



EGD core curriculum



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This document was reviewed and approved by the governing board of the American Society for Gastrointestinal Endoscopy (ASGE).

This is one of a series of documents prepared by the American Society for Gastrointestinal Endoscopy (ASGE) Training Committee. This curriculum document contains recommendations for training, and it is intended for use by endoscopy training directors, endoscopists involved in teaching endoscopy, and trainees in endoscopy. It was developed as an overview of techniques currently favored for performance and training in EGD and to serve as a guide to published references, videos, and other resources available to the trainer. By providing information to endoscopy trainers about the common practices used by experts in performing the technical aspects of the procedure, the ASGE hopes to improve the teaching and performance of EGD.

INTRODUCTION

Learning to perform an EGD is a fundamental aspect of gastroenterology training. The aim of this document is to identify the core cognitive and motor skills required to perform EGD safely and effectively and to direct trainees and educators to useful resources to facilitate training in EGD. The evolving issues of assessing competency and quality during endoscopy training are also addressed. A full review of these topics is beyond the scope of this document but is available throughout various ASGE practice guidelines and technical reviews referenced in this document that can also be found on the ASGE website (www.asge.org). Additional information can be found in the ASGE guideline “Principles of Training in GI Endoscopy” and the “Training in Endoscopy” section of Gastroenterology Core Curriculum (developed by the

Multisociety Task Force), both of which review the overall objectives of endoscopic training, the requirements for endoscopic trainers, and the training process.¹⁻³ These core documents are pertinent and are recommended to endoscopic trainers and trainees alike.

GOALS OF TRAINING

Training faculty

The faculty members responsible for EGD training should be expert endoscopists who are committed to both teaching endoscopy and assessing the competency of trainees.⁵ Program directors need to ensure that an adequate number of teaching faculty members are available to ensure quality training in endoscopy.⁴ The faculty should be responsible for didactic instruction and should have an active supervisory role in the care of patients undergoing EGD. They are expected to foster a positive, professional learning environment. The faculty should provide scheduled periodic assessment and evaluation of the fellows' endoscopic, cognitive, and motor skills.⁵ This evaluation should be provided to the trainee by individual faculty members, the training program director, or both. Timely performance feedback is essential to ensure the proper development of skills and the early identification of any deficiencies that need to be addressed.

Facilities

Training in EGD should take place within recognized Accreditation Council for Graduate Medical Education (ACGME) or international equivalent training programs.⁶ All programs must maintain an environment that is conducive to quality endoscopy education,⁴ including appropriate endoscopy facilities, procedural equipment, staffing, and other clinical support services. Trainees should be exposed to a variety of working environments in which EGD can be

performed, including inpatient and outpatient endoscopy suites, emergency departments, and intensive care units. Programs should provide a suitable inpatient and outpatient experience for trainees, with exposure to a wide variety of patients and indications for EGD.

Initial training in cognitive and motor skills

Cognitive skills. Trainees are expected to acquire the core cognitive skills necessary for achieving competence in the performance of EGD, outlined in Table 1. Essential knowledge includes procedure indications and contraindications, risks and benefits, and other issues of informed consent, assessment of patient safety, and pertinent upper GI anatomy. These skills can be acquired in several ways. Direct exposure to a heterogeneous patient population and an adequate volume of patients should provide the necessary environment to support the development of core cognitive skills for EGD. Furthermore, as mandated by the ACGME, training programs should have a core curriculum and a didactic program that includes GI conditions requiring EGD.⁴ Trainees should also be familiar with the GI endoscopy and gastroenterology societies' guidelines, consensus statements, and technical reviews regarding disease processes in which EGD is an integral part of diagnosis, treatment, or both. The ASGE practice guidelines and technical reviews are available on the ASGE website (www.asge.org). Other sources of information that can enhance and support endoscopic training include anatomy, endoscopy, and pathology atlases and endoscopic videos.

