

Developing the Blueprint for a General Surgery Technical Skills Certification Examination: A Validation Study

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INTRODUCTION: There is a recognized need to develop high-stakes technical skills assessments for decisions of certification and resident promotion. High-stakes examinations requires a rigorous approach in accruing validity evidence throughout the developmental process. One of the first steps in development is the creation of a blueprint which outlines the potential content of examination. The purpose of this validation study was to develop an examination blueprint for a Canadian General Surgery assessment of technical skill certifying examination.

METHODS: A Delphi methodology was used to gain consensus amongst Canadian General Surgery program directors as to the content (tasks or procedures) that could be included in a certifying Canadian General Surgery examination. Consensus was defined a priori as a Cronbach's $\alpha \geq 0.70$. All procedures or tasks reaching a positive consensus (defined as $\geq 80\%$ of program directors rated items as ≥ 4 on the 5-point Likert scale) were then included in the final examination blueprint.

RESULTS: Two Delphi rounds were needed to reach consensus. Of the 17 General Surgery Program directors across the country, 14 (82.4%) and 10 (58.8%) program directors responded to the first and second round, respectively. A total of 59 items and procedures reached positive consensus and were included in the final examination blueprint.

CONCLUSIONS: The present study has outlined the development of an examination blueprint for a General Surgery certifying examination using a consensus-based methodology. This validation study will serve as the foundational work from which simulated model will be developed, pilot tested and evaluated. (J Surg Ed ■■■-■■■. © 2017 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

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

INTRODUCTION

The main goal of certification is to ensure that a candidate is competent in all facets that are required of their profession¹ and in doing so certify that the individual is safe to enter independent practice. The process of certification for surgeons within North America, however, has not included a formal or direct assessment of technical skill, which is clearly an essential domain of competence required of surgeons. Competency-based training and assessment have become a major focus of surgical training around the globe.²⁻⁴ However, high-stakes board certification currently focuses on the assessment of knowledge and judgment^{5,6} whereas technical skill is evaluated typically with in-training evaluation reports, which can be notoriously unreliable.⁷ Recognizing this gap in assessment at the time of certification, surgical boards have acknowledged the need to more

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formally document technical competence, and initiatives are underway to develop high-stakes technical skills assessments for the purpose of certification.⁸

The stakes of a credentialing examination are high, and the consequences of the results are significant. False positives occur when a noncompetent candidate passes the examination, potentially putting patients at risk through lack of physician skill. False negatives occur when a competent candidate fails the examination, negatively impacting the candidate who has invested great efforts in training.⁹ Because of the significance of the results of a certification examination, the validity evidence required for the interpretation of the test scores needs to be extensive, from multiple sources and collected on an on-going basis.¹⁰

Validation studies, aim to build evidence for the argument that links performance on the assessment with the possession of the underlying construct being evaluated. A construct is an intangible entity that can be described but may not be easily measured.¹¹ For example, professionalism, knowledge, and technical skill all represent constructs within the domain of surgery. If a candidate does well in an examination, he/she likely possess more of the construct being tested than someone who performs poorly.

One of the first important steps in developing a high-stakes assessment is to develop an examination blueprint, which outlines the content domain that will be covered and reflects the knowledge and skill expected of the profession.¹² Messick has described a contemporary validity framework, which is made up of 5 sources of validity evidence. The process of developing an examination blueprint, addressed one of these 5 sources (content validity) which aims to ensure that the content of the test parallels the domain being assessed.¹³ Evidence of content validity can be accrued by demonstrating a structured approach to the development of the examination content; ensuring that the content mirrors the construct intended to be measured. An examination blueprint is an essential component and foundational necessity of a certification examination.

Although platforms to assess technical skill have been developed, few have used a contemporary framework of validity in their development, few have used a rigorous methodology in the construction of examination content, and only 1 in North America has been developed for the purpose of certification.^{8,14} The present study is a validation study, outlining one of the first key steps in developing a high-stakes certification examination.

The specific aim of this study is to develop an examination blueprint for a certification technical skills examination for graduating Canadian General Surgery residents using a Delphi consensus methodology.

METHODS

This study was approved by the research ethics board at the University of Toronto.

Delphi Methodology

The Delphi is an iterative, multistage process that aims to achieve consensus amongst a group of experts through a series of structured questionnaires.¹⁵ The 4 major cornerstones of the Delphi technique include the use of experts, anonymity, multiple rounds, and statistical aggregation of results.¹⁵⁻¹⁷ Specifically a small group of experts (between 10 and 20) are chosen as the panelists, individuals who understand the topic or area under study more than others within the same field.^{18,19}

Canadian General Surgery program directors from the 17 Royal College of Physicians and Surgeons of Canada accredited programs were invited to participate as content experts. An online platform, eliminated face-to-face contact amongst the experts ensuring anonymity, and limiting the influence of dominant individuals.²⁰ As suggested in the literature^{21,22} the first iteration consisted of open ended questions. Experts were asked to list General Surgery tasks or procedures that could be included in a final assessment of technical skill for graduating Canadian General Surgery residents. These were grouped into 8 anatomic categories (Table 2). The second iteration consisted of this generated list, with supplemented tasks and procedures supplemented from the Royal College of Physicians and Surgeons of Canada objectives of General Surgery training.²³ The second round was closed ended with each item ranked on a 5-point Likert scale. The descriptors were (1) unimportant, (2) less important, (3) somewhat important, (4) important, and (5) very important. The data were then statistically analyzed to generate a median and interquartile range for each item.

Inclusion Criteria for Examination Blueprint

Cronbach's α was used as a measure of internal consistency²⁴ with a value of ≥ 0.70 selected a priori as the level of consistency required for this study.²⁵ Once consensus had been reached for each anatomic category, items were then selected for inclusion in the final examination blueprint. Items were deemed to have reached positive agreement, and thus selected for inclusion if $\geq 80\%$ of respondents ranked items as either a 4 (important) or 5 (very important). Negative agreement was defined as $> 80\%$ of responses ranked as either 1 (unimportant) or 2 (less important). Neutral agreement was defined as all other responses. Negative and neutral items were excluded from the examination blueprint.

Administration of the Delphi

SurveyMonkey online platform was used to administer the Delphi. Each round closed after 6 weeks and 3 e-mail reminders. Subsequent rounds were sent to those who had responded to the previous round.

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