

An Innovative Model for Preclinical Exposure: West Virginia University Externship in Anesthesia

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Original Article

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Abstract

Background: Medical students often have limited opportunities for clinical exposure in the first and second years of training, especially in the operating room setting. We describe one approach designed to address this deficiency. The West Virginia University externship in anesthesia provides students with first-hand experience observing and performing common procedures.

Methods: Six externs worked with the anesthesia department for four weeks, learning the basics of anesthesia, anesthetic drugs, airway management, and intravenous line placement. The externs spent much of their time in the operating room, where they were exposed to a variety of cases. The externs evaluated the program before and after taking part.

Results: Student participants expressed satisfaction with the externship experience. It increased their self-reported knowledge of and comfort level with certain perioperative procedures and concepts. Post-survey responses showed higher scores compared to the pre-survey responses.

Conclusions: An innovative model, the externship program promotes interest in anesthesia while introducing students to the operating room setting and training them to perform common clinical procedures.

Key words: Students, Medical; Education, Medical; Externship; Training Activities.

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Introduction

Clinical exposure is perhaps the most desired yet least delivered commodity in the first two years of medical school education.¹ This deficit is especially pronounced with respect to the operating room setting. Opportunities to actually participate in patient care and gain hands-on experience are extremely limited and thus valuable to the preclinical student. The primary goal of the West Virginia University externship in anesthesia is to provide maximum exposure and clinical experiences to the medical students who are selected into the summer program between their first and second years. The goal of this study was to investigate whether perceived comfort level of first and second year students before can be enhanced with a curriculum-based and well organized externship experience.

Methods

All first-year medical students at our institution were emailed a description of the program complete with stated goals, planned educational objectives, faculty expectations, and expected time commitments. More extensive information about the program was also presented at the bimonthly lunch meetings of the Anesthesiology Interest Group, a student-run organization dedicated to providing information about and fostering interest in anesthesiology as a specialty. Interested students were instructed to submit a curriculum vitae and a one-page personal statement regarding their interest in the program. The submitted applications and personal statements were reviewed independently by a panel of anesthesia faculty members and the top students were offered spots in the program. In the most recent year, we received sixteen applications out of which six were selected. All email communication was handled by a senior medical student liaison well known to the department; each year, one student participant who stands out during the externship is chosen to be the medical student director and will function as the liaison for the externs the following year.

The summer was divided into two four-week blocks, with three students in each block. Externs effectively became a part of the anesthesiology team for the four weeks of the program. During this time the students learned the basics of anesthesia by working closely with department faculty, residents, and nurse-anesthetists. The program began with a tour of the facility, followed by an introduction to key contacts within the department. Participants then received a series of lectures, one of them being a two-hour session by the chief scrub tech on sterile technique followed by a basic anesthetic drug lecture by a senior faculty member. The first week of the program included two simulation labs, one on airway management and the other on intravenous line placement. After these preliminary measures, much of the externs' time was spent in the operating room observing the clinical practice of anesthesia.

The experience became increasingly hands-on for most of the externs as they developed a rapport with the faculty and became more comfortable with the operating room setting. Externs gained experience with pre-operative evaluation and post-operative management as well as with basics of anesthetic monitoring and anesthetic drugs. They were given the opportunity to

participate in a wide variety of cases. They were allowed to observe and perform many common procedures such as IV line placement, LMA placement, and intubation with direct assistance from faculty. Participants were also given the opportunity to work with faculty on the acute pain and regional anesthesia service. Evaluations were obtained from all student participants in 2007 and 2008. The 12 participants were asked to rate various aspects of the externship individually on a modified Likert scale [1=strongly disagree; 4=strongly agree] and were also given space to answer open-ended questions and to make comments and suggestions. In 2007, participants were given a post-survey on the last day. Starting in 2008, participants were asked to fill out a pre- and a post-survey that included Likert-scale questions about anesthesiology in general, airway management, perioperative evaluation and management, intraoperative anesthesia, and a section to assess knowledge base. The pre-survey was given on the first day of externship, and the same questionnaire was presented as the post-survey on the last day. The anonymous evaluations were analyzed by the medical student director, which maintained student confidentiality as they evaluated the program. Finally, each extern was paid a stipend for his or her participation. Results were analyzed with STATA 11.2 (StataCorp., College Station, TX). Confidence intervals were calculated for the pre- and post-test results, and p-values for the difference in means were derived with Fischer's exact test.