Motor skills. Trainees are expected to master core motor skills to develop competence in the performance of EGD. These core motor skills are listed in Table 2. Trainees should become familiar with the features of an upper endoscope, recognize and troubleshoot any potential problems related to the endoscopic equipment, and practice proper handling of the endoscope before patient endoscopy. Various training models or simulators for EGD are available. Simulation-based training is an ACGME training program requirement and may include use of part-task trainers, nonhuman nonanimal phantoms, animal models, and computer/virtual reality-based systems.⁷ Programs and educational conferences may provide access to *in vivo* or *ex vivo* animal upper GI tracts as well.

Both trainees and faculty should understand that motor skills develop at different rates among individual learners. Early identification of slow development of motor skills and proficiency in performing EGD is important for early intervention to ensure competency by the end of training.

PERIPROCEDURAL MANAGEMENT

Preprocedure assessment and management

Preprocedural assessment and management is an important part of endoscopic training. Determination of

TABLE 1. Core cognitive skills necessary to achieve competence in EGD (adapted from the colonoscopy core curriculum⁴⁵)

1. Patient evaluation
2. Assessment of indication and risk
3. Informed consent
4. Patient preparation
5. Airway assessment and sedation management
6. Anatomy and landmark recognition
7. Recognition of findings
8. Integration of findings into management plans
9. Knowledge of diagnostic techniques and therapeutic devices
10. Detailed report generation and communication
11. Adverse event recognition and management
12. Knowledge of surveillance intervals

TABLE 2. Core motor skills necessary to achieve competence in EGD (adapted from the colonoscopy core curriculum⁴⁵)

1. Correctly holding the endoscope
2. Use of endoscope controls and buttons
3. Intubation of the esophagus
4. Advancement and navigation
5. Tip deflection
6. Pyloric intubation
7. Advancement into the duodenal second portion
8. Withdrawal
9. Mucosal inspection including advanced imaging techniques
10. Retroflexion in the stomach
11. Biopsy and tissue sampling
12. Therapeutic interventions

an appropriate clinical indication for EGD and knowledge of potential risks are critical before the endoscopist or trainee proceeds with both the informed consent process and the examination.⁸ The trainee should be able to educate the patient in culturally appropriate laypersons' terms regarding indications for the procedure, how the procedure will be performed, the alternatives to the procedure, the risks of the procedure, and what to expect after the procedure. Supervising faculty should oversee the informed consent process and emphasize patient education and thorough documentation in the medical record. Trainees should have a thorough understanding of the patient's medical history, including presenting symptoms, comorbidities, surgical history, and medications. This clinical information in conjunction with physical examination findings (including body habitus, airway assessment, and vital signs) and American Society of Anesthesiologists classification⁹ should be used in determining the timing of EGD, the site of service (ambulatory endoscopy unit, hospital-based endoscopy unit, intensive care unit, or operating room), and choice of sedation to be used.¹⁰ Routine laboratory studies are generally unnecessary, although they may be required in certain scenarios.¹¹ Trainees should be familiar with guidelines regarding the management of anticoagulant, antiplatelet, and antithrombotic agents, and they should

formulate a clear management plan in collaboration with other disciplines involved in the care of the patient.¹²⁻¹⁴ Finally, trainees should understand the proper indications for prophylactic antibiotic agents, proton pump inhibitors, prokinetic agents, or vasoactive drugs before the performance of EGD.¹¹

Sedation, patient management, and physician behavior during EGD

Before the initiation of all EGD examinations, trainees should actively participate in the “time out” or patient identification process, which includes verification of the correct patient and procedure to be performed. Trainees should receive training in sedation, which includes understanding the pharmacology of sedation and reversal agents used in the endoscopy setting, monitoring of the patient (including level of sedation), airway management, and the appropriate use of the anesthesia service.¹⁰ Trainees are expected to be able to provide safe and effective sedation and analgesia for patients undergoing EGD (and all endoscopies) by the end of their training.

During the EGD, maintenance of the patient’s comfort, dignity, and privacy is essential. Faculty members are expected to maintain a professional, distraction-free, and positive environment that promotes learning and patient safety. Throughout the procedure, there should be clear and professional communication between the trainee, assisting staff, and faculty members to ensure the patient’s safety and comfort. Feedback to the trainee on procedure performance should be constructive and given privately when possible. The standards for performance of EGD that trainees need to master are described in detail below.

