The Journal of Education in Perioperative Medicine

Brief Report

The Flipped Operating Room: Designing a Flipped Classroom Curriculum to Catalyze Intraoperative Medical Student Education

Nicholas R. Cormier, MD
Anjali Chacko, MD
Ragasnehith Maddula, MD
Burhan Ozturk, MD
John Guzzi, MD
Christopher Szabo, MD
Viji Kurup, MD

Introduction

Anesthesiology rotations teach widely translatable skills, including perioperative clinical reasoning, procedural skills, and interdisciplinary communication.[1] They also connect students with mentors in the field and can increase match rates into anesthesiology residencies.[2] Yet the composition and pedagogy of anesthesia rotations vary nationally.[2,3] Additionally, the time available for residents and attendings to engage students in intraoperative teaching is limited due to simultaneous draws of patient care, perioperative leadership, administrative tasks, and even nonphysician tasks,[4] making high-quality and efficient rotation curricula essential.

A needs assessment of existing anesthesiology rotation curricula was conducted by literature review, revealing that intraoperative and bedside teaching predominate over didactic teaching or simulations.[3] Specific published curricula focus on the distribution of time spent in different settings (eg, intraoperative, critical care, pain medicine, etc)[5] rather than the daily content delivered or teaching aids available to support attending and resident educators in these settings. Our existing local curriculum consisted of weekly, 1-hour didactics by anesthesia faculty or residents on rotating topics of the educators' choosing as well as a simulation session on a translatable topic (eg, anaphylaxis) though no framework for intraoperative teaching existed. During our anesthesia rotation, students are paired with a different attending and resident team each day.

We hypothesized that experiential learning in the anesthesiology rotation setting could be enhanced by implementing a flipped classroom structure, a model in which learners engage independently with lower order cognitive tasks (eg, basic knowledge acquisition and comprehension), shifting the focus of the subsequent teaching–learning session to catalyzing higher order cognitive tasks (eg, applying information to a clinical scenario). The flipped classroom model has been leveraged among other rotations[6] as well as among anesthesiology residents.[7] We asked the following research questions: (1) How does a daily flipped classroom curriculum applied to the intraoperative setting impact self-reported and educator-evaluated goal setting, preparation, and inquiry among rotating medical students? (2) How do stakeholders appraise the curriculum?

Materials and Methods

The authors, in partnership with a cohort of residents and students, cocreated a curriculum drawing on the Kern 6-step curriculum development model,[8] consisting of daily modules synchronized across learner–educator teams and arranged on a perpetual calendar (ie, all students and educators present on the 10th day of a given month would use module #10). Thirty-one total topics, 1 for each day of the month, were chosen using a modified Delphi approach along with closely related correlates identified iteratively by expert consensus of a group of educators and trainees. The modified Delphi methodology consisted of 3 rounds of consensus building: 16 experts identified 83 topics, then 10 experts ranked the topics using a 7-point Likert scale, and lastly 8 experts reranked 20 high-priority topics. Experts were identified among the Society for Education in Anesthesia and Anesthesia Toolbox leadership.[9] Resident educator volunteers developed each module with mentorship and content verification from the authors based on a unified template including learning objectives, curated content (eg, videos, short articles, or links to preferred sources), and questions to springboard intraoperative discussion. Each was kept intentionally brief, approximately 2 pages. Modules were housed in an interactive interface (Figure 1) and made available on the departmental rotation website. Access to the interactive curriculum is available here: https://drive.google.com/file/d/1uQP8Y1WXWmTA4E6vPFLJhWiS88y_-e5-/view?usp=drive_link. Learners and educators accessed the curriculum in the clinical setting using their smartphones.

continued on next page

continued from previous page

The study was classified by the Yale Institutional Review Board as exempt from full review (2000038535). The primary outcomes were learners' (ie, medical students) self-reported preparation for intraoperative teaching, appraisal of intraoperative teaching/learning quality, engagement, and critique of the curriculum. The secondary outcomes were educators' (ie, attendings and residents) assessment of intraoperative teaching/learning quality and their perception of students' preparation and engagement. To measure these outcomes, preintervention and postintervention surveys with 5-point Likert scales were developed through an iterative process in which survey questions mapped to each outcome were written by the first and third authors and honed during review by the remaining authors. A resident and student involved in the original curriculum development evaluated the surveys for question flow, clarity, and logistics of the survey platform. Modifications were made to the branching logic to make completion more efficient. The second version of the survey was presented at the Idea Lab forum of the 2024 Society for Education in Anesthesia Spring Meeting in Philadelphia, PA. Surveys were administered electronically through Qualtrics. Students were approached by text message regarding joining the voluntary study by 1 of the first 3 authors, none of whom was involved in the students' evaluations.

