# General Surgery Residency Inadequately Prepares Trainees for Fellowship

## *Results of a Survey of Fellowship Program Directors*

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**Objective:** To assess readiness of general surgery graduate trainees entering accredited surgical subspecialty fellowships in North America.

**Methods:** A multidomain, global assessment survey designed by the Fellowship Council research committee was electronically sent to all subspecialty program directors. Respondents spanned minimally invasive surgery, bariatric, colorectal, hepatobiliary, and thoracic specialties. There were 46 quantitative questions distributed across 5 domains and 1 or more reflective qualitative questions/domains.

**Results:** There was a 63% response rate (n = 91/145). Of respondent program directors, 21% felt that new fellows arrived unprepared for the operating room, 38% demonstrated lack of patient ownership, 30% could not independently perform a laparoscopic cholecystectomy, and 66% were deemed unable to operate for 30 unsupervised minutes of a major procedure. With regard to laparoscopic skills, 30% could not atraumatically manipulate tissue, 26% could not recognize anatomical planes, and 56% could not suture. Furthermore, 28% of fellows were not familiar with therapeutic options and 24% were unable to recognize early signs of complications. Finally, it was felt that the majority of new fellows were unable to conceive, design, and conduct research/academic projects. Thematic clustering of qualitative data revealed deficits in domains of operative autonomy, progressive responsibility, longitudinal follow-up, and scholarly focus after general surgery education.

**Keywords:** electronic survey, fellowship training, residency training, surgical education

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The practice of general surgery is undergoing significant change. The rapid adoption of new technologies, the integration of advanced minimally invasive techniques, and the exponential expansion of the knowledge and variety of procedures that trainees must learn have coalesced to dramatically and permanently alter the landscape of surgery. In many cases, these rapid changes overwhelm the ability of surgeons to readily adopt and master new techniques. Many surgery training programs also struggle to effectively integrate new procedures and technologies into residency curricula. Yet increasing demand by the public and hospital administrators has pressured surgeons to seek proficiency in all these new procedures.

General surgery residents are particularly subject to these changes in the practice environment. The majority of residents recognize the forces that will influence their future marketability and many feel unprepared to compete. Recent limitations and safeguards imposed by regulatory bodies, which include strict adherence to duty hours and an enhanced level of supervision with markedly diminished degrees of autonomy, have limited residents' exposure and experience compared with prior decades of surgical training.[1] Moreover, an ever-increasing complexity of procedures and the pronounced decrease in transferability of skills among procedures (eg, open, laparoscopic, and endoluminal) require a compensatory increase in exposure and autonomy during training. In some cases, the mentors who train residents may themselves feel they have been inadequately prepared to teach new techniques such as robotic surgery, per-oral endoscopic myotomy, and natural orifice surgery.[2] These factors undoubtedly help explain the unprecedented high demand by residents to invest in additional training and specialization, including specialized fellowships, after general surgery residency. Currently, greater than 80% of chief residents proceed to 1- or 2-year fellowships in various subspecialties.[3] A recent survey of surgical residents has revealed that nearly 40% of residents lack confidence in their skills after 5 years of training, including 23% of graduating chief residents.[4]

In response to this high demand for subspecialty training, many fellowship programs have emerged over the past 2 decades. These have a variety of oversight and affiliation, and include certificate-granting "fellowships," sanctioned by the American College of Graduate Medical Education (ACGME): vascular, cardiothoracic, colorectal, pediatric, and most recently oncologic surgery. In addition, there has been a rise in numerous non–ACGME-supported postgraduate training programs. These include specialty society-governed programs (eg, breast, endocrine, and trauma). Finally, there have been a large number of training programs in advanced gastrointestinal surgery, minimally invasive surgery, bariatric surgery, hepatopancreatobiliary surgery, advanced gastrointestinal surgery, flexible endoscopy, colorectal, and thoracic surgery. These last 2 fellowships provide additional training following completion of an ACGME-accredited colorectal and thoracic training program. Initially, all these fellowship programs were diverse and isolated, typically controlled by individual surgeons or institutions, with little consistency or

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oversight. The fellowship directors of these programs and the specialty societies supporting them ultimately came to recognize the merits of standardization and oversight, resulting in the creation of the Fellowship Council (FC) (https://fellowshipcouncil.org/).

The FC is an association created in 1997 to coordinate general surgery subspecialty fellowships toward the common objective of delivering standardized, quality training through a strong accreditation process. Program accreditation is a rigorous process that is supervised by members of the Accreditation Committee who perform site visits, review fellow case logs, fellow and faculty evaluations, conduct exit surveys, and ensure that training is being conducted according to standard curricula that have been published by the FC. The FC also manages a universal process for matching prospective candidates to fellowships. These fellowships comprise minimally invasive, bariatric, hepatopancreatobiliary, colorectal, thoracic, and flexible endoscopy specialties. The Board of Directors of the FC is formed of 13 members, and there are 9 committees that are charged with executing various projects that address or advance every realm of fellowship training. The research committee of the FC, which was charged with this study, is composed of 9 members from the component societies. The FC oversees 156 training programs, which encompass 210 fellowship positions. In 2012, 191 open fellowship positions were filled through the FC match for advanced specialty training after general surgery residency.

