Canadian credentialing guidelines for colonoscopy

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A series of credentialing guidelines for gastrointestinal endoscopic procedures performed in the management of adult patients has been developed by the Canadian Association of Gastroenterology (CAG) Endoscopy Committee, approved by the Clinical Affairs Committee, and reviewed and endorsed by the Executive Board. In the present article, the CAG suggests specific guidelines for credentialing colonoscopy. It is intended to be read in conjunction with the introductory article that outlines the principles of credentialing (1).

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The CAG does not credential individuals for colonoscopy; that is the responsibility of the endoscopist's local institution or facility. The purpose of these guidelines is to provide a framework that will allow organizations to assess the training and competence of applicants to perform colonoscopy as part of the credentialing process for the granting of privileges.

Colonoscopy is performed to visualize the colonic mucosa, and can be both a diagnostic and therapeutic procedure; it requires the passage of a specialized endoscope – a colonoscope – via the anus or a colostomy to the cecum and, in some cases, to the terminal ileum. The purpose of the procedure is to document any abnormalities, to take biopsies and perform photographic documentation when appropriate, to remove polyps, or to perform therapy such as stricture dilation or hemostasis, if necessary, while minimizing procedure-related risks such as excessive sedation, cardiorespiratory compromise, bleeding and colonic perforation.

COGNITIVE ASPECTS

Appropriate indications

Knowledge of appropriate contraindications and indications for colonoscopy, and the application of appropriate screening and surveillance intervals, is essential. Appropriate indications for colonoscopy, recommended by the American Society for Gastrointestinal Endoscopy (ASGE) and the U.S. Multi-Society Task Force on Colorectal Cancer, are shown in Table 1 (2). An indication should be documented for each procedure, and if it is a nonstandard indication, it should be justified in the documentation (3). Studies have shown that when colonoscopy is performed for appropriate reasons, significantly more clinically relevant diagnoses are made (4-6). However, underutilization of colonoscopy for appropriate indications has also been reported. One survey of 168 internal medicine residents found that only 29% of residents recommended colonoscopy after a positive fecal occult blood test (7).

TECHNICAL ASPECTS

Technical skills

The credentialing criteria discussed in these guidelines have been evaluated with respect to colonoscopy in adult patients aged 18 years or older. The basic principles of credentialing also apply to colonoscopy by pediatric gastroenterologists in children, but the absolute numbers of procedures required to achieve and maintain competence may differ; guidance on credentialing for pediatric endoscopy is, therefore, considered to be the responsibility of the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition.

Minimum number of procedures: The number of procedures completed is currently the only objective measure that is available to assess competence upon completion of training and subsequently, in practice, to document maintenance of competence. Other measures are clearly important and relevant, but they are difficult to assess because there are currently no objective measures of their magnitude or effect. The most recent recommendation from the ASGE and the American College of Gastroenterology, is that 140 supervised, 'hands-on' colonoscopies should be considered as the competency threshold (ie, the threshold at which the technical component of competency should begin to be assessed) (8,9). Performance of a specific, predefined number of procedures does not guarantee competence in colonoscopy (10-12), and a practitioner's technical competence should be assessed on an individual basis. The Gastroenterological Society of Australia recommends that at least 100 of the training colonoscopies should be complete (ie, at least to the cecum and preferably into the ileum), and completed without assistance (13).

Withdrawal times: A measurement of withdrawal time (the time from intubation of the cecum until withdrawal of the colonoscope from the anus) can be used as a quality indicator, because it has been correlated with adenoma detection rate (3,14,15). A mean withdrawal time of 6 min to 7 min or longer

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TABLE 1
Indications for colonoscopy

- Evaluation, by barium enema or other imaging study, of an abnormality that is likely to be clinically significant, such as a filling defect or stricture
- Evaluation of unexplained gastrointestinal bleeding
- Unexplained iron deficiency anemia
- Screening and surveillance for colonic neoplasia
- Chronic inflammatory bowel disease of the colon, if a more precise diagnosis or determination of the extent of activity of disease will influence immediate management
- Clinically significant diarrhea of unexplained origin
- Intraoperative identification of a lesion not apparent at surgery (eg, polypectomy site or location of a bleeding site)
- Treatment of bleeding from lesions such as vascular malformation, ulceration, neoplasia and polypectomy sites (eg, electrocoagulation, heater probe, laser or injection therapy)
- Foreign body removal
- Excision of a colonic polyp
- Decompression of acute nontoxic megacolon or sigmoid volvulus
- Balloon dilation of stenotic lesions (eg, anastomotic strictures)
- Palliative treatment of stenosing or bleeding neoplasms (eg, laser, electrocoagulation and stenting)
- Marking a neoplasm for localization