Students completed a preintervention survey during the first week of their rotation prior to exposure to the curriculum. At least 1 attending and at least 1 resident who worked with each student also each completed voluntary preintervention surveys during this period. During the second week of the rotation, students and their attending/resident teams received access to the curriculum; review of the applicable daily modules by both the learners and educators was voluntary though reminders to access the material were sent to both prior to the start of the clinical day. Whereas the curriculum contained 31 modules, 1 aligned with each day of the month, during a given week, students only interacted with the individual modules assigned to the calendar days within that week. Students as well as at least 1 attending and at least 1 resident educator who worked with each student each completed postintervention surveys at the end of this second week. Students provided a unique identifier to enable linking of their surveys. Students and educators, if they chose, could elect to participate in only the curriculum—and not the research component of the study—without penalty. During the enrollment period, students in their second (M2) or third (M3) years of medical school at our institution completed 2- to 3-week clerkships, and those in their fourth (M4) or later years (M5+) completed 2-week electives or 4-week subinternships; the emphasis on intraoperative teaching is consistent in each rotation. Demographics and respondent opinions were analyzed with descriptive statistics. Five-point Likert scales with the following anchors were coded as *strongly disagree* = 1, *disagree* = 2, *neither agree nor disagree* = 3, *agree* = 4, *strongly agree* = 5. Means with SD of preintervention and postintervention data relating to the primary and secondary outcomes were compared with paired *t*-tests for outcomes pertaining to students. The structure of our anesthesia rotation is such that each student is paired with a different attending/resident team every day; therefore, the attending and resident score means were compared with unpaired *t*-tests. Mean differences with 95% confidence intervals (CI) were calculated. Effect size was calculated with Cohen *d*. Agreement between learner, attending, and resident assessments was also compared with unpaired *t*-tests. The level set for statistical significance was $p < .05$. Effect sizes were defined as small, $d = 0.2$; medium, $d = 0.5$; large, $d > 0.8$. We defined the threshold for a clinically meaningful effect size as medium. Analysis was completed with SPSS software.

Results

Study enrollment occurred during the 2024–2025 academic year. Twenty-one medical students were enrolled, and 12 (57%) self-identified as female; they were from the following class years: M2, 6 (29%); M3, 6 (29%); M4, 4 (19%); >M5, 2 (10%). Medical students were sequentially recruited. None declined to participate during the 6-month pilot. Of the enrolled medical students, 81% completed both preintervention and postintervention surveys and were included in further analysis (ie, 4 students did not complete the postintervention survey). Of the students who did not complete the post-intervention survey, 2 (50%) self-identified as female, 3 (75%) were M2s, and 1 (25%) was an M4. A total of 91 educator surveys were completed; 22 attending and 25 resident educators completed preintervention surveys, whereas 19 attending and 25 resident educators completed postintervention surveys. Demographics are further summarized in Table 1. The data set was otherwise complete due to required data entry prompted by the survey software.

