Surgical subinternships: bridging the chiasm between medical school and residency
A position paper prepared by the Subcommittee for Surgery Subinternship and the Curriculum Committee of the Association for Surgical Education

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Abstract
BACKGROUND: Surgery subinternship rotations are clinical rotations intended to provide senior medical students with experiential exposure and increased autonomy during the care of surgical patients in clinical settings. Due to the lack of guidelines from national surgical organizations, these rotations remain largely unstructured and unstandardized with wide variability in the goals and experiences they provide for medical students.

METHODS: Through synthesis of the literature and by applying an iterative process among members of the subcommittee for surgery subinternship and the curriculum committee of the Association for Surgical Education (ASE) consensus recommendations were established.

RECOMMENDATIONS: Five defined domains were identified as essential for establishing surgery subinternship rotations. These are: administrative structure, goals and objectives, curricular elements, instructional methods, and assessment tools.

CONCLUSIONS: These recommendations should serve as a blue print for establishing a structured, educationally sound, and rewarding clinical rotation for medical students. Applying these recommendations may also provide educators with opportunities for scholarships and academic advancement. © 2015 Elsevier Inc. All rights reserved.

Subinternships are clinical rotations usually completed during the final year of medical school. Subinternships provide medical students with experiential exposure to patient care in the clinical setting with varying degrees of graded autonomy in evaluating patients, creating care plans, and getting involved in
various clinical procedures. These rotations help students become familiar with the type of patients and the scope of clinical practice of a particular discipline. Such immersive exposure may help solidify the student’s interest in pursuing a career in that discipline through residency training. Undertaking a subinternship rotation can also provide students with close working relationships with faculty to provide recommendations and letters of support for residency application.

Background

Recent changes in graduate medical education regulations, and in physician financial compensation models, as well as other medical legal issues have led to increased direct involvement of faculty and senior residents in daily clinical activities, allowing fewer opportunities for medical students to be involved in direct patient care. The diminishing opportunities for clinical experiences offered to medical students have been noted by residency program directors of various specialties. When viewed through the 6 competencies advocated by the Accreditation Council for Graduate Medical Education (ACGME), program directors of different specialties including surgery indicated that medical school graduates had significant gaps in their clinical performance and suggested that these gaps need to be bridged before new residents assume independent care of patients. Residency program directors noted that students lacked skills in self-reflection and self-improvement, were unfamiliar with the effective use of technology to review evidence-based guidelines, lacked advanced clinical reasoning when managing complex patients, found difficulties caring for multiple patients simultaneously, and lacked proper communication skills particularly during difficult communications with patients and families.

These observations by residency program directors emphasize the need for creating structured immersive experience’s for medical students with opportunities for patient ownership and independent decision making under appropriate supervision. Clinical subinternships provide great opportunities for medical students to take ownership of actual patients and increase their autonomy. However, unlike third-year clerkship rotations, subinternships in many institutions lack well-defined structure or explicit curriculum. Students on these rotations mainly shadow residents as they perform daily tasks of patient care with variable degree of interactions with service faculty. Most of these rotations do not comply with the basic tenants required for an educationally sound clinical experience including explicit objectives, defined curriculum, and clear assessment tools. They also often lack opportunities to write orders and perform structured hand-offs of patient care. In addition, most of these rotations lack the administrative structure or didactic curriculum that would support meaningful educational experiences such as a dedicated coordinator for the educational activities or supervised meetings to discuss patient management concepts.

Problem

Several specialties, including Internal Medicine, Family Medicine, Obstetrics and Gynecology, and Emergency Medicine, have developed evidence-based curricula for specialty-specific subinternship rotations and advocated for these rotations to adopt innovative instructional strategies and meaningful assessment methods that provide timely feedback to students. There are no guidelines from national surgical societies to inform the development of similar educationally sound, surgical subinternships.

State of the Surgery Subinternship Today

There is a lack of good peer-reviewed literature and absence of published guidelines from national surgical organizations regarding curricular elements for surgical subinternships. Lindeman et al surveyed more than 250 applicants to a surgical residency program who had enrolled in surgical subinternships before their application and concluded that “surgical subinternships lacked central organization or unifying curriculum.” The study noted that while the majority of surgery subinternships provided students with opportunities for clinical case presentations and for taking call with junior residents, a significant number of these rotations lacked explicit goals and objectives, did not provide students with dedicated time with faculty to discuss common clinical problems, and was devoid of technical and procedural skills laboratories. In a collaborative effort between 3 major national surgical organizations—the American College of Surgeons (ACS), the Association for Program Directors in Surgery (APDS), and the Association for Surgical Education (ASE)—a needs assessment survey was conducted among interns, chief surgery residents, and surgical faculty from 11 medical institutions. The survey provided cognitive and procedural elements to create a national 4-week curriculum with summative assessments for a surgery boot camp designed to achieve a set of competency-based goals and objectives targeting critical cognitive and procedural skills essential to all incoming surgery residents. Recognizing the limited impact a single boot camp could exert on student’s development, the curriculum committee for the surgery collaborative called for a more comprehensive redesign of medical schools curricula, specifically the structure and goals for the final year of school to promote better transition of student graduates into their roles as new residents.

The Subcommittee for Surgery Subinternship and the Curriculum Committee at the ASE noted that the findings from the surgical collaborative group needs assessment survey and those from the Lindeman et al study provides appropriate bases to inform the development of a well-structured surgery subinternship rotation.
Suggested Evolution of the Surgery Subinternship

Through synthesis of the literature and by employing an iterative process among members of the Subcommittee for Surgery Subinternship and the Curriculum Committee of the ASE, it is the recommendation of the group that surgery subinternship rotations should evolve within 5 well-defined domains: administrative structure, goals and objectives, curricular elements, instructional methods, and assessment tools.

Administrative structure

A pivotal component for developing a robust surgical subinternship experience is the creation of a financial and administrative structure for the rotation that is collaborative but separate from that of the M3 surgery clerkship. The separation of the 2 positions allows for specialization and encourages innovation; provides senior medical students with opportunities for personalized mentorship and targeted career advice, which is particularly important during the residency application process; and finally it provides additional educational leadership positions for faculty in the department of surgery. Surgery subinternship directors should petition the Medical School as well as the Department of Surgery at their institutions to help fund and coordinate the educational activities on the rotation and to ensure a meaningful educational experience for medical students attending surgery subinternship rotations. The administrative structure may be through one of the 3 designs. The first design calls for the creation of a separate leadership position of a Subinternship Director, with a separate position for a dedicated administrative coordinator. An alternative proposal is that the M3 Clerkship Director and the M4 Subinternship Director share a single administrative coordinator. A third suggestion would be to maintain one director for both M3 Clerkship and M4 Subinternship with 2 separate administrative coordinators. There are merits, as well as downfalls, to each of these combinations depending on the logistics, finances, time commitments, and structural considerations within specific institutions. Fig. 1 depicts 3 proposals for administrative structure for the surgery subinternship in relation to the Surgery Clerkship.

The surgery subinternship director will need to create a curriculum that emphasizes the clinical application of medical knowledge within the context of actual patient care. The curriculum should build on but not duplicate M3 clerkship goals and experiences as outlined by the ASE publication “Manual for Surgical Objectives.”12 The director for the rotation should work closely with residency program leadership, clinical faculty, residents, and allied healthcare professionals to define expectations and promote the integration of subinterns into clinical care teams where students can develop their own independent clinical skills under direct and indirect supervision and exhibit commitment and ownership to their patients.

The choice of clinical rotations should ensure optimal experiences for the subinterns, taking into account the patient population and pathology encountered through the different clinical services and the number of other learners simultaneously present on the rotation, for example, junior residents, third year medical students (M3), physician assistant students (PA), and others.

