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Journal Title: Advances in Medical Education and Practice

Volume: Volume 9

Publisher: Dove Medical Press | 2018-02-08, Pages 93-97

Type of Work: Article | Final Publisher PDF

Publisher DOI: 10.2147/AMEP.S158000

Permanent URL: <https://pid.emory.edu/ark:/25593/s89bn>

Final published version: <http://dx.doi.org/10.2147/AMEP.S158000>

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Accessed September 12, 2024 9:50 AM EDT

The role of pairing an anesthesiology rotation with the general surgery clerkship: positive impact on surgical and perioperative education

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Background: The use of an anesthesiology rotation in the realm of surgical education is not very well studied. Several studies show the importance of an anesthesiology rotation in the grand scheme of undergraduate medical education. However, its importance in perioperative medicine and surgical education is not very well understood. This study attempts to look at this relationship and determine whether or not a temporal relationship between this anesthesiology rotation and a surgical rotation is important.

Methods: I used an online survey tool to survey medical students who took the anesthesiology rotation (required rotation) in 2014 and 2015 (when rotation was coupled to surgical rotation) and compared those data to the data of students who took the rotation in 2016 (when the rotation was not coupled to surgery). I asked several questions looking at the importance of the anesthesiology rotation to surgical education and to perioperative medicine.

Results: Having a required anesthesiology rotation appears to add value to the general surgery rotation in undergraduate medical education. Furthermore, when this rotation is paired with the general surgery rotation, it appears that the students learn more about perioperative medicine than when the rotation is paired with other “advanced” rotation.

Conclusion: The pairing of anesthesiology with a general surgery rotation does indeed improve the perioperative medicine education and knowledge of students. Students appreciate having a week of anesthesiology with the surgical rotation, and they note that it adds value to the general surgery rotation.

Keywords: anesthesiology clerkship, general surgery rotation, perioperative medicine, medical students

Introduction

Anesthesiology training is not considered a required rotation in the vast majority of US medical schools. This is in contrast to medical schools in Europe and Canada where anesthesiology exposure is commonplace. In fact, the Association of American Medical Colleges states that only 27 of the Association of American Medical Colleges schools had a required anesthesiology rotation in 2008, while over 80% of schools in Canada have a required rotation.¹ The value of an anesthesiology rotation at the undergraduate level has been assessed by multiple studies. It has been shown that various different skills that are learned during the rotation add “value” to the students’ medical education – management of airway skills, pharmacology and physiology, and perioperative management, among other skills.¹⁻³

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The Emory University School of Medicine has a required anesthesiology rotation which encompasses at least 1 week of intense anesthesiology exposure. This rotation has been around for over 20 years, being paired with radiology, being paired with the required surgery rotation, and now most recently being paired with other “advanced” rotations (dermatology, palliative care, ophthalmology, or DOPA [dermatology, ophthalmology, palliative care, and anesthesiology] – each 1 week long). This pairing with the other rotations has just recently occurred over the past 2 years. The anesthesiology rotation had been a required week in the middle of the required surgery clerkship for at least 15 years. Students used to take 3 or 4 weeks of surgery. They would then transition into their week of anesthesiology (a separate rotation run completely by the anesthesiology department) and then complete their remaining month of surgery after.

To date, there have been few studies looking at the impact of a required anesthesiology rotation on surgical education and perioperative management of patients. Galway et al⁴ have addressed the importance of an anesthesiology rotation on general medicine knowledge but have not addressed its importance in general surgical knowledge. Other authors have discussed a general possibility of its importance in surgical education and training but have not specifically studied its implication in the general surgery curriculum.^{1,3,5,6}

Given that the Emory program had recently made changes to its curriculum, pairing anesthesiology with the advanced rotations noted previously, I attempted to look at the importance of having anesthesiology in close association with a surgery clerkship, with respect to both surgical and perioperative education. Given that surgeons are required to be masters of perioperative medicine along with anesthesiologists, I attempted to clarify the role of an anesthesiology rotation in this regard.