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has been associated with a higher detection rate of adenomas (3,14,15). In one study (16), practitioners who had withdrawal times longer than 6 min had a detection rate for advanced neoplasia of 6.4%, compared with 2.6% for practitioners who averaged shorter than 6 min of withdrawal time. Some studies may have been confounded by the extra time needed to remove any polyps found on withdrawal (14); however, more recent studies (16,17) have reported lower polyp detection rates for endoscopists who had shorter withdrawal times during 'negative' colonoscopies (ie, procedures during which no polyps were detected). In the study, the median withdrawal time was 6.3 min, while the median polyp detection rate was associated with a withdrawal time of 6.7 min. Although endoscopists with a polyp detection rate at or above the 90th percentile had a mean withdrawal time of 11.9 min or longer, the authors proposed that the withdrawal time should be at least 7 min (17,18).

Documentation of an individual's mean withdrawal time during negative colonoscopies may be useful in assessing the quality of endoscopic practice for those practitioners who report unexpectedly low or high polyp detection rates. However, it is important to note that standard withdrawal times are not necessarily applicable in individual cases, because differences in colon length, quality of colon preparation and the degree of prominence of haustral markings affect the withdrawal time required to examine the colon adequately (3).

Time to completion: It has been suggested that a mean procedure duration of 30 min is reasonable to permit completion of an adequate colonoscopy (10), although the precise time varies, depending on whether the studies have documented the total procedural time or the 'anus-to-cecum' time. In general, shorter procedural times are preferred to minimize patient discomfort, sedation requirements and costs, while recognizing that withdrawal times should be at least 6 min to 7 min, as discussed above. Furthermore, the speed of insertion needs to balance the trade-off between efficiency in resource utilization on the one hand, and accuracy and patient comfort on the other hand. If the insertion is too rapid, it may reduce the accuracy of lesion detection while increasing patient discomfort, the need for sedation and sedation-related complications.

Generally, the duration of the procedure diminishes with greater training and experience (12,19,20). Studies (12,20,21) report that the median time to the cecum is approximately 15 min to 25 min for trainees, compared with 7 min to 20 min for supervisors.

Success rates

Cecal intubation rates: Cecal intubation rates have commonly been used as a marker for 'colonoscopy completion'. Competent colonoscopists should be able to intubate the cecum in at least 85% to 90% of all cases (3,13,22) and in at least 95% of cases when the indication is for screening in a healthy adult (3). Cecal intubation rates ranging from 76% to 99% have been reported (21,23-25). The differences in intubation rates may be attributable, in part, to the duration and intensity of the endoscopists' training, because family physician colonoscopists have reported lower cecal intubation rates of 54% to 85% (26-28). Cecal intubation rates improve with increasing experience, as measured by the total number of procedures performed (10-12,29,30). It has also been suggested that success rates are greater for endoscopists who perform more procedures annually (31), particularly in the early years of their practice (32). The fact that success rates are higher for endoscopists who perform at least 100 to 200 procedures per year (31,32) suggests that maintenance of competence requires continued experience in a clinical setting. Further study is needed to elucidate the specific factors responsible for failure to intubate the cecum, but for the present, the evaluation of reported cecal intubation rates is an important means of documenting technical skills for colonoscopy.

For this reason, it is important that endoscopists are able to recognize cecal landmarks reliably; trainees, for example, have been shown to significantly overestimate the achievement of cecal intubation (10). In this context, photodocumentation of cecal intubation is particularly important, both for clinical practice and for documentation of the endoscopist's colonoscopy completion rates. Visualization of the cecum should be noted, at a minimum, by documenting the identification of appropriate landmarks (eg, appendiceal orifice, ileocecal valve or terminal ileal mucosa) and, if possible, by photodocumentation. Unfortunately, photodocumentation equipment is not available in many endoscopy units, and if it is available, there are no formal image storage protocols. Nonetheless, visualization of landmarks should ideally be documented for every procedure (3).

Ileal intubation rates: With practice, ileal intubation can be achieved in 80% to 85% of colonoscopies (21,33,34), but an 85% success rate may not be achieved until the endoscopist has performed 600 procedures (21). The average time required for ileal intubation is approximately 3 min (20,21,33,34). Trainees are less likely to be successful, and even if they are successful, they can take up to twice as long to achieve ileal intubation.

Ileoscopy can improve the diagnostic yield of colonoscopy (21,33), but this depends on the indication for the colonoscopy. In patients with colonic inflammatory bowel disease, the diagnostic yield from ileal histology is 19%, compared

with 0.5% to 7.4% in unselected colonoscopy patients (21,34,35). One study suggested that the diagnostic findings at ileal intubation alter patient management in only 50% of the patients (35). Therefore, ileal intubation is recommended only if there is a specific indication for inspecting the ileum and if the finding will alter management (35).

Adenoma detection rates: Studies show that screening colonoscopy in healthy, asymptomatic patients should detect adenomas in at least 25% of men and 15% of women who are older than 50 years of age (3,16). Documentation of polyp miss rates and subsequent cancer development after screening colonoscopies is an important clinical outcome in the assessment of colonoscopy quality. Studies in the mid-1990s demonstrated miss rates for polyps during colonoscopy of 0% to 6% for adenomas 10 mm in size or larger, 12% to 13% for adenomas 6 mm to 9 mm in size, and 15% to 27% for adenomas 5 mm in size or smaller (36-38). Subsequent studies, using computed tomography, reported miss rates for conventional colonoscopy of 12% to 17% for adenomas 10 mm in size or larger (39,40).

In clinical practice, polyp detection rates are quite variable, ranging from unacceptably low polyp yields to over-diagnosis of 'polyps', perhaps due to uncertainty as to what is normal and what is abnormal. In large surveys of colonoscopists in clinical practice, polyp detection rates of 0% to 60% have been reported (14,36). Higher detection rates for polyps and adenomata are associated with longer examinations, longer withdrawal times (17,18), more careful examination of the mucosa proximal to folds and flexures, better colonic distention, and better cleaning of debris and fluid from the colon (41).

Miss rates of 4% to 5% for colorectal cancer have been reported for colonoscopy (42,43). One study reported that colon cancer was found in 6% of patients within three years of a screening colonoscopy (44). Right-sided lesions are especially prone to being missed because of incomplete colonoscopy; again, a report that nongastroenterologists missed cancers more often than gastroenterologists (OR 5.36, 95% CI 2.94 to 9.77) (45) suggests that experience may be an important determinant of a successful colonoscopy.

It is generally considered important that endoscopists be able to estimate polyp size accurately, to help to determine which polyps can be removed safely. Training with different sizes of ball bearings, visualized with the optical distortion of a colonoscope, has been shown to decrease the mean error of estimation from 28% to 8% (46). However, to date, there have been no studies documenting either the ability of trainees to accurately gauge the sizes of colonic polyps or the effect of accurate polyp size estimation on clinical outcomes.

Therapeutic interventions: Competence in colonoscopy requires the ability to perform appropriate diagnostic (biopsy) and therapeutic (eg, polypectomy) interventions. It is mandatory that a colonoscopist be able to remove polyps effectively and safely to minimize the need for a repeat procedure solely to provide therapy and hence to improve cost-effectiveness. The ASGE (8) and the Gastroenterological Society of Australia (13) recommend that practitioners complete at least 30 supervised, unassisted snare polypectomies as a threshold for competence.

The colonoscopist must be familiar with electrocautery, the settings required, and any changes in settings or technique that may be required for different parts of the colon (ie, special precautions for the right colon) and for polyps of different sizes or shapes. The removal of large polyps, particularly those with sessile growth patterns, from high-risk locations in the colon is a skill that is acquired incrementally and likely requires experience with more than 30 polypectomies. Under these circumstances, the colonoscopist must be able to exercise clinical judgment, based on the polyp characteristics, to determine whether a separate consent process is needed, including a discussion of higher than average risks and surgical alternatives. Endoscopic hemostasis skills are also mandatory to immediately treat any peri- or postpolypectomy bleeding that may occur. Although uncommon, these therapeutic interventions can be very challenging, and exposure to these cases is critical in training.

