

The Value of Anesthesiology in Undergraduate Medical Education as Assessed by Medical School Faculty

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Original Article

Abstract

Background: Unlike Europe and Canada, the majority of American medical schools do not require an anesthesiology rotation. Yet the skill set and knowledge base of anesthesiologists includes many topics of importance to all physicians. Furthermore, the clinical environment offers more procedural experience and real-time physiology and pharmacology for teaching than that available elsewhere. Medical schools, however, often focus on “general medical education” and discount the value of a required anesthesiology clerkship. This begs the question, of the topics anesthesiologists excel at teaching, which are considered important by faculty across the spectrum of medical specialties?

Methods: Two-hundred-three senior medical students rated the importance to their career of 14 topics currently taught by lecture, simulation or reading assignment in the required anesthesiology curriculum at the University of Florida. Specialty faculty in each of the major specialties similarly rated the topics. The authors compared these with the opinion of 20 anesthesiology faculty who rated the importance of each topic for each major specialty.

Results: Overall, acute pain management and acute decompensation management were rated “somewhat” or “very important” by the highest proportion of respondents; followed closely by vascular access and fluid management, non-invasive monitoring and conscious sedation. The topics of interest to surgeons most closely aligned with those offered (12/14 rated somewhat or very important by >75% of faculty polled, 14/14: students), followed by emergency medicine physicians (10/14: faculty, 11/14: students). Significant differences of opinion existed between all three groups on several topics.

Conclusion: Anesthesiologists excel in topics important to all future physicians; as many schools enter a new phase of curricular redesign, a rotation in anesthesiology should receive serious consideration. The input of students and physicians in major medical specialties may help define an appropriate curriculum. Including the flexibility for students to adapt that curriculum to individual goals may increase the rotation’s value.

Key words: medical student, education, teaching; medical specialists

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Introduction

Compulsory anesthesiology exposure during medical school is uncommon in the US. According to the Association of American Medical Colleges Curriculum Directory (CurrMIT^{*}), only 27 of 126 medical schools required an anesthesiology clerkship for those graduating in 2008. This differs greatly from the United Kingdom¹ and Germany² where formal anesthesiology exposure is required; and Canada where 13 of 16 schools had a required clerkship in 2000.³ Major changes in the medical curricula have increased exposure to anesthesiology in these countries, while the number of medical schools with required clerkships in the US has remained constant since at least 2001.^{*}

With the ever-increasing emphasis on clinical productivity, and the ongoing obligation to train anesthesiology residents, why would a department of anesthesiology endeavor to increase its workload further by becoming integrated into the medical school curriculum? There are several potential reasons: we have a skill-set that differs from most of our colleagues, especially related to airway management; pharmacologic interventions and physiologic changes are experienced daily, offering a rare educational opportunity; perioperative medicine crosses specialty boundaries and we are uniquely qualified to educate regarding preparation for surgery and its immediate consequences; teaching medical students has promotion and tenure implications that may differ from graduate medical education; and recruitment of medical students into anesthesiology may be increased.

The Department of Anesthesiology at the University of Florida has maintained a required clerkship within the clinical years of the medical school curriculum since 1980. Its duration, location, teaching methodology, and learning objectives have evolved over time. In 2006-07 we developed a two-tier curriculum for our clerkship: a 4-week intensive experience offered in August and September for those considering anesthesiology as a career; and a rotation for students pursuing fields other than anesthesiology, including efforts to tailor the learning objectives to the individual student. The latter was borne of a practical need: engagement of modern students, which is facilitated by perceived relevance for their career. While the pharmacokinetics of isoflurane may not be relevant to a budding pediatrician, management of the apneic child certainly is, and the latter is managed better by anesthesiologists than most. Students are more likely to have the opportunity to practice these skills during an anesthesiology clerkship than any other rotation. As such, the first step we took was to inform the students what we have to offer, then allow them to choose, within reason, what they wished to accomplish during their brief rotation with our service.

Through analysis of student survey responses, and subsequent polling of faculty in their future fields, as well as anesthesiologists, this paper describes what we have learned about the role anesthesiology can and should play in the medical student curriculum and the development of new physicians in the 21st Century.

Methods

Based on our 25-plus years' experience teaching medical students, coupled with the Society for Education in Anesthesia's "Medical Student Curriculum,"[†] we prepared a list of medical topics anesthesiologists teach well. These are either not well-addressed elsewhere in the curriculum, or

anesthesiologists offer a unique perspective of value to the majority of physicians. An initial list was pared down to 14 topics by removing duplicate topics, and conferring amongst our faculty experienced in medical education (Table 1).

Prior to each rotation, we asked the students to complete a survey including their intended field, an importance value for each of those topics (4=very important, 1=irrelevant) and their current level of understanding. Software generated an individualized letter for each student, identifying those areas on which they should focus during their rotation (the greater of their perception or an estimate generated by the author/clerkship director). For each topic the letter provided a reading list, usually chapters from the required textbook (*Essential Anesthesia: from Science to Practice* by Euliano, Gravenstein, Cambridge University Press 2004, 250pp; copies on reserve in the library), key review articles and/or on-line resources.

