

Small-bowel endoscopy core curriculum

This is one of a series of documents prepared by the ASGE Training Committee. This curriculum document contains recommendations for training, 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 the performance and training of small-bowel endoscopy and to serve as a guide to published references, videotapes, 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 small-bowel endoscopy.

INTRODUCTION

Acquiring the skills to perform small-bowel endoscopy safely, effectively, and comfortably requires an understanding of the indications, risks, and limitations of the procedures. It also requires competency in maximizing visualization of the small bowel, minimizing patient discomfort, accurately identifying and diagnosing pathology, and applying appropriate therapeutic interventions (eg, removal or ablation of lesions). Training in capsule endoscopy (CE) and deep enteroscopy require dedicated educational efforts. The ASGE guideline entitled “Principles of Training of Gastrointestinal Endoscopy” and the section of the Gastroenterology Core Curriculum developed by the Task Force in Gastrointestinal Endoscopy review the overall objectives of endoscopic training, the requirements for endoscopic trainers, and the training process.^{1,2} The evolving issues of privileging, tracking outcomes, and assessing competency are also reviewed.³ These core documents are pertinent and are recommended to endoscopic trainers and trainees alike.

WIRELESS CE

Goals of training

GI training programs should require trainees to have formal instruction in CE.^{4,5} The CE training period may be incorporated into the standard 3-year gastroenterology

fellowship program. Review of CE studies by a credentialed capsule endoscopist is a requisite for CE training. The necessary case volume will vary among trainees and will depend on when during the fellowship for this training is undertaken. Based on available data, we recommend a minimum number of 20 supervised procedures to provide adequate experience for those intending to practice CE independently.⁶⁻⁸ There is increasing awareness that proficiency should be based on competency rather than absolute number of procedures performed, reflecting differences in individual learning curves. Trainee variability is a key issue that underscores the importance of competency-based assessments for this type of skill acquisition. Objective measures for assessment of competence in CE are yet to be defined. The minimum training requirements leading to competency have not been validated and are based on expert opinion. When possible, competence should be determined by objective criteria and direct observation by a qualified capsule endoscopist. Passing a formalized in-service examination or achieving a 90% or greater correlation rate of significant findings compared with a credentialed capsule endoscopist would be a reasonable expectation.⁸

Trainees should have an appropriate balance of clinical patient care, didactics, and research exposure during their training in CE. Integration of clinical cases requiring CE into weekly conferences with radiology, pathology, and surgery specialties promotes effective interdisciplinary care. Trainees must further their knowledge of CE through scientific literature reviews, CE courses, and annual scientific meetings of the major digestive diseases societies. In addition to patient care, trainees should be encouraged to participate in research related to CE.⁹⁻¹¹

CE training may be incorporated into a post-fellowship setting if it was unavailable during a gastroenterology fellowship to include completion of a hands-on course with a minimum of 8 hours of Continuing Medical Education credit, endorsed by a national or international GI society (eg, ASGE-sponsored CE course) followed by review of CE studies by a credentialed capsule endoscopist.⁴

Faculty. There must be at least 1 faculty member experienced in CE. The expert faculty must be dedicated to teaching CE procedures and have time available to instruct and evaluate the trainees. Trainers must assist trainees in developing CE image interpretation skills and integration of findings into a patient management plan. Trainers should also help trainees in developing interest and awareness in technological advances.

Appropriate and timely feedback should be provided to trainees during this training period. Individual teaching styles vary, but trainers should foster a positive, professional learning environment. Scheduled periodic assessment and evaluation of technical and intellectual skills of each trainee are required.

Facilities. Programs that offer training in CE should have sufficient volume so that trainees have enough experience to attain competence in CE. Facilities should maintain current hardware and appropriate software for the performance of CE. Programs must have an objective-based curriculum and provide trainees with access to resources such as textbooks, DVDs, lectures, online material, and CE image atlases. Access to CE courses endorsed by a national or international GI society (eg, ASGE-sponsored CE courses) to assist in the education of the trainees is encouraged.

