



ASGE principles of endoscopic training

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This White Paper shares guidance on the important principles of training endoscopy teachers, the focus of an American Society for Gastrointestinal Endoscopy (ASGE)/World Endoscopy Organization Program for Endoscopic Teachers and Leaders of Endoscopic Training held at the ASGE Institute for Training and Technology. Key topics included the need for institutional support and continuous skills development, the importance of consensus and consistency in content and approach to teaching, the role of conscious competence and content breakdown into discreet steps in effective teaching, defining roles of supervisors versus instructors to ensure teaching consistency across instructors, identification of learning environment factors and barriers impacting effective teaching, and individualized training that incorporates effective feedback and adapts with learner proficiency. Incorporating simulators into endoscopy teaching, applying good endoscopy teaching principles outside the endoscopy room, key principles of hands-on training, and effective use of simulators and models in achieving specific learning objectives were demonstrated with rotations through hands-on simulator stations as part of the program. A discussion of competency-based assessment was followed by live sessions in which attendees applied endoscopy teaching principles covered in the program. Conclusions highlighted the need for the following: formal training of endoscopy teachers to a level of conscious competence, incorporation of formal training structures into existing training curricula, intentional teaching preparation, feedback to trainees and instructors alike aimed at improving performance, and competency-based trainee assessment. The article is intended to help motivate individuals who play a role in training other endoscopists to develop their teaching abilities, promote discussions about endoscopy training, and engage both endoscopy trainers and trainees in a highly rewarding learning process that is in the best interest of patients. (*Gastrointest Endosc* 2019;90:27-34.)

On February 5 to 7, 2016 the American Society for Gastrointestinal Endoscopy (ASGE)/World Endoscopy Organization (WEO) Program for Endoscopic Teachers and Leaders of Endoscopic Training was convened at the ASGE Institute for Training and Technology in Downers Grove, Illinois (Figs. 1 and 2). The ASGE and the WEO designed the course to bring together leaders in endoscopic training programs across the United States for an educational and collegial weekend to discuss the latest techniques, theories, models, and methodologies related to endoscopic training.

The attendees consisted predominantly of program directors and core faculty members with significant endoscopy training responsibilities at their institution. Experts from Europe, India, Canada, and the United States discussed their approaches to training and assessment and the frameworks they have developed for effective teaching of cognitive and procedural skills.

OVERVIEW

The intent of this article is to detail the proceedings of this meeting as the basis for providing guidance on the important principles of training endoscopy trainers. Based on both informal feedback during the sessions and a formal survey conducted after the course, it was clear

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that the delegates believed this program had a major impact on their perception of their competence and skills as trainers. We hope this article will stimulate and motivate individuals who play a role in training other endoscopists to further develop their ability to teach endoscopy and to promote discussion around endoscopy training related issues with colleagues.

RECOGNIZING THE NEED FOR FORMAL TRAINING OF ENDOSCOPY TRAINERS

The ASGE/WEO course was a 2-day program with a variety of active learning formats, including small-group learning sessions, panel discussions, hands-on demonstrations, and video and live assessment sessions. At the start of the course, attendees were given a perspective on endoscopy training worldwide, followed by a short discussion on developing effective endoscopic training skills. Attendees were informed of an almost universal lack of perception of the need for the training of trainers in endoscopy, even among experienced endoscopists. The attendees confirmed that formal courses directed to endoscopy trainers have not been available at their home institutions, medical schools, training programs, or from professional societies in the United States, despite their interest in such training. Local and national meetings predominantly teach attendees how to perform new techniques and improve their skills at performing existing ones, whereas very little emphasis is given to improving the teaching skills of endoscopy trainers.

The following take-home points arose from this discussion:

1. Institutional commitment (time allocation and funding) to support formal local efforts to train endoscopic trainers is a necessary first step.
2. Individual trainers need to commit to continually developing their endoscopic teaching skills with periodic observation and feedback from others. Trainers participating in existing train-the-trainer programs in the United Kingdom and Canada have noted improvement as endoscopy trainers is best achieved by attending a minimum of 3 to 4 courses over a 2-year period with supervision by experienced trainers. The skills required to be an effective endoscopy trainer continue to improve even after this time frame. The learning curve for these trainers and influence of repeated observations and feedback on their learning remains to be established.