Postprocedure management

Trainees should be aware of appropriate patient monitoring for adverse events related to the procedure or sedation in the postprocedure period.¹⁵ Again, familiarity with both sedation and reversal agents, including pharmacology, duration of action, and possible adverse events is important. An understanding of the identification and management of endoscopic adverse events from interventions performed during EGD must be an integral part of endoscopy training, and faculty must emphasize the importance of timely recognition, management, communication with patient and family, and appropriate documentation.

After the procedure, trainees should be able to promptly and effectively communicate the procedure findings, therapeutic outcomes, and follow-up management plans with the patient and referring health care provider(s). Emphasis should also be placed on writing clear and concise procedure reports with detailed and accurate descriptions of findings, pertinent negatives, and endoscopic interventions, using accepted standard terminology and accepted grading or classification systems and including appropriate photo documentation. A differential

diagnosis should be formulated that helps inform discussions with surgeons or other consultants and may have a direct impact on clinical management. Recommendations regarding postprocedure monitoring, patient treatment, and follow-up care should be clear and specific.

BASIC PERFORMANCE OF EGD

The fundamentals of performing a quality diagnostic (and therapeutic) EGD require knowledge of upper GI anatomy and of techniques to effectively maneuver the gastroscope, adequately insufflate the lumen, and carefully examine the mucosa.¹⁶ Trainees should strive to perform the examination in a systematic and consistent manner while keeping in mind the preendoscopy differential diagnosis and being alert to clinically significant, unrelated findings.¹⁶

Esophageal intubation

Trainees should be taught to intubate the esophagus under direct visualization. Trainees should know and recognize the anatomic landmarks used to guide esophageal intubation, including the vocal cords, epiglottis, and arytenoid cartilage, and should be alert to the possible presence of significant pathologic conditions encountered in this location. Trainees should recognize that despite good technique and direct visualization of the anatomy, esophageal intubation may be difficult because of various forms of obstruction. Trainees should be familiar with alternative diagnostic options when esophageal intubation is unsuccessful. If possible, trainees should also gain experience in intubating the esophagus with the patient in the supine position.

Pyloric intubation

Pyloric intubation should be performed under direct visualization. Whether thorough examination of the stomach occurs before or after examination of the duodenum varies among endoscopists.

Advancement and withdrawal in the duodenum

After pyloric intubation, trainees should develop the skills to perform a thorough examination of the duodenal mucosa in a controlled manner, whether during advancement or withdrawal of the gastroscope. Trainees should learn that a thorough examination may require several back-and-forth movements of the endoscope until all areas of the duodenum are adequately visualized.

Retroflexion in the stomach

Retroflexion in the stomach should be performed during every EGD examination, except in scenarios related to severely altered anatomy. Trainees must learn this maneuver to ensure thorough examination of the fundus and cardia of the stomach, which are seen only tangentially when visualized in the forward view. Learning to perform

and maintain retroflexion in the stomach is also important for tissue sampling and therapeutic interventions in the proximal stomach.

Withdrawal and mucosal visualization

Trainees should be taught the importance of a thorough examination of the mucosa during both advancement and withdrawal of the endoscope. The importance of adequate washing of the mucosa to facilitate careful mucosal inspection should be emphasized. Trainees should be able to precisely identify and describe landmarks such as the Z-line, the impression of the diaphragmatic hiatus (“diaphragmatic pinch”), and its relationship to the gastroesophageal junction (GEJ). Emphasis should be placed on both the importance of a slow and careful examination, which has been shown to increase the detection rates of Barrett’s esophagus and gastric neoplasia detection,^{17,18} and the accurate characterization of any abnormal findings, including a detailed description of the appearance and precise anatomic location, which may affect prognosis or therapeutic decisions. Trainees must be given ample opportunity during supervised procedures to detect and identify abnormalities independently so they can develop cognitive competence.

