

Gastrointestinal Endoscopy Competency Assessment Tool: reliability and validity evidence

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Background: Rigorously developed and validated direct observational assessment tools are required to support competency-based colonoscopy training to facilitate skill acquisition, optimize learning, and ensure readiness for unsupervised practice.

Objective: To examine reliability and validity evidence of the Gastrointestinal Endoscopy Competency Assessment Tool (GiECAT) for colonoscopy for use within the clinical setting.

Design: Prospective, observational, multicenter validation study. Sixty-one endoscopists performing 116 colonoscopies were assessed using the GiECAT, which consists of a 7-item global rating scale (GRS) and 19-item checklist (CL). A second rater assessed procedures to determine interrater reliability by using intraclass correlation coefficients (ICCs). Endoscopists' first and second procedure scores were compared to determine test-retest reliability by using ICCs. Discriminative validity was examined by comparing novice, intermediate, and experienced endoscopists' scores. Concurrent validity was measured by correlating scores with colonoscopy experience, cecal and terminal ileal intubation rates, and physician global assessment.

Setting: A total of 116 colonoscopies performed by 33 novice (<50 previous procedures), 18 intermediate (50-500 previous procedures), and 10 experienced (>1000 previous procedures) endoscopists from 6 Canadian hospitals.

Main Outcome Measurements: Interrater and test-retest reliability, discriminative, and concurrent validity.

Results: Interrater reliability was high (total: ICC = 0.85; GRS: ICC = 0.85; CL: ICC = 0.81). Test-retest reliability was excellent (total: ICC = 0.91; GRS: ICC = 0.93; CL: ICC = 0.80). Significant differences in GiECAT scores among novice, intermediate, and experienced endoscopists were noted ($P < .001$). There was a significant positive correlation ($P < .001$) between scores and number of previous colonoscopies (total: $\rho = 0.78$, GRS: $\rho = 0.80$, CL: Spearman's $\rho = 0.71$); cecal intubation rate (total: $\rho = 0.81$, GRS: Spearman's $\rho = 0.82$, CL: Spearman's $\rho = 0.75$); ileal intubation rate (total: Spearman's $\rho = 0.82$, GRS: Spearman's $\rho = 0.82$, CL: Spearman's $\rho = 0.77$); and physician global assessment (total: Spearman's $\rho = 0.90$, GRS: Spearman's $\rho = 0.94$, CL: Spearman's $\rho = 0.77$).

Limitations: Nonblinded assessments.

Conclusion: This study provides evidence supporting the reliability and validity of the GiECAT for use in assessing the performance of live colonoscopies in the clinical setting. (Gastrointest Endosc 2015;81:1417-24.)

Abbreviations: CL, checklist; GiECAT, Gastrointestinal Endoscopy Competency Assessment Tool; GRS, global rating scale; ICC, intraclass correlation coefficient; PGA, physician global assessment.

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Assessment is a cornerstone of high-quality endoscopic education, influencing both teaching and learning.¹ There has been a shift in medical education over the past decade toward a competency-based model that is centered on the achievement of core training milestones and competency benchmarks. This necessitates the need for formative assessment tools to document trainees' progress toward predefined outcomes and provide a means of accumulating evidence of competence.² It is increasingly recognized that workplace-based assessment is essential because performance in the authentic clinical environment is core to medical competence.^{3,4} Direct observational colonoscopy assessment tools, if rigorously developed and validated, provide a means to assess endoscopists' performance in vivo, in the workplace, in a standardized and reproducible manner. Additionally, they allow for the integrated assessment of competencies, which is postulated to enhance learning.⁵

The Gastrointestinal Endoscopy Competency Assessment Tool (GiECAT) is a direct observational assessment tool designed to assess competence in performing colonoscopy at the "does" level of Miller's pyramid.^{4,6} It was developed systematically by a panel of 55 international endoscopy experts by using Delphi methodology and thus is reflective of endoscopic practice across institutions.⁶ The GiECAT was specifically constructed to assess the full breadth of competencies required to perform colonoscopy procedures in an integrated manner: (1) technical (psychomotor); (2) cognitive (knowledge and application of endoscopically derived information to clinical practice); and (3) integrative (higher level competencies such as clinical judgment and communication that complement an individual's technical skills and knowledge to facilitate effective delivery of safe and appropriate care in varied contexts) competencies. Additionally, it addresses performance of all components of a colonoscopy procedure, including pre-, intra-, and postprocedural aspects of care. The GiECAT was designed for use as both a formative and summative assessment tool to monitor endoscopists' progress throughout the learning continuum from novice to competent endoscopist. The current study aims to prospectively examine evidence of the reliability and validity of the GiECAT in the context of formative assessment of competence in performing colonoscopy in the clinical setting. Formative assessment aims to promote reflection, guide learning, and enable competence through the provision of feedback and benchmarks to orient the learner and facilitate continuous performance improvement.⁷⁻⁹

Although numerous frameworks have been proposed to evaluate educational assessment tools,^{5,10-13} the Accreditation Council for Graduate Medical Education Advisory Committee on Educational Outcome Assessment's framework for evaluating the quality of an assessment measure¹³ was used as a basis for this study. This framework outlines

standards in 6 areas including reliability, validity, ease of use, resources required, ease of interpretation, and educational impact.¹³ Validity evidence of the use of the GiECAT as a formative assessment tool in the clinical setting is discussed using the unified, evidence-based approach to validation.^{12,14} This approach is based on the accumulation of 5 categories of evidence of construct validity to provide support for an intended use of an assessment tool, including validity evidence of content, response process, internal structure, associations with other variables, and consequences.^{12,14-16}

METHODS

This was a prospective, multicenter, observational study assessing evidence of the reliability and validity of the GiECAT for use in the clinical setting. Ethical approval was obtained from the Research Ethics Boards at all involved institutions including the University Health Network, Mt. Sinai Hospital, St. Michael's Hospital, Sunnybrook Health Sciences Centre, University of Toronto, and the University of Western Ontario. Written informed consent was obtained from all endoscopist participants and patients where required.

Participants

Participants were adult gastroenterology and general surgical residents, fellows, and attending physicians from 6 Canadian academic hospitals. Based on predefined case-volume criteria, novice (performed < 50 previous colonoscopies), intermediate (performed 50-500), and experienced endoscopists (performed > 1000) were recruited to participate.

The Gastrointestinal Endoscopy Competency Assessment Tool

The GiECAT was developed using Delphi methodology, whereby 55 international endoscopy experts from 44 centers rated potential checklist (CL) and global rating scale (GRS) items during 5 iterative rounds of surveys for their importance as indicators of the competence of trainees learning to perform colonoscopy.⁶ The GiECAT comprises a task-specific 7-item GRS and a 19-item CL. The GRS assesses holistic aspects of colonoscopy performance by using a criterion-referenced 5-point ordinal scale with descriptive anchors reflective of the level of independence demonstrated by the endoscopist (Appendix 1, available online at www.giejournal.org). Ratings on the 7 items (technical skill, strategies for endoscope advancement, visualization of mucosa, independent procedure completion (need for assistance), knowledge of procedure, interpretation and management of findings, and patient safety) are summed to generate a score from 7 to 35, with higher scores reflecting superior performance. The CL items, which detail key procedural steps, are scored on a dichotomous

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