IMPORTANCE OF DEVELOPING A CONSENSUS AMONG TRAINERS ABOUT HOW BEST TO TEACH ENDOSCOPY

The value of a deliberate effort to standardize teaching approaches among trainers was emphasized. Within endoscopy training programs, endoscopists predominantly train others in the relative isolation of a “one on one” approach,

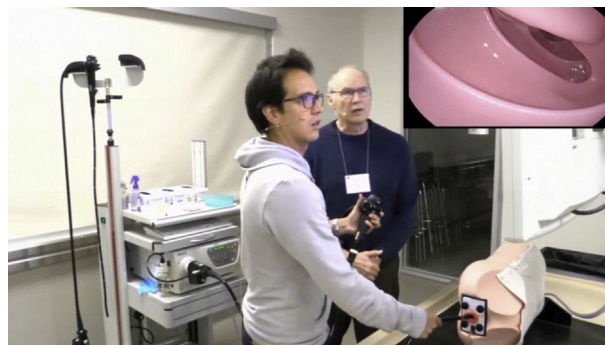


Figure 1. Bedside teaching using a colonoscopy model. The instructor must use consistent language and provide clear instructions (without handling the endoscope).

which may potentially reduce the dissemination of best practices and limit the ability for trainees to observe and understand what the best practices or techniques are. Trainers must accept that the procedural techniques they use may not be effective for most trainees and hence may not be desirable to teach.

The following take-home points arose from this discussion:

1. Trainers within each program must achieve consensus on what is to be taught and how it is to be taught. The lack of standardized principles and teaching approaches may lead to conflicting messages that create confusion in learners.
2. Novice and intermediate learners will benefit from having a consistent message and teaching approach as they develop their skills.

DEVELOPING SKILL AS AN ENDOSCOPY TRAINER: THE IMPORTANCE OF CONSCIOUS COMPETENCE AND THE ABILITY TO DECONSTRUCT TASKS INTO DISCRETE STEPS

The next component of the course was a panel discussion that centered on challenges in the endoscopy training environment. The key message from this discussion was the importance of developing conscious competence for performing and teaching endoscopy.¹ For example, some components of colonoscopy technique, particularly those requiring tactile feedback, require explicit instruction.

“Consciously competent” trainers have explicit knowledge and hence are able to deconstruct tasks, understand each element, and plan training beforehand. They are able to analyze the performance of trainees objectively and can teach the necessary skills by verbalizing sequential steps effectively to the trainee, without needing to take over control of the endoscope to demonstrate the steps. Trainers who are “unconsciously competent” have implicit rather than explicit understanding of their own skill set and what particular techniques are required to perform successfully a particular task; as a result, they cannot verbalize



Figure 2. Feedback. After a training session, each instructor received feedback regarding their performance. This was done in front of all participants, allowing everyone to learn from each episode.

their instructions adequately to a trainee. Attendees learned how repeated performance of the same task results in automation, allowing rapid repetition of a task controlled by the subconscious.² The added advantage of speed provided by subconscious performance limits the ability to teach this task by its very nature, because it no longer consciously controlled. This well-documented phenomenon explains why many endoscopy trainers need to take control of the endoscope from the trainee to demonstrate a skill or problem solve when the trainee is having difficulty. Such trainers are unconsciously competent.

However, unconsciously competent endoscopists can train themselves to become consciously competent trainers. A good first step is to consciously deconstruct various endoscopic maneuvers into their basic elements, following published guidelines when available. To picture task deconstruction, try designing a teaching session for a learner with no prior knowledge or experience in the area. As a simple exercise, list the steps required to tie a pair of shoelaces. How many steps did it take? Next, picture all the steps needed to advance an upper endoscope from the mouth into the upper esophagus. Identify all the knowledge and skills needed to perform this task and explicitly list each component. Note how designing a teaching session for even the easiest endoscopic tasks requires careful thought and planning.