A formal orientation session should introduce students to the goals and objectives of the rotation including administrative tasks and rules. The orientation should also indicate the educational syllabus and time schedules, the reading assignments, and finally the assessment methods and grading policies. During orientation, it is important to emphasize professionalism traits expected of the students.
including ownership of patient care, compassion, and integrity during interactions with patients, their families, and with other healthcare providers. To monitor the student’s educational performance, it is also important to create case and procedure logs that help both students and rotation director identify gaps in clinical experiences and provide practical remedies to address such deficiencies. Midrotation feedback sessions and end of rotation evaluation meetings will help the director to track progress and address pitfalls in a timely fashion.

The Subinternship Director will also act as a surgery career advisor and a coach for students interested in pursuing careers in surgery, which includes providing advice on choosing mentors, identifying research and leadership opportunities, assisting with personal statement writing, choosing institutional and away clinical rotations, assisting with the residency application process, developing mock interviews and interview coaching, among other tasks deemed important for student placement into surgical residency programs.

Goals and objectives

The surgical subinternship should have distinct sets of knowledge, skills, and attitudes that build on but are distinct from those of the surgery clerkship. The surgery clerkship goals provide undifferentiated students with basic knowledge of surgical diseases and conditions, as well as introduces them to the role the surgeon plays in the multidisciplinary care of patients. The clerkship also fosters interest in medical students to pursue surgical careers through mentorship and inclusion into the daily lives and practice of surgeons. On the other hand, the surgery subinternship emphasizes the clinical application of medical knowledge within the context of actual patient care. The goal for surgery subinternships is to prepare students with the attitudinal, cognitive, and procedural skills required to make the transition into their future roles as residents capable of providing safe and efficient care for patients on day 1 of residency. To increase the clinical autonomy of the subinterns and to increase their sense of ownership, it would be helpful to assign subinterns to those clinical services that lack an intern. Otherwise, it would be important to ensure that they are assigned clinical loads that are similar to those expected of the intern on the service. In this situation, it is important for faculty and senior residents on the service to define the expectations and maintain the separation of roles between interns and subinterns. Explicit competency-based objectives should be developed and implemented to ensure the best educational outcomes for students. Additionally, competency-based goals and objectives of the rotation should preferably map into the 6 core competency structure proposed by the ACGME: patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and system-based practice. More recently, The Association of American Medical Colleges (AAMC) introduced the core entrustable professional activities to entering residency. The core entrustable professional activities (EPAs) are defined behaviors and activities that should be expected of all students graduating from medical schools and entering into residency programs regardless of the chosen specialty. The AAMC encouraged medical schools to adopt these EPAs as competency outcomes for their graduates. Surgical subinternships should incorporate these within their goals and objectives. See Table 1 for suggested surgery subinternship objectives incorporating the AAMC’s EPAs and mapped to the 6 ACGME core competencies with suggested instructional strategies and assessment methods.

Curricular elements

Curricular elements for the surgery subinternship should address the ACGME published competencies. Clinical tasks for subinterns should promote clinical decision making in addition to simple knowledge recall. The rotation should provide subinterns with opportunities to independently evaluate patients and construct evidence-based management plans utilizing informatics and electronic resources. Students should demonstrate the ability to write orders, present cases concisely and efficiently, and discuss plans with faculty and care teams to gain timely feedback. The rotation should develop a student’s sense of ownership during transitions of care through instruction in and performance of safe patient hand-offs. Basic understanding of patient safety issues and quality control systems within healthcare institutions are also important curricular elements for the rotation. The subinternship rotation should promote communication skills essential for the daily care of patients, including calling for consultations, timely follow-up on daily care plans, answering pages, triaging multiple simultaneous patients, and managing patients who are unfamiliar to them. They should become aware of essential communication skills to participate in difficult conversations with patients and families. The rotations should provide students with opportunities to develop essential procedural skills including bedside wound management, care for tubes and drains, suturing and knot tying, tube thoracostomy insertion, central line placement, and the use of bedside ultrasound for line placement and for Focused Assessment with Sonography for Trauma.