Endoscopic experience

Preprocedure fund of knowledge and risk assessment. Trainees should have a thorough knowledge of the anatomy and physiology of the GI tract, including common anatomic and postsurgical variants. Trainees should have a detailed understanding of indications, contraindications, adverse events, issues of informed consent, and patient education. A thorough knowledge of the common pathologies of the GI tract is a prerequisite. Trainees must acquire the necessary skills for image recognition of endoscopic landmarks, normal anatomy, and pathologic findings. This knowledge must be acquired from endoscopic procedures, such as upper endoscopy, colonoscopy, and push enteroscopy, and from the CE trainer. Trainees should provide informed consent in terms that are understandable to the patient. The informed consent process is essential in relieving patient anxiety and improving the fellow's understanding of the indications of the planned intervention. Capsule retention secondary to anatomic variation (eg, Zenker's diverticulum) or pathophysiologically acquired changes (eg, fibroinflammatory strictures or motility disorders) should be clearly explained by the trainees during the consent process.^{6,7}

Trainees should be knowledgeable of the technical specifications and performance characteristics of the CE system and software before use in patient care. Trainees should be familiar with the various CE systems that are commercially available and should have a firm knowledge and understanding of the differences.^{12,8} They should have an understanding of how the acquired images are transmitted to an ambulatory data recorder via a series of sensors worn on a belt attached to the patient and how the transmitted images are then downloaded to proprietary software that processes and displays the images for review and interpretation. Trainees are expected to understand the issues related to using a bowel preparation, including type and timing, to obtain quality and interpretable information.⁹ It is important to be aware that adjustment in the

bowel preparation may be warranted when certain clinical conditions occur, such as hospitalization or extended immobilization. The sequence of liquid/solid food reintroduction after capsule ingestion should be clearly communicated because this is a frequent patient concern. Trainees should also be familiar with the disintegrating, nonvideo patency capsule (ie, dummy capsule), which has dimensions similar to those of the functioning video capsule, used for determination of GI patency.

Procedural considerations. Trainees should gain experience with capsule delivery system technology for endoscopic placement in those patients who are unable to ingest the capsule or have a predictable low likelihood of ingestion success (eg, previous stroke or head and neck surgery) and suspected or known delayed gastric emptying (eg, diabetic gastroparesis) to minimize the occurrence of an incomplete small-bowel examination. If capsule retention occurs, trainees should understand appropriate methods for verifying retention (including the contraindication to magnetic resonance imaging), identifying the probable location and cause of retention, and removing the capsule by using both endoscopic and surgical approaches.

Postprocedure requirements. Trainees must accurately identify, interpret, and document CE findings. Effective and expeditious communication of findings and diagnoses are an integral part of the procedure that must be emphasized to trainees. This involves discussions with the patient and the referring health professional. The importance of complete procedure reporting to include identification of appropriate landmarks, use of accepted nomenclature to describe findings, timing or presumed location of findings, and completeness of small-bowel study cannot be overemphasized. Trainers and trainees alike should use the accepted minimum standard terminology in their computerized procedure reporting system or dictated reports to foster standardization of reporting and data collection throughout the endoscopic community. Trainees should document procedures performed by using log books or computer records.

DEEP ENTEROSCOPY

Goals of training

Programs offering training in deep enteroscopy should define the objectives and goals of the training program, specifically whether trainees will have an exposure-only status or be trained to be competent in deep enteroscopy. The training may focus on any of the accepted techniques of deep enteroscopy including double-balloon enteroscopy (DBE) and single-balloon enteroscopy (SBE) (collectively referred to as balloon-assisted enteroscopy), or spiral enteroscopy.¹⁶⁻²²

Given the technical and cognitive demands of deep enteroscopy, trainees should be proficient in routine upper endoscopy and colonoscopy. Deep enteroscopy tends

to be more challenging than routine endoscopy or push enteroscopy and expertise in techniques such as hemostasis, tattooing, polypectomy, balloon dilation, and management of anticoagulation are an essential prerequisite before training in deep enteroscopy. Trainees should have a complete understanding of the anatomy, physiology, and pathology of the esophagus, stomach, small intestine, and colon. Deep enteroscopy training may be incorporated into the standard 3-year gastroenterology fellowship program.