Medical students' self-assessment of their learning and appraisal of the curriculum is summarized in Table 2. Their mean agreement (with SD) with the following statements increased when comparing preintervention and postintervention responses: (1) I came to the operating room (OR) with a predetermined learning goal or discussion topic of the day (3.5 [1.1] vs 4.3 [1.0], $p = .03$, $d = 0.6$), and (2) I came to the OR having read about a specific topic in anesthesia (3.3 [1.2] vs 4.4 [1.1], $p = .006$, $d = 0.7$). There was not a significant increase in mean responses to the following statement: (3) I came to the OR with specific questions about an anesthesia topic (3.7 [0.7] vs 4.2 [1.0], $p = .1$, $d = 0.4$). There were not significant differences in the preintervention responses comparing students from the group who were lost to follow-up versus those who completed all time points ($p > .05$). Students agreed that having a curriculum with daily learning modules was valuable (4.2 [1.0]), a reasonable amount of work outside the OR (4.4 [1.0]), makes intraoperative teaching more effective (4.0 [1.0]), enabled them to acquire foundational knowledge about an anesthesia topic (4.4 [1.1]), helped them feel more prepared entering a day on the anesthesia rotation (3.9 [1.2]), helped them more easily engage with their attending or resident (3.9 [1.1]), and that the daily modules were well-organized (4.4 [1.2]), an appropriate length (4.5 [1.0]), written at an appropriate level for their

continued on next page

continued from previous page

understanding (4.5 [1.0]), and had clear learning objectives (4.5 [1.1]).

Attending and resident educators' assessment of medical students and their appraisal of the curriculum is summarized in Table 3. Both attending and resident educators' agreement with the following statements when comparing preintervention and postintervention responses also increased: (1) The student came to the OR with a predetermined learning goal or discussion topic of the day (attending: 3.2 [0.7] vs 4.2 [0.6], $p < .001$, $d = 1.5$; resident: 3.2 [1.3] vs 4.0 [1.3], $p = .02$, $d = 0.6$), and (2) the student came to the OR having read about a specific topic in anesthesia (attending: 3.0 [0.7] vs 4.1 [0.8], $p < .001$, $d = 1.5$; resident: 3.0 [1.1] vs 3.8 [1.3], $p = .05$, $d = 0.6$). There was a significant increase in attendings' but not residents' responses to the following statement: (3) The student came to the OR with specific questions about an anesthesia topic (attending: 3.0 [1.0] vs 3.9 [0.9], $p < .01$, $d = 1.0$; resident: 3.8 [1.3] vs 4.2 [1.3], $p = .2$, $d = 0.3$). Attending and resident educators agreed that having a curriculum with assigned topics for medical students was valuable (attending: 4.0 [1.1]; resident: 4.4 [0.6]), made intraoperative teaching more effective (attending: 4.1 [0.8]; resident: 4.4 [0.5]), enabled the educator to teach to a higher level (attending: 4.1 [0.8]; resident 4.2 [0.8]), promoted engagement from the medical student (attending: 4.1 [0.8]; resident: 4.2 [0.9]), and was appropriate for intraoperative teaching (attending: 4.2 [1.0]; resident: 4.2 [0.9]).

Comparing the agreement between students' self-assessments and educators' assessments of the students, both preintervention and postintervention, there were not statistically significant differences ($p > .05$) between students' and attendings' scores or between students' and residents' scores for questions (1) and (2) regarding developing learning goals and reviewing content before the teaching–learning session. However, students' preintervention scoring of question (3) regarding the development of specific questions prior to the teaching–learning session was significantly higher than attendings' scoring though no different than residents' scoring (student vs attending: 3.7 [0.7] vs 3.0 [1.0], $p = .02$; student vs resident: 3.7 [0.7] vs 3.8 [1.3]).

Discussion

Our study shows how a flipped classroom curriculum (ie, a flipped OR curriculum) impacts teaching and learning in the intraoperative arena. We base our discussion on our defined threshold for a clinically meaningful change as a moderate effect size. We found that, among results that fit this description, scores increased by approximately 1 Likert-scale point, for example, from *neutral* to *agree*.

The intervention increased the consistency with which students set a daily learning goal and reviewed content on that topic in preparation for the teaching–learning session. Attendings, though not students themselves or residents, perceived that students were primed with more questions on the daily topics. Attendings also scored students significantly lower in this domain preintervention compared with students' self-assessments or residents' assessments. A possible explanation is that students formulated a similar total number of questions but more consistently engaged their attendings to discuss the questions after the intervention. Regarding the curriculum's low-maintenance, synchronized format, positioned on a perpetual calendar, learners and educators found it to be valuable and well-constructed, a catalyst for student preparation and engagement and a framework that supported and elevated teaching.

