

Optimizing the Selection of General Surgery Residents: A National Consensus[☆]

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BACKGROUND: Surgical programs strive to recruit trainees who will graduate as competent surgeons; however, selection processes vary between institutions. The purpose of the present study was to (1) solicit program directors' (PDs) opinions on the proportion of trainees who have difficulty achieving competence and (2) establish consensus on the desired attributes of general surgery (GS) candidates and the technical skills that would be most indicative of future performance.

METHODS: Delphi consensus methodology was used. An open-ended questionnaire, followed by a closed-ended questionnaire, formulated as a 5-point Likert scale, was administered. A Cronbach $\alpha \geq 0.8$ with 80% of responses in agreement (4—agree and 5—strongly agree) determined the threshold for consensus.

RESULTS: The first and second rounds were completed by 14 and 11, of a potential 17, GS PDs, respectively. PDs felt that 5% or less of trainees have difficulty reaching competence in clinical knowledge, 5% to 10% in decision-making, and 5% to 15% in technical skill by the time of completion of training. Consensus was excellent ($\alpha = 0.92$). The top attributes for success in GS included work ethic and passion for surgery. Technical skills that felt to be most appropriate were open tasks (one-handed tie and subcuticular suture) and laparoscopic tasks (coordination, grasping, and cutting).

CONCLUSION: PDs indicate that of the 3 domains, the largest proportion of trainees had difficulty reaching competence in technical skill. Consensus among PDs suggests that top personal attributes include work ethic and passion for surgery. Consensus of technical tasks for inclusion into

selection was basic open and laparoscopic skills. (J Surg Ed 1:111-111. © 2016 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: selection, general surgery, surgical residency, post graduate education, technical skill

COMPETENCIES: Medical Knowledge, Practice-Based Learning and Improvement

BACKGROUND

Surgical programs strive to recruit trainees who will graduate as competent surgeons. To structure entry into surgical postgraduate training programs in North America, national match systems are used to pair final-year medical students to specialty programs (e.g., general surgery [GS] or neurosurgery).¹ Therefore, unlike many countries, medical students are admitted directly into a surgical specialty program without completing an internship or advancing from basic to advanced surgical training.²⁻⁶ Thus, Canadian programs are in a unique position because they are selecting candidates into specialty, without having the opportunity to assess their independent performance in the clinical environment or their acquisition of technical skill in the operating room.

Intuitively, however, students who apply to enter surgical training likely enjoy working with their hands and may self-select as better technicians. It has been reported that students who apply to surgical specialties have a higher self-perceived confidence in their manual dexterity and ability to “work well with their hands,” as compared to their medical colleagues.^{7,8} However, when comparing these 2 groups with objective technical skill assessment metrics, the incoming surgical trainees do not outperform the internist.^{9,10} Therefore, self-selection cannot be relied upon to ensure that surgical applicants have a high potential for technical performance and therefore it may be appropriate

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that surgical programs are given the responsibility to make this assessment instead.

In the current North American system, technical skill is not routinely a component of the selecting process. This may be owing to the strong belief, supported by Ericsson learning theory, that ongoing practice and mentorship will eventually translate into expert performance.¹¹ However, with work-hour restrictions, increasing complexity of surgical techniques, and increased patient safety concerns, the feasibility of this model has been challenged.¹² It has been reported that trainees are not reaching their expected technical milestones by the end of training, which are then reflecting in their performance at the fellowship level.¹³ United States fellowship program directors (PDs) reported that a significant proportion of GS fellows could not independently perform a laparoscopic cholecystectomy or operate unsupervised for more than 30 minutes during a major procedure.¹⁴ Given these reports, it may be beneficial for training programs to adjust the GS selection process to recruit applicants who are able reach technical competence within the restrictions of the current training environment. However, there is a lack of evidence to guide this aspect of the selection process.¹⁵

Therefore, the purpose of the present study was to (1) identify the current components used in the GS selection process at different institutions; (2) solicit PDs' opinions on the proportion of trainees who do not achieve the minimum standards expected of graduating trainees; and (3) establish national consensus on the desired attributes of GS candidates and the technical skills that would be most indicative of future performance.

METHODS

Research Ethics

The University of Toronto Ethics Review Board approved this study.

Current Selection Practices

All Canadian GS PDs were invited to participate. In Canada, all training programs are structured under the umbrella of a University with a recognized medical school, in contrast to individual hospital programs. An online questionnaire, administered using Survey Monkey (Palo Alto, CA), was used to identify the current components used in the GS selection process across the country. Although the written application is standardized by the national match system (Canadian Resident Matching Service), PDs were asked to provide the weighted score for each component of the application at their institution. In addition, PDs were asked whether applicants' clinical knowledge, decision-making skill, and technical skill were evaluated during the selection process, and what percentage

of trainees they felt had difficulty reaching competence in these 3 domains by the time of graduation.

Delphi Consensus Methodology

A Delphi questionnaire was administered to gain consensus on which candidate-specific attributes are important for residents to succeed in GS training. In addition, consensus was sought on the simulated technical skills (both open and laparoscopic) that are most likely to be indicative of a trainee's aptitude to acquire more complex surgical skills and thus future performance.

The Delphi methodology was originally developed in the 1950s by the RAND Corporation to evaluate trends in technology on warfare, but it continues to be widely used to create public policy and clinical guidelines or to formulate training recommendations by aggregating the opinions of experts, where little empirical evidence is available.¹⁶⁻¹⁹ This methodology comprises the following 4 essential components: an expert panel, the promotion of anonymous responses, multiple rounds of questions, and statistical feedback to encourage convergence of responses until an acceptable consensus is met.¹⁹

Expert Panel

Canadian GS PDs were invited to participate in this Delphi process given their unique expertise with trainee selection, as acquired through leadership at their respective institutions. Further, the optimal size of the expert panel for a Delphi is between 10 and 20 persons when the questions being asked are directed to a specific topic and the panel is homogenous.²⁰ The reason for a small selected panel is that the Delphi group should be highly trained and competent within a specialty area of knowledge to gain consensus on a topic within their area of expertise. This is in contrast to the methodology of a survey where the results of a sample are meant to be used to extrapolate to a larger generalizable population; therefore, it is essential for the sample to be large enough to fill this purpose.²¹

Anonymity

A strength of the Delphi technique is that it protects against bias by prohibiting face-to-face contact among the panel members, thus decreasing dominant verbal opinions, seniority, or in-person arguments, which have been reported to sway the panel.^{22,23} In the present study, individual anonymous opinions were encouraged through an online questionnaire, limiting the risk of interaction among panel members.²³

Rounds of Questions

The Delphi process calls for a minimum of 2 rounds of questions, with the first open-ended and the second closed-ended.^{22,24} Open-ended questions encourage responses from the expert panel without directing their opinions to

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