OTHER CONSIDERATIONS IN THE PERFORMANCE OF EGD

Alternative endoscopes

Proper endoscope selection is a key factor during the preprocedural phase of endoscopy and should be discussed with the supervising faculty. Trainees should be familiar with the alternative endoscopes available for EGD (which include ultrathin endoscopes, therapeutic endoscopes, side-viewing duodenoscopes, enteroscopes, and pediatric colonoscopes) and the indications for their use during EGD. Trainees should familiarize themselves with the variety of endoscopes available in their endoscopy unit and their specifications, including scope diameter, number and size of working channels, shaft length, available advanced imaging features, availability of water irrigation, and compatibility with various accessories and devices. The use of these alternative endoscopes may require closer supervision or faculty with a specific skill set.

Training programs should provide exposure to cases that require the use of a duodenoscope to completely inspect or apply therapy to areas hard to see with a front-viewing gastroscope, such as the lip of the duodenal bulb, the proximal cardia, or the major duodenal papilla. The proper and safe use of a duodenoscope during the performance of an EGD is challenging, especially with the relatively blind intubation of the esophagus, and training programs should have the available faculty with the necessary expertise to appropriately teach trainees this skill set.

In addition to awareness of alternative endoscopes, trainees should be cognizant of endoscope modifications

that can improve mucosal visualization. These include caps fitted to the tip of the endoscope, which may improve visualization, particularly in the region of mucosal folds or luminal angulation.

Fluoroscopy

Trainees should become familiar with the indications for the use of fluoroscopy during EGD. However, procedures requiring fluoroscopy may be better suited for more advanced trainees. Exposure to these procedures may also be limited by the availability of faculty and resources. Familiarity with fluoroscopic imaging and radiation safety precautions should be acquired by those who pursue this training. Accurate interpretation of fluoroscopic images should be taught by the appropriate faculty.

TRAINING IN DIAGNOSTIC AND THERAPEUTIC TECHNIQUES

Tissue sampling

A major objective during EGD is to obtain diagnostic tissue specimens. Cold biopsy is the most common technique for tissue acquisition. Trainees must familiarize themselves with the variety and characteristics of biopsy forceps currently available.¹⁹ Trainees should be instructed in the proper technique of biopsy acquisition, highlighting the importance of close proximity to the mucosa and controlled movements. Trainees should be aware of what is considered the ideal location for biopsies and the number of biopsy specimens necessary for diagnosis depending on the condition, including Barrett’s mucosa, gastric ulcers, diagnosis of *Helicobacter pylori* gastritis, and celiac disease.^{16,20} Clear and careful labeling of specimens is important to avoid discrepancies between reports, requisitions, and samples.

Trainees should be well versed in techniques pertaining to snare polypectomy that are similar to those techniques required in the colon. Trainees should be competent in techniques such as submucosal injection (to provide tissue elevation) or ligation with a loop, which may be useful before polypectomy. The trainees should be aware of the different types of snares, including different shapes, sizes, and wires (eg, single, barbed).²¹

Endoscopic mucosal resection is a term usually reserved for resection of larger lesions in the upper GI tract and may combine band ligation with snare polypectomy techniques. Endoscopic submucosal dissection is also an advanced technique that requires dissection of the submucosal space. Many programs may reserve these procedures for individuals undergoing advanced training and may not make them available to trainees in a 3-year gastroenterology fellowship program.

Hemostasis

Competence in the use of hemostasis techniques for acute non-variceal and variceal hemorrhage is a central skill

to obtain during training.^{22,23} Accurate recognition of bleeding stigmata is critical in determining when therapy is indicated and the prognosis for rebleeding.^{24,25} Trainees should be familiar with different treatment modalities and devices available for hemostasis, including injection, thermal coagulation (both contact and noncontact types), mechanical therapy (clipping), band ligation, and topical sprays.²² Trainees should be aware of their individual advantages and potential disadvantages and of the utility of combined therapies in achieving hemostasis. Integral to this learning process is the understanding of principles of electrosurgery,^{26,27} which need to be emphasized in the course of endoscopy training.