The aim of this study was to 1) clarify and compare the role and importance of an anesthesiology rotation when paired with surgery and when not paired with surgery and to 2) understand the importance of an anesthesiology rotation in perioperative medicine education.

Methods

Institutional Review Board exemption was obtained – the need for written informed consent was waived by the Emory Institutional Review Board for this study given that it involves educational surveys where anonymity of respondents was preserved. All surveys were randomly generated by the Emory system, and no names or other identifiers were associated with responses. Given that the department was

already using a survey tool to evaluate the rotation prior to the change in curriculum, the survey was adapted for use in this new cohort. The surveys were kept the same, but additional questions were added to allow comparison. This was a retrospective analysis to compare the anesthesiology rotation paired with surgery on its role in surgical education and perioperative medicine education to the one in which anesthesiology is paired with other nonsurgical advanced rotations, as noted earlier.

After the students finished the required anesthesiology rotation, the students were given an online survey to fill out and evaluate the rotation. The first cohort included students from 2014 and 2015, and a total of 245 students between the 2 years were involved. The second cohort included students in the new curriculum with the rotation being paired with the advanced rotations and involved 121 students.

An online survey was sent to all students after they finished the anesthesiology rotation. Students were asked to rate the answer on a scale of 1 to 5 (1= strongly disagree; 2= disagree; 3= neutral; 4= agree; and 5= strongly agree) on a variety of questions. Box 1 shows the statements that were assessed in the cohorts in 2014 and 2015 (when the anesthesiology rotation was paired with the surgery clerkship). Furthermore, given that the school of medicine was considering moving the anesthesiology rotation in the past, I included one yes/no question, which stated “Do you think the timing of the anesthesiology rotation (being during surgery clerkship) positively impacted your surgical education?” It is again important to remember that the surgical rotation was broken apart by 1 week of anesthesiology.

Box 2 shows the statements that were asked of the students in 2016, when the anesthesiology rotation was changed.

Box 1 From years 2014 and 2015 (anesthesiology rotation in the middle of surgery clerkship)

- Q1: Having the anesthesiology rotation during my surgery rotation was useful.
- Q2: Having the anesthesiology rotation during my surgery rotation increased the value of my surgical rotation.
- Q3: The anesthesiology rotation offered me value in learning perioperative management
- Q4: The anesthesiology rotation offered me value in learning surgical management of a perioperative patient
- Q5: The rotation allowed me to understand perioperative management more
- Q6: The required anesthesiology rotation made the surgical clerkship more useful
- Q7: The rotation made the surgical clerkship more educational

Note: Students were asked to grade these questions from 1 to 5 (1= strongly disagree; 2= disagree; 3= neutral; 4= agree; and 5= strongly agree).

Abbreviation: Q, question.

Box 2 Year 2016 (anesthesiology rotation in the middle of surgery clerkship)

Q1: Having the anesthesiology rotation during my DOPA block was useful
 Q2: Having the anesthesiology rotation during my DOPA block increased the value of my surgical rotation
 Q3: The anesthesiology rotation offered me value in learning perioperative management
 Q4: The anesthesiology rotation offered me value in learning surgical management of a perioperative patient
 Q5: The rotation allowed me understand perioperative management more
 Q6: The required anesthesiology rotation made the surgical clerkship more useful

Note: Students were asked to grade these questions from 1 to 5 (1= strongly disagree; 2= disagree; 3= neutral; 4= agree; and 5= strongly agree).

Abbreviations: DOPA, dermatology, ophthalmology, palliative care, and anesthesiology; Q, question.

Of note, some of the questions remained the same but were rephrased to allow the statements to make sense in context of the anesthesiology rotation being randomly assigned during the year and not being paired with surgery. Moreover, given that this was the first group to have their anesthesiology clerkship moved to become part of the DOPA block, I rephrased the one yes/no question to this group: “Do you think the timing of the anesthesiology rotation (randomly assigned) positively impacted your surgical education?”

