLE [228], but due to its widespread and easy use in the detection of premalignant lesions and early GC, it is preferentially recommended. Conventional chromoendos-



▶ **Fig. 4** General diagnostic approach to gastric cancer and precancerous conditions.



▶ **Fig. 5** Superficial lesions submitted to curative resection: **a** Paris 0-IIa, no ulceration, 8 mm, antrum; en bloc resection with endoscopic submucosal dissection (ESD); low grade dysplasia (LGD), R0. **b** Paris 0-Is, no ulceration,12 mm, incisura; en bloc resection with ESD; well-differentiated, HM0, VM0, Ly neg, R0.

copy improves the detection of precancerous and malignant lesions, and is clinically equivalent to magnifying NBI [229].

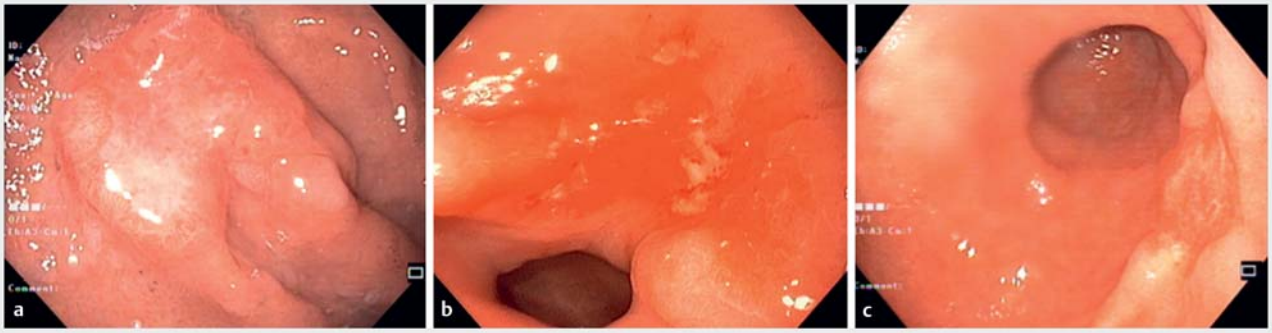
The presence of GC or HGD carries a substantial risk of other synchronous tumors being overlooked, and the risk of development of other early GCs over time with these metachronous lesions emerging only 15 months after the primary lesion [230, 231]. Given these findings, it seems reasonable to conduct a follow-up high quality endoscopy 6 to 12 months after histologically confirmed dysplasia (or indefinite for dysplasia) that does not present with an endoscopically visible lesion.

RECOMMENDATION

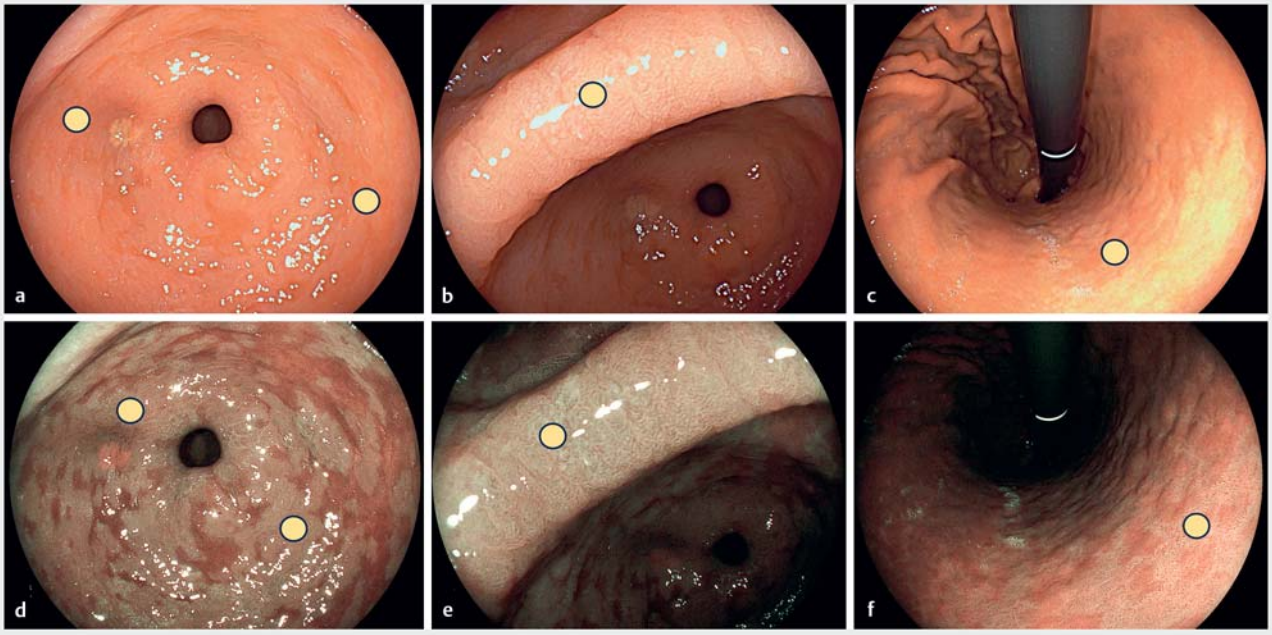
22 ESGE/EHMSG/ESP suggest that patients with a diagnosis of indefinite for dysplasia (confirmed by an expert GI pathologist) and an endoscopic lesion are referred for a high quality endoscopy and, according to endoscopic findings, consideration for guided biopsies or resection. [New]

Conditional recommendation/Low quality; 100 % agreement.

As described above, limited data indicate a relatively high frequency of low grade dysplasia (LGD) (7 %), HGD (5 %), or invasive carcinoma (23 %–29 %) among patients with the diagnosis of indefinite for dysplasia by forceps biopsy [202–204]. Up to 40 % of these patients had a histological upgrade – established through subsequent repeat biopsy, endoscopic resection, or surgical samples – and only 9 % of cases showed recurrent gastric indefinite for dysplasia lesions upon repeat biopsy [204]. Certain risk factors such as surface erythema, nodularity, spontaneous bleeding, lesion size ≥ 10 mm, and depressed morphology are significant predictors of HGD or adenocarcinoma, especially when present in combination [204, 232–234]. In these cases, ER of the lesion can be considered. On the other hand, small tumors and a low sampling ratio are associated with benign pathological findings after endoscopic resection [235]. Diagnostic delays shorter than 1 year were not associated with worse prognoses. Extremely well-differentiated adenocarcinomas accounted for half of the repeated indeterminate cases [203].



▶ **Fig. 6** Superficial lesions sent for surgical treatment because of suspected invasion. **a** Proximal corpus, 0-Is, 20 mm, ulcerated (Ulc +), fold convergences and elevated margins; deep submucosal invasion suspected. Surgery revealed differentiated carcinoma, pT2N + Mo lesion. **b** Distal antrum, 0-IIc-IIa, 23 mm, Ulc + , fold convergences; submucosal invasion suspected. Surgery revealed undifferentiated, pT1b N0 lesion. **c** Antrum, IIc + IIa, 25 mm, fold convergence. Surgery revealed differentiated, pT1b Ly + N0 lesion.



▶ **Fig. 7** Images reflecting absence of significant changes with random biopsies (upper panel) versus significant changes and targeted biopsies (lower panel).

RECOMMENDATION

23 ESGE/EHMSG/ESP suggest that age and comorbidities should be taken into account when selecting patients for endoscopic treatment of an early gastric lesion. [New] Conditional recommendation/Low quality; 96 % agreement.

Gastric ESD has good results in elderly and patients with comorbidities [236–244], but the decision for ER should consider overall survival benefits versus risks, especially in fragile patients with severe comorbidities and multiple risk factors of early mortality or short life expectancy [245–248]. Limited evidence suggests potential survival improvement in very elderly patients with cT1N0 early GC [241], but the impact of conservative management without intervention versus ESD in fragile patients remains unclear. For instance, it is possible that ER may not help to prolong survival in very elderly patients with severe comorbidities such as cardiovascular disease [242]. On the other hand, ER could be a reasonable alternative to surgery for the management of early GC cT1N0 beyond standard indi-

cations for local excision in elderly patients or those with severe comorbidities, or can be considered as definitive treatment with conservative management after noncurative ESD with low and intermediate risk [238, 239, 244, 249–251]. Thus, the indication for ESD should be discussed in a multidisciplinary team taking into account age and comorbidities, especially for fragile patients, and considering assessment of predictors of early and late mortality in high-risk patients; surveillance after ESD should also be discussed.