Task deconstruction and acquisition of conscious competence also allows trainers to better understand how to pinpoint the specific problems that a learner may experience and to apply strategies for teaching that are learner specific. This approach can be applied to any component of endoscopy training. Unfortunately, the process of developing conscious competence takes time and requires a significant commitment to learning. Conscious competence can certainly be learned, a fact that can be attested to by endoscopists formally trained in British and Canadian train-the-trainer programs.³ In both countries, trainers participate in national-level programs that use this approach with excellent feedback from both trainees and trainers alike.

The following take-home points arose from this discussion:

1. Development of conscious competence is instrumental for effective endoscopy teaching.
2. The ability to deconstruct complex procedures into discrete component steps provides an organizational framework for teaching, analyzing trainee performance, and providing constructive feedback.

ENDOSCOPY SUPERVISOR VERSUS ENDOSCOPY TRAINER

Another aspect of the learning environment emphasized during the Program for Endoscopic Teachers was the importance of distinguishing between supervisors and trainers. Specifically, trainers should have conscious competence, knowing what to teach and how best to teach it, along with expertise in assessment of trainee performance and providing feedback. Supervisors, on the other hand, are competent endoscopists who may be role models and who can also recognize when endoscopy is being performed adequately but lack the ability to explicitly enhance the skills of the trainee. Ideally, training programs will use these distinctions to differentiate the requirements for being a trainer or a supervisor. The British and Canadian approach to teaching colonoscopy technique by assigning it only to specific trainers was presented as an example. In this scenario, the other endoscopists defer to the assigned trainers where endoscopic technique is involved, focusing instead on other aspects of patient care or teaching. Whether or not teaching duties are assigned selectively in a program, the key issue is that trainees require a consistent message. The reader can imagine the effect on a learner if a formally trained trainer emphasizes the importance of position change in minimizing loop formation and improving endoscopic views during colonoscopy, whereas the other trainers who may be untrained in these techniques insist that position change not be used.

The following take-home point arose from this discussion:

1. The roles of each individual in a training program should be formally discussed based on his or her ability to perform as either a trainer or a supervisor to facilitate standardization of training techniques across instructors.

IDEAL CONDITIONS FOR ENDOSCOPY TRAINING

The culture of the training unit and the learning environment are critical factors for good endoscopy teaching to be accomplished. Creation of a learning environment in which trainees are comfortable asking questions and know when to ask for help can be accomplished through the routine use of a structured training framework. It is difficult to train effectively in a service that is under

pressure to move patients through quickly or in one that does not have a culture that prioritizes and supports the training mission.⁴ An understanding and resolution of financial pressures is necessary if training is to flourish.

Barriers to implementing teaching innovations at their institutions were identified by approximately half of the delegates and included institutional inertia, lack of cooperation from colleagues, time constraints, and lack of access to and costs of simulators. It is our opinion that investment in training, if well structured and delivered, should translate into achieving a high-quality service with the culture and commitment conducive to effective endoscopy teaching. A randomized controlled trial linked an improvement in quality of training to improvement in patient outcomes in a colon cancer screening program.⁵ However, it is important to recognize that effective teaching may not necessarily benefit the training organization itself, so an appreciation of common teaching goals across training programs and institutions is essential.

The following take-home points arose from this discussion:

1. A number of aspects of the learning environment play an important role in supporting the effort to teach endoscopy:
 - Sufficient time allocated to accommodate trainee participation
 - Sufficient available endoscopy trainers with interest and skill in teaching endoscopy
 - Support for the training mission in the priorities of the division and the institution and their leadership
2. Trainers and their institutions need to recognize, strategize, and overcome barriers to implementing a structured teaching framework in their program.

ADAPTING TRAINING TO EACH LEARNER

The next course element consisted of small-group learning sessions that further explored the learner's goals and needs. Attendees were introduced to a framework that permits the trainer to adapt his or her training to different levels of learners.³

There was a consensus among the presenting faculty that training should be centered on the learner's needs. Ideally, there should be an "aligning of agendas" before the start of a teaching session, with the trainer and trainee agreeing on the main focus of training. Typically, however, learning goals appropriate to the case at hand and to the current needs of the trainee are not set before the procedure, and instead unplanned "teaching" is the norm. The learner's level (novice, intermediate, or advanced) should be taken into account by the instructor when aligning agendas, because different learning issues arise in each developmental phase. In the early stages of training, learners are often unaware of the magnitude of their lack of knowledge. It can be particularly problematic when learners are overconfident and lack the ability to

adequately self-assess their weaknesses. The instructor should thus use preplanned training episodes for each level of trainee and further adapt them based on trainee performance and self-reflection on outcomes.