Our curriculum's success in engaging medical students at our institution may be due to the ways in which it effectively leverages technology in a mobile format. Several theoretical frameworks exist in this domain, including the PICRAT model for technology integration, which relates learners' relationship to an employed technology (eg, Passive, Interactive, or Creative) to an educator's use of technology as a modality that Replaces, Amplifies, or Transforms traditional practice.[10] Our curriculum is interactive on the part of the learner while also requiring a creative relationship with the content as they are asked to apply knowledge to patient care and engage in intraoperative teaching, asking and answering questions from the modules. It is also intended to both amplify the traditional practice of intraoperative teaching and transform it by synchronizing it across educator–learner dyads in a low-maintenance format. This synchronization supports residents as educators by providing them with a curricular framework to springboard their own teaching and makes teaching more efficient for attendings with high clinical and cognitive demands.

Despite these strengths of the flipped classroom modality, several challenges emerged during implementation. As with any organizational change, it required buy-in from residents and faculty; whereas the curriculum was intended to provide a framework for and support their intraoperative teaching, it was also a fundamental change in their teaching approach in that it assigned a topic for the day and primed learners to enter the conversation at a higher level. We achieved this buy-in by cocreating the curriculum with students, residents, and attending educators. A flipped classroom curriculum also required time investment, including time for educators to create high-quality preparatory modules and time for students to review the modules outside of clinical hours. Lastly, the curriculum requires access to technology. Although commonplace at our academic medical center, technology access can be a barrier in rural settings or those in resource-limited countries. Acknowledging these limitations, we chose to innovate our intraoperative teaching curriculum rather than further developing our didactic or simulation program because intraoperative teaching encompasses the largest proportion of teaching time during anesthesia rotations[3] and lacked a formal structure at our institution.

We acknowledge several important study limitations. Ours was a single-center pilot study with a limited sample size in which 4 students were lost to follow-up; however, there were not significant differences in the preintervention responses of the group who was lost to follow-up versus the group who had completed all time points. The study did not formally compare the curricular

continued on next page

continued from previous page

intervention to a control curriculum, and the infeasibility of blinding students or educators to the curriculum may have biased responses. Some attending or resident educators may have encountered multiple different students during the pilot, but because of anonymous survey administration, we were not able to assess the impact of this phenomenon or evaluate autocorrelation. Because different educator teams completed preintervention and postintervention surveys, there is potential bias from the lack of a consistent team evaluating each student; nevertheless, introducing a consistent observer from study staff could have created a Hawthorn effect. Lastly, each module was templated similarly, but each learner and educator in the study interacted with a slightly different subset of topics. We chose a 6-month pilot period to allow for multiple rounds of the curriculum to be experienced, but bias may remain. Our next steps include upscaling our curricular intervention into a formal smartphone application and conducting a subsequent study in a multi-institutional environment. We also look to investigate the role of artificial intelligence in updating existing modules and creating new interactive content.

Acknowledgments

None.

References

1. Ly EI, Catalani BS, Boggs SD, et al. The anesthesiology clerkship: a requisite experience in medical education. *Ochsner J*. 2020;20(3):250.
2. Pravder HD, Veira J, Zhao X, Lin H-M, Kurup V. Bridging the gap: are medical student anesthesiology clerkship characteristics associated with anesthesiology match rates? *Anesthesia Analgesia*. 2022:10.1213.
3. Curry SE. Teaching medical students clinical anesthesia. *Anesthesia Analgesia*. 2018;126(5):1687-94.
4. Cormier NR, Kinney DA, Gaiser RR. What are "nonphysician obligations" anyway? A survey study exploring their impact on anesthesiology resident education and developing a conceptual framework. *A&A Practice*. 2025;19(1):e01885.
5. Galway UA. Designing an optimally educational anesthesia clerkship for medical students–survey results of a new curriculum. *J Educ Perioperative Med*. 2014;12(1):E054.
6. Lew EK. Creating a contemporary clerkship curriculum: the flipped classroom model in emergency medicine. *Int J Emergency Med*. 2016;9:1-5.
7. Kurup V, Hersey D. The changing landscape of anesthesia education: is flipped classroom the answer? *Curr Opinion Anesthesiology*. 2013;26(6):726-31.
8. Kern DE. A six-step approach to curriculum development. In: Thomas P, Kern D, Hughes M, Chen B, eds. *Curriculum Development for Medical Education*. 2016:5-9.
9. Shettig A, Woodworth G, Spofford C, Shaver C, Hofkamp M. Identification of 20 topics to be taught in an in-person 4 week medical student anesthesia elective: a three round delphi study. Presented at Society for Education in Anesthesia; 2022; Pittsburgh, PA.
10. Kimmons R, Graham CR, West RE. The PICRAT model for technology integration in teacher preparation. *Contemp Issues Tech Teacher Ed*. 2020;20(1):176-98.

