Training in basic gastrointestinal endoscopic procedures: a European Society of Gastrointestinal Endoscopy (ESGE) and European Society of Gastroenterology and Endoscopy Nurses and Associates (ESGENA) Position Statement

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MAIN STATEMENTS

This ESGE Position Statement provides structured and evidence-based guidance on the essential requirements and processes involved in training in basic gastrointestinal (GI) endoscopic procedures. The document outlines definitions; competencies required, and means to their assessment and maintenance; the structure and requirements of training programs; patient safety and medicolegal issues.

1 ESGE and ESGENA define basic endoscopic procedures as those procedures that are commonly indicated, generally accessible, and expected to be mastered (technically and cognitively) by the end of any core training program in gastrointestinal endoscopy.

2 ESGE and ESGENA consider the following as basic endoscopic procedures: diagnostic upper and lower GI endoscopy, as well as a limited range of interventions such as: tissue acquisition via cold biopsy forceps, polypectomy for lesions ≤10 mm, hemostasis techniques, enteral feeding tube placement, foreign body retrieval, dilation of simple esophageal strictures, and India ink tattooing of lesion location.

3 ESGE and ESGENA recommend that training in GI endoscopy should be subject to stringent formal requirements that ensure all ESGE key performance indicators (KPIs) are met.

4 Training in basic endoscopic procedures is a complex process and includes the development and acquisition of cognitive, technical/motor, and integrative skills. Therefore, ESGE and ESGENA recommend the use of validated tools to track the development of skills and assess competence.

5 ESGE and ESGENA recommend incorporating a multimodal approach to evaluating competence in basic GI endoscopic procedures, including procedural thresholds and the measurement and documentation of established ESGE KPIs.

7 ESGE and ESGENA recommend the continuous monitoring of ESGE KPIs during GI endoscopy training to ensure the trainee's maintenance of competence.

9 ESGE and ESGENA recommend that GI endoscopy training units fulfil the ESGE KPIs for endoscopy units and, furthermore, be capable of providing the dedicated personnel, infrastructure, and sufficient case volume required for successful training within a structured training program.

10 ESGE and ESGENA recommend that trainers in basic GI endoscopic procedures should be endoscopists with formal educational training in the teaching of endoscopy, which allows them to successfully and safely teach trainees.

SCOPE AND PURPOSE

This manuscript represents the outcome of a formal Delphi process resulting in an official Position Statement of the ESGE and ESGENA. It provides an evidence-based framework to develop and maintain skills in basic endoscopic procedures. These statements relate to definitions, competence, and the structure of training.

Introduction

Endoscopy is a mainstay of diagnosis and treatment of gastrointestinal pathology, and the provision of high quality endoscopic procedures is essential to improving clinical outcomes and patient experience. The European Society of Gastrointestinal Endoscopy (ESGE) and the European Society of Gastroenterology and Endoscopy Nurses (ESGENA) are dedicated to the development of evidence-based guidance aimed at increasing quality and improving outcomes of both diagnostic and therapeutic procedures [1,2].

At the foundation of any such effort is the need to provide high quality education to endoscopists in training. During training, endoscopists need to increase their theoretical knowledge, use distributive attention, gain control over new tools, enhance their ability to recognize, differentiate, and describe normal versus pathologic findings, make timely decisions, communicate, collaborate, and develop leadership within a team. Moreover, they must integrate all these aspects beyond the technical procedure into a patient-centered management plan. Unfortunately, in most gastrointestinal (GI) endoscopy training programs there is no standardized approach to achieve these aims during basic endoscopy training, and most training programs rely on a quantitative procedure-caseload approach. Moreover, training programs in basic GI endoscopy vary in their length, opportunities, and procedures taught [3,4].

Despite the proliferation of society-sanctioned documents (such as guidelines, curricula, technical reviews, and position statements), there is little guidance on basic GI endoscopy

ABBREVIATIONS

ADR	adenoma detection rate
AE	adverse event
AI	artificial intelligence
ASGE	American Society for Gastrointestinal Endoscopy
CRC	colorectal cancer
DOPS	Direct Observation of Procedural Skills
EGD	esophagogastroduodenoscopy
ESGE	European Society of Gastrointestinal Endoscopy
ESGENA	European Society of Gastroenterology and Endoscopy Nurses
GI	gastrointestinal
JAG	Joint Advisory Group in Gastrointestinal Endoscopy
KPI	key performance indicator
PEG	percutaneous endoscopic gastrostomy
PICO	population/problem, intervention, comparison, and outcome
SBT	simulation-based training

training. However, before advancing to complex techniques or tackling advanced endoscopic procedures, every endoscopist must acquire a comprehensive set of basic technical and non-technical skills. This is the foundation for all future development and its importance cannot be overstated. While not every endoscopist will perform advanced endoscopic techniques in their practice, all endoscopists need to attain the same basic set of skills that should be thoroughly honed and correctly utilized. Therefore, to ascertain and understand the differences in practice and unmet needs among GI endoscopy training programs, the ESGE conducted a survey of ESGE member societies and individual young endoscopists to be used as a starting point for this Position Statement. The respondents reported that the main gaps in training were lack of mentorship (20 %), no structured national training program (15 %), and limited access to training for more advanced procedures (15 %).

The aim of this Position Statement is to provide structured, evidence-based guidance on the essential factors and processes involved in training in basic GI endoscopy. Ideally, it will serve trainers, trainees, governing bodies of professional gastroenterology/endoscopy societies, and other stakeholders in making decisions regarding their current and future approach to training in basic GI endoscopy.

Methods

This document was developed in accordance with the current ESGE Publications Policy [5]. We opted for a Position Statement to address the strategic issue of training in basic endoscopic procedures owing to an anticipated lack of evidence and the diversity of national and local healthcare policies. Because of its nature, this Position Statement does not consider various national legislative and practical issues involved in designing GI endoscopy training programs and does not attempt to offer a legal standard. To keep the size of this document manageable, we limited the discussion to the main structural issues and therefore urge readers to consult the referenced literature for more detailed guidance.

In 2021, the project leaders (G.A. and A.V.) made the initial proposal for this Position Statement, which was subsequently approved by the ESGE governing board. It consisted of two activities: an initial survey of the current state of basic endoscopy training in ESGE member societies, and the drafting of the Position Statement itself. In November 2021, surveys were sent out to representatives of ESGE member societies and to individual ESGE members under 40 years of age to gain perspective on current policies, areas of uncertainty, and possible unmet needs in basic GI endoscopy training. At that time the ESGE included 50 national member societies representing Europe, North Africa, and the Middle East. A discussion of the survey results is included in **Appendix 1 s**, see online-only Supplementary material.

A preliminary list of questions and topics was shared with the 19 panelists of this Position Statement. The panelists were divided into three task forces, and an initial online meeting was held in February 2022. At this point minor changes to the structure and question formulation were made. It was acknowledged that, while desirable, high level evidence-based data would not be available or even possible for some aspects of the discussion. In all instances, where it was applicable, we used a structured template to standardize the literature search and the panelists conducted a systematic literature search using the PICO (population/problem, intervention, comparison, and outcome) format. When a PICO question was not considered feasible, we used an expert review of the available literature to inform the Position Statement. Each task force reviewed the available literature and drafted an initial manuscript with a proposed list of statements, which was circulated among all the panelists.

