Medical student subinternships in surgery: characterization and needs assessment

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Abstract

BACKGROUND: Medical students commonly enroll in courses known as “subinternships” before residency application. This study investigated the experiences and needs of students completing subinternships in surgery.

METHODS: Electronic surveys were sent to medical students applying to the surgery residency program at our institution and to medical student clerkship directors for distribution nationally. Approximately 700 surveys were distributed with 275 completed (39%).

RESULTS: Sixty-one percent of respondents indicated subinternships influenced specialty choice, and 82% of this group applied in general surgery. General surgery applicants rated mentorship (93%) and clerkship experience (92%) as important factors for specialty choice. Technical skills education was rated as beneficial by 89% of respondents, but formal laboratories were included only in 21% of courses. Only 49% received course objectives, and less than 10% were given a reading schedule.

CONCLUSIONS: Opportunity exists to define a curriculum for surgical subinternships in order to address student needs for specific didactics for residency preparation and technical skill enhancement.

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Medical students in their final year commonly enroll in advanced clerkship courses known as “subinternships” before applying for a residency position in their chosen specialty. The moniker for these clinical rotations stems from a tradition long held sacred in the medical profession—that of apprenticeship and increasing responsibility with increasing experience, which historically allows these students to take on many of the functions of their first-year resident counterparts, known commonly as internship.¹,²

However, with the sweeping modifications in the regulation of graduate medical training and the changes to billing structures necessitating a paradigm shift in practice patterns for attending physicians,³ anecdotes from students suggest that many of the responsibilities once assumed by subinterns have shifted up the medical training hierarchy.⁴ To date, very little has been published regarding how these courses are formatted,¹ if at all, or if they are standardized between institutions and disciplines. For purposes of this study, the term “subinternship” will be used to refer to any course within a surgical discipline for which a student enrolled after completion of their basic surgical clerkship, either at their home institution or away. Likewise, little is
known about how subinternships affect medical students’
choice of residency. This study sought to examine whether
students enroll in a subinternship in surgery as part of their
career decision-making process as well as the influence, if
any, this actually exerts.

Materials and Methods

With institutional review board approval, 2 focus groups,
each consisting of 6 Johns Hopkins University medical
students, were performed to identify common objectives for
enrolling in subinternship rotations and factors that influ-
ence choice of specialty. By using these data, a questionnaire
was generated and piloted for clarity and content relevance
with 10 fourth-year medical students at the primary study
site. The survey was then distributed electronically in April
to May 2011 to all 4th-year medical students who applied to
the general surgery residency program at Johns Hopkins
Hospital during the 2010/2011 academic year. The survey
was also sent to surgery clerkship directors who are mem-
bers of an Association for Surgical Education listserv for
dissemination at their respective institutions. A survey
excerpt can be found in Fig. 1, and the entire instrument is
available in Appendix 1. Five hundred twenty-two surveys
were sent to individual students, and an additional 50 med-
ical student clerkship directors were sent a survey link for
distribution at their institutions. Two hundred nineteen indi-
viduals completed the survey after an initial invitation e-
mail and 3 reminders to nonrespondents. An additional 56
responses from the survey link sent to clerkship directors
were included out of an approximate 175 survey links dis-
tributed for a total of 275 respondents. This gives an esti-
mated overall response rate of 39%.

The survey was divided into 3 general areas for study:
student objectives for enrollment and their experiences,
course organization and activities, and course demographics.

Using a Likert-type 5-point scale, students were asked to
rate how strongly they agreed or disagreed that one of a list
of objectives was among their personal objectives for the
course as well as a “yes/no” box for whether the objective
was achieved. The survey also presented a list of possible
clerkship educational activities, and students were asked to
answer “yes/no” whether each activity was included as part
of their course and to rate on a Likert 5-point scale how
strongly they agreed or disagreed that the particular activity
would be beneficial as part of a surgical subinternship.
Students’ perception about their ability to participate di-
rectly in patient care and their level of responsibility were
assessed also.

Our survey also attempted to capture a snapshot of the
demographics behind subinternships. Students were asked
how many total subinternships they enrolled in and, of the
total, how many were performed at an “away” institution,
which was defined as any subinternship rotation performed at
an institution other than their primary site of enrollment.
Students who engaged in an away rotation were then asked
again about their objectives for these rotations and whether
they were met as well as course activities and their perceived
educational benefit. For students who did not pursue a
subinternship outside their home institution, they were
surveyed regarding the reasons why they did not pursue an
away rotation. Lastly, all respondents underwent inquiry
regarding factors that influenced their choice of specialty as
well as the residency to which they ultimately applied.