Although there are no standardized guidelines stating the minimum training required to achieve competence, previous studies have indicated that a minimum of 10 procedures are needed before assessing for competence.²² There are no published guidelines relating to procedural competence or the minimum number of supervised procedures required before evaluating for competence. Formal training to competency in deep enteroscopy during a gastroenterology fellowship or completion of a hands-on course with a minimum of 8 hours Continuing Medical Education credit, endorsed by a national or international GI society (eg, ASGE-sponsored deep enteroscopy course) followed by a minimum of 10 procedures supervised by an endoscopist competent in deep enteroscopy is recommended. Although competency may be reached after 10 procedures, it is left to the discretion of the faculty to evaluate and confirm the trainees' proficiency in deep enteroscopy. When training in deep enteroscopy, an acceptable case mix for trainees should include at least 5 retrograde examinations.²³ However, this number may vary based on the skill set of the individual trainee.

Faculty. There should be a faculty member experienced in deep enteroscopy. Faculty should provide instruction on the following: indications, periprocedural management, patient considerations, techniques in performing deep enteroscopy, and integration of findings into the management plan. The faculty should ensure that trainees are exposed to patients with varied indications and therapeutic requirements. The faculty must be dedicated to teaching these advanced procedures and have time available to instruct and evaluate trainees. Periodic assessment of cognitive and endoscopic skills of trainees is required by using objective assessment criteria, when available.

Facilities. Programs that offer training in deep enteroscopy should have sufficient volume so that trainees can have adequate experience to attain competence in these procedures. Appropriate access to anesthesia services is necessary given the prolonged procedure duration. There are various enteroscopy systems available including push enteroscopy, SBE, DBE, and spiral enteroscopy. Training institutions do not need to have all of these systems, but trainees should be aware of the available platforms. Fluoroscopy should be available to facilitate deep enteroscopy in challenging circumstances (eg, surgically altered anatomy). All programs training fellows in deep enteroscopy

should have an established curriculum. Trainees should access educational resources such as textbooks, DVDs, Web sites, endoscopy live courses, and hands-on training. Application of these resources in practiced-based learning is necessary to optimize the training experience.

Endoscopic experience

Preprocedure fund of knowledge and risk assessment. Given the technical demands of the procedure, trainees should have a thorough knowledge of the anatomy and physiology of the normal as well as the surgically altered GI tract. Trainees should have a detailed understanding of the indications, adverse events, limitations and contraindications of these procedures, as well as issues with informed consent, sedation, anticoagulation management, and patient education. Trainees should recognize that cautious use of deep enteroscopy is prudent in certain conditions such as severe inflammation and ulceration, recent surgical anastomosis, and in patients undergoing chemotherapy for small-bowel malignancy. These conditions are associated with a higher risk of perforation.²⁴⁻²⁶ Trainees should be competent in diagnosing and managing potential adverse events that may occur during the procedure such as bleeding, perforation, and pancreatitis. Trainees should be able to determine the primary route of enteroscope insertion (antegrade or retrograde) based on clinical presentation and review of relevant endoscopic and radiologic studies. Trainees should understand the periprocedural management of these patients with regard to bowel preparation, which is a standard requirement for retrograde examinations and optional for antegrade examinations. Because patients may require deep sedation or general anesthesia for some deep enteroscopy techniques, trainees must be able to identify the appropriate sedation option for each patient. Once trainees have achieved expertise in upper endoscopy and colonoscopy, they should begin the process of understanding the deep enteroscopy equipment and accessories available at their facility. Trainees should be familiar with the setup of the enteroscope system and be able to troubleshoot as needed. Trainees must be instructed regarding the proper use of the overtube along with the enteroscope and the necessary maneuvers for enteroscope/overtube reduction and advancement. Trainees should also understand the benefits of CO₂ insufflation versus standard room air insufflation and be adept at using fluoroscopy, which may be used during the procedure.^{22,27} Trainees should be able to explain the informed consent in terms understandable to the patient. The development of good communications skills is an essential part of the training and helps in relieving the patient's anxiety and improving the trainees' understanding of the objectives of the procedure.

Procedural considerations. Trainees need to be able to overcome the difficulties associated with the passage of accessories through the enteroscope working channel, approaching the lesion from the appropriate angle and other

therapeutics (eg, dilation, polypectomy, coagulation) that may be required.¹⁰ Trainees should be able to assemble the device and troubleshoot technical problems that may arise. Performing enteroscopy from the retrograde approach requires greater skill, particularly when navigating through the ileocecal valve.²³ Examination of the mucosa is best performed during enteroscopy insertion rather than withdrawal because trauma induced by insertion of the endoscope and pleating of the bowel over the endoscope can be confused with potential bleeding sites.

It is important to ensure the patients' comfort, dignity, and privacy during the procedure. The principles are best taught by example and supplemented by feedback. In the initial period of training, trainees may be overly focused on the technical aspects of the procedure and may need to be redirected to ensure appropriate measures are undertaken to reduce patient anxiety. Communication between the endoscopist, trainee, and the assistants in the room should be clear, concise, and appropriate with regard to patient safety and comfort.

Techniques.

Push enteroscopy. A pediatric colonoscope or a dedicated small-bowel enteroscope is generally used in cases of suspected proximal small-bowel pathology. Advancement of the endoscope deep into the small bowel is limited by this technique, primarily because of looping of the endoscope within the stomach. Using an overtube decreases looping and may allow for deeper insertion. However, previous studies showed no increase in diagnostic yield with the use of an overtube.²⁹

Single-balloon enteroscopy. The SBE system consists of a flexible overtube with a distally attached inflatable silicon balloon, dedicated enteroscope, and balloon pump controller. The enteroscope and overtube are initially passed into the distal duodenum. Through a series of repeated enteroscope advancements, inflation of the balloon, enteroscope reduction, and moving the overtube forward, the enteroscope is advanced to the point of maximal insertion. The same principles apply to the retrograde approach. Trainees should understand the technical differences between the SBE and DBE, which includes the advantages of ease of setup and the ability to use the device in cases of latex allergy, with the limitation being a potential decreased depth of insertion into the small intestine.³⁰⁻³²

Double-balloon enteroscopy. The DBE system uses an enteroscope and overtube, each with an inflatable latex balloon mounted on the tip and a pump system to control both balloons. The small intestine is pleated over the overtube through a process of repeated sequential inflation and deflation of the balloons at the tip of the enteroscope and overtube until the point of maximal insertion. The same principles apply with the retrograde approach. The techniques of enteroscope and overtube advancement and loop reduction need to be learned.³³⁻³⁵

Spiral overtube enteroscopy. This system involves using an enteroscope with a flexible plastic spiral or raised helix fitted overtube. This procedure involves rotating the spiral overtube that is attached to the distal aspect of the

enteroscope while advancing the enteroscope. Trainees should be aware of the advantages, which include ease of setup and the decreased procedure time.³⁶⁻³⁸

Intraoperative enteroscopy. Intraoperative enteroscopy involves the insertion of the enteroscope either through a natural orifice (mouth or anus) or through an incision in the small intestine (enterotomy) with the assistance of a surgeon manipulating the enteroscope through the small intestine. With the advent of deep enteroscopy, the need for intraoperative enteroscopy has declined.

Postprocedure requirements. Once the procedure has been completed, it is imperative that the trainee communicate the results of the procedure including any therapeutic interventions performed and the subsequent management plan with the patient and the referring physician. The trainee should complete the procedural report by using accepted minimum standard terminology. The trainee should be vigilant in the early recognition and management of adverse events as well as inform patients of potential delayed adverse events and the need for prompt medical attention. The faculty should stress the importance of teamwork with regard to preprocedure management, procedure, and postprocedure care with the trainee. The trainee needs to effectively communicate with the referring physician, surgeon, radiologist, pathologist, and other supporting staff on the patient's care team to ensure optimal patient management.