RECOMMENDATION

24 ESGE/EHMSG/ESP recommend that patients with an endoscopically visible lesion harboring dysplasia (low grade or high grade) or carcinoma should undergo staging and treatment. [Unchanged]

Strong recommendation/Moderate quality; 92 % agreement.

For most superficial lesions when endoscopic features do not predict noncurative resection (see ▶ **Fig. 8**), resection should be proposed. Several studies have shown discrepancies between pretreatment endoscopic biopsies and final diagnosis after resection [252, 253]. A European study demonstrated that histology was upgraded following ESD in 33 % of cases [254]. A meta-analysis conducted by Zhao et al. [255], which included 16 studies and assessed 3033 lesions, also revealed upstaging of gastric LGD occurred in 25.0 % of cases (specifically, LGD to HGD in 16.7 %, and HGD to carcinoma in 6.9 %). Three more recent studies also confirmed the abovementioned findings. A study published in 2021 reported upgrades from LGD to HGD in 17 % and from HGD to carcinoma in 11 %, and a study published in 2023 by Shin et al. reported an overall upgrade rate of 26 % (LGD to HGD in 19 %, and HGD to carcinoma in 7 %) [256, 257]. Another study focusing on 2150 lesions with LGD on biopsies indicated an even higher risk of upgrade to carcinoma (27.4 %) [258]. Thus, biopsy sampling is important to confirm neoplasia but insufficient for staging and correct diagnosis concerning invasion depth, and thus, any endoscopically visible lesion with any neoplastic change should be considered for treatment.

Despite the limitations of biopsies, their results can have prognostic implications. Libânio et al. found that carcinoma in pre-resection biopsies is a significant risk factor for noncurative resection (noncurative resection 29 % vs. 10 %–13 % with dysplasia biopsies, $P<0.01$). This was confirmed as an independent risk factor in multivariable analysis (adjusted OR 3.04) [169].

RECOMMENDATION

25 ESGE/EHMSG/ESP recommend endoscopic submucosal dissection (ESD) as the treatment of choice for most superficial gastric lesions. [Unchanged]

Strong recommendation/Moderate quality; 96 % agreement.

No new evidence.

RECOMMENDATION

26 ESGE/EHMSG/ESP recommend ESD for differentiated gastric lesions clinically staged as dysplastic (low and high grade) or as intramucosal carcinoma (of any size if not ulcerated and ≤ 30 mm if ulcerated), with endoscopic mucosal resection (EMR) being an alternative for Paris 0-IIa lesions with size ≤ 10 mm, with low likelihood of malignancy. [Unchanged]

Strong recommendation/Moderate quality; 96 % agreement.

No new evidence.

RECOMMENDATION

27 ESGE/EHMSG/ESP suggest that a decision about ESD can be considered for malignant lesions clinically staged as having minimal submucosal invasion if differentiated and ≤ 30 mm; or for malignant lesions clinically staged as intramucosal, when undifferentiated and ≤ 20 mm; and in both cases with no ulcerative findings. [Unchanged]

Conditional recommendation/Low quality; 100 % agreement.

ESD is considered safe for expanded indications [259]. Mixed- or undifferentiated-type ECGs with any submucosal invasion have a high risk (36 %) of lymph node metastasis (LNM) [260] and should not be considered for ER. A meta-analysis showed that ESD for undifferentiated early GC is associated with a higher risk of recurrence, but similar adjusted all-cause mortality during follow-up compared to surgery [261].

RECOMMENDATION

28 ESGE/EHMSG/ESP recommends patient management based on the following histological risk after endoscopic resection:

- *Curative/very low-risk resection (LNM risk < 0.5 %–1 %)* En bloc R0 resection; dysplastic/pT1a, differentiated lesion, no lymphovascular invasion, independent of size if no ulceration and ≤ 30 mm if ulcerated. No further staging procedure or treatment is recommended.
- *Curative/low-risk resection (LNM risk < 3 %)* En bloc R0 resection; lesion with no lymphovascular invasion, and:
  a) pT1b, submucosal invasion ≤ 500 µm, differentiated, size ≤ 30 mm; or
  b) pT1a, undifferentiated, size ≤ 20 mm and no ulceration.

Staging should be completed, and further treatment is generally not necessary after a multidisciplinary discussion.

- *Local-risk resection (very low risk of LNM but increased risk of persistence/recurrence)*
  – Piecemeal resection or tumor-positive horizontal margin of a lesion otherwise meeting curative/very low-risk criteria; or
  – Provided there is no submucosally invasive tumor at the resection margin in the case of piecemeal resection or tumor-positive horizontal margin, for otherwise low-risk pT1b lesion (submucosal invasion ≤ 500 µm, well-differentiated, size ≤ 30 mm, and VM0).

Endoscopic surveillance/re-treatment is recommended rather than other additional treatment.

- *High-risk resection* (noncurative): Any lesion with any of the following:
  a) a positive vertical margin (if carcinoma) or lymphovascular invasion or deep submucosal invasion (> 500 µm from the muscularis mucosae);
  b) poorly differentiated lesion if ulceration or size > 20 mm;
  c) in pT1b differentiated lesion with submucosal invasion < 500 µm with size > 30 mm;
  d) or in intramucosal ulcerative lesion with size > 30 mm.

Complete staging and strong consideration for additional treatments (surgery) in multidisciplinary discussion.

[Unchanged]
Strong recommendation/Moderate quality; 100 % agreement.

There are some histological factors that help to predict a minimal risk of LNM. When these criteria are met, the 5-year overall survival of around 90 % and disease-specific survival are similar to surgical outcomes [262]. See also ▶ **Table 3**.

RECOMMENDATION

29 ESGE/EHMSG/ESP suggest a surveillance high quality endoscopy at 3–6 months and then annually after a very low- or low-risk ESD resection or after a local-risk ESD resection without recurrence. Routine use of EUS, MRI, CT, or PET in the follow-up after very low-risk resections is not suggested but could be considered for higher-risk lesions. [Modified]
Conditional recommendation/Low quality; 100 % agreement.

Surveillance after a local-risk ER should include close observation with biopsies from the scar, taken at least at the first follow-up endoscopy, or interventions such as coagulation or ablation, or repeat ESD, which includes resection of the ESD scar and/or coagulation of the scar to prevent recurrence (▶ **Fig. 4**).

In the case of finding a metachronous lesion, the treatment is the same as for any primary gastric lesion. In a recent systematic review ESD showed better outcomes regarding complete resection compared with EMR, and similar outcomes compared with surgery, for metachronous lesions or recurrences [263].

Based on a recent meta-analysis that identified risk factors for metachronous lesions after ER or subtotal gastrectomy [264], the FAMISH score was developed to predict the risk for metachronous lesions after gastric ESD. It identified a low-risk group that could benefit from extended surveillance intervals (contributing to a “greener” surveillance).

RECOMMENDATION

30 ESGE/ EHMSG/ESP recommend that after a high-risk resection, the need for additional treatment is decided in a multidisciplinary team (MDT) discussion taking into account LNM risk, age, comorbidities, and life expectancy. [Modified]
Strong recommendation/Moderate quality; 100 % agreement.

A recent study created a nomogram based on lesion features predicting noncurative resection, externally validated with an AUC of 0.8675 [162]. Other nomograms and AI-based scores exist.

Lymphovascular invasion is a key risk factor for LNM. The eCura system classifies patients based on a scoring system of tumor-related histological risk factors to predict the likelihood of LNM after a high-risk resection, categorizing them into low-, intermediate-, or high-risk groups. Recent evidence shows that surgery is better than observation regarding 5-year overall survival only in the eCura high-risk group, with similar results in the low and intermediate groups, despite a higher recurrence-free survival rate in all groups [265]. The eCura system was validated in the West, with a new W-eCura score proposed, showing improved accuracy in LNM prediction [266]. If surgery is

necessary, a previous noncurative ESD does not negatively impact results [267], and one study suggested that delaying the surgery more than 30 days after the ESD may improve safety without compromising the oncological outcomes [268].

Close surveillance, including endoscopy and CT every 6–12 months, could be considered when surgery is not an option because of age or severe comorbidities, when the surgical risk surpasses the risk of LNM (e. g., eCura low-risk), or based on the patient's choice. In this scenario, patients should be informed of their risk for local or distant recurrence, considering that such recurrences have a poor prognosis with treatment often limited to palliative care.