Instructional strategies

There should exist weekly protected time for educational activities under the direct supervision of the rotation director. Educational activities should include professor rounds, whether in the form of bedside rounds or meeting within a protected environment for in-depth discussion of patient assessment and plan of care development. The format for these rounds should be case-based discussions of patient-centered care to promote higher thinking skills for subinterns in a relaxed nonjudgmental atmosphere. A detailed, but not lengthy, list for independent readings for
### Table 1  Surgery subinternship objectives mapped to the ACGME 6 core competencies and the AAMC’s core entrustable activities for entering residency (CEPAER) with suggested instructional strategies and assessment methods

<table>
<thead>
<tr>
<th>ACGME core competency</th>
<th>Surgery subinternship objective</th>
<th>Instructional strategies</th>
<th>Assessment methods</th>
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<tbody>
<tr>
<td><strong>Patient care</strong></td>
<td>1. Perform and present concise history and physical examination (EPA 1/EPA 6)</td>
<td>Daily rounds, case-based discussions, web-based modules, chart audits, simulation</td>
<td>Direct observation forms and professor rounds, clinical appraisals, simulation</td>
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<td>2. Develop and prioritize differential diagnosis and select working diagnosis following a patient encounter (EPA 2)</td>
<td>Videos, skills laboratory, OR teaching</td>
<td>Skills laboratory, clinical appraisals</td>
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<td>3. Recommend and interpret common diagnostic and screening tests (EPA 3)</td>
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<td>4. Discuss patient orders/prescriptions and construct evidence-based management plans (EPA 4)</td>
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<td>5. Provide documentation of clinical encounters in written or electronic format (EPA 5)</td>
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<td>6. Triage and manage multiple patients</td>
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<td>7. Perform bedside procedures: wound care, laceration repair, care for drains and tubes, central lines, chest tubes, ultrasound utilization, suturing and knot tying (EPA 12)</td>
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<td><strong>Medical knowledge</strong></td>
<td>1. Identify and manage unstable and critically ill patient (equivalent to EPA 10)</td>
<td>Independent readings, didactics, web modules, simulation</td>
<td>Multiple choice questions, simulation</td>
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<td>2. Manage common perioperative patient problems</td>
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<td>Mock pages, small group presentations</td>
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<td>3. Demonstrate understanding of the pharmacology of common medicines: analgesia, nausea/vomiting medicines, antibiotic groups</td>
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<td>4. Demonstrate understanding of the relevant anatomy for common surgical procedures</td>
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<td>5. Demonstrate the understanding of common surgical equipment and materials (eg, electrosurgical unit, types of mesh and suture materials)</td>
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<td><strong>Practice-based learning and improvement</strong></td>
<td>1. Identify strengths, deficiencies, and limits in one’s knowledge and expertise</td>
<td>Daily rounds, professor rounds, attending morbidity and mortality conferences</td>
<td>Clinical appraisals, writing an essay</td>
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<td>2. Set learning and improvement goals</td>
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<td>3. Demonstrate effective use of electronic resources into daily practice and personal improvement (equivalent to EPA 7)</td>
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<td>4. Incorporate feedback, self-reflection, and improvement into daily practice</td>
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<td><strong>Interpersonal and communication skills</strong></td>
<td>1. Communicate effectively with patients and families respecting cultural and socioeconomic backgrounds</td>
<td>Didactic, role-play, web-based modules, simulation</td>
<td>Mock pages, simulation</td>
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<td>2. Work effectively as a productive and dependable member of the healthcare team (equivalent to EPA 9)</td>
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<td>3. Demonstrate structured and effective communication skills when answering pages</td>
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<td>4. Perform structured sign-outs during transitions of care (equivalent to EPA 8)</td>
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<td>5. Obtain informed consent for tests and/or procedures (EPA 11)</td>
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nonclinical topics should be available, including topics on patient safety, healthcare quality controls, and principles of evidence-based practice. Web-based learning modules should be encouraged for communication topics, discharge planning, and patient handoff skills. The rotation should also provide access to a technical skills laboratory where students are provided with proctored practice and timely feedback. Clinical proctors should also directly observe student history and physical examination skills and provide them with timely feedback to improve their performance. Proctors should also discuss and critique management plans with an emphasis on evidence-based guidelines. Finally, utilizing simulations, when available, would allow for focused training on isolated patient care issues with increased reproducibility and assurance of exposure to defined curricular elements that may not be readily available during daily service.