Results

Across the board, students were extremely pleased with the experience, reporting it to be "much better than expected," and "a great experience." The average response to the statement, "The anesthesia externship was well organized" was a 3.42. Similarly, the average responses to the statements "The anesthesia externship was beneficial to your knowledge about anesthesia related patient care," and "Sufficient amount of time was scheduled to address the objectives of the externship," were 3.92 and 3.75, respectively, as presented in Table 1.

Students were asked specifically about the utility of the senior medical student director as a liaison. Most participating externs utilized and appreciated the student as a resource, commenting that "it made it easier on us," and "allowed for a more free exchange of information." All students felt that the externship was both beneficial and appropriate for first-year students. The evaluations also revealed that the students seemed to particularly enjoy their time in the simulation lab, evidenced by multiple suggestions to increase time spent there.

On the post-survey the average response on every item of the questionnaire increased, as demonstrated in Tables 2-5. The knowledge-based portion of the survey consisted of 15 questions relating to anesthesia. The six externs' average response was 9.17 of 15 (61%) on the pre-survey, and increased to an average of 14 of 15 (93%) on the post-survey. While the small sample limited statistical inference analyses, a calculated Cohen's d of 1.68 suggests that the externship had a meaningful effect on student's responses to the post-survey. Cohen's d is a measure of effect size, defined as the difference between two means divided by the standard deviation.

Based on the feedback given on the evaluations, the program directors made modifications in 2008 in order to increase the benefits of the program. In addition to the primary goal of clinical exposure, the externship was found to benefit the students in additional ways. These additional

findings became secondary goals for the externship in the future and included (1) fostering interest in Anesthesiology as a subspecialty in order to recruit students, (2) instruction in airway management and procedural skills, (3) introducing students to simulation technology, (4) increasing contact between department faculty and preclinical student externs, (5) providing opportunities for research and continued education, (6) providing clinical context for problem based learning during the second year, and (7) enhancing satisfaction with the second year by providing a preview of clinical medicine

Discussion

The anesthesia externship provides selected preclinical students the opportunity to experience clinical medicine while providing an introduction to anesthesiology. At the West Virginia University School of Medicine, as well as most medical schools across the nation, students are instructed in classrooms rather than in the hospital setting during the first two years of their education. Most students are only given the opportunity to practice clinical skills beginning with their third year clerkship. The program, now in its third year, goes far beyond the shadowing opportunities traditionally offered to first and second year medical students by providing a model for exposure.²

Alternate options for increasing clinical exposure to first and second year medical students included accepting a greater number of externs into a program for shorter durations of time. This method would allow all interested applicants to experience the summer program. However, the four-week externship allowed for students to gain a rapport with faculty as they practiced procedural skills. By accepting three students per four week block into this program, the program also allows for flexibility to cater towards student interests and increased operating room time. Exposure to the real-time hospital environment for four weeks gives externs a background in operating room etiquette, acute patient care, and sterile technique. The program provides externs with the opportunity to practice procedural skills such as intravenous placement and to assist in endotracheal intubation, arterial line placement, and regional anesthesia. Based on their survey responses externs likely gained familiarity with a skill set that may serve them well later in the medical school curriculum. Based on survey results, all students found the structure, content, and timeline of the externship appropriate.

Although this was not formally evaluated, faculty were more than happy to teach the enthusiastic externs. This may have been the case because only the top applicants with an interest in clinical exposure and anesthesia were selected into the program, the student externs were also well received by residents and nurse-anesthetists.