The consensus for the proposed statements was assessed through an anonymous and iterative online Delphi process. A maximum of three sequential voting rounds to reach consensus was set beforehand. All statements were graded using a five-point Likert scale (1, strongly disagree; 2, disagree; 3, neither agree nor disagree; 4, agree; 5, strongly agree). Consensus was considered to have been reached when there was at least 80 % agreement (the sum of agree and strongly agree) on each statement. Changes were made to the statements after each round of voting in consideration of the comments and discussions of the previous draft. Statements were deleted or reformulated by the project leaders for the subsequent voting round if the agreement was < 80 %. Where there was a repeated lack of consensus for a reformulated question, the choice was made to exclude the statement from the final draft and report the lack of consensus. The results of each voting round are detailed in **Table 1 s**.

After three voting rounds, the final statements (▶ **Table 1**) and manuscript were discussed and approved during an online meeting. This draft was then sent for external peer review, modifications, and final approval by the ESGE governing board, and then to all ESGE individual members for comments.

▶ **Table 1** The final statements agreed after three rounds of voting.

	Statement
1	ESGE and ESGENA define basic endoscopic procedures as those procedures that are commonly indicated, generally accessible, and expected to be mastered (technically and cognitively) by the end of any core training program in gastrointestinal (GI) endoscopy
2	ESGE and ESGENA consider the following as basic endoscopic procedures: diagnostic upper and lower GI endoscopy, as well as a limited range of interventions such as: tissue acquisition via cold biopsy forceps, polypectomy for lesions ≤ 10 mm, hemostasis techniques, enteral feeding tube placement, foreign body retrieval, dilation of simple esophageal strictures, and India ink tattooing of lesion location
3	ESGE and ESGENA recommend that training in GI endoscopy should be subject to stringent formal requirements that ensure all ESGE key performance indicators (KPIs) are met
4	Training in basic endoscopic procedures is a complex process and includes the development and acquisition of cognitive, technical/motor, and integrative skills. Therefore, ESGE and ESGENA recommend the use of validated tools to track the development of skills and assess competence
5	ESGE and ESGENA recommend incorporating a multimodal approach to evaluating competence in basic GI endoscopic procedures, including procedural thresholds and the measurement and documentation of established ESGE KPIs
6	ESGE and ESGENA recommend that competence in basic GI endoscopic procedures should be assessed during training by dedicated endoscopy trainers
7	ESGE and ESGENA recommend the continuous monitoring of ESGE KPIs during GI endoscopy training to ensure the trainee's maintenance of competence
8	Training programs should offer stepwise exposure to skill acquisition, practice in those techniques, and periodic assessment of relevant skills by formal trainers in GI endoscopy within a structured and goal-oriented program
9	ESGE and ESGENA recommend that GI endoscopy training units fulfill the ESGE KPIs for endoscopy units and, furthermore, be capable of providing the dedicated personnel, infrastructure, and sufficient case volume required for successful training within a structured training program
10	ESGE and ESGENA recommend that trainers in basic GI endoscopic procedures should be endoscopists with formal educational training in the teaching of endoscopy, which allows them to successfully and safely teach trainees
11	ESGE and ESGENA recommend that GI endoscopy nurses be actively involved in fully developing the skillset of a trainee by contributing to instruction in basic equipment handling, reprocessing protocols, and patient monitoring
12	ESGE and ESGENA suggest the inclusion of simulation-based training using validated GI endoscopy simulators in the early phase of training in basic endoscopic procedures
13	ESGE and ESGENA recommend that continuous medical education through various on-site and individual learning activities be supported during training
14	ESGE and ESGENA recommend that trainers use their best clinical judgement to match the case to the trainee, appropriately supervise, and intervene as needed in order to ensure high quality examinations and avoid unnecessary prolongation of procedures or potential adverse events
15	ESGE and ESGENA recommend that GI endoscopy trainers, trainees, and training institutions have specific professional liability cover according to their respective national legislation. In procedures involving trainees, the trainer carries the overall responsibility and should act prudently and in accordance with community standards of care in the best interest of the patient
16	ESGE and ESGENA recommend that physicians involved in GI endoscopy training who are confronted with medicolegal issues follow institutional guidance on risk management, disclosure, and communication with the patient and their family members to mitigate potential litigation

1 Definitions

1.1 Definition of basic endoscopic procedures

STATEMENTS

1 ESGE and ESGENA define basic endoscopic procedures as those procedures that are commonly indicated, generally accessible, and expected to be mastered (technically and cognitively) by the end of any core training program in GI endoscopy.

2 ESGE and ESGENA consider the following as basic endoscopic procedures: diagnostic upper and lower GI endoscopy, as well as a limited range of interventions such as: tissue acquisition via cold biopsy forceps, polypectomy for lesions <10 mm, hemostasis techniques, enteral feeding tube placement, foreign body retrieval, dilation of simple esophageal strictures, and India ink tattooing of lesion location.

There have been attempts made at ranking the complexity of endoscopic procedures [6], but there remains no formal definition of what constitutes a "basic endoscopic procedure." A general understanding of the term implies an accessible, standardized GI endoscopic procedure that can be provided competently and routinely by any fully trained endoscopist. In contrast, advanced endoscopic procedures are technically more demanding, less commonly available (or restricted to specialist referral centers), more resource intensive, and presuppose prolonged specialist training and dedicated credentialing [7].

Most current training curricula [8–13] agree on the following as basic GI endoscopic procedures: esophagogastroduodenoscopy (EGD), rectoscopy, sigmoidoscopy, colonoscopy, tissue acquisition via cold biopsy forceps, hemostasis techniques, enteral feeding tube placement, foreign body retrieval, dilation of simple (short [< 2 cm] and straight) esophageal strictures, endoscopic removal of polyps of ≤ 10 mm, and endoscopic marking (India ink tattoo) of lesions requiring more advanced additional management (▶ **Table 2**). Some curricula also include video capsule endoscopy within this list, but this is not yet universally available in all endoscopy services. There is an expectation that basic GI endoscopic procedures should be mastered by the end of a regular endoscopy training fellowship to deliver independent endoscopists capable of managing most routine indications for GI endoscopy.

There is some variability in defining some of these procedures as part of essential core training in all programs owing to variation in epidemiology, resources, and national or institutional policies. For example, procedures such as rectoscopy/proctoscopy are more likely to be performed by surgeons, while opportunities for exposure to foreign body retrieval may be limited in teaching units without emergency medicine departments. On the other hand, certain trainees may be allowed to engage in more advanced GI endoscopic procedures toward the end of their basic training (e. g. advanced endoscopic mucosal resection, dilation of complex esophageal stenosis, etc.). Furthermore, because advanced endoscopic imaging (i. e. virtual chromoendoscopy) has become widespread and is routinely used in training, it is important to include exposure to optical diagnosis in basic training, while acknowledging that it remains a skill requiring further specialized training [14].

▶ **Table 2** List of basic gastrointestinal (GI) endoscopic procedures.

Procedure*
Diagnostic upper GI endoscopy
▪ Esophagogastroduodenoscopy
Diagnostic lower GI endoscopy
▪ Rectoscopy
▪ Sigmoidoscopy
▪ Colonoscopy
Cold forceps-assisted biopsy
Polypectomy for polyps of ≤ 10 mm
Enteral feeding tube placement
▪ Percutaneous endoscopic gastrostomy (PEG)
▪ Percutaneous endoscopic gastrojejunostomy (PEG-J)
Hemostasis
▪ Injectables: adrenaline injection, sclerotherapy, thrombin injection
▪ Mechanical: rubber band ligation, through-the-scope clip, cap-mounted clip (if locally available), endoloop
▪ Thermal: contact (bipolar or heater probe), noncontact (argon plasma coagulation)
▪ Topical agents: powders and gels
Foreign body retrieval
Endoscopic dilation of simple esophageal strictures
Tattooing of lesion location

* Photodocumentation of anatomic landmarks and suspected pathologic lesions and standardized endoscopic reporting are considered part of the GI endoscopic procedure.