Overall management algorithms are shown in ▶ **Fig. 8** and ▶ **Fig. 9**.

Surveillance of individuals with precancerous conditions

RECOMMENDATION

31 ESGE/EHMSG/ESP recommend that patients with extensive endoscopic changes (C3 + or EGGIM 5 +) or advanced histological stages of atrophic gastritis (severe CAG or GIM and/or significant changes in both antrum and corpus, OLGA/OLGIM III/IV) should be followed up with high quality endoscopy every 3 years. [Unchanged]
Strong recommendation/Moderate quality; 100 % agreement.

RECOMMENDATION

32 ESGE/EHMSG/ESP recommend opportunistic risk stratification of precancerous conditions in all endoscopies, because endoscopic surveillance every 3 years in patients with high-risk premalignant conditions is cost-effective irrespective of country. [Modified]
Strong recommendation/Moderate quality; 87 % agreement.

Studies published since 2018 have confirmed that patients with significant atrophy and/or IM in both antrum and corpus (OLGA/OLGIM III/IV) are at increased risk of gastric adenocarcinoma [205, 216, 219, 221, 223, 269–271]. A 2– to 3-year surveillance interval may facilitate early detection of dysplasia or early gastric carcinoma in those patients [269, 272]. In the diverse guidelines, surveillance every 3 years is recommended and, as stated above, this strategy is cost-effective in different settings including in low-prevalence countries (e. g. USA). Thus, stratifying of risk among individuals with precancerous conditions must be performed in all gastroscopies.

RECOMMENDATION

33 ESGE/EHMSG/ESP suggest that individuals with endoscopic features of extensive changes (C3 + or EGGIM 5 +) or histologically advanced stages of atrophic gastritis (severe atrophic changes or intestinal metaplasia in both antrum and corpus, OLGA/OLGIM III/IV), and with a first-degree relative with gastric cancer may benefit from a more intensive follow-up (e. g. every 1 to 2 years after diagnosis). [Modified]
Conditional recommendation/Low quality; 100 % agreement.

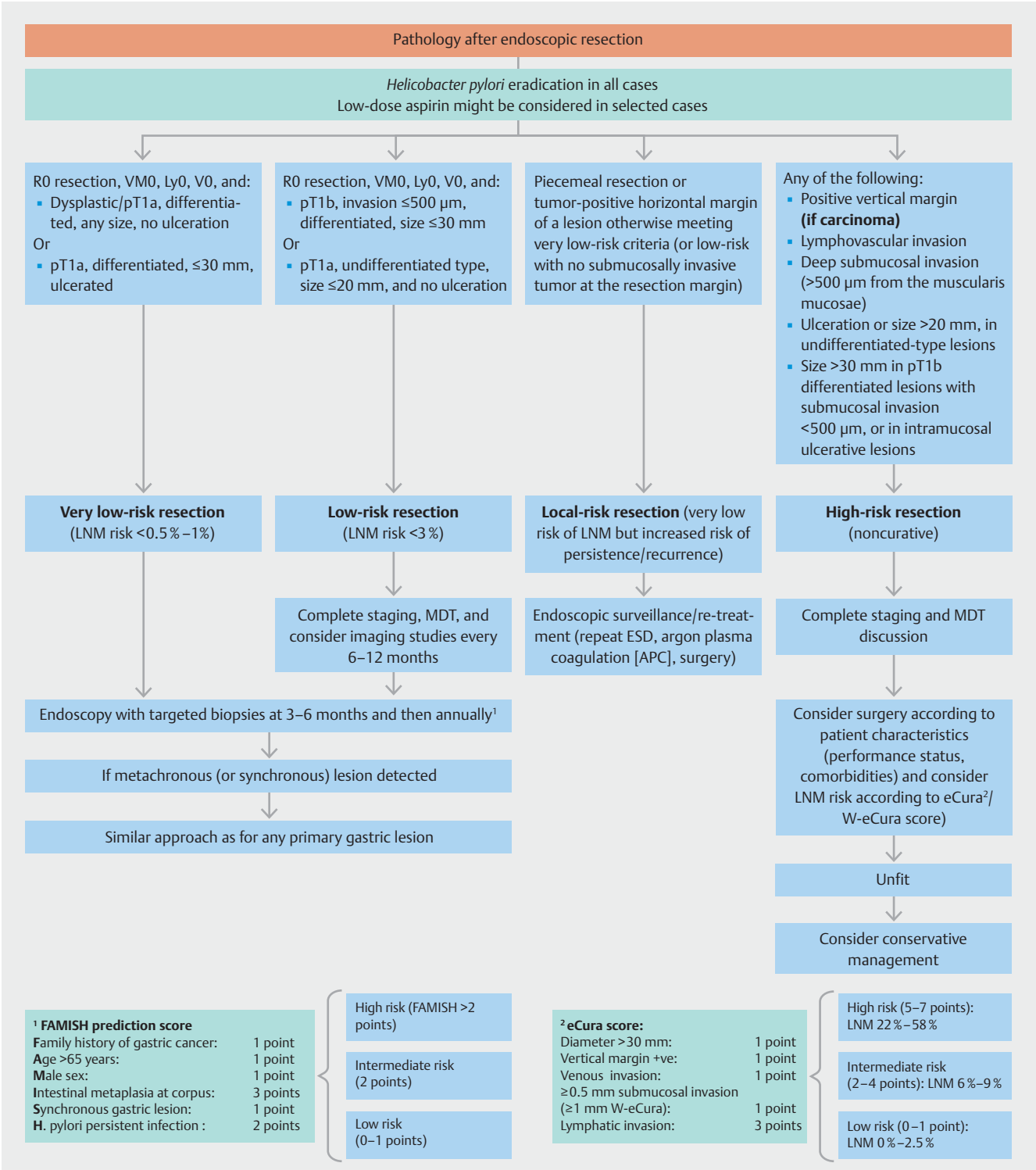
Since 2019, two cross-sectional studies have confirmed that there is a high prevalence of gastric precancerous conditions in first-degree relatives of patients with GC [273, 274]. Two case–control studies have also reinforced family history of GC (first- and/or second-degree relatives) as an independent risk factor for gastric neoplasia development [223, 275]. Considering the new data, there is no reason to change the statement.

RECOMMENDATION

34 ESGE/EHMSG/ESP recommend no surveillance endoscopy in patients with mild to moderate chronic atrophic gastritis (CAG) or gastric intestinal metaplasia (GIM) restricted to the antrum, in the absence of endoscopic signs of extensive lesions or of other risk factors (family history, incomplete intestinal metaplasia, or persistent *H. pylori* infection). This group constitutes most individuals found in clinical practice. [Modified]
Strong recommendation/Moderate quality; 100 % agreement.

There is no evidence in the literature for increased risk of GC in patients with mild to moderate atrophy localized to the gastric antrum. A family history of GC is an independent and significant risk factor for GC, and atrophic gastritis is significantly more prevalent in first-degree relatives than controls [195, 212, 223, 274–277]. Persistent *H. pylori* infection is an independent risk factor for gastric neoplastic lesions [270].

Even though several studies have reaffirmed IM as an important risk factor for dysplasia and gastric adenocarcinoma, the increase in the risk of gastric adenocarcinoma is progressive, being observed with increasing OLGIM stages, with the risk for OLGIM I being negligible [206, 212, 221, 223, 271, 278–287].



▶ **Fig. 9** Algorithm for post-therapy care of gastric lesions considering risk profiles**.** LNM, lymph node metastasis; Ly0, no lymphatic invasion; MDT, multidisciplinary team; VM0, negative vertical margin; V0, no venous invasion.
[1]FAMISH score may be used to individualize surveillance; [2]eCURA may define risk for LNM.

RECOMMENDATION

35 ESGE/EHMSG/ESP suggest that in patients with gastric intestinal metaplasia (GIM) at a single location but with a family history of gastric cancer, or with incomplete intestinal metaplasia, or with persistent *H. pylori* gastritis, high quality endoscopic surveillance every 3 years may be considered. [Unchanged]

Conditional recommendation/Low quality; 96% agreement.

