

# Great Expectations? Future Competency Requirements Among Candidates Entering Surgery Training

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**INTRODUCTION:** We describe a multimethod, multi-institutional approach documenting future competencies required for entry into surgery training.

**METHODS:** Five residency programs involved in a state-wide collaborative each provided 12 to 15 subject matter experts (SMEs) to participate. These SMEs participated in a 1-hour semistructured interview with organizational psychologists to discuss program culture and expectations, and rated the importance of 20 core competencies derived from the literature for candidates entering general surgery training within the next 3 to 5 years (1 = importance decreases significantly; 3 = importance stays the same; 5 = importance increases significantly).

**RESULTS:** Seventy-three SMEs across 5 programs were interviewed (77% faculty; 23% resident). All competencies were rated to be more important in the next 3 to 5 years, with team orientation ( $3.87 \pm 0.81$ ), communication ( $3.82 \pm 0.79$ ), team leadership ( $3.81 \pm 0.82$ ), feedback receptivity ( $3.79 \pm 0.76$ ), and professionalism ( $3.76 \pm 0.89$ ) rated most highly.

**CONCLUSIONS:** These findings suggest that the competencies desired and required among future surgery residents are likely to change in the near future. (J Surg Ed 000:1–6. © 2019 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

**KEY WORDS:** selection, screening, competency, job analysis, non-technical skills

**COMPETENCIES:** Systems-Based Practice, Interpersonal and Communication Skills, Professionalism

## INTRODUCTION

The world of surgical education is a changing landscape. As noted in his 2017 keynote address at the American College of Surgeons (ACS) Clinical Congress, Dr John Potts highlighted a number of ways in which surgical residency will change in the upcoming years, including more emphasis on “soft competencies,” different methods for learning, and expanding the way in which patient care is delivered.<sup>1</sup> Other reports similarly highlight changes in expectations among surgical trainees. For example, a recent needs assessment of national stakeholders across the United States revealed that communication is one of the areas rapidly growing in importance for future surgeons.<sup>2</sup> Additionally, the Accreditation Council on Graduate Medical Education (ACGME) program requirements are increasingly providing explicit expectations that surgery residents can effectively function in interprofessional and multidisciplinary teams and mentions the term “team” over 20 times in the most recent version.<sup>3</sup> The consequences of performing inadequately along these multiple dimensions of competence is becoming more widespread as well, with reports of the most frequent resident performance deficits pertaining to areas of professionalism and interpersonal skills.<sup>4–7</sup>

As we continue to expand the nature of work and competencies expected of surgical trainees, it is critical that our selection tools and methodologies are optimally designed to identify candidates most able to

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meet those demands. The current collection of materials used to screen candidates include United States Licensing Examination scores, letters of recommendation, and medical school grades.<sup>8,9</sup> Test scores and grades are primarily designed to evaluate student medical knowledge, while letters of recommendation have been documented to vary in their use, usability, and fairness.<sup>10-11</sup> Thus, the most influential items currently available in an applicant's packet may not objectively or comprehensively capture the aforementioned skills critical for the success of future surgeons, such as learning agility, flexibility, adaptability, communication, teamwork, leadership, and other noncognitive and nontechnical skills. As a community, we need to adopt screening methods and tools that can provide us with objective and comparable data to determine if incoming candidates have the knowledge, skills, abilities, and other characteristics (KSAOs) to fit into our cultures and thrive in our training environments—not only as they are now, but as they will be over the course of their training.

The goal of this study was to identify the most important competencies currently desired upon entry into general surgery training and to investigate if, and to what extent, the importance of those competencies might change in the upcoming years. With these data as a foundation, programs might then be able to reshape the information that is collected from applicants to ensure they have the skills and attributes to succeed in residency.

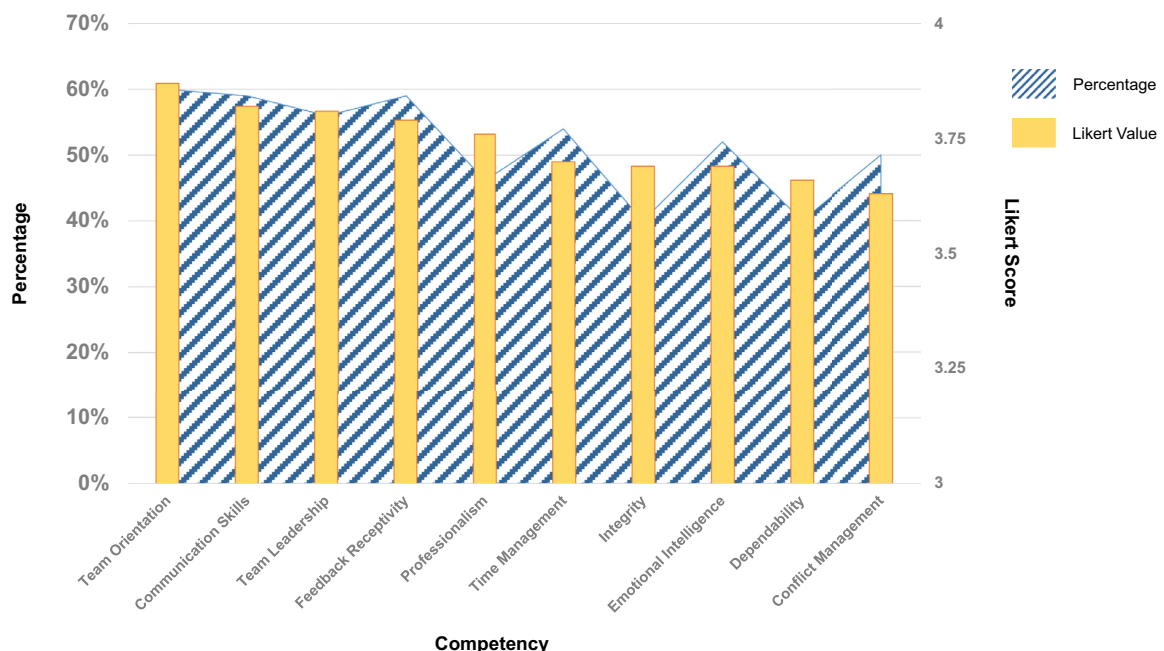
**TABLE 1.** Future criticality of competencies in general surgery.

| Competency              | Future Criticality Mean $\pm$ SD | Percentage of SMEs Indicating "More Important" in the Future |
|-------------------------|----------------------------------|--|
| Adaptability            | 3.55 $\pm$ 0.85                  | 47%  |
| Agreeableness           | 3.31 $\pm$ 0.70                  | 30%  |
| Attention to detail     | 3.60 $\pm$ 0.90                  | 40%  |
| Communication skills    | 3.82 $\pm$ 0.79                  | 59%  |
| Conflict management     | 3.63 $\pm$ 0.88                  | 50%  |
| Conscientiousness       | 3.51 $\pm$ 0.74                  | 37%  |
| Dependability           | 3.66 $\pm$ 0.86                  | 40%  |
| Emotional intelligence  | 3.69 $\pm$ 0.83                  | 52%  |
| Feedback receptivity    | 3.79 $\pm$ 0.76                  | 59%  |
| Integrity               | 3.69 $\pm$ 0.90                  | 40%  |
| Planning/organizing     | 3.61 $\pm$ 0.82                  | 49%  |
| Problem solving         | 3.60 $\pm$ 0.82                  | 45%  |
| Professionalism         | 3.76 $\pm$ 0.89                  | 46%  |
| Resilience              | 3.57 $\pm$ 0.80                  | 41%  |
| Self-directed learning  | 3.60 $\pm$ 0.83                  | 49%  |
| Self-regulation ability | 3.61 $\pm$ 0.83                  | 45%  |
| Stress tolerance        | 3.59 $\pm$ 0.82                  | 44%  |
| Team leadership         | 3.81 $\pm$ 0.82                  | 56%  |
| Team orientation        | 3.87 $\pm$ 0.81                  | 60%  |
| Time management         | 3.70 $\pm$ 0.82                  | 54%  |

Note: 1 = importance will significantly decrease in the next 3 to 5 years; 3 = importance will remain the same in the next 3 to 5 years; 5 = importance will increase significantly in the next 3 to 5 years.

## METHODS

Five general surgery residency programs across the state of Texas formed a state-wide consortium to work



**FIGURE 1.** Percentage of subject matter experts indicating competency will be more important in the future.

together on improving the surgical residency selection process. The FITxBEST (Finding your Institution in Texas for a Better Experience in Surgical Training) consortium was created to implement a more efficient and effective screening process for entry into general surgery training ([www.FITxBEST.com](http://www.FITxBEST.com)). The consortium's goal was to deemphasize traditional metrics commonly used by programs (United States Licensing Medical Examination scores, unstructured interviews) that have high potential for bias<sup>12-14</sup> and low utility in predicting an array of residency performance metrics,<sup>15-18</sup> and instead implement evidence-based screening methods and assessments to match applicants based on fit.

To achieve these aims, industrial organizational psychologists (IOPs) first conducted an on-site multimethod job analysis<sup>19</sup> at each location to document the competencies required of residents for success in each program, program values, and institutional culture. Each Program Director team was asked to provide 10 to 15 subject matter experts (SMEs) who were central to their educational mission (Program Director, Associate Program Director, Chair, members of Clinical Competency Committee, etc.) or who represented an "ideal" incumbent trainee to participate in the process. Each SME participated in a one-on-one, 1-hour semistructured interview based on the critical incident technique<sup>20</sup> to identify critical competencies required for success in their program. Separate from the qualitative interviews, SMEs then rated the criticality (1 = not essential; 5 = absolutely essential) of 20 core competencies derived from the literature needed among residents upon entry. Because gathering information regarding the future importance of these competencies is required from professional guidelines in both test development<sup>21</sup> and employee selection,<sup>22</sup> SMEs also rated the future importance (1 = importance significantly decreases; 3 = importance stays the same; 5 = importance significantly increases) of these competencies for entering trainees in the next 3 to 5 years, similar to standard industry practice. SMEs were asked to consider changes in the surgical education landscape, such as new requirements from national governing bodies, modifications in surgical technologies and techniques, revisions to undergraduate medical education curricula, and any planned programmatic endeavors when considering the future importance of these competencies. All SMEs were provided with a definition sheet of all competencies prior to completing ratings to ensure understanding and align mental models. SMEs were also given the opportunity to write in any competencies not listed and rate along the same metrics. Further, acknowledging the fact that training programs are created to hone an array of skills required among general surgeons, all SMEs indicated the extent to which each competency was "trainable" or if a

minimum baseline was needed upon entry to be successful in the early years of residency.

Using the data derived from the job analyses, the industrial organizational psychologists were able to determine both the current and future importance of a number of competencies deemed important for success in general surgery residency training. Within and between program rater agreement was assessed via interclass correlation coefficients. Potential differences between faculty and incumbent trainees were evaluated with independent samples *t* tests. All analyses were conducted in SPSS version 25.0.

## RESULTS

Seventy-three SMEs across 5 programs were interviewed (77% faculty; 23% resident). Faculty across programs had an average tenure of 8.33 ( $\pm 10.20$ ) years in the program, ranging from 1 to 52 years. Programs similarly ranged in their maturity, with a newer program that received initial accreditation in 2014 having an average faculty tenure of 3.32 ( $\pm 1.80$ ) years, while the most mature program which received accreditation in 1951 having an average faculty tenure of 17.80 ( $\pm 15.75$ ) years. All programs provided at least 3 ideal incumbent trainees to participate, most of whom (77%) were PGY4 or PGY5s.

Overall interrater agreement of the criticality of competencies required among entering trainees was 0.84; within-program agreement ranged from 0.57 to 0.92. Competencies rated most critical across all programs included integrity ( $4.94 \pm 0.24$ ), dependability ( $4.70 \pm 0.58$ ), professionalism ( $4.42 \pm 0.76$ ), communication ( $4.38 \pm 0.67$ ), and resilience ( $4.30 \pm 0.73$ ). However, 4 of the top 10 competencies (feedback receptivity, integrity, resilience, team orientation) had substantial mean differences ( $p < 0.05$ ) between at least 2 programs. There were no differences between resident and faculty ratings of the current importance of these competencies [Figure 1](#).

Programs demonstrated extremely high levels of agreement across programs (interclass correlation coefficients = 0.95) and within programs (range: 0.86-0.97) on the importance of these competencies in the future. There were no differences between resident and faculty ratings of the future importance of these competencies. Overall, all competencies were rated likely to be more important in the next 3 to 5 years, with team orientation ( $3.87 \pm 0.81$ ), communication ( $3.82 \pm 0.79$ ), team leadership ( $3.81 \pm 0.82$ ), feedback receptivity ( $3.79 \pm 0.76$ ), and professionalism ( $3.76 \pm 0.89$ ) rated most likely to increase importance in the future. Although the overall average for each was on the "likely to increase in importance" side of the scale, agreeableness, conscientiousness, adaptability, resilience, and stress tolerance were reported to be more important in

the future by only 30%, 37%, 47%, 41%, and 44%, respectively (Table 1). Forty-percent (12/20) of competencies were rated as likely to decrease in future importance by at least 1 SME.

## DISCUSSION

To ensure relevance of our screening and assessment tools, it is critical that programs undertake efforts to cogently and comprehensively identify the most important KSAOs that are needed for effective performance in residency. A job analysis, sometimes referred to as competency modeling,<sup>23</sup> is an important tool that helps organizations consider and pay attention to job-related information and KSAOs necessary to effectively fill a position's demands and expectations and is the foundational validity evidence for selection tool development.<sup>24</sup> In this project, many faculty indicated that this process was the first instance in which they had ever been asked to systematically consider what competencies and attributes are most important for trainees entering their program and to compare the relative value of each. Given that the average faculty tenure in each program was 8 years, this is a striking finding.

In line with best practices in test development and employee selection,<sup>21,22</sup> we made an intentional effort during this process to obtain information on future job requirements for each program. Whether the result of changes were associated with evolutions in surgical education more globally, shifts in local organizational culture, or plans for leadership transitions, we gathered information that allowed us to capture data not only on the current status quo but also future competency requirements. Capturing this information helps inform the integrity and longevity of any assessment tool developed and provides insight into the frequency in which this process needs to be monitored and repeated.

Our data reveal that there are a number of nontechnical skills that are anticipated to increase in importance over the next few years, with competencies related to interpersonal dynamics (team orientation, team leadership, and communication), professionalism, and receptivity to feedback rated the most likely to increase significantly. We take comfort that these findings not only appear to align with recent trends and expectations in surgical education,<sup>1-5</sup> but also acknowledge that other topics, such as resilience and stress management, were rated less likely to change in the future. Given the amount of discussion occurring on these topics, it might be assumed that these competencies would be expected to be more important in the future as discussion of their importance continues to gain momentum. Alternatively, given that resilience was one of the competencies rated

most critical, it may be that the importance of these competencies has simply reached a ceiling effect or that SMEs acknowledge that more system-based interventions (rather than personal resilience) are components that could benefit from change in the future. Regardless, our findings as a whole clearly highlight that there are a number of noncognitive and nontechnical competencies expected of trainees upon entry, and that the emphasis of these is only going to become more important in the coming years. As a community, we need to be sure that our methods to screen applicants on these competencies are evolving in parallel. Performing a thoughtful analysis of how current application data (letters of recommendation, medical licensing examination scores, personal statements, etc.) are able to provide usable information about these competencies will be an important first step, followed by rigorous development of objective and equitable methods to fill in the gaps.

Another interesting take-away from these data is the finding that no single competency was rated to be more important by more than 60% of SMEs across programs. Even among what might be considered a fairly homogeneous population (surgeons in Texas with defined roles in surgical education), no overwhelmingly uniform consensus emerged. These findings suggest that programs have their own unique demands, expectations, and culture which shape their perspectives on the importance of future competency requirements. As such, programs need to identify the most efficient and effective methods to disseminate these values and expectations, so that applicants can have more information at their disposal to make informed application decisions.

The results of our study not only have implications in the types of assessments and methods we use for selection into surgical training, but also have implications for assessment in training. According to these data, valued performance criterion in training may be a moving target. As a community, we must ensure that the assessments we use to evaluate trainees (milestones, rotation evaluations, American Board of Surgery requirements, etc.) are similarly keeping up with these trends. Perhaps the most comprehensive competency assessment is the ACGME milestones. Comparison of the competencies assessed within this study to the new ACGME milestones,<sup>24</sup> for example, reveals that the competencies assessed in this study are present on only approximately 52% of all of the behavioral descriptors included on milestone rating forms. Programs similarly should examine their armamentarium of resident assessments to determine the extent to which they are measuring many of these highly desired competencies longitudinally over the course of a resident's career.

Finally, our findings suggest that leaders in undergraduate medical education should be taking efforts to train and assess these skills among medical students. Currently,



curricula have been developed to hone many technical skills among medical students interested in surgery, such as the ACS/Association for Surgical Education medical student simulation-based surgical skills curriculum,<sup>25</sup> but even this has only 2 modules specifically related to communication. Thus, to adequately prepare students for entry into surgical training, while also giving them a realistic preview of the skills required for success, medical educators should develop relevant and effective curricula and assessments to develop these important skills.

A number of limitations are worth mentioning. First, these data represent only a single snapshot of programs within 1 state. At this point, it is unclear if these findings would generalize to other geographical regions or if they represent all program types. Our sample did include a diverse composition of programs based on program maturity and program type (university-based, community-based), but future work needs to be done if these results are replicable across other types of institutions. Furthermore, we specifically only measured perspectives around the anticipated changes within the next 3 to 5 years, and will thus need to continue to monitor and refine these data over time. As surgical education continues to evolve towards competency-based medical education and progressive autonomy, the desired and required competencies for success in surgical training will have to be revisited.

## CONCLUSIONS

These findings suggest that the competencies needed among entering surgery residents are likely to change in the future. As such, programs should ensure that their screening and selection methods will be equipped to objectively measure many of these nontechnical skills not otherwise available in traditional application packets.

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