Assessment tools

Assessment of subinterns should be comprehensive and targeted to provide meaningful feedback. This can be done through a composite scoring system that is made open and clear to students at the beginning of the rotation. The composite score should include clinical appraisals by faculty, 360° appraisals by residents and nursing staff involved in patient care on the services they rotate through, performance evaluations of procedural skills, professionalism points for the timely completion of reading, and project assignments. It is also valuable to include an end of rotation essay that would demonstrate the student’s adaptive thinking regarding the application of patient safety concepts to daily patient care practices, or the implementation of quality control systems within healthcare institutions, or the institution of evidence-based practice protocols to improve patient outcomes. The condensed time of a 4-week rotation may not be ideal for comprehensive summative assessments for cognitive and procedural skills among subinterns and the limited time would not allow for meaningful remediation. In addition, such tests may divert the attention and efforts of subinterns away from the required tasks. The subinternship should be viewed as a venue for “deliberative practice” and “reflective practice” of clinical skills that builds to a finishing course like the residency preparatory curriculum or a capstone course with a preparatory curriculum layered around it. These end of year courses should allow medical schools to assess graduating student’s competencies and their individualized achievement of entrustment behaviors, while providing ample time for remediation strategies closer to student’s graduation.

Evaluating the Subinternship

It is important to design meaningful evaluation strategies to ensure that the goals and objectives of the rotation are accomplished. Reviewing student’s clinical and procedural logs during and at the completion of the rotation as well as
Expected Barriers and Potential Solutions

The creation of a structured surgical subinternship rotation is a major institutional change that requires commitment and vision by departmental leadership, innovation and ownership by faculty, as well as commitment of financial and administrative resources by the medical school. Faculty’s time and the availability of financial resources remain the major 2 barriers for the creation and maintenance of an educationally sound surgery subinternship clerkship. Innovative approaches are required to address these 2 important issues based on the local institutional structure and culture for each institution. While we do acknowledge that financial constraints and emphasis on clinical productivity are global barriers facing faculty recruitment, it is important to emphasize that incentives can be other than monetary. Incentives can be in the form of acknowledgement of efforts, creation of leadership positions, improving academic and research productivity, as well as academic promotion. When petitioning the department of surgery and the medical school to provide a steady stream of financial and administrative support, it would be helpful to indicate the value added by the new structured rotation in the form of increasing student recruitment into the specialty and improving student education and preparedness for residency, which would ultimately add to the positive reputation of both the department and the medical school. Moreover, the thrust for the creation of relevant modules and well-defined experiences through a national standardized subinternship curriculum could provide a shared platform of resources that would help offset the costs that any one program may be required to invest for this endeavor.

Summary

The surgery subinternship should be viewed as a venue to ensure students are given graded responsibilities, developing their higher thinking skills, and made aware of patient safety principles and application of evidence-based practices. This effort by the Surgery Subinternship Subcommittee and the Curriculum Committee at the ASE provides a blue print for establishing a structured, educationally sound, and rewarding surgery subinternship rotation for medical students. The recommendation to create a separate administrative structure for the rotation should serve as an incentive for surgery department chairs to enhance the educational mission of their department and open additional leadership opportunities for faculty. It also provides means to recruit more students into the specialty. For the subinternship director, the rotation provides potentials for career development as educators and opportunities for scholarly activities for academic advancement.

References