FC-accredited programs deliver comprehensive training augmented by a large volume of specialty-specific cases, offering trainees ample opportunities to gain proficiency in their skills. These programs emphasize the development of independence and safe, graduated responsibility. Because the duration of most of these fellowships is 1 year, the trainees' learning curve is steep. Of all the factors that influence the slope of this curve, the most important may be the foundational abilities the fellows bring to the fellowship from general surgery training. Several studies have revealed that the more prepared the trainee is, the faster the learning curve is ascended, allowing more time for refining necessary skills that are specific to a given specialty.[5–7] Conversely, new fellows who are not adequately trained during their residency in fundamental skills, for example basic laparoscopic skills, will usually take longer to reach a steady state in their advanced training, and consequently may not be able to advance to the point of performing complex procedures independently by the completion of their fellowship.[8,9]

This study, therefore, seeks to evaluate the level of preparedness of incoming fellows to FC subspecialty surgical fellowships to determine whether there are domains in which gaps in training exist that could be targeted for intervention during general surgery residency. If these gaps can be identified, these data could be utilized to develop a more directed training experience in the final year of general surgery residency, allowing for a greater likelihood of successful, independent transition to practice by the conclusion of a specialty-specific fellowship.

## METHODS

### Survey Design

The FC board of directors charged the FC research committee with the task of evaluating the level of preparedness of incoming fellows to the various fellowship types sponsored by the FC. The research committee is composed of active FC board members and program directors (PDs) who represent different FC specialties (advanced laparoscopy, bariatric, hepatopancreatobiliary, colorectal, and thoracic surgery). The research committee defined objectives to evaluate the incoming fellow in 5 educational domains (Table 1). Quantitative questions and at least 1 reflective qualitative inquiry were developed for each domain. The questions were converted to

**TABLE 1.** Survey Administered to Fellowship Council Program Directors: Quantitative Survey Questions*

**Professionalism**
- The incoming fellow communicates effectively with his or her patients
- The incoming fellow promptly comes in after hours to evaluate a patient that may need a higher level of care/ICU transfer
- The incoming fellow demonstrates ownership toward the patients
- The incoming fellow treats the ancillary staff with respect
- The incoming fellow treats the residents and house staff with respect
- The incoming fellow demonstrates professional behavior
- The incoming fellow knows the history and the imaging of the patient he or she is operating upon
- The incoming fellow arrives to the operating room prepared for the operation

**Level of independence/graduated responsibility**
- The incoming fellow formulates a plan of action for patients (inpatient/outpatient) before you seeing the patient
- The incoming fellow can independently perform:
  - a laparoscopic cholecystectomy without me being scrubbed
  - 30 min of a major procedure safely with me being in the room next door
- The incoming fellow is able to:
  - take general surgery call with only occasional consultation with me and only occasional assistance in the operating room for difficult cases
  - care for all postoperative issues on our surgical patients
- The incoming fellow is expected to be able to:
  - perform advanced cases independently by the end of the second half of the fellowship year
  - practice independently by the end of the fellowship year

**Psychomotor ability†**
- The incoming fellow is proficient in obtaining laparoscopic intra-abdominal access
- The incoming fellow is able to control bleeding
- The incoming fellow is proficient in recognition of anatomy and anatomic tissue planes
- The incoming fellow is proficient in dissection of tissue planes
- The incoming fellow is proficient in safe tissue manipulation
- The incoming fellow is proficient in uses of energy and energy sources proficiently
- The incoming fellow is proficient in laparoscopic suturing
- The incoming fellow is proficient in the use of staplers

**Clinical evaluation and management**
- The incoming fellow demonstrates an understanding of the:
  - pathophysiology of the disease
  - options for treatments, and the role and indication for surgery
- The incoming fellow demonstrates the ability to:
  - perform an initial outpatient interview and the design of the correct work-up
  - counsel patients regarding the differential diagnosis and the recommendations for care
- The incoming fellow has a good grasp of:
  - indications for surgery and the appropriate work-up
  - alternatives for treatment, and the areas of controversy or lack of consensus
- The incoming fellow demonstrates:
  - proficiency in postoperative patient care
  - ability to recognize the early signs of the development of complications
  - 7 ability to initiate appropriate investigations, and to respond with appropriate interventions
- The incoming fellow understands postsurgical or postendoscopic follow-up appropriate to the disease and proper surveillance
- The incoming fellow has the clinical maturity to identify features of the potentially critically ill patient, to triage to the appropriate level of care, and to seek senior help for the problem in a timely manner with clear communication

(*continues*)

**TABLE 1.** Survey Administered to Fellowship Council Program Directors: Quantitative Survey Questions* (*Continued*)

| **Academia and scholarship** |
|---|
| • The incoming fellow has a genuine interest in academic projects |
| • The incoming fellow has a healthy curiosity in understanding the underlying mechanisms |
| • The incoming fellow has motivation to advance the scientific basis of surgery |
| • The incoming fellow is familiar with recent publications in his or her field of advanced training |
| • The incoming fellow displays self-initiative in conducting clinical research |
| • The incoming fellow is aware of and eager to meet deadlines for academic projects |
| • The incoming fellow is able to compile and analyze data |
| • The incoming fellow is able to present the salient findings of a study clearly |
| • The incoming fellow demonstrates understanding of research protocol design |
| • The incoming fellow demonstrates understanding of basic statistics |
| • The incoming fellow has a good grasp on the fundamentals of preparing an abstract or manuscript |
| • The incoming fellow is capable of writing a cohesive manuscript |

*Scale from 1 to 5—strongly disagree, disagree, neither agree/disagree, agree, and strongly agree.

†Response options for this domain were strongly disagree, disagree, agree, and strongly agree, with examples of particular behaviors provided for each option to improve reliability and decrease subjectivity of responses.

an online format and beta tested to ensure brevity, clarity, relevance, and consistent interpretation. The survey was then refined, incorporating feedback from the beta test of the survey. The final survey comprised a total of 46 quantitative (Table 1) and 6 qualitative inquiries. Quantitative questions used a standard 5-point Likert-style scale, except in the psychomotor domain, in which 4-point descriptive options were employed to improve reliability and decrease subjectivity of responses.[10] Each descriptor provided a particular behavior to anchor the scale option selected. The Indiana University Institutional Review Board granted exemption, with the requirement that all data collected remain anonymous and participants could not be identified by the current institution or program type.