The following take-home points arose from this discussion:

1. Alignment of agendas is important to ensure trainer and trainee expectations are matched.
2. Specific training goals should be set after a discussion between trainer and trainee, before trainees perform procedures.

TRAINING SHOULD ADAPT TO THE LEARNER AS THEIR SKILLS EVOLVE

Instructors should continue to develop their ability to gauge the skill and knowledge level of trainees to tailor trainee learning objectives and responsibilities appropriately throughout the learning process. Training the novice begins with setting expectations, teaching basic endoscope handling, and then instructing them sequentially through learning tasks of increasing difficulty. At this stage of training, the instructor bears most of the responsibility for setting learning objectives, and the training style is more directive. In contrast, teaching the advanced trainee necessitates a delicate balance between the learning needs of the trainee and the safety of the patient, given the higher incidence of adverse events. As with all endoscopy teaching, patient safety is paramount. This fine balance comes into play when teaching cannulation techniques in ERCP, for example, or advanced polypectomy techniques. The trainer should allow advanced trainees to play a larger role in setting learning objectives, particularly as their skill in self-assessment improves over time. Topics of interest may also move more toward effectively managing an endoscopy list, practice management, and a commitment to lifelong learning.

EFFECTIVE FEEDBACK

Feedback improves trainee performance and is an essential element of effective teaching. The following take-home points arose from this discussion:

1. Feedback is most effective and useful when there has been explicit communication of the learning objective(s) before the teaching encounter. The feedback should directly relate to the stated learning objective.
2. Feedback should be limited to 1 or 2 major points at a time (there should only be 1 to 2 major learning objectives per procedure) to avoid overloading the learner.
3. Feedback should be provided to trainees routinely and in a timely manner, ideally during or soon after the training procedure.
4. During the feedback process, the trainer should ask probing questions to assess the trainee's understanding of the learning objective and to determine if the

trainee's expectations and self-assessment have changed as a result of the training session.

5. Feedback should be specific and should offer solutions and not just point out problems with the learner's technique, for example, providing detailed step by step instructions on how to resolve a loop.

GROUND RULES IN ENDOSCOPY TRAINING

Another element of instruction addressed during the program related to the hierarchy of needs. Although the trainee's learning needs are important, patient safety should always be the primary consideration. This allows clarity on when the trainer should take over control of the endoscope from a trainee and when the endoscope may be returned to the trainee. Specifically, trainers should take over control of the endoscope when it is clear that a trainee can no longer progress without help or without putting the patient at risk. For this to be a "matter-of-course" process, this ground rule should be covered with trainees before entering the procedure room. Ideally, there should be an explicit discussion with trainees that such occurrences do not imply failure on their part or do they imply an end to the teaching exercise and opportunity. This safety-related ground rule contrasts with the effective teaching technique of taking temporary control of the endoscope to demonstrate what needs to be done when verbal instructions do not suffice and then returning the endoscope to the learner try to complete a maneuver.

The following take-home point arose from this discussion:

1. Patient safety carries the highest priority in the hierarchy of needs within the training setting, and ground rules to ensure this should be explicitly set during the preprocedure discussion between trainer and trainee.

INCORPORATING SIMULATORS INTO ENDOSCOPY TEACHING

The program next presented an overview of the use of simulators in teaching endoscopy and provided tips for conducting a successful hands-on workshop. Also in this issue of *Gastrointestinal Endoscopy*, the ASGE published a white paper stemming from the 2017 Endovators Summit addressing the role of simulators in teaching endoscopy and assessing skill and a Technology Update on the role of simulators in endoscopy.^{6,7} Delegates were given concrete, practical tips on how to set up hands-on training at their own institution, including information on appropriate equipment, faculty-to-student ratios, and more. It is common for trainers who have never run a hands-on workshop to underestimate the amount of planning and organization that is required to run a successful program, like any other form of teaching encounter. In a well-conceived and well-conducted hands-on training session, the principles of

education outlined in this article are applied to the lessons planned and the mode of instruction used.