Thermal coagulation devices include heater probes, bipolar electrocautery probes, and argon plasma coagulation (APC).^{26,28} Emphasis should be placed on the development of competency in the setup and proper use of these devices. This includes knowing the specific power settings to use for particular applications or findings and the appropriate endoscopic technique to achieve hemostasis in each situation.^{27,28}

Trainees must become proficient in the performance of injection therapy for hemostasis. It is important that they understand the indications for use and are knowledgeable about available needle devices and injection agents and their mechanisms of action (eg, direct pharmacologic effect on the tissue [epinephrine] or tamponade effect from volume [saline solution or diluted epinephrine] or tissue destruction [sclerotherapy]).²⁸ Familiarity with other injectable agents such as thrombin, fibrin, and cyanoacrylate glues should be encouraged, although direct experience with these agents may be limited by availability or regulatory issues.²⁹ Trainees should be technically adept enough to maintain adequate control of the endoscope while delivering targeted injections in a controlled and efficient manner.

Endoscopic placement of clips for hemostasis is a form of mechanical therapy that causes physical tamponade at a bleeding site. Trainees should develop familiarity with available clips and their specifications, and they should be proficient in positioning and deploying the hemoclips.²⁸

Endoscopic band ligation devices can be used in the treatment of variceal and nonvariceal hemorrhage. Trainees should be familiar with available banding devices and must master their assembly and effective deployment to achieve hemostasis.³⁰

Foreign body removal and management of food impactions

Endoscopic management of foreign bodies and food impactions should be part of standard training in EGD.³¹ The importance of airway protection and the appropriate selection of sedation based on the patient's condition, the risk of aspiration or perforation, and the type of object requiring removal should be emphasized. Trainees must be familiar with the available overtubes and removal devices in their endoscopy unit and emergency

endoscopy cart.^{32,33} Hands-on training should be provided in the use of overtubes and safe advancement of these devices over the endoscope into the esophagus. Further details of patient treatment and technical aspects of the procedure are covered in an ASGE guideline.³¹

Management of luminal obstruction

Luminal obstructions of the esophagus and the gastric outlet are common indications for upper endoscopy.³⁴⁻³⁶ When considering esophageal stenoses, trainees must be cognizant of the possible benign and malignant etiologies and should be able to accurately characterize the severity or complexity of the stricture during endoscopy. For benign strictures, trainees should be familiar with the different types of dilators used for therapy (tungsten-filled bougies, wire-guided polyvinyl dilators, and through-the-scope balloon dilators), their mechanisms of action, and the techniques to perform these dilations safely and effectively.³⁷ Fellows should be aware of the limited role of dilation for esophageal malignancy (to facilitate feeding tube placement or staging by endoscopic US) and the indications for self-expanding metal stents (SEMSs) in the management of these patients.³⁵ More complicated cases include pneumatic dilations of the lower esophageal sphincter for achalasia, or dilations of complex strictures requiring fluoroscopy. These dilations and the use of SEMSs for malignant strictures may require advanced training, depending on the training program. Fellows should also be aware of alternative therapeutic strategies, including steroid injections for refractory benign strictures, botulinum toxin injection, per-oral endoscopic myotomy or surgical myotomy for achalasia, and surgical or radiologic procedures (including feeding tube placement) for nutritional support.³⁴

For gastric outlet obstructions, trainees should be aware of the benign and malignant mechanical obstructions and of motility disorders that may require endoscopic therapy.³⁶ They should understand the roles for balloon dilation or SEMS placement (with or without fluoroscopy) in the therapeutic management of these patients. Training for these procedures may be limited to advanced fellows in certain programs. They should be aware of the limited role that injection therapy may play for gastroparesis and of alternative surgical and radiologic strategies to provide nutritional support.

For all luminal obstructions, trainees should also be aware of alternative management options, including surgical or radiologic procedures in select patients. For dilations or other therapeutic procedures, trainees must be able to recognize and manage adverse events, including bleeding and perforation.^{34,36}

Endoscopic placement of enteral nutrition devices

The principles of training in endoscopic placement of enteral nutrition devices, including percutaneous

endoscopic gastrostomy and jejunostomy tubes, is covered in an ASGE curriculum.³⁸ Competence in upper endoscopy is a prerequisite for the successful and safe performance of these procedures. Trainees should be knowledgeable in the nutritional assessment of patients, the ethics of enteral feeding, and the indications, contraindications, and alternatives to enteral feeding tube placement. Familiarity with available devices and various techniques for the performance of these procedures is necessary for training.³⁹ Trainees should be well versed in the postprocedure care of these patients and in the identification and management of related adverse events.