## Participants and Data Collection

The survey was deployed electronically to the 145 active fellowship PDs of accredited fellowships within the FC. The PDs represented all the specialties within the FC (advanced laparoscopy, bariatric, hepatopancreatobiliary, colorectal, thoracic, and flexible endoscopy programs). The electronic link sent to the PDs was accompanied by a letter from the chair of the FC research committee and the FC president outlining the goal of the survey. The accompanying letter had clear instructions regarding the anonymous nature of the survey. Both the letter and the survey were designed to emphasize to the PD that they should respond to the questions from the perspective of providing a global (multidomain) assessment of the graduates of general surgery training programs as they *enter* fellowship. Three electronic mailings were completed every 2 weeks for a period of 6 weeks. The surveys sent out in the months of April and May of 2012 not only provided the PDs the ability to gauge the characteristics and skills of the fellows as they initiated their training in July of the former year but also afforded the PDs sufficient time and opportunity to assess the gradual evolution of their fellows' proficiencies and competencies.

## Data Analysis

The quantitative responses are reported by the frequency distribution of responses within a given response category, for example, (1) strongly disagree, (2) disagree, (3) neither disagree nor agree, (4) agree, and (5) strongly agree. For the psychomotor domain, only 4 options were offered ranging from strongly disagree, disagree, agree, to strongly agree, with descriptors provided for each option and each question within this domain, and the frequency of responses were recorded accordingly. The qualitative written responses to the open-ended reflective questions were reviewed to identify themes. In keeping with grounded theory, a qualitative research approach in which themes are discerned from participants' responses, rather than from predefined constructs or categories, was utilized.

# RESULTS

The global assessment survey was completed by 91 of 145 fellowship directors (63% response rate) over a 6-week period. In addition to the quantitative responses (Tables 2–6), each of the 5 domains queried returned 15 to 25 free text reflective qualitative responses in response to a request for comments, specifying the strengths and deficits on recent incoming fellows within each domain.

Within the domain of *professionalism*, fellowship directors reported that overall incoming fellows demonstrated effective communication strategies and were respectful of patients and colleagues, with a response of agree or strongly agree provided 79% to 92% of the time for all attributes queried within this domain (Table 2). Within the qualitative comments for this domain, however, the predominant theme emerging from the open-ended responses was a lack of patient ownership, with illustrative comments highlighting this concern in 8 of 21 (38%) of the comments provided (Table 7).

Within the domain of *level of independence/graduated responsibility*, there was a shift toward utilization of the entire breadth of the scale as demonstrated by the modal responses shown in italic in Table 3. The greatest area of deficiency seemed to reside with the ability of an incoming fellow to perform 30 minutes of a major procedure independently on arrival to fellowship, with 42.7% of fellowship directors providing a response of disagree or strongly disagree with this statement. Despite this deficiency on entry to fellowship, 82% of fellowship directors agreed that fellows were able to perform advanced cases independently by the completion of fellowship, and 89% agreed that fellows were able to practice independently by the completion of fellowship training (Table 3). Themes that emerged from the open-ended responses in this domain reflected a generalized lack of autonomy and independence during residency that delayed progress, or at least required a "catching-up" phase at the beginning of the fellowship. Limited experience during residency with advanced procedures was also highlighted (Table 7).

The *psychomotor ability* domain was evaluated with only a 4-point scale, with vivid descriptors provided for each response of strongly disagree, disagree, agree, and strongly agree to improve the consistency of responses for a given level of performance. Although the modal response as shown in italic was "agree" for most skills queried, almost one third of responders provided an answer of disagree or strongly disagree for statements relating to an incoming fellow's proficiency in recognizing and dissecting tissue planes, and 56% disagreed that incoming fellows were proficient in laparoscopic suturing (Table 4). These same areas of concern were reflected in the open-ended responses. However, fellowship directors also reported that fellows typically progressed toward independence over the course of the fellowship (Table 7).

With respect to incoming fellows' skills within the domain of *clinical evaluation and management*, there was an overall agreement that fellows demonstrated the ability to evaluate patients, develop and

**TABLE 2.** Professionalism Domain Responses

| Abbreviated Query | Strongly Disagree, % | Disagree, % | Neither Agree nor Disagree, % | Agree, % | Strongly Agree, % |
|---|---|---|---|---|---|
| Communicates effectively | 0.0 | 1.1 | 6.7 | *50.0* | 42.2 |
| Comes into hospital to see sick patients | 0.0 | 5.6 | 8.9 | 38.9 | *46.7* |
| Demonstrates ownership of patients | 0.0 | 6.7 | 10.1 | *43.8* | 39.3 |
| Treats ancillary staff with respect | 0.0 | 0.0 | 7.8 | 35.6 | *56.7* |
| Treats residents with respect | 0.0 | 0.0 | 5.6 | 41.6 | *52.8* |
| Demonstrates professional behavior | 0.0 | 0.0 | 7.8 | 32.2 | *60.0* |
| Reviews history/imaging of patients for OR | 0.0 | 6.7 | 12.4 | *43.8* | 37.1 |
| Arrives to OR well prepared | 1.2 | 7.0 | 12.8 | *43.0* | 36.0 |

OR indicates operating room.