This study was considered exempt by the Institutional Review Board. Data from the pre-course survey was collated in a Microsoft Excel® spreadsheet then de-identified. It included two classes: 2006-07 and 2007-08. All specialties represented by at least 10 students were included in the analysis. Surgery and its subspecialties were combined into one group.

A convenience sample of faculty colleagues in each of those specialties was asked to complete the same survey anonymously. Colleagues in each specialty, known to have an interest in education through participation in College of Medicine educational meetings, were contacted and asked to pass the link on to others in their specialty. By this method the response rate is impossible to calculate. Information regarding procedural-orientation of the physician's actual practice was not sought. Requests were made of generalists in each field, however, not subspecialists (e.g., internal medicine physicians but not cardiologists). All 79 anesthesiology faculty were asked to rank the importance of each topic for each specialty.

For each group, specialty and topic combination, an importance ratio was calculated as the proportion choosing Very/Somewhat important. These importance ratings were compared between groups using Fisher's Exact Test (2 x 2 matrix, Very/Somewhat important versus Neutral/Irrelevant) with $\alpha=0.05$.

Results and Evaluation

For the year 2006-07, of the 109 students for whom the pre-course survey was available, 106 (97%) completed it. For 2007-08, 93% (97/104) of students completed the survey. Identified fields included pediatrics (31), internal medicine (29), surgical specialties (26), radiology (21), family medicine, obstetrics-gynecology, emergency medicine, psychiatry (15 each), ophthalmology (8), dermatology (7), neurology, pathology, physical medicine, radiation oncology (5 each), two students chose "other."

Faculty response to the anonymous survey included emergency medicine (6), family medicine (5), general surgery (9), internal medicine (7), obstetrics-gynecology (6), pediatrics (5), psychiatry (11), and radiology (8). Twenty anesthesiology faculty (25%) responded.

Based on the importance ratios (proportion of group/specialty respondents rating each topic "Very" or "Somewhat" important), Acute pain management was rated more important than any

other of our topics (Table 2). All specialty faculty polled rated it accordingly, though anesthesiology faculty rated it of less importance for psychiatry and radiology. Of students, only those choosing radiology thought the topic unimportant (Table 3).

Following close behind in importance was acute decompensation management. All groups polled considered this less important for psychiatry. Topics of least importance were basics of regional and general anesthesia, which were rated important only for surgeons and obstetricians. Pooling all the specialties, more than half of all three groups (specialty faculty, students, and anesthesia faculty) considered all topics except regional and general anesthesia to be important (Table 2). In general, students and their faculty agreed on the importance of each topic, with some notable exceptions (Table 4). Anesthesiology and specialty faculty also agreed on the importance of most topics, with the exception of those listed in Table 5. Table 6 describes those areas where students valued the topics for their specialty more than anticipated by anesthesiology faculty.

With regard to individual specialties, the perceived educational needs of surgeons most closely aligned with the topics offered (Table 3). All were considered important to students and anesthesia faculty while a lower number of surgical faculty considered regional anesthesia (0.6), and chronic pain (0.3) important. Psychiatrists found the fewest areas of common interest, limited to acute and chronic pain management for faculty and students; anesthesiology faculty considered only chronic pain important for this group.

Discussion

The role of anesthesiology in the undergraduate medical curriculum is unclear and inconsistent both within the US and around the developed world. Since at least 1974⁴ anesthesiologists have editorialized about the virtues of a clerkship in an anesthesiology department. Initial reports focused on procedures (airway and vascular access), monitoring, pharmacology, physiology, and “an appreciation of the scope of the specialty;”⁴ cardiopulmonary resuscitation, care of the critically ill patient, preoperative evaluation, and pain management were eventually added as curricular elements.^{1,5-7}

In academic centers where anesthesiology clerkships have been implemented, these recommendations have been largely followed. A 1999 survey of undergraduate teaching of anesthesiology outside the US identified five areas taught by >50% of the responding programs: pharmacology (83%), preoperative assessment (92%), obstetric anesthesia (60%), local anesthetic agents (70%), and care of the unconscious patient (77%).⁷ Patient sedation was taught by 44%. Commonly taught skills included airway management and intravenous cannulation. A similar Canadian survey³ identified airway management, fluid therapy, and peri-operative assessment as the most commonly taught topics.

More recently, Rohan et al⁸ endeavored to more scientifically determine the content desirable in an anesthesia clerkship. Using a Delphi technique, a panel of Irish consultant anesthetists defined an anesthesia curriculum for undergraduate medical students. Their resulting recommendations included a minimum two-week duration clerkship focused on clinical exposure and small group teaching. They identified 27 knowledge topics of importance with much overlap. The majority of their subjects fall under both the long-standing suggested areas above and our topics list. Their top two, management of the unconscious patient and acute postoperative pain management, are

consistent with two of the top three as rated by our anesthesiology faculty. Our third, cardiopulmonary physiology, was ranked 13th in the Rohan study. With regard to skills, Rohan's group identified as important various forms of non-invasive airway management, basic life support, intravenous cannulation, and aseptic technique. Despite the fact that the Rohan study was not available when we began this project, topics overlapped substantially with ours. This consistency across studies by authors in different countries reassures that our selected curricular elements translate well to medical centers as a whole.