Results

Survey data were compiled and analyzed using basic
parametric statistics. They were reported in groups of
course demographics, student objectives and experience,
impact on specialty choice, course activities, and student
responsibility and autonomy.

![Figure 1](image_url) Distributed survey instrument: an excerpt of the electronic medical student survey regarding surgical subinternship courses.
Course demographics

A majority of respondents completed a total of either 2 or 3 subinternships in surgery (n = 89 and 85, 33% and 31%, respectively), and a majority of respondents (n = 153, 58%) completed at least 1 subinternship outside their home institution, also known as an “away” rotation. Of those students who enrolled in away rotations, 34% completed 1 (n = 88), 20% completed 2 (n = 53), and 12% completed 3 or more (n = 12). When surveyed about the reasons why they favored enrolling in an away rotation, 89% of respondents agreed or strongly agreed that their choice of rotation site was because of a desire to obtain a residency position at that particular institution (n = 136), and 77% similarly cited a preferred area of the country that they sought out (n = 115). Equal numbers of students enrolled in an away rotation to obtain a letter of recommendation as well as to experience diversity in the practice patterns of multiple institutions (69%, n = 103 and 101, respectively). Smaller numbers of students cited a desire to work with 1 or more faculty member at a particular institution (n = 82, 54%), an interest in research opportunities at another institution (n = 36, 24%), or poor experience at their home institution (n = 26, 17%).

Among those students who did not participate in an away rotation, 57% agreed or strongly agreed that cost was a contributing factor in their decision-making process (n = 60), whereas 40% cited personal or family reasons for not pursuing an away rotation (n = 42). Thirty-four percent of survey respondents agreed or strongly agreed that they were discouraged from pursuing away rotations by faculty at their home institution (n = 36), but only 28% of students expressed concern that an away rotation would decrease their chances of matching at a particular program (n = 27). Almost half of the students (n = 49, 48%) who did not participate in an away rotation stated that they were not interested or did not feel a need to complete one.

Student objectives and experiences

Students rated their degree of agreement or disagreement with a list of prepopulated personal objectives for a subinternship in surgery and were provided a free text box to write in other potential objectives. The percentage of student responses for each of the listed student objectives for subinternship enrollment can be found in Fig. 2. The most common objectives among survey respondents were a desire to enhance their understanding of basic patient management (n = 252, 97%) and to increase their knowledge in the field of surgery (n = 250, 95%), whereas 94% agreed that these objectives had been achieved (n = 241 and 239, respectively). Although only 78% of students agreed or strongly agreed that they enrolled in a subinternship to obtain letters of recommendation (n = 202), 84% of respondents achieved this objective regardless of their initial intent (n = 237). Of note, 85% of students cited a desire to increase their operative technical skills as an objective for a subinternship (n = 225), but only 75% of this group agreed that they accomplished it (n = 169).

Impact on specialty choice

Sixty-one percent of students surveyed agreed or strongly agreed that they enrolled in a surgical subinternship to determine whether they wanted to pursue a residency position in general surgery (n = 156). Ninety-five percent of this group agreed that they achieved the objective (n = 152), and 82% ultimately applied to a general surgery residency program (n = 124). Sixteen
percent of this same group applied to another surgical specialty (n = 25), and only 2% applied to a nonsurgical specialty (n = 3) such as internal medicine or radiology. Fifteen percent of survey respondents marked “neutral” for whether they enrolled in a surgical subinternship to determine their career choice (n = 37), and 84% of this group applied to a general surgery residency (n = 31). Of those students who disagreed or strongly disagreed (n = 25, 10%), 64% applied for residency in general surgery (n = 16), and 36% applied to another surgical specialty (n = 9), making the argument that these students were already confident about their specialty choice.