Advanced imaging

Trainees should be familiar with available proprietary imaging enhancements, referred to as optical contrast endoscopy or electronic chromoendoscopy.⁴⁰ These currently include narrow-band imaging, flexible spectral imaging color enhancement, and i-SCAN. Methods of enhancement and their clinical utility have been discussed in a technical review.⁴⁰

Chromoendoscopy involves the use of stains or dyes that are sprayed onto the GI mucosa to improve tissue visualization and characterization.^{41,42} Trainees should be familiar with the different types of stains and their properties (absorptive, contrast, or reactive). Trainees should have knowledge of the common clinical applications for chromoendoscopy in the upper GI tract. Furthermore, trainees should be aware of the practical aspects of using stains, including allergy to dyes (eg, Lugol's solution), proper dilution, application of a mucolytic before stain use, mode of delivery, timing of the stain, and proper rinsing of the mucosa.

Familiarity with the interpretation of both electronic and traditional chromoendoscopy images should be developed during training.

Ablative therapies

Trainees should have exposure to ablative therapies for the management of metaplastic, dysplastic, and malignant conditions of the upper GI tract. Training in ablative therapies, including APC, radiofrequency ablation, cryoablation, and multipolar electrocautery, is reviewed in detail in an ASGE curriculum.⁴³ Although training programs may not offer training in all ablative therapies, trainees should have working knowledge of the different ablation techniques, their available devices, the indications for treatment, and possible adverse events.³⁰

Endoscopic tattooing

Endoscopic tattooing is a technique to facilitate localization of a luminal abnormality at the time of surgery or repeated endoscopic examination. Trainees should be familiar with the techniques for delivering a submucosal injection of dye that will allow for easy localization.⁴⁴

ASSESSMENT OF TRAINEE PERFORMANCE AND ACQUISITION OF COMPETENCY IN EGD

Formal evaluation of each trainee's endoscopic skill has been traditionally obtained by applying the ACGME core competencies. It has been recognized that trainees must receive routine and timely feedback on their upper endoscopy skills throughout their training experience. The ACGME has replaced its assessment system with the Next Accreditation System, which focuses on milestone attainment throughout training, assessing competence by all trainees, with thorough documentation by their training programs.⁵ The need for validated assessment tools that can be used for determining both cognitive and motor competencies has subsequently become critical. The ASGE Training Committee has recently published a new evaluation tool for the assessment of competency in endoscopy for trainees performing EGD.⁵ The use of this tool should provide a mechanism both for detecting deficiencies in the cognitive or motor skills necessary for the performance of EGD and for tracking the trainee's progress. This information can be provided to the trainee as constructive feedback throughout training.

Monitoring of procedure logs should be performed periodically by the training program director to ensure that minimal threshold numbers are achieved and surpassed during training. The achievement of competence in upper endoscopy should be determined by a combination of objective and subjective measures and should not be based solely on the trainee's reaching a minimal threshold number of EGDs. The minimum threshold numbers listed in the guideline "Principles of Training in GI Endoscopy"² (130 for EGD) specifically consider this number to be the minimum number of supervised cases before which competency can be assessed.

Quality measurement

The importance of measuring and monitoring quality in the performance of EGD has implications for trainees seeking credentialing and clinical privileges, and quality may ultimately have an impact on physician reimbursement based on patient outcomes. Several quality parameters for EGD have been designated in the most recent guideline from the ASGE/ACG Taskforce on Quality in Endoscopy.¹⁶ These include preprocedural, intraprocedural, and postprocedural quality indicators such as documentation of an appropriate indication for the study, adequate preparation of the patient, full visualization of the entire upper GI tract, appropriate biopsy sampling of identified lesions, performance of indicated therapeutic techniques, and recommendations for the medical management of identified conditions. Trainees should understand the importance of developing and maintaining a portfolio to document their own performance quality during and after training and should establish a system to update this in a continuous way.

DISCLOSURE

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