The following take-home points arose from this discussion:

1. Logistics of hands-on simulator training sessions must allow for sufficient time to incorporate demonstration of proper technique broken down into component steps, trainee endoscopy time for deliberative practice of specific skills, and instructor feedback.
2. Appropriate selection of learning objectives is essential to conducting a successful workshop. These objectives must be appropriate to the needs of the targeted trainees and sufficiently limited in scope to allow ample time for the number of attendees to achieve them.
3. Certain tasks require a longer time to teach as well as to practice, and trainees will benefit from repeat opportunities for hands-on experiences in these tasks.
4. Trainers at hands-on workshops need to know how to perform the procedures and how to teach with cognitive competence. They should also have experience with teaching on the particular simulator models being used in a given workshop.
5. Hands-on training is rewarding for trainer and trainee alike but is labor and resource intensive.
6. Computer-based simulators offer opportunities for independent practice but have major drawbacks in terms of cost, availability, and, to date, usefulness in practicing complex therapeutic techniques.

KEY PRINCIPLES OF TEACHING USING SIMULATORS

After these small-group sessions, attendees rotated through hands-on simulator stations designed to have them directly experience the key principles of hands-on training. This session demonstrated how simulators and models could be used to effectively achieve specific learning objectives. Many general principles of endoscopy teaching outlined in this article were applied and illustrated using mock teaching encounters on various plastic inanimate and ex vivo animal models. Trainers practiced developing a specific learning objective for each episode of training and communicating this with the trainee. They were asked to try to identify appropriate procedure training goals for a given trainee at a given point in their training and to limit the focus of the training episode, when necessary, to achieving that goal. Attendees quickly learned that in some situations this objective could require integrating all elements of a procedure, whereas in others it might be equally valid to limit teaching to a very finite and specific deconstructed element that needed improvement.

Attendees also experienced a phenomenon common to learners, that of cognitive overload, which can interfere with learning. This may occur when trainees attempt to absorb too much new information rapidly or attempt to focus on 2 different issues simultaneously. For example,

asking the trainee to explain what they are doing during the procedure can often be counterproductive. Cognitive overload can also occur more subtly in settings where a learner is nervous, upset, or frustrated. It is important for instructors to check for understanding and for cognitive overload before providing additional teaching.

In these sessions, attendees also experienced how simulators, endoscope imagers, and other resources can be used to address specific learner needs. Unique learning opportunities and teaching techniques not easily achievable during procedures on patients were demonstrated:

- Blindfolded endoscopy to promote precise, standardized verbal instructions
- Role play practice of endoscopist-assistant communication
- “What not to do” exercises (including instructor demonstration and attendee recognition) of common incorrectly performed and potentially dangerous techniques
- “Getting out of a jam” exercises incorporating troubleshooting during difficult emergency endoscopy scenarios. Simulators allow repeated practice of these “high-stakes” skills, which may be lifesaving in these rare scenarios.

The following take-home points arose from this session:

1. The same general principles of good endoscopy teaching apply to teaching using simulators.
2. Models and simulators allow teaching and practice of endoscopic techniques and interventions in certain scenarios that may be less feasible on real patients because of rarity of occurrence of these scenarios and of patient safety concerns.

COMPETENCY-BASED ASSESSMENT OF ENDOSCOPY TRAINING

After these hands-on sessions, attendees returned to a large-group session to discuss the issues of trainee assessment, competency, and feedback. During trainee development, attendees heard that formative assessment is a fundamental element of training. By having a structured approach to assessment using a competency framework and direct observation of procedural skills, an instructor can easily and systematically identify areas of deficiency. Using structured validated assessment tools can be particularly useful when a trainee works with multiple different trainers.⁸

Attendees also heard how competency frameworks for formative assessment are gradually becoming the new standard in North America. Both the United States and Canada have moved to a competency-based model for postgraduate medical education. In these contexts, both formative and summative assessments are used, the latter being a structured approach to determining whether a trainee can practice independently. The increased adoption of a competency-based model should bring greater

consistency over time and reduce the likelihood of credentialing poor performers for independent practice.

It was emphasized that reliable summative assessment of competency requires objective review of multiple procedures to ensure the trainee has achieved consistent performance at a predetermined acceptable level of skill. Lack of appreciation of this need for consistent performance may result in inappropriate confidence regarding an individual ability or skill level. Understanding how surrogate measures (key performance indicators/report cards) are inter-related enables a more objective and valid continual assessment of quality, which is also an important consideration for all endoscopists, particularly those already in practice.

The following take-home points arose from this session:

1. Use of available objective competency assessment tools have value for both formative and summative assessment but require application over multiple procedures to provide reliable information.
2. Objective assessment tools deconstruct tasks and provide frameworks conducive to identifying learning needs and providing useful feedback to trainees.

PRACTICING ENDOSCOPIC TEACHING

The final live training session at the workshop allowed the attendee trainers to implement their newly learned principles on local trainees in the hands-on lab. Attendees were asked to set training session goals, deconstruct the training, implement the structured teaching framework, and provide trainees with feedback. The encounters were videotaped and reviewed by the attendees and experienced educators running the exercise, who then provided feedback to the volunteer trainers on their training episode. In this exercise, the entire focus was on feedback directed at the teacher. This activity emphasized the effectiveness of best endoscopic training practices, reinforcing many of the principles discussed throughout the program.

ORGANIZING TRAINING OUTSIDE OF THE ENDOSCOPY ROOM

The other small-group sessions focused on specific issues germane to planning a structured teaching program:

1. Approach of training programs on the teaching of advanced procedures with a consideration of training to exposure versus training to competency. The use of tracking to identify and focus advanced endoscopy training on trainees with an aptitude for and desire to pursue such training was discussed.
2. Approaches for institutions to incorporate new technologies and techniques into their training programs, including programs without specific local expertise or sufficient case volume.
3. Best approaches and available resources for trainers to help trainees develop cognitive skills, such as

recognition of abnormalities, identification of pathology, and development of appropriate management decisions based on endoscopic findings.

4. Introduction of trainees to the issues of safety and professionalism in the endoscopy suite.

PROGRAM FOR ENDOSCOPIC TEACHERS AND LEADERS OF ENDOSCOPIC TRAINING FEEDBACK

The workshop terminated with a debriefing session at which participants were asked to revisit their original learning objectives and reflect on what they had learned. They were asked to commit to new learning objectives that they intended to accomplish after the workshop. The overall workshop structure and approach was therefore similar to the training philosophy for the endoscopy suite, starting with a mutually agreed on learning objective, providing feedback that improves performance, giving the learner time for reflection, and closing with a debriefing that results in a new objective.

Delegates universally indicated an improvement in their ability to identify new methodologies and techniques that may be applied to teaching endoscopy, share training methodologies with fellow trainers at their own institutions, use appropriate models for teaching diverse techniques in endoscopy, and incorporate the latest strategies for assessing trainee competency. Attendees listed specific changes they planned to implement in their own training programs, such as teaching highlights of the workshop to other endoscopy trainers within their group, reviewing the endoscopy training process with faculty at an annual fellowship retreat, working with new endoscopy models and simulators, and implementing changes in training and feedback for fellows including incorporation of deconstructing techniques in their teaching process.

The following take-home points arose from this session:

1. It is important to have a structured framework for teaching within the fellowship program that incorporates a generally adopted plan for trainers to assess each trainee's learning needs, develop trainee specific instruction plans, and give regular constructive feedback.
2. Planning in teaching should be incorporated at the program level.
3. Trainers should identify the learner's needs and use these to set an objective agenda between trainer and trainee.
4. Objective competency assessment tools should be formally incorporated within training programs.

CONCLUSIONS

There is a need for formal training of endoscopy trainers to the level of conscious competence, which in turn will enable improved endoscopic education of trainees. Existing training curricula should be adapted to incorporate formal training structures, which will improve the

effectiveness of training. Preparing for teaching is essential, and feedback should be aimed at improving performance. Formative and summative assessments of endoscopy training should be competency based. With the incorporation of good training techniques, both endoscopy trainers and trainees can engage in a learning process that is highly rewarding and in the best interests of our patients.

ENDORISING ORGANIZATION

The World Endoscopy Organization endorsed this document.

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Abbreviations: ASGE, American Society for Gastrointestinal Endoscopy; WEO, World Endoscopy Organization.

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