

Utilizing a Novel Tool for the Comprehensive Assessment of Resident Operative Performance

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PURPOSE: A mechanism for more effective and comprehensive assessment of surgical residents' performance in the operating room (OR) is needed, especially in light of the new requirements issued by the American Board of Surgery. Furthermore, there is an increased awareness that assessments need to be more meaningful by including not only procedure-specific and general technical skills, but also nontechnical skills (NOTECHS), such as teamwork and communication skills. Our aims were to develop a methodology and create a tool that comprehensively assesses residents' operative performance.

METHODS: A procedure-specific technical skill assessment for laparoscopic colon resections was created through use of task analysis. Components of previously validated tools were added to broaden the assessment to include general technical skills and NOTECHS. Our instrument was then piloted in the OR to measure face and content validity through an iterative process with faculty evaluators. Once the tool was finalized, postgraduate 3 (PG3) and PG5 residents on a 2-month long rotation were assessed by 1 of 4 colorectal surgeons immediately after completing a case together. Construct validity was measured by evaluating the difference in scores between PG3 and PG5 residents' performance as well as the change in scores over the course of the rotation.

RESULTS: Sixty-three assessments were performed. All evaluations were completed within 48 hours of the operation. There was a statistically significant difference between the PG3 and PG5 scores on procedure-specific performance, general technical skills, NOTECHS, and overall performance. Over the course of the rotation, a statistically significant improvement was found in residents' scores on the procedure-specific portion of the assessment but not on the general surgical skills or NOTECHS.

CONCLUSION: This is a feasible, valid, and reliable assessment tool for the comprehensive evaluation of resident performance in the OR. We plan to use this tool to assess resident operative skill development and to improve direct resident feedback. (J Surg 70:813-820. © 2013 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: internship and residency, educational assessment, surgery, education

COMPETENCIES: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Professionalism, Interpersonal and Communication Skills

INTRODUCTION

Resident operative development is a key component of surgical training. Currently, little is understood about residents' performance in the operating room (OR) or how this develops over the course of training. However, beginning in the 2012 to 2013 academic year, the American Board of Surgery has implemented a new requirement that mandates graduating residents undergo 2, and eventually 6, operative performance assessments during their residency training to sit for the General Surgery Qualifying Examination.¹

Assessment tools have been difficult to implement and therefore have not become routine practice in most training programs.² Although many assessment tools can be found in the literature, a large number of these assessment tools were developed for use in simulated settings.^{2,3} Studies of assessment tools for live OR assessment are limited because they only cover select procedures and may not meet the evaluation needs of every program.^{2,3} We wanted to develop a

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methodology that makes it easier for residency programs to integrate formal, direct observation assessment of operative skills as a routine part of their evaluation repertoire. Our goal, therefore, was to create a methodology that could be reproduced and adapted to many different procedures, purposes, and situations.

Another limitation of existing assessment tools is that they focus on 1 or 2 domains of resident operative performance: procedure-specific technical skills and general technical skills.^{2,3} However, there is an increased awareness that assessments could be more meaningful if they also incorporated evaluation of NOTECHS, such as teamwork, leadership, and situational awareness. Although validated NOTECHS assessments exist,^{4,5} they require an outside trained observer, which requires additional resources and brings another person into the OR. This can disrupt the natural flow of the already busy environment. Although multiple studies have assessed both technical and NOTECHS,^{6,7} no assessment tools have been developed that incorporate technical and NOTECHS into 1 comprehensive assessment tool. Therefore, a mechanism for more comprehensive assessment of surgical residents' performance in the OR is needed.

Our aim for this project was (1) to develop a methodology, which could be used to create and implement a tool that comprehensively assesses residents' performance in the OR, and (2) to assess the feasibility and validity of a tool developed using this methodology.

METHODS

Cases and Research Subjects

We selected laparoscopic segmental colon resection as our index case. This is a core surgical procedure, with both open and laparoscopic components. At our institution, these procedures are almost exclusively performed by the 4 colorectal surgeons working with PG3 and PG5 residents during their 2-month colorectal rotation, which gave us a well-defined cohort of evaluators and subjects. The faculty members who operated with the resident performed the evaluation after completion of the case.

Our hospital's Institutional Review Board granted us an educational exemption for this project. All surgical residents were notified of the study and were allowed to decline participation.

Instrument Development

Procedure-Specific Assessment

For the procedure-specific portion of the assessment, we reviewed the current assessment tools for segmental colectomies available in the literature. Although we were able to identify some assessment tools, including the Objective Performance Rating System evaluation tool for open colectomies,⁸ a practice-

based assessment tool for laparoscopic right hemicolectomies from the United Kingdom,⁹ and a tool for evaluating advanced laparoscopic colon procedures (right, sigmoid, and anterior resections) for fellows and consultants,¹⁰ there was no tool that ideally met our specific needs. Using task analysis, a domain expert on the research team identified the key components of the operation. This was used to create a procedure-specific technical skill assessment for laparoscopic colon resections. The members of the research team then developed an anchored rating scale measuring the amount of assistance the resident required from the faculty rater to complete each step.

General Technical Skills Assessment

After reviewing the general technical assessment tools available in the literature,³ we based the general technical assessment portion of our tool on the Objective Structured Assessment of Technical Skills for Surgery (OSATS).¹¹ This tool was selected because it is well known, widely used, and has been studied in the laboratory and validated for use in the clinical setting.¹² Although we also identified the global operative assessment for laparoscopic surgery instrument¹³ for laparoscopic general technical skills, the research team felt that OSATS¹¹ was more comprehensive and would also capture the open portion of laparoscopic segmental colon resections.

NOTECHS Assessment

For the nontechnical portion of our assessment tool, we evaluated existing tools⁵ and identified the NOTECHS¹⁴ and NOTECHS for surgeons (NOTSS)¹⁵ instruments as the 2 best potential matches for our assessment. However, both are lengthy and require a trained observer. After piloting both tools in the OR, we used the broad categories from NOTSS¹⁵ to help create the framework for the nontechnical assessment, as it captured the different types of nontechnical performance highlighted in both the tools.

Refinement of our Instrument

We started by piloting the assessment tool in the OR and revised it in an iterative process with the help of the 4 colorectal surgeons as well as within our research team, which included surgeons, medical educators, a resident, and a health services researcher. During a 2-month colorectal rotation, the third-year and fifth-year residents were assessed by 1 of the 4 colorectal surgeons immediately after completing a case together. After performing the assessment, a member of the research team followed-up with the surgeon to discuss the assessment tool, specifically the clarity of the items and rating scale as well as how well they felt the tool captured the resident's performance. Based on this feedback from the faculty, the tool was revised by the research team and then piloted again in the OR.

The tool continued to be revised in this iterative process until all of the colorectal surgeons and researchers reached consensus. Face validity and content validity were established during this iterative process. Face validity describes how well

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