In most medical schools, anesthesiology is an elective commonly available only to fourth year medical students.^{3,4} With the anesthesiology externship program, exposure to this specialty during the early stages of the medical curriculum may spark or increase interest in the field as well as assist in career planning. The externs come away with a sense of what anesthesia and hospital medicine actually entails, and this may play an important role in matching well prepared future physicians into the specialty.

Student evaluations and faculty observations helped identify improvements that were easily implemented in 2008. Changes that have been made include, but are not limited to, the addition of a short interview of all applicants, an increased amount of time spent in the simulation lab, and the administration of a brief pre-survey and post-survey for objective measurement of learning. As the externship faced an increase in the number of applicants, it was found that a short interview helped faculty identify qualities unfound on resumes, such as character, amicability, enthusiasm, and other intangibles that are valuable in making a selection. A second change included an increased time spent in the simulation laboratory with a senior faculty member. According to the strong responses in the evaluations in 2007, the externs found the practice in a simulation laboratory increased their confidence to later perform clinical skills on live patients. A third change in 2008 included the implementation of a pre-survey and post-survey to further evaluate the anesthesia externship as a beneficial experience.

In addition to making these changes, the program director expanded the primary goal of the program with a list of secondary goals. These goals were initially identified as positive secondary outcomes with the first group of externs. For example, after gaining rapport with faculty members, interested externs requested to participate in current research projects to maintain involvement with the anesthesia department. Other students commented that they have taken their real-life experiences into their second year with a well-rounded perspective in discussing cases. By creating secondary goals, the externship may maximize benefit to the student participants. These secondary goals are deemed appropriate if they have no adverse effect on the primary goal—on the contrary, most complement and enhance the principal mission of a good clinical experience.

Since the externship allows for a limited number of selected participants, the data retrieved from the evaluations are based on a small population size of twelve participants. Furthermore, the pre-survey and post-survey were offered during the summer of 2008, so a sample size of six further limits the strength of this data. The selected population consisted of first year medical students who had a pre-existing interest in anesthesiology and in obtaining clinical skills and wished to spend one month of summer break working to gain experience in the hospital setting. This population of ambitious students may limit the ability to generalize the data toward a wider population of all first year medical students. The evaluations were presented on a Likert Scale, which is often prone to central tendency bias (avoidance of extreme response categories), acquiescence bias (agreement with statements as presented), and social desirability bias (portraying oneself or organization in a favorable light). While we are aware of a handful of other externship programs in anesthesia across the country, to the best of our knowledge the incorporation of a senior medical student as the main contact is unique.

This type of externship opportunity should be simple and inexpensive to reproduce. Students were given a stipend of \$500 for participating in the four-week program; with three externs per four-week block, and two blocks per summer, the total cost was \$3,000. Faculty time consisted of approximately 19 total hours, and included attending the annual one-hour anesthesia interest group meeting, hosting an introductory two-hour meeting, a one-hour exit interview with each student, and one hour per week conducting a simulation experience. In addition, the author spent approximately 10 minutes each day drawing up a schedule for the externs.

Conclusion

The anesthesia externship at West Virginia University provides a model for medical students in their preclinical years to gain hands-on experience with clinical skills. The program has introduced participants to anesthesiology and provided hands-on exposure to various common procedures in the course of four weeks. It increased student participants' self-reported knowledge of and comfort level with certain procedures and concepts used in perioperative practice. Our program is unique in that it uses a medical student director to act as a liaison between students and faculty; the student director was found to be a beneficial team member who eased student integration into the department. This model prepares student participants for the clinical years of the medical school curriculum, and was found to be a positive experience for participants.