1.2 Access to training

STATEMENT

3 ESGE and ESGENA recommend that training in GI endoscopy should be subject to stringent formal requirements that ensure all ESGE key performance indicators (KPIs) are met.

Traditionally across the globe, basic GI endoscopic procedures have been performed by physicians belonging to gastroenterology/hepatology or surgical specialties. Some healthcare systems also allow other physicians (i. e. general practitioners and internal medicine specialists) or nonphysicians (i. e. nurses, nurse practitioners, and physician assistants) to perform certain basic GI endoscopic procedures, either independently or under limited supervision from an attending physician [15–17].

The lack of personnel and significant increase in the number of patients requiring endoscopic examinations, particularly flexible sigmoidoscopy or colonoscopy in the setting of colorectal cancer (CRC) screening programs, are the main drivers for training nonphysicians to perform these basic procedures [18]. Meanwhile, unmet needs in the era of open-access endoscopy, individual motivation, and financial incentives may move physicians outside of gastroenterology/hepatology or general surgery to pursue training in basic endoscopic procedures.

There are some advantages to employing nonphysician endoscopy providers in certain situations, so it is essential to ensure that the same standard of high quality for the procedures is maintained. Despite several studies reporting adequate performance of both upper and lower GI diagnostic procedures by nurses [19–21], a large systematic review of 17 476 documented nonphysician endoscopies [22] showed that data on the efficacy and safety of endoscopies performed by non-

physicians is conflicting and prone to a significant risk of bias. Furthermore, a recent large systematic review and meta-analysis of more than 3.5 million colonoscopies [16] reported significant differences in the quality of colonoscopy across various medical specialties and concluded that gastroenterologists significantly outperform surgeons and other medical specialists in key quality metrics such as adenoma detection rate (ADR), cecal intubation rate, and post-colonoscopy interval CRC rate. These findings are consistent with the pre-existing literature [23, 24], which also signaled that the quality and safety of basic endoscopic procedures vary significantly across different medical specialties. Consequently, expert opinions [25, 26] and professional society guidance [18] advise caution in relation to nonphysicians performing endoscopic procedures.

When deciding which healthcare workers should be trained to perform basic endoscopic procedures, a wide range of medical, legal, economic, and cultural aspects should be considered, including societal need, patient safety and optimal outcome, workforce availability, and equity of access to a high standard of healthcare, as well as liability should adverse events (AEs) occur.

2 Competence

2.1 Skillset

STATEMENT

4 Training in basic endoscopic procedures is a complex process and includes the development and acquisition of cognitive, technical/motor, and integrative skills. Therefore, ESGE and ESGENA recommend the use of validated tools to track the development of skills and assess competence.

Competence in basic GI endoscopic procedures can be defined as the attainment of an adequate level of skill that enables the endoscopist to provide efficient and safe procedures according to professional standards. The skillset needed for a trainee to successfully and safely perform basic GI endoscopic procedures can be categorized broadly as cognitive, motor, and integrative (▶ **Fig. 1**) [8, 27]. Achieving competence in a timely fashion is the aim of any training program in basic endoscopy and the basis for credentialing.

Before starting hands-on training, it is mandatory to acquire basic knowledge regarding endoscopic anatomy, the function and technical characteristics of the endoscope, the indications and contraindications for procedures, and the relevant key performance indicators (KPIs) [2, 28–31]. Knowledge regarding preprocedural management, such as bowel preparation, the assessment of relevant patient history, obtaining informed consent, and anticoagulation management, and the management of immediate AEs are all part of the essential cognitive skills novices must acquire early in their training.

In recent years, the focus on assessing a trainee in GI endoscopy has clearly shifted from rigid numerical procedure thresholds toward a competency-based educational model [32–35]. This shift originated from the observation that trainees' learning curves varied significantly in clinical practice after completion of a GI fellowship [36, 37]. The definition of competency has also evolved beyond motor and cognitive skills, by including a set of "integrative" skills, such as appropriate patient communication, leadership, and professionalism. The mainstay of competency-based education is skill assessment, centered within a defined framework of various competencies. These can be assessed through evidence-based assessment tools and direct observation in the workplace from the beginning of training [38, 39]. The Direct Observation of Procedural Skills (DOPS) has been shown to provide this kind of multidimensional evaluation and various other tools provide objective and comprehensive formative assessment across the different domains of GI endoscopic competence [37, 40–48] (see **Appendix 2s**).

In addition, "learning curve monitoring" in the form of a logbook allows trainees to report performance data on specific endoscopic procedures. The endoscopy trainer should evaluate the logbook and the trainee's progress at predetermined time intervals [9]. For instance, the Joint Advisory Group in Gastrointestinal Endoscopy (JAG), has proposed an e-logbook covering:

- self-assessment of performed procedures based on selected parameters (KPI, DOPS)
- trainee's assessment of the trainer(s)
- anonymized feedback from trainers
- creation of a personal development plan for each trainee [49].

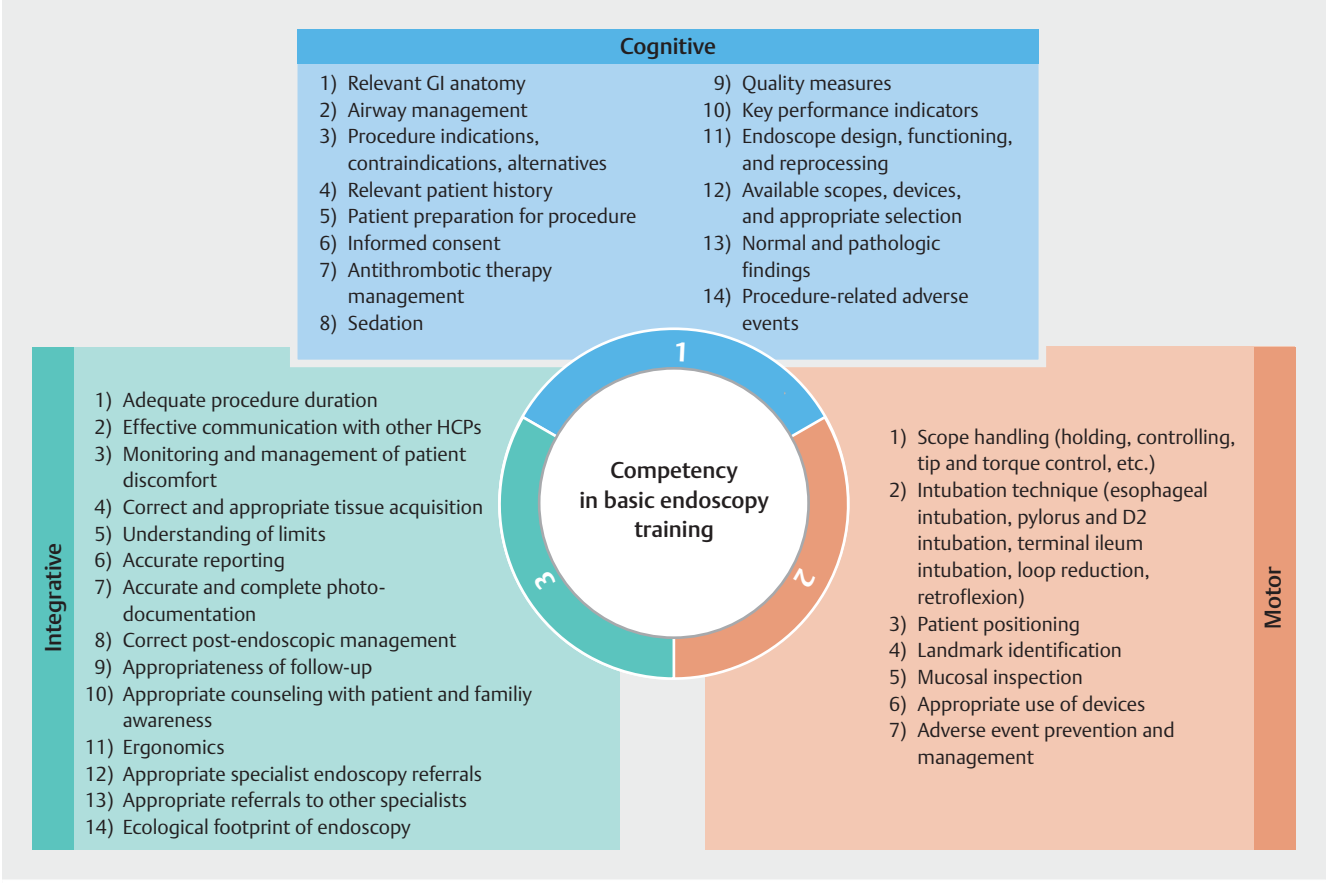
In a national survey in the UK, this e-portfolio was found to be a highly valuable tool in assessing trainee progress in GI endoscopy training [50] and it could represent a good model for more widespread use in endoscopy learning programs.

2.2 Competence assessment

STATEMENT

5 ESGE and ESGENA recommend incorporating a multimodal approach to evaluating competence in basic GI endoscopic procedures, including procedural thresholds and the measurement and documentation of established KPIs.

Traditionally, appraisal of competence in basic GI endoscopic procedures relied on reaching a minimum number of procedures that was thought to reflect adequate hands-on exposure [9]. KPIs in endoscopy have been strongly associated with increased procedural quality and patient experience [51, 52]. Furthermore, through the Quality Improvement Initiative, the ESGE has made available several documents aimed at providing reliable performance measures that can be readily employed in the training framework and improve the overall quality of endoscopic procedures and services [2, 28–31, 53]. Therefore, it seems only reasonable to incorporate these same indicators during endoscopy training evaluation, as they may offer a



▶ **Fig. 1** The essential skills required to achieve competency in basic gastrointestinal (GI) endoscopy.
HCP, healthcare professional; D2, second part of duodenum.

more comprehensive assessment of endoscopic competence. For certain procedures, established KPIs (▶ **Fig. 2**) have been correlated to procedural caseload and competence levels [10, 27, 39, 54–73]. The inclusion of KPI measurement during training appears to describe more accurately and completely the level of competence achieved.

Below we present an overview of the current evidence regarding competence thresholds for each basic GI endoscopic procedure. A detailed overview of studies investigating the associations between KPIs and competence/training is available in **Appendix 2 s**.

2.2.1 EGD

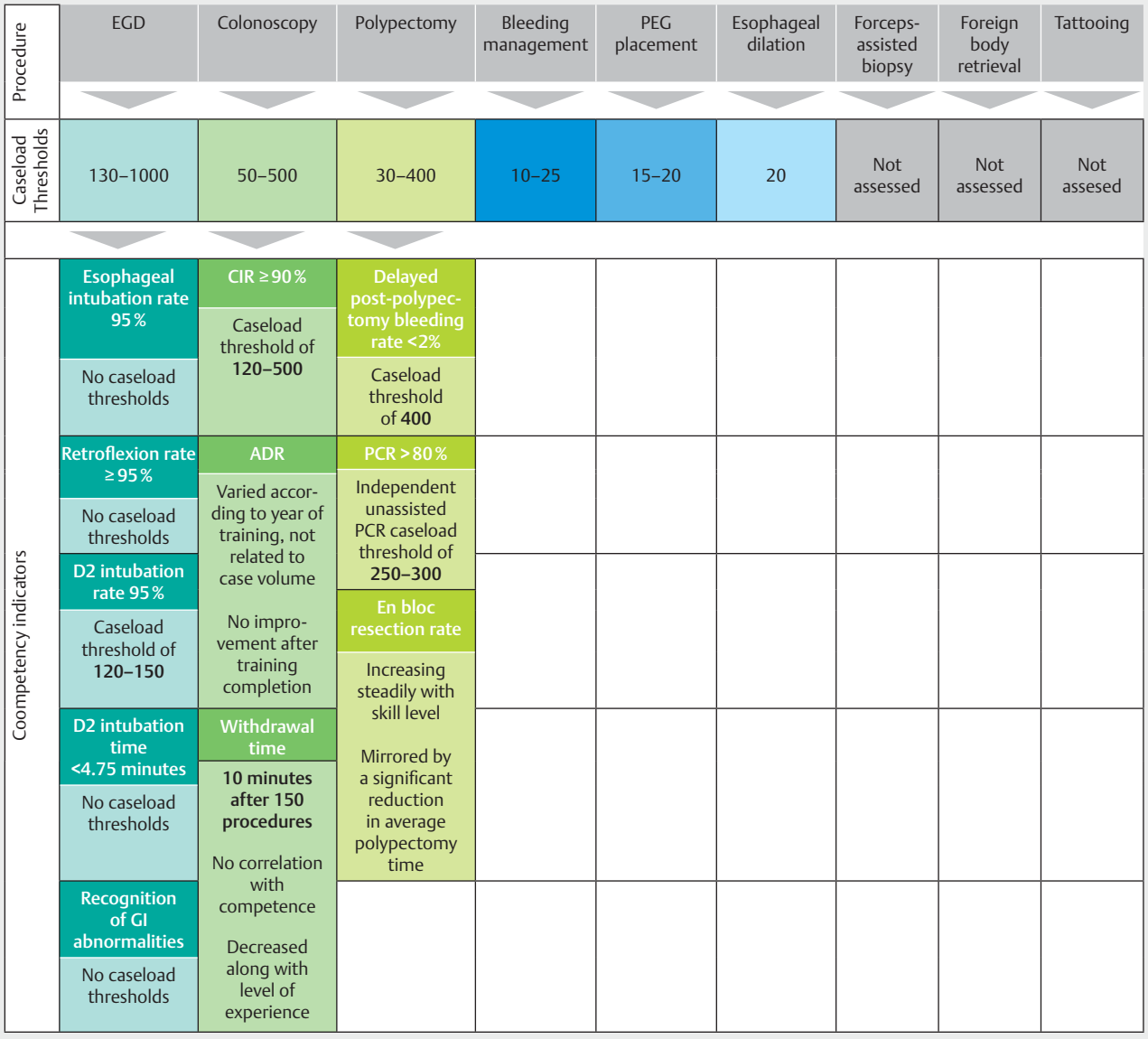
The competency threshold for EGD has been defined as the number of procedures needed to reach a duodenal intubation rate of 95 %. This ranges from 120 to 250 procedures in most studies [62, 74, 75], while guidelines recommend minimum case volumes ranging from 130 to 1000 EGDs [10, 11, 54, 58]. Additional KPIs such as esophageal intubation, J-maneuver (gastric retroflexion) rate of 95 %, D2 intubation time <4.75 minutes, and recognition of GI pathologies have been proposed, but these did not correlate with EGD caseload [44]. The American Society for Gastrointestinal Endoscopy (ASGE) recommends esophageal and duodenal (to the second portion of the duodenum) intubation rates of 95 %, while the JAG also includes a successful gastric retroflexion rate of ≥ 95 % as a criterion standard [76].

We strongly believe that additional KPIs [28] such as photo-documentation of upper GI anatomic landmarks, minimum procedure time, use of standardized terminology in endoscopy reports, and the proportion of correctly used biopsy protocols (e. g. MAPS, Seattle) should be systematically incorporated into the assessment of EGD competency.

2.2.2 Colonoscopy

There is significant variability in defining colonoscopy caseload thresholds across the biomedical literature [39, 60–73] and different guidelines [10, 27, 54–59] (range 50–500 cases). Thresholds are higher when stricter definitions of competency are applied, yet there is no consensus on an overall minimum colonoscopy caseload [39, 68, 69].

Established KPIs (i. e. cecal intubation rate, ADR, and withdrawal time) have been included in studies and assessed in terms of colonoscopy competence. A cecal intubation rate ≥ 90 % was assessed in 12 studies and correlated with variable colonoscopy thresholds (range 120–500) [60, 62, 63, 66, 68–74]. Data regarding the ADR varied according to the year of training, with no relation to case volume [67, 69, 70], nor improvement



▶ **Fig. 2** Schematic representation of available recommendations for performance thresholds and key performance indicators (KPIs) for basic endoscopic procedures.
EGD, esophagogastroduodenoscopy; PEG, percutaneous endoscopic gastrostomy; CIR, cecal intubation rate; ADR, adenoma detection rate; PCR, polypectomy completion rate; D2, second part of duodenum; GI, gastrointestinal.

after training completion [62]. Only one study reported correlation of the ADR with caseload [77]. Withdrawal time decreased as the level of experience increased. In one study, withdrawal time settled at approximately 10 minutes after 150 procedures [71], but no correlation with colonoscopy competence was identified [67, 68, 70, 71, 78].

2.2.3 Polypectomy

Usually, competence in performing polypectomy is expressed by minimum caseload volume (range 250–400). The thresholds correspond to select KPIs, such as delayed post-polypectomy bleeding rate of < 2 % (400 polypectomies) [79] or independent unassisted polypectomy completion rate of > 80 % after 250–300 polypectomies [72, 80]. En bloc polyp resection rates increase with skill level and are mirrored by a significant reduction in mean polypectomy time [80]. Furthermore, polypectomy completion rate appears to be a marker of efficiency, but is inadequate to identify polypectomy competence [72, 79, 80].

The Gastroenterology Core Curriculum delivered by the American Association for the Study of Liver Diseases (AASLD), American College of Gastroenterology (ACG), American Gastroenterological Association (AGA) Institute, and ASGE in 2007 proposed a threshold of 30 procedures for snare polypectomy and hemostasis [81]. However, polypectomy skills go beyond the performance of resection. Polypectomy involves correct lesion assessment and characterization using validated mor-

phologic classifications, appropriate choice of resection technique, and ancillary maneuvers, as covered by the Direct Observation of Polypectomy Skills (DOPyS), a global assessment scale [82]. In summary, data regarding competence in basic polypectomy are scarce and based on few studies with a limited number of subjects [72, 79, 80].

2.2.4 Bleeding management

No evidence exists regarding competence thresholds in the endoscopic management of GI bleeding. Scientific societies have arbitrarily set the minimum threshold to acquire basic endoscopic hemostasis competence for upper GI bleeding (UGIB) emergencies at 10–25 procedures [60, 61, 83]. A recent analysis of the JAG endoscopy training system database in the UK revealed significant regional variation in exposure to acute UGIB cases during training [84], with key issues being the lack of structured training and lack of access to on-call exposure to UGIB cases [85].

2.2.5 Percutaneous endoscopic gastrostomy placement

A joint American recommendation states 15 percutaneous endoscopic gastrostomy (PEG) procedures as the competence threshold, while Canadian credentialing guidelines recommend 20 PEG procedures [81, 86]. A single study partially assessed training in PEG placement; however, no obvious benchmark could be established [87].

2.2.6 Esophageal dilation

Guidelines [61, 83, 88, 89] recommend that 20 procedures are required to acquire competence in esophageal dilation of simple strictures, which are generally defined as short, symmetrical, non-angulated, and allowing the passage of the diagnostic endoscope.

2.2.7 Assessment of competence

STATEMENT

6 ESGE and ESGENA recommend that competence in basic GI endoscopic procedures should be assessed during training by dedicated endoscopy trainers.

Competence assessment during training may be external or may rely on self-assessment [90]. External assessment is performed by supervisors – generally the endoscopy trainers themselves, usually defined as "expert endoscopists," although an unequivocal definition of the latter is lacking. Bias in the assessment process is an obvious concern because of inherent subjectivity of the assessor, with the three "isms" (ageism, racism, and sexism) impacting transparency [91]. A "dual" assessment has been proposed to increase objectivity, but this is considered more time-consuming [89]. Whether a trainee should be overseen by a single or by multiple trainers during fellowship and whether this has the potential to reduce bias has not been established and is dependent on local conditions.

The role of self-assessment has been evaluated, with some studies revealing a tendency to overestimate performance [90]. Video-based observation of expert performance of procedures intending to improve self-assessment accuracy may alleviate this problem [92–97]. Credentialing bodies, such as JAG in the UK or the Royal College of Physicians and Surgeons of Canada, acknowledge the importance of self-assessment in the GI endoscopy learning path [98].

The GI endoscopy trainer should be qualified in conducting credible, unbiased appraisals of trainees' performance. However, to date, no validated tools to identify appropriate educators for endoscopy training have been developed. The assessor–trainee matching process should be determined locally and tailored to national regulations. The review of competence should be a multistep, well-structured process, conducted using evidence-based assessment tools incorporating subsequent milestones. The relevance of self-assessment seems to be ambiguous, although achieving a high level of agreement between the assessor and the trainee (i.e. by incorporating self-assessment in the "ask-tell-ask" complex approach [99]) may allow it to be one of the additional training validation options.

Assessment of competence performed during training is the foundation for successful certification upon completion of the gastroenterology fellowship and is essential in establishing if a physician can work independently, offering safe and high quality endoscopy care. Accreditation and credentialing are beyond the scope of this document, and vary significantly amongst healthcare systems, sometimes involving formal examinations by independent observers or proctors.

2.3 Maintenance of competence

STATEMENT

7 ESGE and ESGENA recommend the continuous monitoring of KPIs to ensure the trainee's maintenance of competence.

After gaining adequate competence in basic GI endoscopic procedures, reduced procedural volume is associated with suboptimal performance [100]. Therefore, continued development and maintenance of skills is critical to ensure an ongoing high level of competence. Practicing GI endoscopists should keep track of their own KPIs to make sure that they do not fall under the required thresholds.

There is very limited evidence on techniques and retraining modalities for endoscopists after the completion of their training program. The existing literature has described different interventions and their impact on endoscopists' performance indicators. The most robust data show that any kind of feedback on endoscopist performance improves performance indicators [101]. A meta-analysis reported a modest improvement in ADR (risk ratio [RR] 1.21, 95 %CI 1.09–1.34) when endoscopists were provided with feedback of their performance [102]. Low polyp detectors appeared to benefit the most from

this intervention. Incorporating retraining programs and continuous quality assessment seem crucial to ensuring a continuous high quality GI endoscopy service.

3 Structure of training

3.1 Training program structure

STATEMENT

8 Training programs should offer stepwise exposure to skill acquisition, practice in those techniques, and periodic assessment of relevant skills by formal trainers in GI endoscopy within a structured and goal-oriented program.