Since 2019, several studies, including two meta-analyses, have shown that incomplete IM is an independent risk factor for gastric adenocarcinoma, even when IM is present at a single location [220, 288, 289]. Additionally, having a family history of GC in first- or second-degree relatives has also been identified as an independent risk factor for gastric adenocarcinoma [223, 275]. Lastly, persistent *H. pylori* infection is a known class I carcinogen for gastric adenocarcinoma and is an independent risk factor for gastritis progression and carcinogenesis.

RECOMMENDATION

36 ESGE/EHMSG/ESP recommend against any tailored surveillance strategy based on genetic status, birthplace, or ethnicity in patients with gastric precancerous conditions. [Unchanged]

Conditional recommendation/Low quality; 96% agreement.

The American Gastroenterological Association's Technical Review on the natural history and outcomes in patients with GIM showed no significant differences in progression according to ethnicity, based on a meta-analysis of 3 studies [290]. Another systematic review and meta-analysis reported no significant differences in the odds ratio for progression to GC of gastric precancerous conditions according to area (East Asia pooled OR 3.99, 95%CI 2.78–5.73; Western countries pooled OR 2.95, 95%CI 1.91–4.57) [291]. A study published in 2020 found no increased risk according to race/ethnicity for progression of gastric precancerous conditions to dysplasia or cancer [292]. Another recent study was not informative because of the absence of progression in the included cohort (because of relative sample size and follow-up duration) [293]. On the other hand, a systematic review and meta-analysis dedicated to the natural course of GIM published in 2019 showed higher GC incidence in patients with IM in studies (n = 21) conducted in Asia (7.58 [95%CI 4.10–11.91] per 1000 person-years) as compared to Europe (n = 25) (1.72 [95%CI 0.36–3.70] per 1000 person-years; $P < 0.029$) but information at individual level was not provided [286]. A retrospective study by Dhingra et al. [272], not included in that meta-analysis, suggested a higher progression rate in patients of Asian ethnicity of 3.07 (95%CI 1.02–9.19). Controversial findings reported in the literature preclude any robust recommendation.

Regarding genetic susceptibility, several studies show divergent trends for progression toward GC in patients with *H. pylori* infection or precancerous conditions [294, 295]. However, no tool is available in routine practice to provide tailored surveillance. This is of course different for specific situations such as hereditary syndromes.

RECOMMENDATION

37 ESGE/EHMSG/ESP suggest that random biopsies are not required during surveillance of cases with advanced OLGA/OLGIM stages at baseline endoscopy once no superficial lesions are observed. [New]

Conditional recommendation/Low quality; 100% agreement.

Previous studies reveal conflicting evidence whether IM can progress or regress over a period of time [296–299], and disease-associated risk may be underestimated in one third of patients classified as low-risk by the index endoscopy [222]. Therefore, endoscopic reassessment with nontargeted biopsies in patients with an initial low-risk stage can help to redefine the surveillance program. Contrarily, in cases of already known advanced stages of precancerous conditions at baseline endoscopy in which no regression is expected, the follow-up could be performed without random biopsies but with a high quality endoscopy including chromoendoscopy to detect visible lesions. In this case, the assessment of the extent of IM could be performed with the EGGIM endoscopic system that has demonstrated a good correlation with the pathological score [300]. Notably, this may be an opportunity to reassess *H. pylori* status. See ▶ **Fig. 10** and ▶ **Fig. 11**.

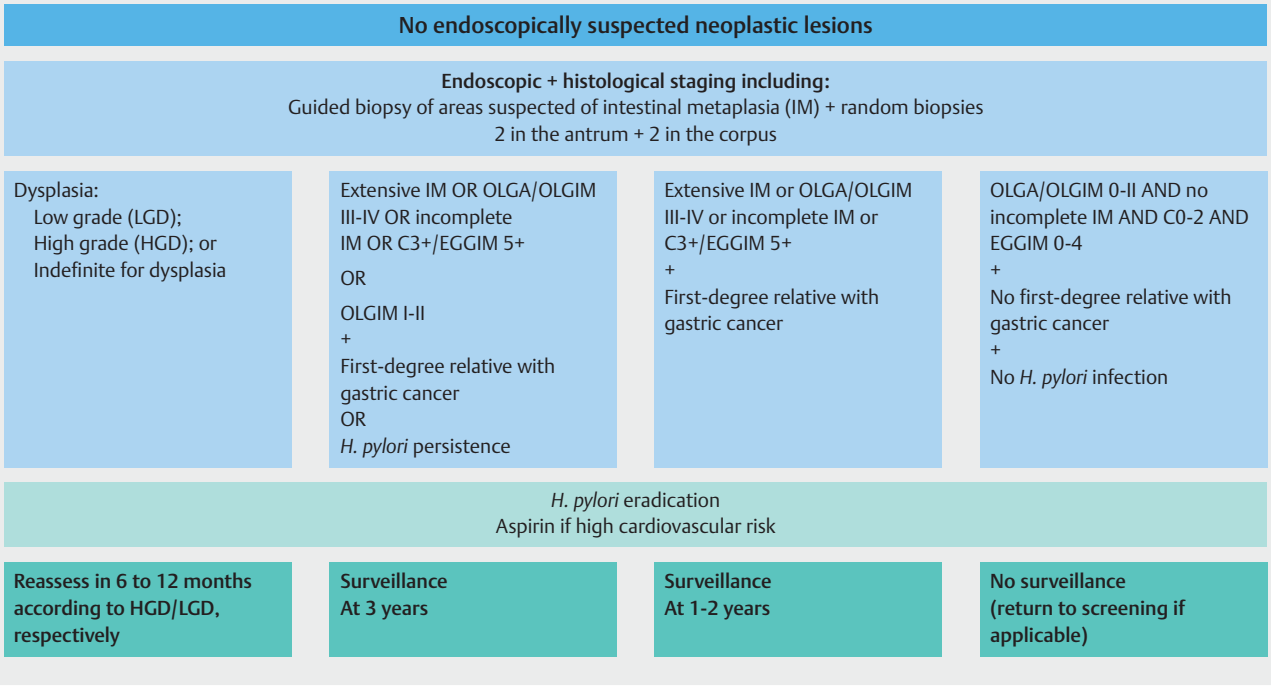
Role of *H. pylori* in patients with precancerous conditions and early gastric neoplasia

RECOMMENDATION

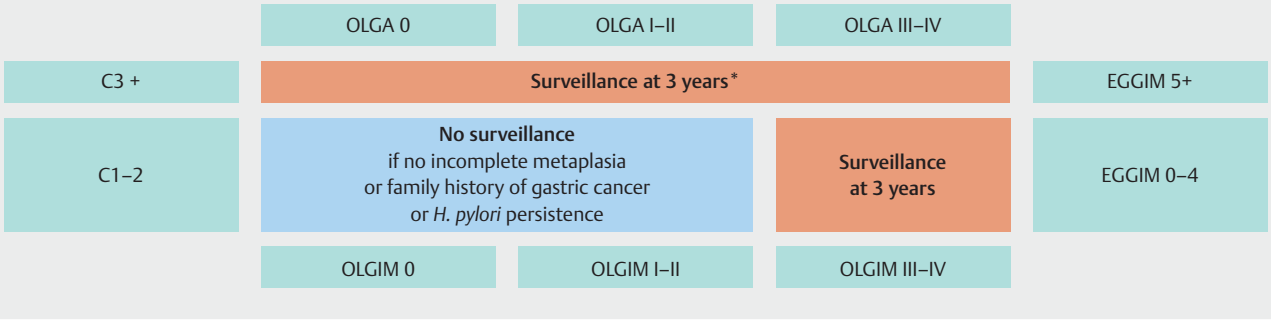
38 ESGE/EHMSG/ESP recommend *H. pylori* eradication in individuals with nonatrophic chronic gastritis and atrophic gastritis, to reduce the risk of gastric cancer. [Modified]

Strong recommendation/High quality; 100% agreement.

The reduction of GC risk after *H. pylori* eradication is more obvious in individuals without baseline premalignant conditions, before the development of CAG or GIM (hazard ratio [HR] 0.37, 95%CI 0.15–0.95) [301, 302], and also in the long term (8–10 years after the treatment) [303]. Even after CAG had been established, a Turkish study including 40 060 patients observed a significant improvement in the grade of CAG in the corpus and antrum after *H. pylori* eradication [304]. Also, a recent meta-analysis (15 studies included) showed that, compared with placebo or no treatment, *H. pylori* eradication improved CAG (RR 1.84, 95%CI 1.30–2.61, $P < 0–01$) [305]. In



▶ **Fig. 10** Management of precancerous conditions (and nonvisible dysplasia or indefined). C3 + , C0–2, Kimura–Takemoto classification; EGGIM, endoscopic grading of gastric intestinal metaplasia; OLGA, operative link on gastritis assessment; OLGIM, operative link on gastric intestinal metaplasia.