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Table 1: Anesthesia Externship Evaluation	
Statement	Mean Score *
The Anesthesia Externship was well organized.	3.42
The Anesthesia Externship was beneficial to your knowledge about Anesthesia related patient care.	3.92
Sufficient amount of time was scheduled to address the objectives of the externship.	3.75
* Scoring 0=Not Applicable; 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree	

Table 2: Pre-survey / Post-survey Response – General

Statement	Pre-survey Mean Score *	CI	Post-survey Mean Score*	CI	p value
I am interested in Anesthesiology as a career.	4.3	4.0-4.6	4.6	4.2-5.0	0.370
I have a good idea of what Anesthesiologists do every day.	2.8	2.3-3.3	4.9	4.7-5.1	<0.001
I feel comfortable approaching a resident with statements.	3.3	3.0-3.6	5.00	5.0-5.0	<0.001
I feel comfortable approaching a clinical faculty member with questions.	3.3	2.8-3.8	4.8	4.5-5.1	<0.001
I have been exposed to simulation technology during my medical education.	3.0	2.4-3.6	5.00	5.0-5.0	<0.001

* Scoring 1=Strongly Disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree

Table 3: Pre-survey / Post-survey Response – Airway Management

Statement	Pre-survey Mean Score	CI	Post-survey Mean Score	CI	p value
I am comfortable assessing a patient's airway.	2.1	1.5-2.7	4.3	3.8-4.8	0.001
I am comfortable performing mask ventilation.	1.9	1.4-2.4	4.7	4.4-5.0	<0.001
I know how to select an appropriate size mask for mask-ventilation.	1.4	1.0-1.8	4.2	3.6-4.8	<0.001
I know how to position the patient's head for mask-ventilation.	2.0	1.3-2.7	4.5	4.1-4.9	<0.001
I know the steps to take when mask-ventilation becomes difficult.	1.2	0.9-1.5	4.3	4.0-4.6	<0.001
I can recognize when a patient is in respiratory distress.	2.2	1.5-2.9	4.00	4.0-4.0	<0.001
I am comfortable inserting a Laryngeal mask airway.	1.4	1.0-1.8	4.5	4.1-4.9	<0.001
I am comfortable performing endotracheal intubation.	1.3	1.0-1.6	3.9	3.7-4.1	<0.001

* Scoring 1=Strongly Disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree

Table 4: Pre-survey / Post-survey Response – Perioperative Evaluation and Management

Statement	Pre-survey Mean Score	CI	Post-survey Mean Score	CI	p value
I am comfortable performing a pre-operative evaluation of a surgical patient.	1.4	1.0-1.8	3.5	2.9-4.1	<0.001
I am comfortable performing post-operative evaluation of a surgical patient.	1.4	1.0-1.8	3.1	2.6-3.6	0.001
I understand what is meant by 'induction,' 'maintenance,' and 'emergence.'	1.5	1.0-2.0	4.7	4.4-5.0	<0.001
I understand the reasoning behind a rapid sequence induction.	1.3	1.0-2.6	4.1	3.4-4.8	<0.001
I am comfortable establishing IV access.	1.4	1.0-1.8	3.5	3.1-3.9	<0.001
I am comfortable inserting a peripheral artery catheter.	1.1	0.9-1.3	2.1	1.5-2.7	0.007
I know the most common complications associated with general anesthesia.	1.3	1.0-1.6	3.9	3.7-4.1	<0.001

* Scoring 1=Strongly Disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree

Table 5: Pre-survey / Post-survey Response – Intraoperative Anesthesia

Statement	Pre-survey Mean score	CI	Post-survey Mean score	CI	p value
I am comfortable in an operating room environment.	2.7	1.7-3.7	4.8	4.5-5.1	0.001
I know where I can stand and what I can touch in an operating room.	2.6	1.8-3.4	4.9	4.7-5.1	<0.001
I know what the ‘sterile field’ consists of.	2.3	1.6-3.0	5.00	5.0-5.0	<0.001
I am comfortable reading and interpreting the anesthesia monitor.	1.4	1.0-1.8	4.6	4.2-5.0	<0.001
I know where on a patient to place the leads for an ECG.	1.9	1.7-2.1	4.8	4.5-5.1	<0.001

* Scoring 1=Strongly Disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree