

Training in patient monitoring and sedation and analgesia

This is one of a series of statements discussing training issues for gastrointestinal endoscopy. The Training Committee of the American Society for Gastrointestinal Endoscopy prepared this text. A previous guideline related to this topic (Gastrointest Endosc 1998;47;669-71) was published in 1998. Since that time, new information has become available which requires an update of this statement and its recommendations. In preparing this training guideline, a MEDLINE literature search was performed, and additional references were obtained from the bibliographies of the identified articles and from the recommendations of expert consultants. When inadequate data existed from well-designed prospective trials, emphasis was given to results from large series and reports from recognized experts.

Guidelines for appropriate training in endoscopy are based on a critical review of the available data and expert consensus. Controlled clinical trials are needed to clarify aspects of this statement, and revision may be necessary as new data appear.

INTRODUCTION

The ability to provide sedation and analgesia safely and effectively and the ability to ensure the clinical stability of patients by appropriate monitoring during GI endoscopy are skills that endoscopic trainees must develop. In the past decade, the introduction of new medications and the widespread dissemination of a variety of automated monitoring devices transformed the practice of endoscopy. Although both upper endoscopy and colonoscopy may successfully be performed in the absence of systemic medication, randomized prospective trials involving gastroscopy suggest that sedation enhances patient tolerance of the endoscopic examination.¹ Similar data regarding colonoscopy are not yet available.

At present, the vast majority of patients undergoing GI endoscopy in the United States receive intravenous medication, usually a combination of a narcotic and a benzodiazepine, with a very low reported incidence of sedation-induced complications.² Despite an excellent overall safety record, cardiopulmonary complications, likely, in large part, because of sedative and analgesic medications,

are believed to account for 50% and 60% of procedure-related morbidity and mortality, respectively. Accreditation bodies and professional societies have acknowledged that moderate sedation is safe, but potentially serious cardiopulmonary events, such as hypoxemia, apnea, hypotension, airway obstruction, and cardiopulmonary arrest, can occur.³⁻⁶ Critical-event analyses have linked prolonged hypoxemia secondary to respiratory depression as the precipitating event in cases of pediatric sedation.^{7,8}

Appropriate training in these skills is thus essential to the provision of patient safety and comfort before, during, and after each endoscopic examination. This Guideline defines the cognitive and procedural skills that must be conveyed to the trainee, and the optimal setting and methods for conducting such training.

CONTENTS OF TRAINING

The goal of training in patient monitoring and sedation techniques is to enable the trainee to provide maximal patient safety and comfort uniformly during each type of endoscopic procedure, and to concurrently optimize the diagnostic and therapeutic success of the procedure. To achieve this, the trainee must achieve mastery of a broad variety of information. The curriculum of the training program should incorporate the following critical concepts and practices:

1. Trainees must be able to provide the patient with adequate preprocedure education regarding the sedation/analgesia aspects of the examination.^{2,3}
2. The trainee endoscopist must obtain appropriate patient information in the preprocedure clinical assessment (history and physical). It should be stressed that this initial evaluation may identify cases, such as uncooperative patients, patients with drug- or alcohol-abuse histories, patients taking high doses of narcotics or benzodiazepines, or patients with instability because of comorbid conditions, where the use of general anesthesia as an alternative to conscious sedation and analgesia constitutes the safest and most prudent approach.^{2,3,9}
3. The trainee must be instructed in the precise definitions of the various levels of sedation, such that the trainee understands both the physiologic characteristics and the clinical and medicolegal implications of conscious (light) sedation, deep sedation, and general anesthesia. The trainee must realize that sedation is a continuum.