When surveyed about specific factors that influenced their choice of specialty, applicants to general surgery programs were most likely to cite faculty mentorship, experiences on their basic surgery clerkship, and the types of case exposure obtained as very or somewhat important (n = 196, 195, and 194, respectively; 93%, 92%, and 92%, respectively). For applicants who pursued a residency in a surgical specialty other than general surgery, only 65% indicated that basic surgery clerkship experiences were important (n = 22), whereas 80% cited practice opportunities as very or somewhat important (n = 28). Most striking were the differences observed between general surgery applicants and survey respondents who applied in a nonsurgical specialty. Only 38% of general surgery applicants felt that expected earnings were very or somewhat important to their specialty decision (n = 81) as opposed to 100% of nonsurgical applicants (n = 6). A similar trend was observed with expected physician lifestyle, with 25% of general surgery applicants rating it as very or somewhat important (n = 53), whereas 83% of nonsurgical applicants rated it as part of their specialty decision (n = 5). A complete listing of specialty choice factors correlated with specialty application can be found in Table 1.

Among all survey respondents, 97% matched successfully to a postgraduate position (n = 251). Seventy-eight percent of all survey respondents matched in general surgery (n = 187), 20% to another surgical specialty such as orthopedic surgery or integrated cardiothoracic and vascular surgery (n = 47), and 2% to a nonsurgical specialty such as radiology or internal medicine (n = 6). Forty-seven percent of those surveyed matched at a program they did not rotate at or near (n = 123), whereas 23% remained at the institution where they went to medical school (n = 59) and 16% matched to an institution where they enrolled in an away rotation (n = 40). General surgery applicants were equally likely to remain at their home institution (n = 44, 23%) but were slightly more likely to match to a program where they had performed an away rotation (n = 28, 25%). Like the group as a whole, 50% matched to a program they did not rotate at or near (n = 97).

### Course activities

Less than half of students enrolled in general surgery subinternship courses received formal objectives (n = 136, 49%). Of those who did, 52% were distributed in paper form (n = 70), 28% via a Web site (n = 37), and 20% through e-mail (n = 27). Survey participants were asked whether they perceived a list of potential course activities as beneficial to their education as well as whether or not the activity was included as part of their clerkship. Respondents were also asked to write in other activities they participated in that were not included in the list. A complete list of student participation in possible course activities and their perceived benefit can be found in Table 2.

The presentation of a patient case or other topic to members of their team was the most common activity cited as part of a surgical subinternship (n = 191, 74%), and 80% of all respondents agreed or strongly agreed it would be beneficial (n = 206). Only 10% of students received a detailed reading schedule or list for the rotation (n = 26), but 88% of those who did have access to this resource believed it was beneficial to their education (n = 23); 58% of all respondents agreed or strongly agreed that a detailed reading schedule would be beneficial to their education (n = 151). Almost all respondents answered that a review of basic technical topics and a workshop on common calls received by residents would be beneficial (n = 236 and

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Self-reported factors that influence student choice of specialty</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factors influencing specialty choice</strong></td>
<td><strong>General surgery applicants (n = 212) (%)</strong></td>
</tr>
<tr>
<td>Experience with a faculty mentor</td>
<td>196 (93)</td>
</tr>
<tr>
<td>Experience with a resident mentor</td>
<td>173 (82)</td>
</tr>
<tr>
<td>Experiences on basic surgery clerkship</td>
<td>195 (92)</td>
</tr>
<tr>
<td>Experience on surgical sub-internship</td>
<td>183 (86)</td>
</tr>
<tr>
<td>Exposure to cases</td>
<td>194 (92)</td>
</tr>
<tr>
<td>Exposure to patients</td>
<td>174 (82)</td>
</tr>
<tr>
<td>Practice opportunities</td>
<td>166 (79)</td>
</tr>
<tr>
<td>Expected earnings</td>
<td>81 (38)</td>
</tr>
<tr>
<td>Physician lifestyle</td>
<td>53 (25)</td>
</tr>
</tbody>
</table>

The number and percent of survey respondents who applied in general surgery, another surgical specialty, or a nonsurgical specialty who agreed or strongly agreed that the listed factors influenced their specialty choice. Numbers and percents for all columns may vary because of missing or incomplete data.
Table 2  Potential subinternship curriculum elements and the perceived benefit to student education