ASSESSMENT OF TRAINING

Formal evaluations of each trainee's endoscopic skills should be obtained, as outlined by the ACGME core competencies.³⁹ Using these ACGME core competencies as an objective guideline for verbal and written feedback will allow each training program an established method of documentation and credentialing. Trainees must receive appropriate and timely feedback on deep endoscopic skills throughout the training experience, including formative and summative evaluations in all areas being evaluated, including the following.

Patient care

Trainees must be able to provide patient care that is appropriate, effective, and compassionate. This would include, but not be limited to, the following: history taking, including family, genetic, psychosocial, and environmental histories, and the ability to perform a comprehensive and accurate physical examination. The ability to arrive at an appropriate differential diagnoses, outline a logical plan for specific and targeted investigations pertaining to the patient's symptoms, and formulate a plan for management and possible follow-up treatment is critical. Review of all diagnostic and/or therapeutic endoscopic options should also be included. Trainees should be able to present the results of each consultation orally and in writing and to defend any recom-

mentations for diagnostic and/or therapeutic endoscopy. Expertise in providing informed consent is essential.

Medical knowledge

Trainees must demonstrate a core fund of knowledge in gastroenterological physiology, pathophysiology, radiology, and surgery. Trainees must be able to demonstrate an analytic approach and use appropriate investigations, including the practice of evidence-based medicine to support any recommended use of CE and deep enteroscopy.

Interpersonal and communication skills

Trainees must be able to demonstrate interpersonal and communication skills that result in effective information exchange with their patients, families, and other health care professionals. This would include, but not be limited to, verbal and written communication as a consultant. Effective communication skills in reviewing the risks and benefits of CE and deep enteroscopy with patients and their families are essential for the informed consent process. Endoscopic reports should be accurate and timely, describing in detail how the procedure was performed. Trainees must be able to work effectively as members and leaders of the health care team.

Professionalism

Trainees must understand and be committed to all elements of professionalism, including respect, compassion, and integrity toward patients and their families and toward other health care professionals. Trainees must demonstrate ethical behavior, responsiveness, and sensitivity to a diverse sex, ethnic, socioeconomic, and aging patient population.

Practice-based learning and improvement

Trainees must be able to investigate, evaluate, and improve their patient care practice by analyzing and assimilating both scientific evidence as well as their own previous endoscopic experience into their practices. They should be able to critically appraise clinical studies relevant to the practice of CE and deep enteroscopy and be able to use information technology to support their own education. They must be involved in teaching and be able to facilitate the learning of other students and health care professionals in CE and deep enteroscopy.

System-based practice

Trainees must demonstrate an understanding of, awareness of, and responsiveness to the larger context and system of health care delivery, particularly with regard to the very specialized care involved in patients undergoing CE and deep enteroscopy. Trainees should understand how their patient care and endoscopic practice affects other health care professionals, including surgeons, oncologists, pathologists, and radiologists who may also be involved in each patient's care. Trainees should practice cost-effective health care when using these invasive tech-

niques, without compromising the quality of care for their patients. Trainees should be able to advocate for timely, quality patient care and know how to partner with other health care providers to provide the optimal health care for their patients.

CONCLUSIONS

This small-bowel endoscopy core curriculum was developed to provide an overview of the key components of the various procedures in current practice. It is recommended that all fellows be trained in CE to a level of competence for independent practice. Although all fellows should have exposure to deep enteroscopy, training should be limited to programs with sufficient case volume, expertise, and trainee intent for using these techniques out in practice. Efforts should be made to record objective measures of competency during the training process.

DISCLOSURE

Christopher J. DiMaio, MD, Consultant: Boston Scientific Corporation and Olympus Corporation of the Americas; Mohammad Al-Haddad, MD, Consultant/Speaker: Boston Scientific Corporation and Abbott. All other authors disclosed no financial relationships relevant to this publication.

Abbreviations: CE, capsule endoscopy; DBE, double-balloon enteroscopy; SBE, single-balloon enteroscopy.

SMALL-BOWEL ENDOSCOPY CORE CURRICULUM REFERENCES BY TOPIC

INTRODUCTION

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