**TABLE 3.** Level of Independence/Graduated Responsibility Domain Responses

| Abbreviated Query | Strongly Disagree, % | Disagree, % | Neither Agree nor Disagree, % | Agree, % | Strongly Agree, % |
|---|---|---|---|---|---|
| Formulates a plan of action for patients | 0.0 | 9.0 | 10.1 | *53.9* | 27.0 |
| Can independently perform a laparoscopic cholecystectomy | 2.2 | 15.6 | 12.2 | *43.3* | 26.7 |
| Can perform 30 min of a major procedure independently without supervision | 9.0 | *33.7* | 23.6 | 20.2 | 13.5 |
| Can take general surgery call with rare need for assistance with cases | 3.4 | 22.7 | 21.6 | *42.0* | 10.2 |
| Provides all postoperative care | 1.1 | 16.7 | 14.4 | *51.1* | 16.7 |
| Can perform advanced cases independently by the end of fellowship | 0.0 | 2.2 | 15.6 | *52.2* | 30.0 |
| Can practice independently by the end of the fellowship year. | 0.0 | 3.3 | 7.8 | 38.9 | *50.0* |

**TABLE 4.** Psychomotor Ability Domain Responses*

| Abbreviated Query | Strongly Disagree, % | Disagree, % | Agree, % | Strongly Agree, % |
|---|---|---|---|---|
| Able to control bleeding | 1.1 | 12.2 | *73.3* | 13.3 |
| Proficient in recognition of anatomy and anatomic tissue planes | 1.1 | 24.7 | *58.4* | 15.7 |
| Proficient in dissection of tissue planes | 3.3 | 25.6 | *51.1* | 20.0 |
| Proficient in safe manipulation of tissue | 1.1 | 28.9 | *54.4* | 15.6 |
| Proficient in appropriate use of energy devices | 0.0 | 22.2 | *60.0* | 17.8 |
| Proficient in obtaining laparoscopic intra-abdominal access | 2.2 | 18.9 | *55.6* | 23.3 |
| Proficient in laparoscopic suturing | 13.5 | *42.7* | 38.2 | 5.6 |
| Proficient in use of staplers | 1.1 | 13.3 | *64.4* | 21.1 |

*Response options for this domain were anchored with examples of particular behaviors provided for each of the 4 possible answers and specific to the query, to improve reliability and decrease subjectivity of responses.

deliver appropriate recommendations, and initiate appropriate interventions (Table 5). One concern raised in the open-ended responses was associated with an observed tendency of incoming fellows to order excessive tests or overutilize hospital resources such as an intermediate or intensive care unit level of care to be certain that the patient was "okay" (Table 7).

The greatest concerns raised by fellowship directors in this survey were within the domain of *academia and scholarship* (Table 6). Although the modal response shown in italic was agree or neutral for all attributes queried, the percentage of fellowship directors responding within the agree or strongly agree response options ranged from only 32% to 76% (Table 6). The open-ended responses also reflected this concern, with 69% of the comments received relating to a general lack of interest among fellows in academic pursuits or scholarship activities (Table 7).

## DISCUSSION

Over the past decade, there has been a dramatic increase in the number of residents pursuing fellowship training after general surgery residency, with greater than 80% of graduating surgical residents seeking postresidency fellowship training in 2012. This study sought to assess existing gaps between the abilities of graduating chief residents and the requisites of specialty fellowships, and was undertaken after communications between the FC Board of Directors and the leadership of the Committee of Advanced Surgical Training and the GI Surgery Advisory Council of the American Board of Surgery. These bodies were interested in assessing the level of preparedness of graduating chief residents for postresidency fellowships. It is hoped that this data will be useful in developing curricula and training schemas that better prepare candidates for fellowships and eventual independent surgical practice.

**TABLE 5.** Clinical Evaluation and Management Domain Responses

| Abbreviated Query | Strongly Disagree, % | Disagree, % | Neither Agree nor Disagree, % | Agree, % | Strongly Agree, % |
|---|---|---|---|---|---|
| Understands pathophysiology of disease | 1.1 | 5.6 | 7.9 | *59.6* | 25.8 |
| Understands treatment options and indications for surgery | 0.0 | 7.1 | 10.6 | *57.6* | 24.7 |
| Performs appropriate initial outpatient evaluation | 0.0 | 3.3 | 16.7 | *46.7* | 33.3 |
| Counsels patients regarding differential and recommendations | 0.0 | 3.4 | 22.7 | *48.9* | 25.0 |
| Understands indications for surgery and appropriate work-up | 0.0 | 4.4 | 15.6 | *55.6* | 24.4 |
| Understands treatment alternatives and areas of controversy | 0.0 | 12.4 | 19.1 | *56.2* | 12.4 |
| Proficient in postoperative care | 0.0 | 2.2 | 8.9 | *55.6* | 33.3 |
| Recognizes complications early | 0.0 | 5.7 | 15.9 | *48.9* | 29.5 |
| Initiates appropriate investigations and responds with appropriate interventions | 0.0 | 3.4 | 18.2 | *47.7* | 30.7 |
| Demonstrates appropriate postoperative care recommendations relevant to disease, including surveillance | 0.0 | 3.4 | 23.0 | *55.2* | 18.4 |
| Recognizes decompensating patients, transfers to the appropriate level of care, and clearly communicates to the faculty member | 0.0 | 4.5 | 13.5 | *51.7* | 30.3 |

**TABLE 6.** Academia and Scholarship Domain Responses

| Abbreviated Query | Strongly Disagree, % | Disagree, % | Neither Agree nor Disagree, % | Agree, % | Strongly Agree, % |
|---|---|---|---|---|---|
| Interested in academic projects | 7.8 | 17.9 | 21.1 | *38.9* | 14.4 |
| Curious about the underlying mechanisms of disease | 3.4 | 9.0 | 11.2 | *59.6* | 16.9 |
| Motivated to advance science of surgery | 7.9 | 18.0 | 25.8 | *38.2* | 10.1 |
| Familiar with recent publications in the field of advanced training | 2.2 | 20.2 | *37.1* | 33.7 | 6.7 |
| Displays initiative in conducting research | 8.9 | 27.8 | 26.7 | *31.1* | 5.6 |
| Eager to meet deadlines for academic projects | 7.8 | 17.8 | 24.4 | *38.9* | 11.1 |
| Able to compile and analyze data | 2.2 | 29.2 | 21.3 | *38.2* | 9.0 |
| Able to present salient findings of a study | 2.2 | 15.7 | 31.5 | *40.4* | 10.1 |
| Understands research protocol design | 6.7 | 27.8 | 27.8 | *34.4* | 3.3 |
| Understands basic statistical analyses | 6.7 | 30.0 | 27.8 | *30.0* | 5.6 |
| Understands components of abstract and manuscript | 7.9 | 27.0 | 28.1 | *33.7* | 3.4 |
| Can write a cohesive manuscript | 8.9 | 27.8 | *31.1* | 26.7 | 5.6 |