<table>
<thead>
<tr>
<th>Potential clerkship activities</th>
<th>Students able to participate n (%)</th>
<th>Perceived benefit if participated n (%)</th>
<th>Perceived benefit if no participation n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detailed reading schedule</td>
<td>26 (10)</td>
<td>23 (88)</td>
<td>128 (55)</td>
</tr>
<tr>
<td>Team presentations</td>
<td>191 (74)</td>
<td>164 (86)</td>
<td>42 (63)</td>
</tr>
<tr>
<td>Online content quizzes</td>
<td>10 (4)</td>
<td>10 (100)</td>
<td>71 (31)</td>
</tr>
<tr>
<td>Technical skills laboratory</td>
<td>53 (21)</td>
<td>51 (96)</td>
<td>182 (89)</td>
</tr>
<tr>
<td>Central line placement laboratory</td>
<td>34 (13)</td>
<td>33 (97)</td>
<td>196 (89)</td>
</tr>
<tr>
<td>Basic bedside procedures laboratory</td>
<td>91 (35)</td>
<td>87 (96)</td>
<td>125 (74)</td>
</tr>
<tr>
<td>Technical topic review</td>
<td>53 (21)</td>
<td>50 (94)</td>
<td>186 (90)</td>
</tr>
<tr>
<td>Common call/problem workshop</td>
<td>19 (8)</td>
<td>18 (95)</td>
<td>225 (94)</td>
</tr>
<tr>
<td>Taking call with junior residents</td>
<td>196 (75)</td>
<td>173 (88)</td>
<td>37 (59)</td>
</tr>
<tr>
<td>Taking call with senior residents</td>
<td>148 (57)</td>
<td>140 (95)</td>
<td>64 (60)</td>
</tr>
</tbody>
</table>

The number and percent of survey respondents who had specific educational activities included as part of their advanced surgical clerkship as well as the perceived benefit to those who had the activity included as part of their clerkship and those who did not.

Large numbers of survey participants also expressed that increased technical skills education would be beneficial. Ninety-four percent of respondents believed a technical skills laboratory or central line laboratory would be beneficial (n = 233 and 229, respectively), whereas 89% believed a basic bedside procedures laboratory would be of benefit (n = 212). Four students who disagreed or strongly disagreed that a basic bedside procedures laboratory would be beneficial commented that they received these skills during their basic surgical clerkship and sought not to replicate prior learning efforts. Again, only small numbers of students had access to these opportunities during their subinternships (ie, 21% had a technical skills laboratory [n = 53], 13% a central line laboratory [n = 34], and 35% a basic bedside procedures laboratory [n = 48]).

When asked to list things that could be improved about subinternships, 33% of respondents cited a desire for more dedicated teaching time (n = 31), 25% a desire for a reading list or standardized curriculum (n = 23), and 24% a desire for increased autonomy and responsibility (n = 22). When asked to list elements that made their subinternship(s) successful, 65% listed time and increased responsibility in the operating room (n = 71), 60% cited autonomy in decision making and direct responsibility for patient care (n = 65), and 54% discussed increased relationships with and mentoring by faculty and residents (n = 59).

Student responsibility and autonomy

Survey respondents also highly valued subinternship experiences that fostered increased levels of autonomy and responsibility for patient care. Seventy-one percent of students agreed or strongly agreed that they had the opportunity to autonomously evaluate common problems for surgical floor patients (n = 179), and 99% of students who participated in this activity rated it as beneficial to their education (n = 178). This is contrasted to 38% of respondents who were able to act as the first responder for patient issues in receiving nurse calls about inpatient problems (n = 97) although only 70% of those who participated in this activity believed it to be beneficial (n = 68).

Subinternship rotation students often cite a desire to write independent orders, and 69% stated that they were able to write orders that required a resident or attending cosignature (n = 174), with 95% believing it was beneficial to their education (n = 166). Only 7% of survey respondents were permitted to write orders that did not require a cosignature (n = 29), but 54% of responses were neutral or negative toward the idea of students writing orders that do not require cosignature (n = 137).

As mentioned previously, the acquisition of technical skills was a highly desired activity during surgical subinternship courses. Fifty-two percent of students cited an ability to act as a first assistant for at least 1 surgical procedure during their rotation, and all of them believed it to be beneficial to their education (n = 131). Although not acting as a true first assistant, 68% of respondents agreed that they were permitted to perform some basic steps of a surgical procedure during their subinternship (n = 171), and 99% who participated believed it to be a worthwhile undertaking (n = 169). Of those students not permitted to engage in either of these activities, 97% and 96%, respectively, believed participation would provide benefit to their education (n = 115 and 78, respectively).

Comments

The results of our study reveal that unlike basic surgical clerkships commonly taken during the 3rd year of medical school, surgical subinternships generally lack a central organization or unifying curriculum. Respondents to our survey viewed more organized educational activities, specifically including technical skills, favorably as part of a subinternship course in surgery. Thus, opportunity exists to build structure into these rotations via the use of specific didactics targeted to these more advanced learners as well.
as activities focused on enhancing the technical skills that students perceive are lacking from their current courses.