Colonoscopists should also know when and how to perform biopsies. This knowledge should include the cognitive component of determining the indications for biopsy, in addition to the technical skills required to obtain targeted mucosal biopsies. Mucosal biopsies should be obtained from the colon and, possibly, from the terminal ileum in patients with chronic diarrhea (3), even if the mucosa is macroscopically normal, as is the case for patients with microscopic colitis (3). If surveillance is performed in patients with inflammatory bowel disease, systematic biopsy of the colon and terminal ileum can assist in establishing the extent of disease, as well as in differentiating between ulcerative colitis and Crohn's colitis. A systematic biopsy protocol increases the sensitivity of surveillance for dysplasia (47); as such, it should provide biopsies from all four quadrants, every 10 cm along the length of the colon (3).

Complication rates

The incidence of complications, such as perforation and postpolypectomy bleeding, recorded by an individual endoscopist should be comparable to those reported in the literature. The published evidence suggests that perforation rates should be less than one in 500 for all patients and less than one in 1000 for patients undergoing screening (48-50). The expected perforation rates for patients undergoing screening are lower because these individuals are generally healthy and they tend to not have colonic conditions that have been associated with perforation (3). Furthermore, the complication rates should be lower, because the risk to benefit ratio should also be lower for patients who are otherwise healthy.

Large epidemiological studies (31,48) have not confirmed a statistical correlation between the rate of perforations and the level of experience, the number of prior colonoscopies or the annual volume of colonoscopies. This may be due, in part, to the low rate of complications, which makes it difficult to show statistical differences between groups. For example, a review (48) of over 10,000 colonoscopies reported that although trainees performed only 20% of procedures, they were involved in 40% of the perforations; however, this difference was not statistically significant.

Pseudo-obstruction, ischemia, severe colitis, radiation-induced changes, stricture formation, bulky colorectal cancers, severe diverticular disease and chronic corticosteroid therapy have been associated with higher rates of perforations (3).

Endoscopic series suggest that the overall risk for postpolypectomy bleeding should be less than 1% (51-55). The risk of bleeding increases with the size of the polyps and with a more proximal colonic location. Bleeding rates may exceed 10% for polyps larger than 2 cm, particularly in the proximal colon (54-57). The use of blended or cutting diathermy current

is associated with an increased risk of immediate bleeding, whereas pure low-power coagulation is associated with an increased risk of delayed bleeding (58,59).

TRAINING

The proportion of colonoscopists in Canada or the United States that have had limited or no formal colonoscopy training is unknown. In a British study (24), 17% of colonoscopists had received no supervised training for their first 100 procedures, and only 39% had been involved in a training course; the quality assessment demonstrated that cecal intubation was achieved in only 77% of cases. In Canada, all gastroenterologists are required to complete a formal two-year subspecialty training program, and many complete a third year of subspecialty training before they enter full-time practice. Surgical residents generally acquire their endoscopic and medical gastroenterology training over a shorter period of time, usually in the context of a three-month attachment to a gastroenterology training program.

The ASGE recommends that endoscopists complete a gastroenterology or surgical residency to satisfy the intellectual requirements regarding colonoscopy. Therefore, physicians in other specialties need the opportunity to acquire specialized knowledge in addition to technical training. The time needed for training of nonendoscopist physicians (nongastroenterologists and nonsurgeons) has not been clearly defined, but it must be sufficient to afford adequate exposure to the clinical assessment of inpatients and outpatients, as well as the opportunity to assimilate the relevant literature to fulfil the intellectual training requirements for colonoscopy. It is difficult to provide this extent of training in less than six to 12 months, even in a recognized teaching facility.

The ASGE recommends that the thresholds for determining endoscopic competence should be equivalent for nonphysician and physician trainees (60); therefore, it is reasonable that 'nonendoscopist physicians' should be expected to achieve the same standards of competence.

Short courses

Because neither the technical nor intellectual requirements for colonoscopy can be acquired in a short period of time, neither short courses nor self-instruction is considered to provide sufficient training to achieve competence in colonoscopy.

Computer simulators

Despite marked advances in computer graphics and tactile feedback (variable resistance of insertion, loop formation), the role of colonoscopic simulators remains unclear. Systems that are currently state-of-the-art (eg, GI Mentor and GI Mentor II, Symbionix, Israel) can distinguish between an experienced endoscopist and a beginner by procedure time and efficiency (ie, percentage of mucosa surveyed per second) (61). However, in one study, although experienced colonoscopists advanced much more quickly than novices on the simulator, the time-to-cecum appeared to plateau after only seven repetitions by medical students who had never previously performed an endoscopy (62), suggesting that current simulators do not provide a 'true-to-life' experience. On the other hand, there was no improvement or 'learning' of the program or procedure over five repetitions in another study that used a different simulator (HT Immersion Medical Colonoscopy Simulator, Immersion Medical, USA) (63). A study showing that simulator-trained fellows had higher cecal intubation rates than nontrained fellows for the first 15 human procedures (64), suggests that there may be benefit, at least at the outset, for simulator training; however, the long-term effect of simulator traning on competence for colonoscopy is not known. These caveats notwithstanding, it is probably preferable if novice endoscopists acquire their basic technical skills on a simulator rather than in a routine clinical setting; the long-term benefits may be limited, but the short-term benefits for the trainees' first few patients, the supervisor and, indeed, the trainee may be substantial.