The results of this high response rate survey (63%) depict several important findings in each of the measured domains. With regard to professionalism, there seemed to be overall high levels of communication skills among recent surgery graduates and demonstration of respect for colleagues, but there were troubling traits of general clinical unpreparedness and a lack of sense of ownership toward patients as reflected in 38% of the open-ended comments in this domain. Also of concern is the fact that 43% of PDs felt that incoming fellows were unable to perform 30 minutes of a major procedure independently in the operating room, and 30% of PDs felt that new fellows could not independently and safely perform basic operations such as a laparoscopic cholecystectomy. Although the modal response for independence while taking general surgery call is "agree" at 42%, approximately 50% of responders selected an answer of "disagree," "strongly disagree," or "neutral" on this statement; thus, these data points are not as incongruent as they may seem when examining the modal responses alone. In addition, the question regarding independence in operative performance related to performance of 30 minutes of a major case independently, and cases performed during call may or may not fall into this category; thus, these questions potentially query different skills sets accounting for the variation in modal responses observed.

Although high rates of motor and cognitive proficiency were reported in various fundamental laparoscopic skills, there were significant gaps identified in advanced laparoscopic skills such as suturing and knot tying. This is surprising given the requirement for certification in the Fundamentals of Laparoscopic Surgery curriculum for graduates of all general surgery residents in the United States and all FC fellows. This suggests that isolated training in a simulated environment without true automatization of this skill in the applied environment is inadequate, and incoming fellows likely had relatively little opportunity to practice these skills during patient operations

**TABLE 7.** Themes Identified in Fellowship Program Directors Open-Ended Responses by Domain Queried*

| Domain | Themes With Illustrative Quotes |
|---|---|
| Professionalism | Lack of ownership (8/21 responses—38%)<br>• "Ownership is absent"<br>• "There has been a shift of attitude in terms of ownership of patients and a willingness to come in after hours if not officially scheduled to be on call"<br>• "... attitude that patients belong to a service" |
| Level of independence/ graduated responsibility | Lack of autonomy and independence during residency delays progress during fellowship (9/25 responses—36%)<br>• "My fellow had not made significant independent decisions prior to this year"<br>• "It increasingly appears that recent fellows are hesitant in the OR and wait for "prompts" from their mentors"<br>• "Many fellows are pursuing fellowships to make up for poor experiences in their residency rather than to take their skill to the next level ..."<br>• "More frequently fellows come in with weaker skills ... making progression of responsibility much slower and minimizing the educational value of the fellowship"<br>Limited experience with advanced procedures before fellowship (6/25 responses—24%)<br>• "Technical advanced laparoscopic skills are not present at the beginning of fellowship"<br>• "Usually [have ability to] perform basic general surgery procedures, but are totally unable [to perform] advanced procedures" |
| Psychomotor ability | Foundational technical skills are often deficient on arrival (6/19 responses—32%)<br>• "... clearly lacks the experience of identifying retroperitoneal structures during complex cases like a Whipple"<br>• "... fine dissection and following planes is a recurrent deficit of fellows"<br>• "Most fellows are significantly deficient in [laparoscopic] intracorporeal suturing and knot tying"<br>The fellow progresses toward independence over course of fellowship (4/19 responses—21%)<br>• "Just needs more time in the OR"<br>• "They seem to quickly pick up all these skills within a few months of training"<br>• "... fellows ... are independent by the end of the year" |
| Clinical evaluation and management | The fellow lacks confidence in managing complex or sick patients (4/15 responses—27%)<br>• "... ordered excessive peri-operative tests in order to make sure he didn't miss anything"<br>• "Often over-triages most clinical scenarios, utilizing diagnostic studies and hospital resources ... to make sure the patient is 'okay' prior to discharge" |
| Academia and scholarship | General lack of interest in incoming fellows for academic pursuits (11/16 responses—69%)<br>• "I have noticed an undeniable reduction in the interest of incoming fellows in academic projects"<br>• "Little interest in conducting research ..."<br>• "Most applicants have zero to no interest in any academic pursuits including writing and presenting" |

*Describe strengths/deficits in the ... domain of recent incoming fellows.
OR indicates operating room.

before matriculation into their fellowship. This represents a significant opportunity for future enhancements in general surgery residency to increase the exposure of these skills to general surgery residents in the context of laparoscopic suturing in patients.

The overall low degree of readiness of incoming fellows limits their ability to benefit during the early phases of advanced training offered by fellowship mentors. In addition, the variability in the degree of preparedness makes it difficult for fellowship PDs to develop and administer consistent educational curricula. The causes of such perceptions are multifactorial and may be due to limited exposure to advanced complex procedures for residents, lack of mentor availability, reduction of duty hours and increased supervision requirements, lack of continuity of care because of increased requirements for transitions to remain compliant with rules, a reduction in emergency operations, and the rigid nature of the current residency training paradigm.

There have been prior efforts to address these perceived gaps in training. In a 2002 presidential address for the American Surgical Association, Haile Debas called for a reassessment of surgical education.[11] As a result, a Blue Ribbon Committee on Surgical Education was created and published recommendations in 2005.[12] These recommendations were comprehensive and included the restructuring of surgical training so that opportunities for earlier differentiation into goal-oriented specialty tracks be created, newer teaching technologies (simulators and virtual reality platforms) be incorporated, modular formats of training and the availability of focused subspecialization be adopted, and the option for research modules—either between the basic and advanced specialty modules or at the completion of residency—be incorporated. The significance of surgical research and professional development was also acknowledged and recommendations were made that underscored the central roles these areas play in the advancement of surgery as a discipline and surgeons as scientists.