The general structure and requirements of GI endoscopy training programs are overseen by national accreditation bodies owing to the obvious need to ensure uniformity and allow accreditation and credentialing. However, the specifics of GI endoscopy training programs depend on individual institutional strategies and are therefore quite variable [9, 54, 103]. Endoscopy training programs are generally geared for gastroenterology/hepatology or surgical trainees as part of their fellowship program. Alternative pathways [104, 105] for training of both physicians and nonphysicians are also available in some healthcare systems.

A standardized program for training in basic GI endoscopy should offer participants a formal framework, sufficient time, and an appropriate training environment that enables the stepwise acquisition of those essential attributes required for competent practice of basic endoscopy. A paradigm shift from the classic apprenticeship model to a highly structured and formalized, competency-oriented education is underway in many healthcare systems [41, 106]. A schematic view of the optimal characteristics for training programs in GI endoscopy is presented in ▶ **Table 3**.

A coherent GI endoscopy training program provides a natural progression from introductory theoretical knowledge to endoscope manipulation outside the patient, leading to progressively more independent hands-on integrated patient-centered care under the supervision of dedicated trainers and the management of a program director. The endoscopy program director is responsible for devising and updating the formal framework and training curriculum, establishing the educational activity list, continuously overseeing the performance of both trainers and trainees, monitoring outcomes, and determining the institutional rules for privileging and credentialing [33].

Briefly, a trainee should progress from simple to more demanding endoscopic activities, and from supervised to minimally or even unsupervised endoscopic procedures as experience is accrued. While assigning a trainee to a particular trainer for the duration of the program theoretically ensures a stronger relationship and can be conducive to feedback and coaching [107, 108], some programs recommend or have constraints that require the use of multiple trainers per trainee. Breaks in training may have a limited negative influence on learning curves, but they do not preclude the teaching of endoscopy "in blocks" to allow for clinical or research rotations [109].

A proposed flowchart for the development of trainees during a GI endoscopy training program is shown in ▶ **Fig. 3**.

▶ **Table 3** Characteristics of the optimal endoscopy training program.

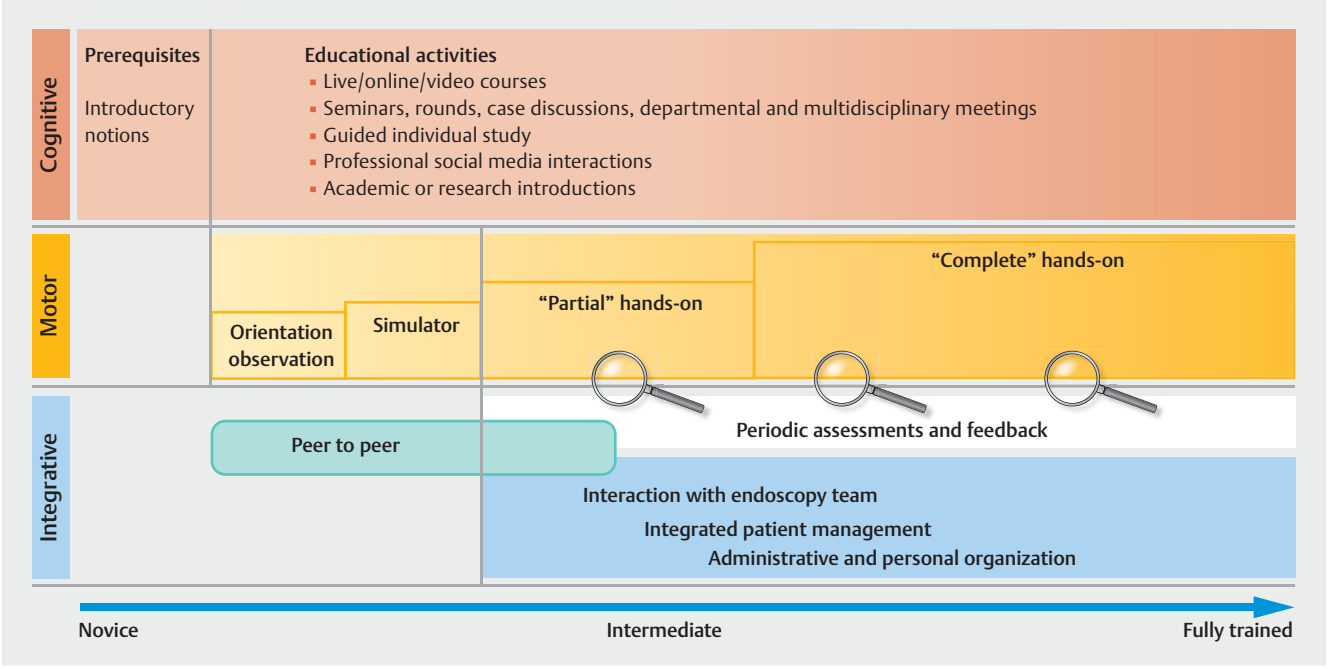
Characteristic
Clear structure and goals for trainees and trainers
Actualized, competency-based curriculum
Formally trained trainers
Natural stepwise progression in access to procedures
Availability of various validated simulators
Educational activities (i. e. journal clubs, seminars, case presentations, morbidity and mortality conferences, and multidisciplinary sessions, academic courses, video or online courses, etc.)
Competency-oriented minimum requirements for procedure volume and training period
Continuous assessment of performance (i. e. log books, periodic documented trainer assessments)
Capacity for continuous feedback between trainer and trainee
Inclusive, open, and growth-oriented environment
Sustainable development

3.2 Requirements for training centers

STATEMENT

9 ESGE and ESGENA recommend that GI endoscopy training units fulfill the ESGE KPIs for endoscopy units and, furthermore, be capable of providing the dedicated personnel, infrastructure, and sufficient case volume required for successful training within a structured program.

Currently, there are dedicated training programs for advanced GI endoscopy (e. g. endoscopic ultrasound [EUS], endoscopic retrograde cholangiopancreatography [ERCP], third-space endoscopy, etc.) with prespecified requirements for training [110–113]. However, no standard has been defined for programs dedicated to training in basic GI endoscopy. It is well established that the endoscopy service serves an essential role in providing high quality, safe, and patient-centered endoscopy, and the ESGE has recently published recommendations on the essential performance measures required of any endoscopy service [30], as well as suggestions for improving the sustainability of these services [114]. Apart from fulfilling these criteria, an endoscopy training unit should additionally have adequately trained and credentialed staff experienced in teaching basic GI endoscopic procedures, dedicated work-



▶ **Fig. 3** Proposed structure for a training program in basic gastrointestinal endoscopy showing the stepwise acquisition of the relevant cognitive, motor, and behavioral skills that ensure competence upon completion of the training program. A trainee must first become familiar with the general rules and practices, as well as scope characteristics and ergonomics, before starting to manipulate the endoscope, while continuous educational activities are pursued throughout training. Trainees should progress through a brief period of orientation, in which they further familiarize themselves with the equipment and controls, and ideally move on to validated simulators before attempting hands-on procedures in patients. Peer-to-peer interaction may help in the initial stages of orientation and first procedures, while close trainer supervision with periodic assessments and feedback ensure the development of technical proficiency. As trainees start procedures in patients, they should become accustomed to the endoscopy team and workflow, and gradually develop essential nontechnical endoscopic skills (such as pre- and post-endoscopy management, leadership, and integrated team management).

spaces, and educational facilities (e. g. meeting rooms, auditoria, libraries, etc.), and ideally a simulator-training center. Importantly, an efficient educational process requires adequate staffing (particularly a low trainee-to-trainer ratio) and a sufficient case volume to permit all trainees to at least reach the minimum threshold number of endoscopic procedures to achieve competence.