Fitch et al compared faculty and new physicians' (PGY-2 level) opinions regarding which procedures are essential to learn in medical school.⁹ Procedures were rated as "no need to know", "convenient to know", and "must know." Where their procedure list intersects with anesthesiology, non-invasive airway management and local anesthesia were considered "must know" by both groups. Vascular access was considered more important by faculty than new physicians, while intubation was the reverse (60% "must know" for new physicians, 46% for faculty). Both groups rated conscious sedation similarly, with approximately 25% considering it irrelevant, and the same number considering it a "must know" topic.

Clearly the field of anesthesiology offers educational benefits for all physicians. However, anesthesiologists' perception of which procedures and knowledge to emphasize may differ from that of physicians in other specialties.

Kerfoot et al¹⁰ explored this question in the specialty of urology. His group polled directors of generalist residencies, urology residencies, medical student educators in urology, and urology residency applicants, asking each to choose the five most important urology topics for all medical students. They found "marked homogeneity among participant groups" though there were some differences; for example, Emergency Medicine physicians and pediatricians thought prostate-specific antigen screening less important than did their adult generalist colleagues. Based on the aggregate data they selected the eight most commonly cited topics. Each was rated as a "top five topic" by 24-75% of respondents. This level of concurrence was sufficient for the authors to conclude that a nationally standardized curriculum would be feasible. Kerfoot et al's survey was different from ours in that we asked which topics were important for a student entering each subspecialty separately; by contrast, Kerfoot asked what every medical student should know about urology upon graduating from medical school (from a list of topics). This presents a subtle but important distinction, the latter depends on the recognition by specialists of the needs of physicians in other fields.

In addition to polling specialty faculty and their future residents regarding important topics, ours is the first report of polling anesthesiology faculty not just about what they deem important to teach, but to consider for which future specialties each topic warrants emphasis. Delete space, all one paragraph... While one might expect that faculty anesthesiologists would consider our anesthesia curricular topics of more importance than the students, and even their future faculty, there was surprising agreement in most areas (Table 3). There were also many instances where students valued topics more than anesthesiologists (Table 6). Some areas of disparity present concern, however. For example, the lack of importance placed on conscious sedation by internal medicine physicians seems misguided. Both students and anesthesia faculty considered this topic important while not one of the seven internists who responded to the survey so responded. Perhaps none is a proceduralist or intensivist, yet medicine residents are expected to rotate in

these areas. It should be noted that conscious sedation does not appear on either the ACGME[‡] or ABIM[§] requirements.

This study reinforces the notion that an anesthesiology experience would likely benefit the education of physicians entering all fields. More than half of each group polled considered 12 of the 14 offered topics “Somewhat” or “Very” Important for all students as a group. Furthermore, Table 3 suggests that tailoring the curriculum may be appropriate, enabling students to focus on areas of identified need.

A weakness of this study is the small number and relatively narrow range (university physicians) of specialty faculty input. We focused on the perceived needs of the students, as this drives their engagement.¹¹ The agreement between the perception of students and this small sample of faculty is encouraging. Of course, sub-specialists such as gastroenterologists or cardiologists, would likely have differing views, but these fields require fellowships after internal medicine residency and subspecialists might therefore rightfully expect that additional training will occur in the intervening residency. Another shortcoming of our study is the survey topics were presented as stated in Table 1 without further explanation. Topics such as “Basics of general anesthesia,” may be interpreted at many levels and further offering details might have changed respondent’s perception of the topic’s utility.

Modern emphasis on a team-based approach necessitates an understanding of the role and scope of each specialty. Students experience all other major fields during their training, albeit some indirectly such as radiology and pathology; anesthesiology should be represented in the medical school curriculum as well.

We endeavored to learn what anesthesiology can offer to training in the range of medical specialties to which our students apply. Across the range of offered topics, all students and specialty faculty found areas of educational need. This study emphasizes the value anesthesiology departments can provide to a medical school curriculum and suggests topics on which to focus with appeal to a broad range of specialties.

Footnotes

*<http://www.aamc.org/meded/curric/start.htm> accessed October 8, 2008

†Anesthesiology-Related Guidelines For Adaptation In Part Or In Toto, Into Various Medical Student Curricula; downloaded from <http://seahq.org> Member's only site

‡ACGME Internal Medicine Program Requirements

https://www.acgme.org/acWebsite/RRC_140/140_prIndex.asp, accessed September 9, 2009

§ABIM Internal Medicine Policies <http://www.abim.org/certification/policies/imss/im.aspx#ccr>, accessed September 9, 2009

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