



TABLE 1. List of core technical, nontechnical, and cognitive skills for colonoscopy

Technical	Nontechnical	Cognitive
<ul style="list-style-type: none"> <li>• Correct positioning of the endoscope</li> <li>• Use of endoscope controls, including angulation control knobs</li> <li>• Endoscope insertion</li> <li>• Effective endoscope advancement including tip control and torque steering</li> <li>• Strategies for endoscope advancement including patient position change</li> <li>• Loop reduction</li> <li>• Intubation of terminal ileum</li> <li>• Achieve a clear luminal view required for mucosal inspection on withdrawal, including good visualization around corners and folds and appropriate use of mucosal cleaning techniques (eg, lavage, suction)</li> <li>• Biopsy sampling technique</li> <li>• Polyp removal techniques (snare, biopsy)</li> </ul>		

Training programs must maintain an environment that is conducive to quality endoscopy education. This includes not only adequate procedural equipment, staffing, and compliance with work-hour guidelines but also from departmental and institutional standpoints.<sup>6</sup> Access to simulation capability is also beneficial as discussed below in the initial hands-on training section.

Knowledge of GI anatomy, colon preparation, procedure indications and contraindications, sedation, and airway management is essential. These can be taught using various methods from didactic lectures series, core reading requirements including ASGE guidelines, and even multimedia educational tools.

Training in the techniques of colonoscopy must go hand-in-hand with the development of good preprocedural assessment habits. Staff should instruct trainees to review pertinent medical information (surgical history, medical history, medications, etc) on each patient.<sup>7</sup> Prior sedation issues and previous endoscopic findings should be reviewed. A thorough knowledge of how each of these factors relates to

Before fellows begin hands-on training, some basic cognitive, technical, and nontechnical skills are required.

colonoscopy indications, contraindications, adverse events, informed consent, patient education, and anticoagulation management is essential and should be taught to all trainees.<sup>8-10</sup> Full reviews of these topics are beyond the scope of this document but are covered in ASGE guidelines referenced and are also available on the ASGE website ()

formation of loops. A finger grip makes it easier to detect resistance and maximizes rotation of the shaft between the fingers and thumb, as compared with a fist grip.<sup>28</sup> A 2-handed technique, where the right hand is intermittently removed from the colonoscope shaft and used to



withdrawal (to allow for visualization of the mucosa on the way out) should be taught to all trainees. Baskets or retrieval nets are useful to retrieve multiple polyps but at an added cost.

**Delayed or immediate hemorrhage.** Delayed or immediate hemorrhage occurs in less than 1% of polypectomies; therefore, many trainees will have very limited direct experience with its treatment.<sup>57-60</sup> The endoscopic trainer is urged to review the proper approach to postpolypectomy bleeding with the trainee before an actual occurrence. The techniques used are similar to those used in other types of GI bleeding, and trainees must ultimately feel confident in the management of postpolypectomy bleeding. As with all GI bleeding, an appreciation of a team approach with surgeons should be fostered and routine measures for lower GI bleeding carried out.

**Angiodysplastic lesions (angiodysplasia).** Angiodysplastic lesions may be difficult to visualize, especially in an acute bleeding situation. Trainees need to be able to identify these lesions and distinguish them from other vascular markings in the colonic mucosa. Optimal bowel preparation is essential. In addition, trainees must be taught to pay attention to the mucosal detail during initial colonoscopy advancement to prevent and recognize mucosal hemorrhage from scope trauma. Trainees should be familiar with argon plasma coagulation, which is frequently used for obliteration of angiectasias because this instrument generally produces more superficial cautery effect and reduces deep tissue injury.<sup>61,62</sup> It may also be especially advantageous for the treatment of radiation-induced angioectasia of the rectum.

**Lower GI bleeding.** A full discussion of evaluation and treatment of lower GI bleeding is beyond the scope of this document. Endoscopic techniques may be considered in these selected cases as part of a multidisciplinary team approach where angiography and surgery are also considered.

**Colonoscopy for treatment of colonic pseudo-obstruction (Ogilvie syndrome).** Colonoscopy for treatment of colonic pseudo-obstruction must be undertaken without the benefit of bowel preparation with minimal air inflation and maximal suction used while negotiating the colon. Therefore, these emergency procedures are best performed by experienced colonoscopists with experienced trainees under extremely close supervision. Reasonable attempts to achieve cecal intubation should be made; prolonged attempts are inadvisable. Placement of a colonic decompression tube should be strongly considered given the high recurrence rate after colonic decompression alone. Trainees should become familiar with the various techniques used to place decompression tubes.

**Colonoscopic decompression.** Colonoscopy is frequently used for derotation and decompression of colonic volvulus. Trainees should be instructed that once the narrowing of the volvulus is traversed with gentle pressure, prolonged suctioning should be applied and the mucosa inspected for signs of ischemia. Emergency surgery is indicated if gangrenous mucosa is identified. If not, colonoscopic decompression can be a temporary method to allow patient preparation for elective surgery. Trainees should understand recurrence rates are high using colonic decompression alone.<sup>63</sup>

**Self-expanding metal stents.** Self-expanding metal stents designed for colonic use can provide palliation or relief of obstruction to allow preoperative bowel preparation in patients with obstructing colorectal tumors.<sup>64,65</sup> Training in the use of self-expanding metal stents may be appropriate for select trainees, but education in this therapy is usually reserved for trainees in advanced endoscopy fellowship programs.

**Tattooing.** Tattooing is often used to mark the site of a lesion to localize the affected area before resection. In addition, polypectomy sites may be tattooed to allow accurate localization during future surveillance colonoscopy. It is performed using commercially available needles and available carbon suspension. Trainees should be able to perform tattooing, which is identified in the literature as a necessary skill for endoscopic procedures.

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