Proctoring

A proctor is an impartial, qualified colonoscopist in charge of supervising a candidate during colonoscopy to assess competence. The role of the proctor is to evaluate – not to teach and not to help with the procedure (1). When appropriate, proctoring should extend over at least 30 to 50 supervised procedures, because it is very difficult to ascertain true failure and complication rates if fewer procedures are observed. However, it should be noted that proctoring is time-consuming; supervision of 30 to 50 procedures probably necessitates a time commitment of 25 h to 40 h, and without appropriate compensation for the proctor, this cannot constitute a standard component of credentialing for colonoscopy.

NONPHYSICIANS AND COLONOSCOPY

The concept of well-trained nurses performing flexible sigmoidoscopy has been studied in the United Kingdom and the United States; this practice will be reviewed in a separate publication. For colonoscopy, the data on nurse-colonoscopists are much more limited. Although, anecdotally, nurse-colonoscopists trained in the United Kingdom are at least the equal of physician colonoscopists, there are no nonphysician colonoscopy training programs in Canada at the present time. As a result, the CAG does not recommend that the present credentialing guidelines be applied in the case of nonphysicians who wish to undertake colonoscopy training. Clearly, all colonoscopists are expected to achieve the same standard of competence, but the training and documentation needed to achieve these standards may vary depending on the individual's initial level of training.

SUMMARY

Technical competence for routine colonoscopy can be assessed after 150 procedures; however, completion of a specified number of colonoscopies does not imply competence. It is recommended that documentation of competence be based on the completion of at least 100 unassisted procedures. Competent colonoscopists should be able to intubate the cecum in at least 85% to 90% of all cases (3,13,22) and in at least 95% of screening cases in healthy adults (3). The mean completion time for colonoscopy should be approximately 30 min, with an emphasis on methodical, careful withdrawal to optimize lesion detection. However, it should be recognized that some procedures may take more than 30 min, particularly if multiple or complex polypectomies are required. The proposal that withdrawal times should generally be in excess of 7 min (16-18) emphasizes the importance of careful inspection on withdrawal of the colonoscope, although the optimal time has not been determined. Success rates improve with experience and higher

annual procedure volume (31), particularly in the early years after completion of training (32). Better results have been associated with a volume of at least 100 to 200 procedures per year (31,32). Photodocumentation of cecal intubation is encouraged for quality assurance purposes, to prompt appropriate ancillary investigations in the event of incomplete colonoscopy and to minimize the risk that right-sided lesions are missed.

When colonoscopy is performed for cancer screening, adenomata should be detected in at least 25% of men and 15% of women older than 50 years of age; lower detection rates raise the concern that polyps are being missed or that the procedure has been performed for an inappropriate indication (3). Competence in colonoscopy requires the ability to perform appropriate diagnostic and therapeutic interventions during the same procedure. At least 30 supervised, unassisted snare polypectomies should be completed as a threshold for competency (8,13).

Complication rates should be comparable with those reported in the literature, that is, a perforation rate of less than one in 500 for all patients and less than one in 1000 for patients undergoing screening (48-50), with a postpolypectomy bleeding rate of less than 1% (51-55).

Nontechnical components of competence (knowledge of expected pathology, judgment regarding biopsy and therapy, indications, contraindications, informed consent and immediate postprocedural management) require a training program that generally involves a minimum of six to 12 months of training. Although endoscopic simulators may shorten the early phase of technical training, it is not clear how the rapid acquisition of apparent competence using a simulator translates into competence at colonoscopy in clinical practice.

Institutions that grant privileges for colonoscopy should be encouraged to develop endoscopic reporting mechanisms and databases so that colonoscopists may monitor the quality of their practice and effect improvements if they identify deficiencies, thus maintaining colonoscopic procedural competence and optimizing clinical care over the long term.

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