▶ **Fig. 11** Comprehensive approach: both endoscopic and histological information must be considered for stratification of risk and allocation of individuals to different surveillance regimes (if no autoimmune gastritis is diagnosed). C3 + , C1–2, Kimura–Takemoto classification; EGGIM, endoscopic grading of gastric intestinal metaplasia; OLGA, operative link on gastritis assessment; OLGIM, operative link on gastric intestinal metaplasia. *Adjust to 1–2 years if first-degree relatives with gastric cancer.

a 20-year follow-up study in a high GC risk Hispanic population, treatment of *H. pylori* led to a significant regression of CAG to nonatrophic gastritis after 6 years [284]. The current evidence supports that *H. pylori* eradication therapy impacts on preventing the progression and improving the severity of preneoplastic conditions, such as chronic gastritis, especially in the earliest phases [306].

RECOMMENDATION

39 ESGE /EHMSG/ESP recommend that *H. pylori* eradication should be considered in patients with established gastric intestinal metaplasia. [Unchanged]

Conditional recommendation/Moderate quality; 100 % agreement.

H. pylori is the major etiological and risk factor for GC development [31,306]. It is largely accepted that *H. pylori* eradication is associated with decreased GC risk and incidence in healthy individuals [307,308]. However, the effects of *H. pylori* eradication on precancerous conditions were not consistently seen previously, emphasizing the concept of "point of no return" in the Correa cascade. One systematic review and one meta-analysis from 2020 found no decreased risk or incidence of GC in patients with precancerous conditions after *H. pylori* treatment [309,310]. Despite these data, *H. pylori* eradication induced improvement and regression in established atrophic gastritis and IM in two meta-analyses [305,310]. However, when the authors explored RCTs conducted outside China, the precancerous regression was not observed [305]. In both meta-analyses the authors only observed this association in RCTs with a follow-up greater than 5 years, suggesting slow reduction of inflammation after elimination of *H. pylori* infection because of the chronic inflammatory effects in gastric mucosa. A prospective study found a significant improvement in atrophy and inflammation after *H. pylori* eradication, highlighting the need for treatment of this infection [311]. These data are in line with the most recent international guidelines, which recommend *H. pylori* eradication in patients with GIM [30,31,312].

To conclude, new evidence was published after MAPS II regarding the impact of *H. pylori* eradication in patients with established precancerous conditions. Although a reduction in GC risk was not seen after *H. pylori* eradication in patients with established GIM, a regression of precancerous conditions was seen in long-term follow-up. It is important to mention that most of the RCTs were conducted in Asian populations, emphasizing the importance of conducting more studies on Western populations to validate these data.

RECOMMENDATION

40 ESGE/EHMSG/ESP recommend *H. pylori* eradication for patients with gastric neoplasia after endoscopic or surgical therapy. [Modified]

Strong recommendation/Moderate quality; 100% agreement.

New evidence strengthens recommendations for *H. pylori* eradication after endoscopic treatment of gastric precancerous or neoplastic lesions or subtotal surgical treatment of malignant lesions with remaining gastric mucosa [313,314].

In a randomized trial, it was shown that risk of metachronous GC was significantly reduced after successful eradication compared to placebo after 5.9 years' follow-up (HR 0.50, 95%CI 0.26–0.94; $P=0.03$) and even an improvement in atrophic changes was observed (in 48.4% vs. 15.0%, $P<0.001$) [303]. Another randomized trial reported comparable data about metachronous GC after endoscopic resection (4.1% vs. 8.2%, $P=0.01$) after 71.6 months' follow-up with an adjusted HR of 2.02 (95%CI 1.14–3.56; $P=0.02$) for the control group without *H. pylori* treatment [315]. The improvement of atrophy was confirmed in another study after 60 months of follow-up, when compared to persistent *H. pylori* infection ($P=0.029$) [316]. A systematic review and meta-analysis combining nine cohort studies with 2755 patients included, concluded a lower effect of *H. pylori* eradication in patients with severe atrophic gastritis and IM (RR 1.18, 95%CI 0.88–1.59, I^2 10%) [317].

RECOMMENDATION

41 ESGE/EHMSG/ESP recommend against testing for microbiota other than *H. pylori* for preventing or treating gastric precancerous conditions. [New]

Strong recommendation/Moderate quality; 100% agreement.

There is increasing evidence that microbiota other than *H. pylori* might play a role in gastric carcinogenesis [318–327]. Changes in the physiological environment along the carcinogenic cascade lead to altered microbial profiles [319,320,323]. Dysbiotic bacterial communities have been identified both in gastric precancerous conditions and even in gastric adenocarcinoma [319,320,323]. Animal studies demonstrated accelerated development of gastric precancerous conditions in germ-free mice infected with *H. pylori* and colonized with intestinal bacteria compared with *H. pylori*-infected mice, suggesting additional effects on gastric carcinogenesis [328,329].

Up to the present, there is no evidence to support the concept of analyzing gastric microbiota with the objective of stratifying individual risk or intervening to reduce the risk for the development of gastric precancerous conditions [330].

Role of non-*H. pylori* interventions in the management of early gastric neoplasia and precancerous conditions

RECOMMENDATION

42 ESGE/EHMSG/ESP recommend smoking cessation in individuals with precancerous conditions or after endoscopic treatment of superficial lesions. [New]

Strong recommendation/Low quality; 100% agreement.

Most data on the impact of lifestyle factors on the risk for metachronous or synchronous GC after ESD for early gastric cancer originate from East Asia. In a multicenter prospective study from Japan including 850 patients, current smoking status remained an independent risk factor for synchronous lesions (within 1 year of treatment) in the multivariate analysis (OR 2.33). In contrast, alcohol intake, salt consumption, as well as diet content of yellow or green vegetables and fruit, and consumption of green tea as protective factor, did not reveal a significant risk effect in univariate analysis [331]. This confirmed the data of an earlier study of the same group, following 439 patients for 53.6 months, which also showed a dose–

response relationship for smokers with >20 pack-years [332]. Similar results were reported for a cohort of elderly patients >75 years of age. Patients who stopped smoking after ESD of early GC have also been shown to have a lower incidence of metachronous lesions [333].

European data on a Portuguese cohort of 230 patients who were followed for a median of 33 months after ESD also found that both current and former smoking status represented an independent risk factor for synchronous lesions [334]. As mentioned above, alcohol intake was not confirmed as an independent risk factor in these studies.

While some studies suggest an impact of smoking on both the development and progression of precancerous conditions of the stomach [335,336], a meta-analysis from 2014 could not confirm this issue [337]. Thus, there are no comprehensive studies that highlight an impact of smoking or dietary factors on the progression of precancerous conditions. Nevertheless it seems reasonable, as an intervention with further impact, to recommend stopping smoking.

RECOMMENDATION

43 ESGE/EHMSG/ESP suggest that patients with an appropriate indication for proton pump inhibitors (PPIs) or histamine (H2) receptor antagonists (H2RAs) should not discontinue the medication. [New]

Conditional recommendation/Low quality; 100% agreement.

An increasing body of literature suggests a positive association of long-term PPI intake and individual GC risk, but results of individual studies remain highly variable and there is no evidence for a causal link. A hypothesis states that the increased gastrin secretion with PPI intake has a trophic effect on the gastric mucosa, also resulting in enterochromaffin-like (ECL) cell hyperplasia and the possibility of type 1 gastric neuroendocrine tumors [338]. Several recent meta-analyses have reported a 1.5– to 2-fold increased risk for individuals on PPI [339–350]. These referred almost universally to noncardia GC. The data on the effect on the incidence of cardia cancer are heterogeneous [339,341]. Most of these publications include data from Western and, in particular, European cohorts, but only a few of the authors include a dedicated analysis of these cohorts. Some of these report a maintained effect, although weaker than for Asian cohorts [342,348], others do not confirm this [343]. Zhang et al. published an overview on the meta-analyses that have been published up to 2022 [351]. All analyses share similar limitations, including significant heterogeneity of the studies as well as a high likelihood of publication bias. There is lack of adjustment for relevant confounding factors which can be seen across most of these studies, including *H. pylori* status, tobacco consumption, family history, and previous treatment or co-medication. Given these limitations, and in view of a lack of evidence for a causal relationship, PPI use should not be restricted for patients with a clear indication for use. Long-term use is feasible in the right clinical context, that is, at low dose for the correct indication.

Several studies on the impact of long-term PPI intake on the incidence of gastric atrophy or IM are suggestive of a positive association, but most meta-analyses fail to confirm a significantly increased risk [338,352–354]. In a meta-analysis by Lv et al., only a subanalysis of four studies with a follow-up of at least 12 months demonstrated a twofold risk increase (RR 2.21, 95%CI 1.47–3.33) [355]. This remained significant only for cases with IM (RR 1.93, 95%CI 1.03–3.63), not for atrophy (RR 1.50, 95%CI 0.91–2.47). The authors note a high likelihood of publication bias and significant study heterogeneity. There remains an unaccounted variation regarding the type of PPI used as well as dose and treatment duration. About half of the studies compare PPI intake with the effect of antireflux surgery which is also likely to have an impact on gastric physiology. Furthermore, most studies are not well controlled for *H. pylori* status which remains a major confounding factor. There are no good quality data suggesting an increased risk of progression of precancerous conditions on PPI [352].

Data on the impact on the recurrence of endoscopically treated cancer or of metachronous lesions are scarce. Oura et al. published data on one cohort of 418 patients with various durations of PPI treatment and could not show an effect (HR 1.04, 95%CI 0.10–1.09) [356]. The results were not adjusted for smoking status, family history of GC, or *H. pylori* eradication status. Randomized controlled trials on this issue are needed.

There is no clear evidence to suggest that long-term intake of H2RA has an effect on individual GC risk. The majority of studies investigate the intake of H2RAs in comparison to PPIs. Only a few studies analyzed the risk of H2RA alone. A detailed meta-analysis on the effect of long-term intake of acid-suppressive medication by Ahn et al. suggests that long-term H2RA intake is also associated with an increased risk for GC (OR 1.39, 95%CI 1.19–1.64) [340]. This is further supported by other analyses that do not confirm the risk attributed to PPI intake, when comparison is made with individuals on H2RA [339,346]. While there are more abundant data on the association of gastric neoplasia with PPI, H2RAs should also be used with caution.

For these patients, with a need for long-term PPI therapy, it may be reasonable to test and treat for *H. pylori*.

RECOMMENDATION

44 ESGE/EHMSG/ESP suggest that low-dose daily aspirin can be considered for prevention of gastric cancer in selected individuals with high risk for cardiovascular events. [Unchanged]

Conditional recommendation/Low quality; 100% agreement.

Since the MAPS II guideline, five new meta-analyses on mostly observational studies have been published exploring the chemopreventive effects of aspirin and other nonsteroidal anti-inflammatory drugs (NSAIDs) against GC [357–361]. The

most recent meta-analysis, including 18 studies, was preceded by a nationwide Korean cohort study with a total of 63 678 participants after large-scale propensity score-matching. A lower risk for GC was reported for regular aspirin users during a median 4.7-year observation period (HR 0.72, 95 %CI 0.60–0.85) [357]. The pooled analysis further corroborated the beneficial effect of aspirin use for at least 365 days in GC protection, although with significant heterogeneity noticed according to study design (HR 0.77, 95 %CI 0.70–0.86, I^2 87 %; and HR 0.73, 95 %CI 0.59–0.90, I^2 61 %; for case–control and cohort studies, respectively) [357]. Furthermore, no difference in effect size was observed between Eastern and Western populations (OR 0.79, 95 %CI 0.70–0.89; and OR 0.73, 95 %CI 0.56–0.95; respectively) [357]. In a meta-analysis by Niikura et al. the daily use of aspirin was associated with the highest preventive benefit against GC (daily, RR 0.65, 95 %CI 0.52–0.83, vs. monthly, RR 0.77, 95 %CI 0.55–1.07, vs. occasionally, RR 1.09, 95 %CI 0.77–1.54), and reduced noncardiac GC incidence was observed (RR 0.74, 95 %CI 0.58–0.94, vs. RR 0.84; 95 %CI 0.54–1.23 for cardiac GC) [361]. Considering that NSAIDs and aspirin have a potential for serious adverse events it is the opinion of the present authors that they cannot be recommended specifically for this purpose. The exception may be low-dose aspirin since it has a better safety profile and its beneficial effects are more generalized, reducing also cardiovascular death risk and the risk of development of other cancers, and therefore it could be considered in selected patients.

Thus far, there is no conclusive evidence confirming a protective effect of long-term use of aspirin against the development of metachronous lesions after endoscopic resection of early gastric cancer. Data on this topic originate mostly from retrospective cohort studies and while the results are suggestive of a trend towards reduced incidence, the difference from the control group was not significant in any of the studies [362, 363].

RECOMMENDATION

45 ESGE/EHMSG/ESP recommend against the use of other specific drugs or supplements (including probiotics) for chemoprevention in any clinical setting outside of clinical studies. [Modified]

Conditional recommendation/Low quality; 96 % agreement.

Statins There is no adequate evidence from RCTs, but observational studies suggest a lower risk for GC in individuals on statin treatment. Several meta-analyses report a risk reduction of 30 %–40 % [364–370]. However, publications that included a distinct analysis of data from Western populations show less of an impact (10 %–20 % risk reduction) compared to Asian cohorts [366–368, 370]. There is a general agreement across these publications that there is broad heterogeneity between studies and a high likelihood of publication bias. There are no good data on the impact of statin intake on the risk for precancerous conditions of the stomach, but one Korean study addressed the risk of metachronous lesions after endoscopic resection of early GC [371]; statin intake resulted in a risk reduction of over 80 % in the multivariate analysis (HR 0.17, 95 % CI 0.13–0.24).

COX-2 inhibitors Meta-analyses have highlighted the role of COX-2 inhibition as an effective approach in GC prevention [372–374]. Nevertheless, more recent studies on this topic remain mostly elusive [375]. A 2013 prospective nonrandomized study on the role of selective COX-2 inhibitor treatment in patients with precancerous gastric conditions demonstrated intestinal metaplasia regression was more frequent in patients on celecoxib after *H. pylori* eradication after 1 year (44.3 % vs. 14.3 %) [376]. Other studies suggest that inhibition of COX may slow progression of gastric precancerous conditions. A double-blind RCT, including 1024 participants who received *H. pylori* eradication treatment or placebo followed by celecoxib or placebo showed that regression of gastric precancerous conditions significantly increased both in the eradication group (59 % vs. 41 % placebo) and in the celecoxib group (53 % vs. 41 % placebo) [377]. However, in this study no statistically significant benefit was observed for celecoxib after *H. pylori* eradication.

Metformin It remains controversial as to whether metformin is associated with a reduced risk of GC in patients with diabetes. Up to the present, four systematic reviews and meta-analyses have looked at this issue. Franciosi et al. analyzed the results of 12 randomized controlled trials and 41 observational studies [378]. While no significant difference was observed in the randomized trials, the evidence from the observational studies shows an overall reduced risk of all-cause and cancer-related mortality (in particular GC) for patients on metformin (OR 0.83, 95 %CI 0.76–0.91). A systematic review by Li et al. does not report a significant difference in GC incidence, but an association of metformin intake with better prognosis [379]. Shuai et al. reviewed 11 nonrandomized studies and concluded that metformin was associated with reduced GC recurrence (HR 0.79, 95 %CI 0.62–1.0], but the effect was particularly evident in Asian populations [380]. The data from a Korean nationwide population-based cohort study did not show a significant association between metformin use and GC development, although the data from a linked meta-analysis confirmed an effect (0.84; 95 %CI 0.73–0.96) [357].

Supplements Vitamin and nutritional supplements are proposed for prevention or improved prognosis of GC [381, 382]. The prospective long-term interventional Linxians trial evaluated multiple interventions including retinol/zinc, riboflavin/niacin, vitamin C/molybdenum, selenium, and vitamin E/beta-carotene compared to placebo [383, 384]. Nutritional intervention for 6 years with more than 20 years of post-intervention follow-up showed no effect on mortality. The Shandong Interventional Trial showed that vitamin but not garlic supplementation (for 7 years) was associated with a reduced incidence of GC within 22 years of long-term follow-up after *H. pylori* treatment [385–388]. The Nutrition Intervention NIH study evaluated several supplements, including iron, zinc, selenium, calcium, folic acid, vitamin A, beta-carotene, vitamin C, and vitamin E [389]. The study provided evidence that multivitamin supplementation was associated with a reduced risk of upper GI

cancers in general, but an increased risk of gastric noncardia cancer (HR 1.59, 95 %CI 1.24–2.05]. According to two systematic reviews and meta-analyses of nonrandomized trials, vitamin D intake is not associated with a reduced incidence of GC [370, 390]. A randomized controlled trial from Japan showed no impact on GC recurrence in patients on vitamin D supplementation [391, 392]. Selenium is not associated with a beneficial effect and a reduction in cancer risk according to a Cochrane review and meta-analysis [393].

Probiotics There are no high quality prospective randomized controlled trials addressing the effect of probiotics on GC incidence, progression of precancerous conditions, or effect on the development of metachronous cancers.

Special settings

Hereditary syndromes with increased risk of GC

RECOMMENDATION

46 ESGE/EHMSG/ESP suggest that in individuals with hereditary syndromes with increased risk of gastric cancer, endoscopic surveillance should follow recommendations for the specific syndrome or according to the gastric mucosal changes, whichever interval is shorter. [New]

Conditional recommendation/Very low quality; 100 % agreement.

Although most GCs are sporadic, approximately 1 %–3 % are related to known cancer susceptibility syndromes and/or genetic causes [394]. Patients with hereditary diffuse GC, gastric adenocarcinoma and proximal polyposis of the stomach, familial intestinal GC, classic and attenuated familial polyposis, MUTYH-associated polyposis, Peutz–Jeghers syndrome, juvenile polyposis syndrome, Lynch syndrome, and Li–Fraumeni syndrome are at increased risk of GC [394]. Detailed gastric surveillance protocols for each of these syndromes are outside the scope of this Guideline. However, some evidence exists for Lynch syndrome [395–397] and limited evidence for FAP patients [398], identifying *H. pylori*, advanced stages of gastritis, and family history of GC as additional risk factors for GC in these groups of individuals. Thus, we do suggest that surveillance intervals be tailored to individual patient characteristics and follow the shortest interval.

Autoimmune gastritis

RECOMMENDATION

47 ESGE/EHMSG/ESP suggest that patients with autoimmune gastritis should have high quality endoscopic follow-up every 3 years to detect gastric cancer and neuroendocrine tumors. [New]

Conditional recommendation/Low quality; 96 % agreement.

Autoimmune gastritis is a chronic condition at risk for the development of neuroendocrine tumors and GC [399]. An advanced stage of autoimmune gastritis, when gastric intrinsic factor and vitamin B12 deficit occur, is represented by pernicious anemia [400], a condition associated with a higher risk of GC. In a case–control study, 5 % of patients with GC presented autoimmune gastritis and pernicious anemia was the leading clinical sign (OR 22.0) [401], whilst in a retrospective study on patients with autoimmune gastritis, 5.9 % of patients presented high grade dysplasia or adenocarcinoma [402]. In another retrospective study, the incidence rate of GC in patients with autoimmune gastritis was 14.2 cases per 1000 person-years [403], and a very recent meta-analysis conducted on 13 studies, showed an incidence rate of GC of 0.14 % per person-year [404].

Regarding endoscopic follow-up, in a longitudinal cohort study on 160 patients (76 % had autoimmune gastritis), 3 GCs were found at a 3-year follow-up and all the patients had autoimmune gastritis and 1 of them presented pernicious anemia [405].

Common variable immunodeficiency

RECOMMENDATION

48 ESGE/EHMSG/ESP suggest that patients with common variable immunodeficiency (CVID) should have a high quality endoscopy at the time of diagnosis and then should be followed up according to staging of precancerous conditions and/or presence of autoimmune gastritis. [New]

Conditional recommendation/Very low quality; 100 % agreement.

GC seems more prevalent [406–410], and develops earlier [407, 411–414] in patients with CVID compared to the general population, but large sample or population-based studies are missing. An association between CVID and autoimmune gastritis/pernicious anemia has been described in several studies [411, 414–417]. Because of the Ig defect, endoscopic screening or breath-test for *H. pylori* and for gastric precancerous conditions including autoimmune gastritis diagnosis should be recommended.

Other situations

Autoimmune diseases Several autoimmune diseases have been studied for the risk of developing GC. In a recent meta-analysis [418], 52 studies were included and 24 different types of autoimmune diseases having at least two studies, were considered. Dermatomyositis showed the highest relative risk (RR 3.69, 95 %CI 1.74–7.79), followed by pernicious anemia (RR 2.84 95 %CI 2.30–3.50), and Addison disease (RR 2.11, 95 %CI 1.26–3.53). Dermatitis herpetiformis, IgG4-related disease, primary biliary cirrhosis, diabetes mellitus type 1, systematic lupus erythematosus, and celiac disease showed RRs between 1.36 and 1.74.

Other autoimmune diseases showed a slight increase in the risk of developing GC.

ESGE does not recommend systematic surveillance in these patients but an upper endoscopy with gastric mapping or non-invasive tests for the presence of *H. pylori* could be useful, in particular for the detection of associated autoimmune gastritis.

Immunosuppressive therapies Regarding the risk of GC in patients receiving immunosuppressive therapies, the scarce data available in the literature do not allow provision of specific recommendations on surveillance in this context [419–422]. Most of the studies are retrospective and concern mainly transplant recipients and their risk of malignancies in general, rather than specifically focusing on GC [423–430].

According to certain studies, patients who received renal transplants had a higher incidence of GC than the overall population. As a result, the authors suggested regular endoscopic surveillance [423,424]. A meta-analysis showed that the incidence of GC (among other types of cancers) is significantly increased in patients with a diagnosis of HIV/AIDS and who underwent transplants, underlining the importance of immunosuppression in the development of malignancies [430]. Nevertheless, the paucity and the weakness of the supporting data do not allow definition of a standardized surveillance program.

Undoubtedly, further studies are needed to better understand the correlation between immunosuppressive therapy and the risk of GC.

Gastric MALT lymphoma (GML) Patients with gastric MALT (mucosa-associated lymphoid tissue) lymphoma present a higher incidence of GC than the general population as reflected by a population-based study (RR 4.32, 95%CI 2.64–6.67) [431], and a nationwide study (6-fold increase as compared with the general population) [432]. In a multicenter retrospective study including 474 patients with primary gastric lymphoma between 2010 and 2020, 24 cases of gastric adenocarcinoma (5.1%) were identified [433]. In a long-term (median 122 months) follow-up study of 120 patients with GML after *H. pylori* eradication, a significantly higher incidence of GC (8.567; 95%CI 3.566–20.582) was observed as compared to the general population [434]. One systematic review of the literature has been reported on synchronous GML and gastric adenocarcinoma [435]. Patients with GML present a higher rate of gastric precancerous conditions (68% [436], 33% [437], 46% [438], and 57.9% [439]) than nonlymphoma patients (22% [219] and 3.2% [219]; historical comparisons).

Gastric precancerous conditions in patients with GML seem to progress more rapidly than in nonlymphoma patients (historical comparisons): with progression to dysplasia/cancer in 13.5% of patients during 5 years [438], progression to more severe intestinal metaplasia in 21.2% of patients during a median 30.5-month follow-up [439,440], and frequent and rapid progression of atrophy and GIM [439,440], as compared to 4%–14% in patients without lymphoma [218,220]. In the presence of residual GML, the risk of GC appears even higher and gastric precancerous conditions may progress even after remission of GML [441]. Moreover, data coming from several fundamental studies indicate several common pathways in gastric carcinogenesis and lymphomagenesis [442,443]. Therefore, ESGE/EHMSG/ESP recommends that after remission patients with gastric MALT lymphoma should be followed up according to the stage of precancerous conditions, and in the absence of precancerous conditions, every 5 years (expert opinion).

Uptake of guideline recommendations

It has been over a decade since the first international guideline on the diagnostic assessment and management of individuals with atrophic gastritis, GIM, and dysplasia of the stomach was published [4]. However, to our knowledge, few studies have explored the extent of adherence to this guideline [444–447].

In the same year that the first MAPS guideline was published, a nationwide survey was conducted by two Italian national gastroenterology societies: the Italian Association of Hospital Gastroenterologists and Digestive Endoscopists and the Italian Society of Digestive Endoscopy. This survey included 24 endoscopy units across Italy and a total of 979 patients with dyspeptic symptoms. The results showed that separate descriptions of antral and corporal biopsies were included in 69% of the pathology reports, while the Sydney system was applied in only one third of the histology reports [446]. In 2018, the Italian Society of Digestive Endoscopy conducted a new survey among its endoscopist members. The results indicated that approximately nine out of ten gastroscopists applied the biopsy protocol according to MAPS guidelines for diagnosing and staging atrophic gastritis and intestinal metaplasia [445].

A retrospective study was conducted on patients diagnosed with GIM or gastric atrophy at three centers in the Netherlands and the UK between 2012 and 2019. The authors analyzed the adequacy of surveillance, following histological diagnosis at the index endoscopy, based on the 2012 ESGE guidelines [447]. According to their results, surveillance was adequately performed in 54.3% of patients.

In a study conducted in the USA, 50 patients with newly diagnosed GIM based on gastric biopsy histopathology performed between 2016 and 2019 were included. The study assessed adherence to GIM management recommendations as defined by the American Gastroenterological Association [312] and ESGE [9], including: (a) ordering *H. pylori* testing after GIM diagnosis; (b) obtaining subsequent gastric mapping biopsies if gastric biopsy location, and thus extent of GIM, was not initially specified; (c) recording the family history of GC in the medical record by the gastroenterologist; and (d) including a recommendation on interval for surveillance endoscopy in the procedure note following GIM diagnosis by biopsy. The results showed that 42.3% of GIM patients had a *H. pylori* test recommended after GIM was detected, 22.0% had antrum and gastric body biopsies separated into labeled specimen jars, 14.0% had gastric mapping biopsies recommended or performed, 2.0% had surveillance endoscopy interval recommended, and 32.0% had documentation of family history of GC in the medical record [444].

From January 2010 to February 2023, at least 15 guidelines or consensus statements addressing the diagnosis and management of GIM have been issued, emphasizing the importance

of GIM as a precancerous condition and the need for a risk-stratified approach to endoscopic surveillance [6]. Future studies are needed that evaluate the uptake of these guidelines in clinical practice.

The "green box"

How might MAPS III strategies improve green sustainability in endoscopy practice?

- ***Appropriate diagnostic and follow-up examinations*** Inappropriate digestive endoscopy results in increased overall carbon footprint (in Europe estimated to be 30 804 CO_2 metric tons). The MAPS III guides clinical practice on indications namely gastric cancer or gastric precancerous conditions and screening and surveillance endoscopy, reducing the number of inappropriate diagnostic examinations as well as inappropriate endoscopic follow-up (e. g. for atrophic gastritis restricted to the antrum without dysplasia and no additional risk factors). Additionally, noninvasive biomarkers (e. g., PG I serum levels or/and PG I/II ratio) may allow screening, potentially avoiding endoscopy.
- ***Application of virtual chromoendoscopy (VCE)*** Application of an endoscopy-led staging system (incorporating the Kimura–Takemoto classification for CAG and EGGIM for intestinal metaplasia) as recommended by the MAPS III Guideline will result in fewer endoscopies, reducing the environmental impact of unnecessary follow-up procedures. Developments in AI with computer-aided characterization may also allow a further gain in optical diagnosis, further limiting the need for histology.
- ***Biopsy sampling and histology*** Biopsy sample processing, including production and transport of chemical reagents, waste, and electricity consumption, accounts for a large proportion of endoscopy-related greenhouse gas emission. MAPS III advocates the use of advanced optical diagnosis via implementation of virtual chromoendoscopy, limiting histological examination only to necessary cases, thus reducing the number of samples and consequently the environmental impact, without affecting diagnostic accuracy even in non-expert hands. Absence of an endoscopic pattern suggestive of severe atrophy/intestinal metaplasia could result in the use of a single vial for biopsy specimens (for *H. pylori* diagnosis) or completely preclude biopsy (when the *H. pylori* status is known), saving 0.29 kg of CO_2e (carbon dioxide equivalent) per sample container avoided.
- ***Energy optimization*** The energy consumption of radiology examinations, for example, MRI and contrast-enhanced CT scanning, makes a significant contribution to overall energy usage of radiology departments. The carbon footprint of MRI (including both in-hospital process energy at 29 kWh per patient and off-hospital energy at about 75 kWh per patient), required not only for electricity consumed during use but also for manufacturing the scanner itself and disposable and reusable products, may reach up to a maximum of 22.4 kg of CO_2e. The MAPS III Guideline does not recommend routine performance of three modalities, contributing to an environmentally friendly aspect.

Research agenda

The first cohort studies on the clinical relevance of atrophic gastritis and gastric intestinal metaplasia date back to the 1960 s. Since then, our understanding of these conditions has markedly progressed. This knowledge was first translated into a clinical guideline in 2012 with the publication of the first MAPS Guideline (MAPS I). That Guideline not only aimed to improve and standardize clinical practice, but also to identify a research agenda to allow further improvement of our management of patients with gastric atrophy and metaplasia. With this MAPS III Guideline, an updated research agenda remains as relevant as before.

Our future research should aim to address the following issues.

We need to improve our understanding of determinants of disease progression and move beyond the current phenotyping of severity and extent of gastric IM. The latter details are helpful in excluding patients at low risk for development of cancer, but are insufficiently selective in identifying patients at high risk.

Further, we also need to align endoscopic protocols, and improve training of endoscopists in the use of these protocols. When doing so, AI-based tools are likely to be helpful. To improve clinical practice, these tools should help to increase selectivity, rather than merely expand clinical demand for endoscopic surveillance. Next, to allow clinicians to understand their performance, we need appropriate, simple, and reproducible quality assurance measures and standards.

Finally, we need to understand the clinical efficacy and cost–effectiveness of therapies that aim to alter the natural course, both of gastric IM and after treatment of early cancer.

▶ **Appendix A** Components to be included in endoscopic report

Report	Required data
Endoscopy (pre-endoscopic submucosal dissection [ESD])	▪ Paris classification ▪ Ulceration (Y/N) ▪ Size (mm) ▪ Inclusion of images is mandatory, preferably within the endoscopic report; they should be clear and well-labeled
Endoscopy (ESD)	▪ Exact location ▪ Paris classification ▪ Ulceration (Y/N) ▪ Size (mm) ▪ En bloc versus piecemeal ▪ Inclusion of images is mandatory, preferably within the endoscopic report
Report	Required data
Stage of precancerous conditions	▪ Refer to the system used (eg. Kimura–Takemoto [KT], or endoscopic grading of gastric intestinal metaplasia [EGGIM]) ▪ Inclusion of images is mandatory

▶ **Appendix B** Components to be included in histology report

Pathology of endoscopic submucosal dissection (ESD) specimens	▪ Most severe histology observed and differentiation ▪ Size [mm] ▪ Horizontal margin – negative, HM0 (preferably >1 mm) – positive for carcinoma, HM1c, or dysplasia, HM1dh (for high grade dysplasia), HM1 dl (for low grade dysplasia) ▪ Vertical margin – negative, VM0 (preferably > 1 mm) – positive, VM1; only applicable for carcinoma ▪ Maximum depth of invasion sm (taken from the lowest fibre of the muscularis mucosae) ▪ Lymphatic and/or venous infiltration (L0, L1; V0, V1) ▪ R0 if en bloc, and horizontal and vertical margins negative ▪ RX (nonassessable), if en bloc or piecemeal, and horizontal margin positive (HM1) and vertical margin negative (VM0) ▪ R1 if vertical margin positive (VM1)
Pathology of precancerous conditions	▪ Chronic gastritis (Y/N; severity) ▪ Activity (Y/N; severity) ▪ Glandular atrophy (none, mild, moderate, severe) ▪ Intestinal metaplasia (none, mild, moderate, severe; ideally complete vs. incomplete) ▪ Dysplasia (no; low grade; high grade) ▪ *H. pylori* (Y/N; method of detecion (Giemsa, immunohistochemical [IHC]) ▪ Pathological diagnosis

Disclaimer

The legal disclaimer for ESGE guidelines [448] applies to this Guideline.

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Competing interests

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