Although a national curriculum is currently being developed for surgical “boot camps” to aid in the transition from medical school to surgical residency,\textsuperscript{5–7} we would advocate that a higher proportion of top students could be captured by optimizing the ways in which senior students who have not yet decided on their specialty choice continue to be exposed to and learn about the field of surgery. Careful consideration should be given to the curricular content of the proposed surgical boot camp so that efforts may be synergized between the 2 types of courses rather than contributing to redundancy and the duplication of efforts. Results of our survey would advocate for a more broad-based curriculum for surgical subinternships in an effort to provide learning opportunities for the multiple types of students who enroll in these courses including those students who have previously decided on a non–general surgery residency but desire exposure to surgical problems and patient management.

Although it is known that a complex set of factors including sex, race, indebtedness, temperament, and relationship styles influence medical student specialty choice,\textsuperscript{8–13} no studies have been conducted to determine whether students’ experiences during subinternships impact their ultimate career decisions, particularly within the field of surgery. A recent study\textsuperscript{14} shows that basic surgery clerkships have a favorable but transient impact on students’ negative perceptions of surgeons. In fact, a higher proportion of senior students had a negative view of surgeons than did 1st- or 2nd-year medical students.\textsuperscript{14} The results from our study suggest that potential earnings and lifestyle were not critical factors to those students who ultimately applied for residency in general surgery but ranked highly among those students who used a subinternship to determine their career choice and ultimately applied in a nonsurgical specialty.

Ramifications of this overall negative view of surgeons and surgical specialties may influence residency choice. Results from the National Resident Matching Program for 2011 showed that applications to categorical general surgery programs remain steady at 1.1 applications per position from United States graduates (1,273 applications for 1,108 positions).\textsuperscript{15} This is in comparison to 6.4 applications per position in radiation oncology, 6.0:1 for dermatology, 4.4:1 for diagnostic radiology, and 2.4:1 for integrated plastic surgery programs. Only 7.7% of US applicants matched in general surgery, which is an overall decline from the high of 12.1% in 1981.\textsuperscript{16} Overall, 81% and 99.8% of categorical general surgery positions in 2011 were filled by US seniors and all applicants, respectively. These data suggest that surgical educators could focus on improving the surgical subinternship experience as 1 possible means of increasing student applications to categorical general surgery programs, and our data show that a majority of students use the subinternship to inform their career decisions, and a curriculum optimized to capture and maintain their interest should be determined.

One additional complicating factor of the study of subinternships is that students may enroll in these courses at their home institution (as most do for at least 1 term) or they may apply to engage in this clinical work at other institutions. Although many popular theories are discussed among medical school staff, no data have been published to enumerate the reasons that students do or do not choose to enroll in subinternships at outside medical centers,\textsuperscript{12} commonly referred to as “away” rotations. Our study suggests that cost and family or personal reasons are the most common deterrents to the pursuit of a rotation outside a student’s primary medical school, but individuals with a strong desire to attend a particular program continue to see this as an opportunity to improve their chances of a successful match placement.

This study has several important limitations. The survey instrument was developed and piloted for this study but was not subjected to preadministration psychometric analysis. The survey population was recruited in 2 different ways. First, survey invitations were sent to those students who had applied for a categorical general surgery position at Johns Hopkins Hospital, and a second and potentially overlapping group received a survey link sent for distribution to medical student clerkship directors subscribed to an Association for Surgical Education e-mail list; therefore, the exact number of survey links distributed is unknown. The survey was performed after the match occurred, thus reducing potential bias from belief that survey response would impact residency placement but may also have contributed to a lower response rate secondary to attrition. Another limitation was the low number of respondents who enrolled in a surgical subinternship but decided to apply for residency in a nonsurgical specialty. It is unknown if this reflects a true pattern in student enrollment and application trends or simply sampling bias, and, thus, the applicability of conclusions drawn from this group may have less validity. Future studies should be designed to follow students’ careers longitudinally in order to ascertain the attrition rate and better measure satisfaction with the choice of specialty.

In summary, our study has shown that surgical subinternship rotations represent a period of time when students’ career decisions are still under influence and should be seen as an opportunity to capitalize on the development of specific learning objectives and activities that target the perceived needs of these students to continue to attract the best candidates for surgical residencies.

Supplementary data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.amjsurg.2012.10.008.

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