Others have also recognized the lack of preparedness of the current general surgery graduate workforce. The American Board of Surgery Certifying Examination results have been steadily declining, with a decrease in the passing rate from 80% in 2008 to a rate of 72% in 2012.[13] In July 2012, the American College of Surgeons (ACS) and the ACGME cosponsored a summit, the National Invitational Conference on Transition to Practice in Surgery, to discuss this issue. More than 75 stakeholders representing the boards, residency review committees, PD organizations, and professional societies from across the surgical specialties, as well as the American Hospital Association, participated. A product of this invitational conference is the development of the ACS Transition to Practice Fellowship in General Surgery housed within the Division of Education of the ACS. Similar to FC-accredited fellowships, these select fellowships will not

be subject to approval by the ACGME, thus are designed to provide flexibility and educational opportunities tailored to the candidates' individual practice interests. The curricula for these fellowships will include basic components that include endoscopic procedures, critical care, common general surgical operations, obstetrics/gynecology, and practice management. An important feature of these curricula will be that of granting the fellow gradual autonomy so that by the end of the training period the fellow will be capable of confidently leading a practice that is characterized with high-quality care. To date, 5 such transition-to-practice fellowships have been created.[14] This model of graduated responsibility is also a distinguishing feature of the FC-accredited specialty fellowship programs, as compared with ACGME-accredited fellowships, which are governed by the same duty-hour and supervision requirements as general surgery residency training.

Other initiatives are under way that may also influence and enhance resident training in the future to improve readiness for transition to fellowship or practice. The ACGME has recognized the limitations of the current system of surgery resident training. Although significant strides have been made in contemporary postgraduate surgical education, the rigid nature of program requirements has resulted in an inability to keep pace with technical innovations and changes in the marketplace.[15] As a result, the Next Accreditation System will be implemented, initially as a pilot program, in July 2013, in 7 of the 26 ACGME-accredited core specialties, with the remaining specialties to follow in July 2014. The main characteristic of this new system will be a shift away from the current process-oriented system to one of monitoring outcomes. Programs will be called upon to demonstrate progress toward defined milestones for residents using robust assessment metrics. If successful, this system could be extended to undergraduate medical education to follow the adoption of competencies and restructuring taking place in many medical schools. Although the Next Accreditation System is a laudable goal, it is currently unstructured and there remain many questions regarding how this will achieve true reintegration of the graduated responsibility that has eroded in surgical training over the past decade, and which likely accounts for the deficiencies identified in this study by fellowship directors.

Although this study provides additional data that our current training paradigm is falling short, it also presents significant opportunities. Currently, flexibility exists to tailor training in the final years of general surgery residency toward a resident's ultimate path, thus allowing for increased preparation. The American Board of Surgery now provides an allowance of up to 12 months of flexibility in the final 36 months of general surgery residency training (maximum of 6 months per year) for focused assignments to reflect a resident's future specialty interest.[16] Few programs have taken advantage of this flexibility option to date; however, this should be maximally leveraged to improve the preparation of our general surgery graduates, tracking into fellowships or to meet the needs of their future practice in general surgery.

The FC has also responded to these data by moving the match date for its fellowships earlier in the year so that residents will have matched into their future path of training by June of their PGY4 year. This will allow for potential creation of a more tailored experience to improve preparation for their ultimate path in their final year of training. The FC component societies are currently considering what foundational skills could be optimally achieved during general surgery training, and are hoping to collaborate with those stakeholders who support the broad-based training of general surgeons. For example, fellows tracking into a hepatopancreaticobiliary fellowship would benefit from acquiring excellent foundational ultrasound skills during residency and would be expected to become proficient in hepatobiliary and pancreas ultrasound during fellowship. Similarly, fellows tracking into a bariatric fellowship should develop proficiency in intracorporeal laparoscopic suturing during residency, and would become proficient performing a gastric bypass during fellowship. Ideally, such an undertaking would encompass the entire house of surgery so that prerequisite experiences are defined in a collaborative way for all residents, with the training of all graduates optimized.

This study has several limitations that must be acknowledged. The inherent nature of survey-based acquisition of data reflects the subjective opinions of the responders. The survey was also administered in April and May of the fellowship year, and because fellowship directors were asked to consider the fellow's skill set upon matriculation to fellowship, the results are also subject to recall bias. In addition, the respondents were isolated to only FC fellowship PDs, and thus these data reflect experiences with only those residents entering an FC fellowship. The response rate of the survey was not 100%, thereby raising concerns of responder bias; however, the response rate of 63% represents the views of the majority of PDs surveyed. Because of the anonymous nature of the survey, it is not possible to compare the demographics of the nonresponders with those who completed the survey. Despite these limitations, the findings of this study seem congruent with the opinions expressed by other stakeholders in the surgical education arena.[11,12]

## CONCLUSIONS

In conclusion, the findings presented provide affirmation of the many concerns expressed in more general terms by other stakeholders regarding the lack of readiness of graduates of general surgery residency training to enter independent surgical practice or benefit fully from postgraduate specialty training. We identified major deficiencies in the domains of independent practice ability, patient responsibility, and some motor skills—all considered fundamental elements of safe and effective patient care. These findings are not surprising given the rigid and conservative nature of the current general surgery residency training paradigm, which has been unable to keep pace with technological advancements. There is also a perceived low level of interest in academic and scholarly activities that was identified in this study. If sustained, this lack of scholarly interest may affect the ability of practicing surgeons to accept new techniques or part with established methods, and may impede the future advancement of surgical science in the United States. Fortunately, surgical education training programs and certifying and accreditation bodies such as the ACGME, the American Board of Surgery, and the ACS have recognized these deficits and are discussing possible changes to the surgical education paradigm. It is hoped that significant changes will be implemented in the near future, with the aim of once again producing surgical residents who are confident and well prepared for the rigors of the surgical marketplace or specialty fellowship.