These endoscopy units should be credentialed and fulfil the requirements of their respective national healthcare and educational systems. Through the development of partnerships with less developed countries, the ESGE also seeks to encourage the development of local endoscopy training units that can provide high quality endoscopy in limited resource settings [115].

3.3 Trainer requirements

STATEMENT

10 ESGE and ESGENA recommend that trainers in basic GI endoscopic procedures should be endoscopists with formal educational training in the teaching of endoscopy, which allows them to successfully and safely teach trainees.

It is now widely acknowledged that expertise in GI endoscopy is not sufficient to guarantee performance as an endoscopy trainer [116, 117]. Trainers must have "conscious competence" of the endoscopic technique and of the training activity. Conscious competence is the trainers ability to be able to deconstruct their actions, verbalize their interventions, and communicate the sequence of steps involved, thereby increasing the trainee's conscious understanding and skill acquisition [118, 119]. The trainer is also required to be adept at negotiating appropriate goals for each training session, aligning agendas with the trainee for each session, observing and assessing performance, providing tailored and constructive feedback, and avoiding cognitive overload of the trainee [108, 117, 120].

Because adequate teaching requires considerable educational skills, formal training of GI endoscopy trainers is highly recommended and is supported by the evidence of improved outcomes [121]. Most available data on this issue come from the implementation of "train the trainers" in colonoscopy courses in the UK. Train the trainers in the UK was developed after a nationwide audit of colonoscopy discovered that the traditional colonoscopy training model was limited and suffered from several pitfalls [49, 122, 123]. Subsequently, such standardized training courses for endoscopy trainers have gained popularity outside the UK [124, 125] and have been adopted in surgical units [126]. A large-scale randomized trial in 40 centers in-

volved in CRC screening in Poland showed that training endoscopy unit leaders through dedicated short courses resulted in a sustained improvement in the ADR [121].

Because these courses are not universally available, trainers for basic endoscopic procedures should, as a minimum, be formally trained and credentialed, be able to perform at over 95 % technical success level [8], and be proficient in AE management in order to ensure patient safety.

3.4 GI endoscopy nurses' involvement in training

STATEMENT

11 ESGE and ESGENA recommend that GI endoscopy nurses be actively involved in fully developing the skillset of a trainee by contributing to instruction in basic equipment handling, reprocessing protocols, and patient monitoring.

Training requires the concerted effort and dedication of the entire GI endoscopy team, ranging from the endoscopist to nurses and ancillary personnel.

Endoscopy nurses are particularly well positioned to influence training in basic GI endoscopic procedures. There is evidence that nurse participation in colonoscopy observation may increase the ADR [127], and a multicenter, randomized controlled trial showed that the participation of experienced (≥ 2 years) endoscopy nurses led to a significantly higher polyp detection rate for fellows in training (< 500 colonoscopies) [128]. Nurses are integral in teaching good endoscope intubation technique, the prevention and management of loop formation during colonoscopy, and use of endoscopic accessories, and in offering valuable performance-enhancing feedback. They participate in monitoring patient comfort and safety and, in certain countries, specially qualified nurses can administer and help train others to administer moderate sedation for GI endoscopic procedures [129]. Furthermore, because of their familiarity and experience with endoscopic equipment design and reprocessing protocols [130], nurses offer invaluable support in teaching trainees safe handling of endoscopes and accessories in the endoscopy unit.

3.5 Simulation-based endoscopy training

STATEMENT

12 ESGE and ESGENA suggest the inclusion of simulation-based training using validated GI endoscopy simulators in the early phase of training novices in basic endoscopic procedures.

The concept of simulation-based training (SBT) is predicated on the idea of a controlled environment replicating, to varying extents, the experience of the actual endoscopic procedure being taught. In theory, SBT in endoscopy allows the trainee to acquire technical skills that transfer to clinical practice, thereby accelerating learning curves and reducing patient risk. Four types of simulators are generally considered: mechanical models, virtual reality simulators, ex vivo models, and live animal models [131]. Among these, virtual reality simulators have been the most commonly tested for training in basic GI endoscopic procedures and several meta-analyses have indicated modest benefit [37, 132, 133], thereby encouraging the adoption of SBT in some fellowship programs [134].

For EGD, prior exposure to SBT has been associated with an increased number of completed procedures, decreased time to pass the pylorus, and fewer trainer-assisted examinations [135–137]. Some studies of SBT in flexible sigmoidoscopy have reported a moderate benefit for its use (i. e. faster insertion time, shorter procedure duration, a higher percentage of visualized mucosa, and decreased patient discomfort) [138, 139], while a separate study concluded that patient-based teaching was superior [140]. When performing a colonoscopy, trainees in SBT groups showed improved performance, defined as shorter procedure times, increased cecal intubation rates, increased time with a clear endoscopic view, more unaided procedures, and less reported patient discomfort [138, 141–143]. However, the benefit of SBT may only be noticeable when associated with proper feedback and debriefing [144, 145]. Furthermore, while the exposure of trainees to SBT seems advantageous over no prior training when starting endoscopic procedures in patients, there remains insufficient evidence that it provides significant benefit over conventional patient-based training [133].

In conclusion, most available data suggest that training on validated simulators confers most benefit to novices, who demonstrate some increased competence parameters in their initial patient-based procedures (mostly endoscope intubation skills), albeit with limited clinical impact. Therefore, where available, SBT should be used early on in training and be integrated into the overall structured curriculum [146].

3.6 Educational activities during training

STATEMENT

13 ESGE and ESGENA recommend that continuous medical education through various on-site and individual learning activities be supported during training.

Access to continuous and diverse educational activities is mandatory in order to acquire and maintain cognitive skills during GI endoscopy training [147]. Every endoscopy training program should have an established curriculum, scheduled interactive meetings (i. e. seminars, case-based discussions, journal clubs, multidisciplinary meetings, morbidity and mortality conferences, bedside teaching rounds, etc.), and regular discussion sessions between trainees and their respective trainers.

Lecture-based interactive workshops with video cases seem to be an effective introduction to formal endoscopy education techniques, for trainees as well as trainers [148]. Live endos-

copy events with defined learning objectives are gaining in popularity, are attractive to trainees, and can provide important educational benefits [149]. Participation in conferences is encouraged throughout training and is an important modality for ensuring continuous medical education and strengthening the endoscopy community. Visiting fellowships, either observational or hands-on, may also facilitate learning and are especially useful where home units lack sufficient trainers or resources (www.esge.com/grants/fellowship-grant/).

The opportunities for high quality online educational content are rapidly increasing and there is a wealth of information that can be readily accessed. Use of internet-based e-learning platforms promotes continuing medical education [150] and may have a role in improving some endoscopic skills, such as lesion detection [151]. Many endoscopy societies, flagship journals, individual endoscopists or collaborations, and industry stakeholders now regularly use social media platforms to disseminate scientific content to their audience [152]. In fact, the use of closed social media groups is gaining support and may have a growing role in endoscopic practice and education [153]. The recent pandemic has forced the educational community to reassess, accelerate, and adapt to distance learning [150, 154, 155], and there is evidence that telementoring is a viable tool in some settings [156].

The ESGE recognizes the need to explore online and hybrid teaching in order to ensure widespread, equitable access to education and reduce the environmental impact of GI endoscopy training [114].