Results

Of the 245 students in the years 2014 and 2015, 224 responded (91%). Of the 121 students in the year 2016, 102 responded (84%). A two-sample *t*-test was performed on the means to the responses to the statements for Q3 through Q7. Questions Q1 and Q2 were just compared as they were not exactly the same. The mean values, standard deviation, and *p*-values for the means are listed in Table 1.

Interestingly enough, when the anesthesiology rotation was paired with the surgical rotation, students found that they learned more about perioperative management when the rotation was paired with the surgery clerkship. Q3, Q4, and Q5 all addressed perioperative management. While students generally believed that the anesthesiology rotation had value in learning perioperative management in all cohorts, those that had the rotation with surgery appeared to learn more about perioperative management. There was statistical significance between the two values in all of these questions. Of note, Q4 showed that the pairing of anesthesiology with surgery helped with surgical management perioperatively.

Table 1 Data showing means and standard deviations (SDs) for the questions (Q) noted

| Question | Mean 2014/2015 | Mean 2016 | SD 2014/2015 | SD 2016 | <i>p</i> -value |
|----------|-------------------|--------------|-----------------|---------|-----------------|
| Q3 | 4.79 | 3.0 | 0.41 | 0.33 | <0.0001 |
| Q4 | 4.58 | 3.33 | 0.59 | 0.46 | <0.0001 |
| Q5 | 4.86 | 2.46 | 0.96 | 1.10 | <0.0001 |
| Q6 | 4.82 | 4.66 | 1.21 | 0.98 | 0.24 |

Furthermore, Table 1 also showed that regardless of when the anesthesia rotation was, it was indeed a useful adjunct to the surgery clerkship (Q6). The difference between the two questions was not statistically significant.

Given that Q1 and Q2 were phrased somewhat differently between the cohorts, I decided to compare the values and not apply statistical models. It is important to note that students generally found the placement of their anesthesiology rotation with surgery more favorable than when it was paired with the DOPA block. Table 1 shows that for Q1 the students believed it more useful to have anesthesiology as part of their surgery clerkship than as part of their DOPA block. For Q2, students believed that having the rotation as part of their surgery block increased the value of their surgical rotation. Students were less adamant in the DOPA block.

Boxes 3 and 4 are also included as qualitative information from the surveys. Open-ended comments were solicited at the end of the survey and provide a more subjective understanding of how the students felt. Box 3 is from the years 2014 and 2015 (when the rotation was placed in conjunction with surgery). Box 4 represents comments from 2016 (again, when the rotation was randomly placed during the third year rotations). The free text area of the survey was not required, so answers were limited, but representative quotations are included.

Discussion

The anesthesiology rotation at Emory School of Medicine has been a long-standing “advanced” rotation that was required for all medical students. It was originally combined with radiology as “A’s and Rays” and then progressed to being paired with the required surgery rotation. Because of curricular changes (including the addition of other “advanced rotations”) and changes to the academic calendar, the school moved to combining the anesthesiology rotation with these other “advanced rotations.” This led to the development of the rotation block called DOPA.

The benefits of having a required anesthesiology rotation are varied and significant. Airway management skills along

Box 3 Comments from the years 2014 and 2015 (when the rotation was placed in the middle of the surgery rotation)

- “The rotation was great. It made surgery “come alive” because I actually understood what was happening everywhere in the operating room (on the surgical side and on the anesthesia side).”
- “Fun rotation. Great procedures. Made me understand a little bit about what the anesthesiologist was doing on the other side of the drapes.”
- “I enjoyed rotation. Good break from surgery but also let me understand what was happening.”
- “Rotation was well placed. Made me understand what the anesthesiologist does. Made me understand why they ordered specific tests or what made a patient “ready” for surgery. I wish we had longer on the rotation.”
- “It was a good rotation. I learned lots of technical skills and also learned about anesthesiology in relation to surgery. What it is? What an anesthesiologist does. How getting ready for surgery is more than just being NPO. The anesthesia resident taught me about reading EKGs and interpreting stress tests.”
- “Didn’t know what anesthesiologists did prior to rotation. Actually made the surgery rotation more whole because you can’t do surgery without anesthesia. If you’re learning about surgery, you have to learn about anesthesia.”