- Deeper than intended levels of sedation are not uncommon and must be managed appropriately.^{3,9,10}
4. The trainee must develop a thorough understanding of the pharmacology of all drugs used for sedation/analgesia, including mechanisms of action, appropriate dosing intervals, the potential for drug–drug interactions, the effects of patient comorbidity and patient age on the process of sedation, and the rational usage of reversal agents. This training should include the combination of a benzodiazepine and opioid, as well as potential adjunctive agents, such as phenothiazines.¹¹ The trainee should be familiar, in principle, with the use of propofol administration for procedural sedation. The advantages and disadvantages of topical pharyngeal anesthesia and the use of careful incremental drug dosing, titrated to achieve specific clinical end points, should be taught.¹²⁻¹⁴ The trainee must also learn which patients may not be candidates for standard sedation regimens and may require monitored anesthesia care.⁹
 5. Endoscopists in training must understand basic cardiopulmonary physiology and pharyngeal anatomy, and be able to establish and maintain an adequate airway. This may include the following:
 - a. The principle of pulse oximetry, including physiologic and nonphysiologic causes of abnormal values, such as vasoconstriction, alveolar hypoventilation, ventilation-perfusion mismatch, and the effect of variability in sampling rates on the detection of sampling of hypoxemia.¹⁵⁻²¹
 - b. The use of electrocardiographic monitoring in patients with known or suspected cardiovascular disease.
 - c. The principles of capnography as an adjunct to pulse oximetry and visual inspection, particularly in patients undergoing prolonged procedures or receiving deep sedation.²²
 - d. The appropriate use of oxygen, because it may decrease the incidence of electrocardiographic changes in patients with and without a history of cardiovascular disease.¹⁵⁻²¹
 - e. Although advanced airway management may be required rarely, instruction in the use of basic airway skills should be emphasized. These include the following:
 - i. Head tilt maneuver
 - ii. Jaw thrust maneuver
 - iii. Placement of a nasopharyngeal airway
 - iv. Placement of an oropharyngeal airway
 - v. Bag mask ventilation
 6. Trainees must comprehend the essential role of the well-trained GI nurse or assistant in providing optimal patient monitoring and must be aware of the circumstances in which additional personnel are required, such as ERCP and complex therapeutic interventions, so that 1 assistant may remain primarily focused on monitoring the patient. It should be emphasized that, in the case of deep sedation, a person who is present for the uninterrupted observation of the patient's respiratory and cardiovascular status is required.^{4,5}
 7. Clinical parameters to be monitored during the procedure and appropriate standards of intraprocedure documentation must be understood. The trainee, who initially will be focused on mastering the technical basics of endoscopy, must appreciate that, although the assistant plays an essential role, ultimate responsibility for all aspects of the monitoring process rests with the endoscopist.
 8. The appropriate role of automated monitoring devices should be conveyed, including routine pulse oximetry and selective use of continuous electrocardiographic and blood pressure monitoring. It is essential that trainees appreciate that the use of pulse oximetry and other monitoring devices does not replace direct clinical assessment and observation of ventilatory function, in particular, given the potential for severe hypoventilation and hypercapnia in patients on pulse oximetry who are receiving supplemental oxygen.^{4,5}
 9. The trainee should understand the significant risk of postprocedure complications of sedation and analgesia, and learn appropriate standards of postprocedure monitoring and predischarge assessment.
 10. The trainee should be familiar with antagonistic agents of those sedative and analgesic drugs in common use, including their pharmacology, duration of action, and indications. The trainee should also be knowledgeable about the necessity for monitoring patients after use of these antagonists to detect spontaneous re-sedation and unexpected respiratory depression.^{4,5}
 11. Trainees must understand the risks of using sedatives and analgesics in women who are pregnant. They must be aware of the Food and Drug Administration safety classification of each medication that is administered during endoscopy to a woman who is pregnant. Trainees should also learn which clinical situations necessitate consultation with an anesthesiologist before sedation.
 12. Trainees in pediatric GI endoscopy will often require special training and experience in sedation and monitoring techniques beyond that needed for endoscopy in adults, in part, because of highly unpredictable drug metabolism in children and a much greater reliance on deep sedation and general anesthesia. The curriculum for trainees in this field should, in addition, reflect established guidelines pertaining to the monitoring of children during procedures.

METHODS AND SETTING OF TRAINING

Training in patient monitoring and the administration of sedatives and analgesics should occur within the context of a global training program in GI endoscopy, which, in turn, should be conducted at accredited residency or

fellowship training programs within the disciplines of GI medicine, pediatric gastroenterology, or surgery. Much of the training process occurs within the endoscopy suite, with trainees learning appropriate sedation and monitoring practices while performing endoscopic procedures under the close supervision of an expert endoscopy instructor. Simultaneously, trainees learn through practice the technical and cognitive aspects of endoscopy. Clinical training must be complemented by a comprehensive didactic review of pharmacology, cardiopulmonary physiology, principles of anesthesiology, and other relevant areas. This must be achieved through a combination of supervised independent study, lectures, and topic reviews at academic conferences.

The development of a procedural sedation curriculum with problem-based learning modules should be considered. This should include sections on basic pharmacology, physiologic monitoring techniques, recognition of various levels of sedation, appropriate dosing of medications for procedural sedation, basic airway management skills (including training on models), and the recognition and management of complications stemming from procedural sedation.

A periodic morbidity and mortality conference or some other forum to review complications also is essential. Each endoscopy instructor should be an accomplished endoscopist with well-established clinical skills and a thorough mastery of all aspects of current practice in sedation/analgesia and patient monitoring. Ultimate responsibility for the training program lies with the training program director.

Training in patient monitoring and sedation outside of such traditional residency pathways is theoretically possible but in most cases is impractical. Weekend or "short" courses may provide useful information and serve as valuable refreshers but are inadequate as the sole source of training.

ASSESSMENT OF SKILLS

Objective data that quantified the experience needed to achieve competence in GI endoscopy are sparse, and no studies specifically address trainees' acquisition of skills in sedation and patient monitoring. In this setting, as with other aspects of endoscopic training, the determination of each trainee's competence in these areas rests on the subjective, expert assessment of the endoscopy instructor and the training program director. Procedural assessment forms are available, which include the components of the procedural sedation curriculum.²³ Maintenance of ongoing competence remains the responsibility of hospital credentialing bodies.

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This document is a product of the Training Committee. The document was reviewed and approved by the Governing Board of the American Society for Gastrointestinal Endoscopy.

Results from *GIE* online polling

We asked and you answered. Here are the results of the latest *GIE* online poll.

In regards to NOTES in 2017, the GI endoscopist will be:

- (42 votes, 24%) An expert, performing NOTES, EMR, ESD, interventional ERCP, etc
- (49 votes, 28%) Not involved anymore with NOTES, which will be done by laparoscopic surgeons
- (48 votes, 27%) An “endoscopic interventionalist” with both GI and surgical training
- (37 votes, 21%) Performing NOTES together with a laparoscopic surgeon

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