3.7 Artificial intelligence in training

While the evidence for the use of artificial intelligence (AI) for quality improvement in GI endoscopy is increasing, very few studies have specifically explored the impact of AI on training in endoscopy. At the present time, the quantity of data was judged insufficient to provide an evidence-based statement on this topic.

To date, only one randomized trial has been published investigating AI for training in upper GI endoscopy [150]. This study evaluated an AI system designed to identify anatomic landmarks, provide real-time feedback on blind spots, and produce automatic photodocumentation during EGD. AI-assisted trainees showed a reduced number of blind spots and more complete mucosal exploration, albeit without showing an increase in their technical competence scores [157].

In colonoscopy, preliminary evidence has shown that the use of computer-assisted characterization/optical diagnosis (CADx) for diminutive colorectal polyps increases the diagnostic confidence of nonexperienced endoscopists, and that continuous use of CADx results in an increase in overall diagnostic performance over time [158, 159].

Two studies [160, 161] have investigated the role of an AI training framework (i. e. libraries of expert-annotated endoscopic images) in the assessment of endoscopist performance, both for upper GI neoplasia recognition and lower GI neoplasia characterization. This framework, although artificial, was shown to be a promising setting for competence assessment because of the unique combination of a high prevalence of rare conditions and the possibility of immediate and repeatable benchmarking of endoscopist performance.

Although the available evidence is still preliminary, AI holds potential for assessing and improving trainees' cognitive and technical skills. AI could provide formative feedback, performance assessment, and guidance during clinical examinations, as well as during simulation, allowing for more personalized and independent training. Technically, AI methods are mature enough to automate tasks such as performance assessment [162]. To enable additional studies on AI for training in endoscopy, efforts should be made to design ergonomic interfaces to intuitively visualize learning curves, readily identify areas requiring further training, and provide constructive feedback to trainees.

3.8 Patient safety in training

STATEMENT

14 ESGE and ESGENA recommend that trainers use their best clinical judgement to match the case to the trainee, appropriately supervise, and intervene as needed in order to ensure high quality examinations and avoid unnecessary prolongation of procedures or potential adverse events.

There are limited data on AEs related to basic GI endoscopic procedures involving trainees. In general, training in basic GI endoscopy is generally considered safe when it is overseen by dedicated trainers in an adequately structured training program. While some studies do not specifically report trainee involvement in procedures [163–165], most large retrospective studies carried out in teaching hospitals show no association between trainee involvement and AEs [24, 166–176]. Furthermore, in prospective studies examining the benefit of simulators in training programs, no AEs were registered [133, 166, 177, 178]. We identified only two studies that reported any risk at all in this setting (i. e. slightly increased risk of inconsequential, short-term, and reversible changes in vital function parameters, such as transient hypoxia [169, 179]). On the other hand, prolongation of the procedure, leading to potential sedation-related incidents [180], or unnecessary exposure to radiation have been described by other groups [166, 175, 176]. Therefore, while it is very unlikely that the participation of a trainee increases the risk for AEs, it is also probably impossible to calculate this owing to the very low incidence.

It is inevitable that, during training, procedure times are prolonged and this may lead to AEs, especially in vulnerable patients with co-morbidities. Therefore, one way to ensure safety is for the trainer to match the fellow's current performance level to the procedure [181] and patient, and avoid unnecessary prolongation of the procedure. Other qualities of the trainer that ensure short- and long-term safety are formal training [182], sound clinical judgement in how and when to intervene, and the ability to offer appropriate supervision and feedback [183]. Minimizing distractions during procedures with

trainees [184], scheduling the trainee-involved endoscopic procedures early in the day's endoscopy list [185], implementing simulation training for emergency situations [186], and supporting discussions in morbidity and mortality conferences can all reduce AEs and improve patient outcomes [187].

Constant dedication to improving each trainee's performance is essential as there are data to show that some practitioners do not improve their endoscopy quality indicators after completing training [188], with obvious impact on patient safety [189, 190]. Incorporating attention to patient safety and satisfaction into training programs can aid in developing a trainee's understanding of a culture centered on patient safety [191]. The ESGE strongly encourages the implementation of GI pre-endoscopy safety checklists as an important tool to prevent AEs and medical errors [192], and further recommendations on ensuring patient safety in the endoscopy unit are available in guidelines [193].

3.9 Medicolegal requirements and considerations

STATEMENTS

15 ESGE and ESGENA recommend that GI endoscopy trainers, trainees, and training institutions have specific professional liability cover according to their respective national legislation. In procedures involving trainees, the trainer carries the overall responsibility and should act prudently and in accordance with community standards of care in the best interest of the patient.

16 ESGE and ESGENA recommend that physicians involved in GI endoscopy training who are confronted with medicolegal issues follow institutional guidance on risk management, disclosure, and communication with the patient and their family members to mitigate potential litigation.

While the frequency of legal claims involving GI endoscopy trainees is low [194, 195], the learning environment poses specific problems from a medicolegal standpoint. Liability in malpractice claims is variable according to national legislation and it is the responsibility of trainers and their institutions to ensure adequate professional liability insurance and cover for AEs occurring during training [196]. Medical errors are a significant concern both to healthcare professionals and to the public at large [191], and taking visible and clear preventive actions decreases the frequency and costs of avoidable AEs [197]. To this end, it is highly advisable to implement risk management programs [198], encourage physicians to report and study errors, and engage in regular morbidity and mortality conferences, in order to foster a culture of service excellence [199, 200].

It is evident that the trainer or supervisor carries a burden of responsibility and could be indirectly liable for claims arising from negligent supervision or errors during training. A prudent endoscopist who is supervising trainees should personally verify essential elements pertaining to patient safety and quality of the intervention (e. g. implementation of pre-endoscopy safety checklists for identification of patient, procedure indication, co-morbidities, informed consent, procedure reporting, post-procedural monitoring and recommendations, etc.). When they do occur, AEs should be viewed as important opportunities for reflection, feedback, and growth in the training process.

It is obvious that, even when participating in a training setting, the patient must be offered the current standard of care (from the informed consent process, through the GI endoscopic procedure itself, to proper follow-up) conducted in accordance with good clinical practice, regardless of the degree of trainee involvement [201]. If medicolegal incidents arise, it is important to realize that most claims are preventable. Good physician–patient relations based on communication, disclosure, and professionalism decrease the likelihood of subsequent legal action [202–204]. Efforts to educate patients on the importance and safety of trainee involvement in the endoscopic procedure may contribute to addressing legitimate patient concerns and preventing litigation [205].

As digestive endoscopy continues its development, new techniques and devices, as well as teaching concepts and frameworks, are being constantly introduced into current practice. Although it is likely that variability in national practices and requirements will persist, ESGE and ESGENA consider that training in basic endoscopic procedures should become standardized and oriented toward achieving measurable performance, while providing a high quality training experience centered on patient safety and outcome.

Disclaimer

ESGE Position Statements represent a consensus of best practice based on the available evidence at the time of preparation. The statements may not apply in all situations and should be interpreted in the light of specific clinical situations and resource availability. Further controlled clinical studies may be needed to clarify aspects of these statements, and revision may be necessary as new data appear. Clinical considerations may justify a course of action at variance with these recommendations. This ESGE Position Statement is intended to be an educational device to provide information that can assist the development and structure of training programs. The recommendations are not rules and should not be construed as establishing a legal standard of care or as encouraging, advocating, requiring, or discouraging any particular treatment. The legal disclaimer for ESGE guidelines applies to the present position statement [5].

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Competing Interest

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