Abbreviations: EKG, electrocardiogram; NPO, nothing per os.

Box 4 Comments from the year 2016 (when anesthesiology rotation was randomly placed)

- “It was my first rotation of Applications phase. I had no idea about anything. Wish I had been in the OR before this rotation.”
- “I just finished internal medicine before this rotation. Didn’t even know about what happens in surgery. Was a good rotation and I learned procedures. Residents were nice.”
- “I think this would be better if I had had surgery or gynecology, something in the OR.”
- “Good rotation, good teachers. I had surgery as my first rotation almost 1 year ago, so it was good to be back in the OR.”
- “I had this after pediatrics and ophthalmology. I think it was okay. I don’t think I knew enough to get a lot out of the rotation. It was still good. I learned how to intubate and place IVs.”

Abbreviations: IV, intravenous; OR, operating room.

with applied pharmacology and physiology are high on that list. However, the skills learned in perioperative management of a surgical patient are also critical.

This study supports the fact that a temporal relationship with the required surgical rotation can improve the student’s knowledge base even further in perioperative medicine. While having a required anesthesiology clerkship at any point during a student’s medical school career is beneficial, pairing it with surgery even helped students learn more about surgical patients as a whole and increased the value of the surgical rotation more than if anesthesiology was paired with other clerkships. The study further elucidates that students see more value in managing perioperative patients when they see it in the context of general surgery. The qualitative representative quotations found in Boxes 3 and 4 also help elucidate this theory. Interestingly, the qualitative quotes were more positive in the years the rotation was part of the surgery clerkship than when it was randomly placed. One of the students in the 2016 cohort even brings up that anesthesiology was their first rotation of the applications phase (third-year clerkship year), and this significantly affected how the student viewed the rotation. Not having been in the operating room prior to anesthesiology and not even having had internal medicine or other core rotations can certainly diminish the value of the rotation.

Many studies have looked at the importance of an anesthesiology clerkship in the global US medical school

curriculum. From pain management, fluid management, vascular access, and invasive and noninvasive monitoring, the impact of anesthesiology is clear.^{1,7} Knowledge of perioperative medicine and the management of the surgical patient (in the full perioperative period) is critical for all new physicians. Having even just a week of anesthesiology can help students understand and have a great appreciation of the nuances of these patients. Having that week with the surgical curriculum can offer even more benefits. Students appear to learn more and even have a better qualitative appreciation of the rotation and of surgery as a whole when it is placed in that way.

When interpreting this paper and study, it is important to note some limitations. The responses could easily have been influenced by what rotations the students had prior to and after filling out the survey (surgical subspecialties, critical care medicine, etc). I did not look at the complete order of rotations for any given medical student, and this could be a possible confounding factor in the data that was received. This study was also based only at one institution. Looking at anesthesiology curricula and timing at multiple different sites and schools of medicine could offer a greater perspective and a greater understanding of the role of a surgical education at the undergraduate medical level. It may even be worthwhile to survey the anesthesiology faculty and residents on how medical students performed depending on where the

anesthesiology rotation was placed. This will likely provide some important information as well.

Conclusion

As more and more medical schools are reevaluating curricular goals, student requirements, and clerkships as a whole, this study elucidates that the anesthesiology rotation is indeed a strong addition to any medical school curriculum. It is most aptly placed in conjunction with a surgical clerkship as the two are, of course, related. Placement randomly in a curriculum, while helpful and educational, is not ideal. Students perceive a greater value to their medical education and believe that they gain a great appreciation and knowledge base in perioperative medical education. With the concepts of the perioperative, medical, and surgical homes gaining more importance in the US health care system, medical schools are being asked to improve their curricula in this regard. An anesthesiology clerkship, when appropriately placed, may indeed be useful for these reasons.

Disclosure

The author reports no conflicts of interest in this work.

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