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## DISCUSSANTS

### M.G. Sarr (Rochester, MN):

Much of my discussion addresses our association and the future of education. We all know that survey studies are fraught with problems: inadequate response rates, unknown differences between responders and nonresponders, subjective nature of questions, parochial/political agendas, leading questions, nonvalidated surveys, and, in this study, lack of a prior comparison group. I will not address these obvious limitations here.

However, there is a clear message from this study and several other surveys that—despite their limitations—call into question the declining resident experience, autonomy, technical skills, patient ownership, and, equally telling, trust in their function as an independent surgeon after finishing residency training.

Admittedly, "benchmark quantification" of "training" as published in recent literature and defined by (1) the number of cases logged by residents, (2) pass rates on in-training examinations, and (3) reviews of patient morbidity and mortality has not ostensibly eroded. However, the expertise of the graduating chief residents has been questioned by many, perhaps most, educators.

When only 40% of our residents are believed to be able to perform 30 minutes of independent operating for major cases without supervision, and 30% are deemed "unsafe" to perform a laparoscopic cholecystectomy independently, we have a problem. I maintain that we need to stop being bullied by public and politically driven agendas and some of our own pundits. Once again, we need to take control of educating our successors.

We all acknowledge that before the duty-hour restrictions of 2003, many of us trained and worked in situations that were barbaric, often dangerous. Indeed, with our current regulations, residents are safer, but no one can deny that in the past, graduating residents were superb. Nevertheless, we cannot and should not go back.

I have 2 questions for our association:

1. Where should we concentrate our efforts? Should we focus on medical school, tracking in residency with the so-called early specialization, or should we accept the fact that fellowships are an expected part of the training and not considered additional training?
2. Should the politically driven ACGME and our own RRC liberalize their stringent rules to allow residents to make more professional decisions to exceed the 80-hour restriction when clinical situations demand their presence?

### Response From S.G. Mattar (Indianapolis, IN):

With regard to what we can do in preparing these incoming fellows, I think we should focus on both medical school and residency levels. There are already plans afoot, which I think should be encouraged, to start preparations for a surgical career at the medical school level, maybe the fourth year of medical school once students have selected surgery. Special curricula are being developed and selected institutions are planning to proceed with a general surgery residency.

The Fellowship Council is already addressing this issue. We have already advanced our matching date to start in June, so that once the residents who are going into surgical fellowships have been selected, this last year of residency can be fashioned in such a way as to better prepare them for their coming fellowship year. Of course, this change brings up a lot of logistical issues, such as call schedules and other administrative matters, but a dialogue around and more efforts toward solving these issues should take place.

The ACGME, RRC, and regulatory bodies should become more flexible. Duty hours per se may not be the main problem, but it is a factor. However, what is even more important is providing residents with some form of autonomy, some form of independence, because these are the concerns that are probably affecting the survey results more than anything else.

## DISCUSSANTS

### F.R. Lewis, Jr (Philadelphia, PA):

I have no substantial argument with the points being made but would note that the issue of inadequate preparation should not be considered newsworthy. The American Board of Surgery has held retreats and has addressed resident preparation on multiple occasions over at least the past decade. On the board certification examination, the failure rate on the oral examination has been progressively rising for 10 years, from 16% in 2006 to about 28% in 2012. There has been a relatively consistent failure rate in the high teens on the written examination. The failure rates on the 2 examinations do not substantially overlap, so that the results are more or less additive. Therefore, the total number of people who fail either the written or the oral examination the first time around is typically in the middle 30s. This rate is arguably far too high for a group of talented people who should have mastered the subject after completing a 5-year training program.

Six major factors account for where we are at present. First, surgical experience during basic medical school training, particularly in the fourth year, has virtually vanished. Clerkships, in which medical students took night call and began real experience on a surgical service, rarely occurs anymore. Night call is nonexistent. The fourth year, in terms of surgical experience, is relatively poor virtually everywhere. I would point out that training is an area subject to the medical school environment and not one over which the surgical world has any control.

Second, over 20 years the surgical environment has changed dramatically. Gastric surgery has markedly decreased; biliary tree surgery has virtually disappeared; abdominal vascular surgery for general surgical residents has also virtually disappeared; and trauma experience has decreased by two thirds. Several major categories of surgery no longer exist because of changes in the environment and improved drug treatment of diseases. That phenomenon is not reversible.

Third, and one area that is under the control of program directors and chairs of surgery, is that the exposure of surgical residents to the operating room in the early years of residency is remarkably poor. The average number of operations done by a first-year resident is presently fewer than 2 per week. The average number of operations done by a second-year resident is between 2 and 3 per week. These are residents who are spending 80 hours per week in the hospital but doing only 2 or 3 operations during this period, operations that arguably could be done in half a day.

It would be hard to imagine a less efficient educational process. If we do not expose residents to the operating room early and take advantage of the opportunities to give them more advanced training, their progression in later years is severely compromised. There is no reason that junior residents could not be doing much more operatively than they are currently.

Fourth, residents have markedly decreased experience with open surgery because of the conversion of open surgery to laparoscopic surgery. The problem here is that the complex open operations that were previously done by general surgical residents have not been replaced by comparable laparoscopic operations of equal complexity. Fellowships in advanced laparoscopic surgery and the other GI areas are not available for residents.

Fifth, the decreased autonomy and independence of residents is undoubtedly a major factor, but one that is largely beyond our control, involving multiple ethical, legal, and other issues that are not easy to change.

Finally, there is the issue of work hours. The 80-hour workweek has effectively taken 6 months to 1 year of in-hospital time out of residency, hours that focused most heavily on evening and weekend experience, when there was more opportunity for independence and autonomy.

Four of these 6 factors are arguably areas over which we do not have much control. Two of them are. We can certainly affect what residents do in the early years of residency, and we can potentially affect the amount of laparoscopic surgery to which they are exposed.

However, fellowships after general surgical residency are largely uncontrolled in today's environment. The Fellowship Council is to be complimented on making some efforts to evaluate the impact of their fellowships on general surgical residency, but other nonaccredited fellowships in colonic, thoracic, and pediatric surgery, which have been proliferating for years, are unregulated. They infringe on the residents' surgical experience.

## DISCUSSANTS

### M.E. Klingensmith (St Louis, MO):

I have a question regarding the Fellowship Council. This group represents a slice of all the fellowships available, and so we are looking at a single sample size of trainees. Do you have any demographic data about these individuals? How competitive are they compared with the cohort that went to fellowships in pediatric surgery or thoracic or surgical oncology, those fellowships that are traditionally thought of as the more "competitive"?

Are we seeing some effect of your sample size, in that these people are unprepared because they are in some way a trailing cohort compared with peers?

### Response From S.G. Mattar (Indianapolis, IN):

We do not have data on the sample size and the nature of these fellows entering our programs versus the ones who are going to pediatric surgery. We have not made those comparison studies.

## DISCUSSANTS

### M.A. Malangoni (Philadelphia, PA):

You have identified deficiencies in a number of areas, but in all areas except academic research, there are more fellows with good characteristics than with poor characteristics. Have you looked at what the differences are between those 2 groups that might help identify a solution to this particular problem?

Would abolishing the fellowships and driving all of these cases back into the residency programs solve the problem?

### Response From S.G. Mattar (Indianapolis, IN):

With regard to the first question about what it is that is specific to those fellows who were perceived to be better, we have not looked at those data.

As for abolishing fellowships, the fact is that there is a huge demand and need for them by residents and markets, alike. I do not think fellowships are going to be eliminated anytime soon because they are needed, and they are perceived to be valuable. They are rewarding to all stakeholders.

In the future, perhaps as residency training programs evolve and meet all the needs of residents, and as we find that applications for fellowships start declining, I can see a day will come when fellowships may be abolished.

## DISCUSSANTS

### L.A. Neumayer (Salt Lake City, UT):

As someone who considered the best year of residency to be my first year in practice, I do not think your findings represent a new phenomenon. With 80% of general surgery residents pursuing fellowships, whether they are ACGME accredited or not, we are now exposed to the whole spectrum of graduating residents, the very good as well as the average and those few below average, whereas in the past decades, the individuals pursuing fellowships were the very good and above average. The majority went directly into practice. Many are questioning the ownership versus shift mentality. Are we pushing back against something that is actually better? Is it wrong to develop a team that can provide exceptional patient care within the confines of our current system that requires shifts?

### Response From S.G. Mattar (Indianapolis, IN):

Absolutely not wrong. All incoming fellows should feel that they have ownership toward their patients. We promote that. In fact, we are somewhat disappointed and dismayed that residents feel that the patient is part of a service and not their own.

## DISCUSSANTS

### A.A. Meyer (Chapel Hill, NC):

We are surprised that residents and medical students do not seem to have that much commitment or ownership or experience, and, at the same time, we change our expectations. Half the students coming out of medical school have never put in an NG tube, a third have never put in an IV, and then we are shocked. Is this a self-fulfilling prophecy? We have a fellowship, so we train the fellows and we do not train the residents. Now, we have to train the residents as fellows because they do not learn it.

Fellowships are convenient, but we ran into this at some points with residents. They became perceived as inexpensive labor. Is that what we are doing with fellows?

To try to solve the issue of disappointing results, have you broken out the cohort of fellows who do their fellowship at the same institution as they do their residency? If they do that, some of that bias and all the other factors should not be a surprise. It really makes you

look at your own individual residency, as opposed to the perception that residencies across the board are ineffective.

### Response From S.G. Mattar (Indianapolis, IN):

We have not looked at whether the fellows in the fellowships came out of the same residency program or whether they scored differently from residents who came from across other programs. But you are perfectly right. Fellows, and even residents, should be considered to be trainees and not employees. In fact, the Fellowship Council goes a long way to ensure that fellows are undergoing an educational experience and not being used as workhorses.

## DISCUSSANTS

### A. Sachdeva (Chicago, IL):

I have 1 comment and 1 question. The comment relates to the widespread concern regarding preparation for practice across all surgical specialties, not just in general surgery. Last year, the American College of Surgeons convened a national invitational conference at the College's headquarters in Chicago to address this important concern. Representatives from the respective boards, the RRCs, program director organizations, and specialty organizations were invited to discuss the issues and propose solutions. The discussions resulted in 3 sets of recommendations for the period before graduation from residency, 3 sets of recommendations for the period after individuals enter practice, and 1 set of recommendations relating to regulatory issues, credentialing, and financial considerations.

One of the spin-offs of that meeting was the crystallization of the concept of a postresidency transition to practice program in general surgery. This is not a fellowship, and individuals would work as junior partners with a senior surgeon or a group of senior surgeons to acquire additional skills and experience to practice independently. This program will be housed in the American College of Surgeons Division of Education. The question I have for you relates to the information you presented from the perspective of program directors of the fellowships. Do you have any information from the fellows regarding their self-efficacy? How did they feel? If the program directors felt they were deficient in some areas, were the fellows confident or not confident about their skills in those areas?

### Response From S.G. Mattar (Indianapolis, IN):

In fact, surveying the fellows is going to be our next project. It will also be a nice way to validate the study that we just did.