The authors are in the Department of Anesthesiology at the Yale School of Medicine in New Haven, CT. ***Nicholas R. Cormier*** *and* ***John Guzzi*** *are Assistant Professors;* ***Anjali Chacko*** *is a Chief Resident;* ***Ragasnehith Maddula*** *is an Anesthesiology Resident;* ***Burhan Ozturk*** *is a Critical Care Fellow;* ***Christopher Szabo*** *is an Associate Professor;* ***Viji Kurup*** *is a Professor.*

Corresponding author: *Nicholas R. Cormier, MD, Department of Anesthesiology, Yale School of Medicine, 333 Cedar Street, New Haven, CT, 06510. Telephone: (203) 785-2802, Fax: (203) 785-6664*

Email address: *Nicholas R. Cormier: nicholas.cormier@yale.edu*

Financial disclosure: *No financial support from foundations, institutions, pharmaceutical or private companies.*

Abstract

Background: Anesthesiology rotations teach widely translatable skills and connect students with mentors in the field. However, their composition and pedagogy vary nationally, and the time available for attendings and residents to engage in intraoperative teaching is limited. Flipped classroom curricula, when applied to the operating room setting, have the potential to catalyze intraoperative teaching.

Methods: We developed a flipped classroom curriculum consisting of daily modules synchronized across learner–educator teams and arranged on a perpetual calendar. The primary outcomes were learners' (ie, medical students) self-reported preparation for intraoperative teaching, appraisal of intraoperative teaching/learning quality, engagement, and critique of the curriculum. The secondary outcomes were educators' (ie, attendings and residents) assessments of intraoperative teaching/learning quality and their perception of students' preparation and engagement. A preintervention and postintervention survey design was implemented employing questions scored on 5-point Likert scales.

Results: Twenty-one medical students, 41 attending educators, and 50 resident educators were enrolled during a 6-month pilot period. Preintervention and postintervention scores were compared. After the intervention, medical students more consistently came to the operating room with a defined learning goal based on self-assessment (mean [SD], 3.5 [1.1] vs 4.3 [1.0], $p = .03$, $d = 0.6$) and the assessment of educators (attending: 3.2 [0.7] vs 4.2 [0.6], $p < .001$, $d = 1.5$; resident: 3.2 [1.3] vs 4.0 [1.3], $p = .02$, $d = 0.6$). They also more consistently reviewed foundational information in preparation for teaching based on self-assessment (3.3 [1.2] vs. 4.4 [1.1], $p = .006$, $d = 0.7$) and that of educators (attending: 3.0 [0.7] vs 4.1 [0.8], $p < .001$, $d = 1.5$; resident: 3.0 [1.1] vs 3.8 [1.3], $p = .05$, $d = 0.6$). Attendings perceived that students also more consistently came to the operating room with specific questions about a topic (3.0 [1.0] vs 3.9 [0.9], $p < .01$, $d = 1.0$). Students and educators found the curriculum to be a valuable, organized, and efficient primer that promoted student engagement and higher order teaching.

Conclusions: A flipped classroom curriculum can be implemented in the intraoperative arena to catalyze learners' preparation for the clinical day, set an agenda for the teaching–learning session, and promote engagement while also supporting and elevating teaching by attending and resident educators. Our synchronized format positioned on a perpetual calendar was also perceived as valuable and well-constructed.

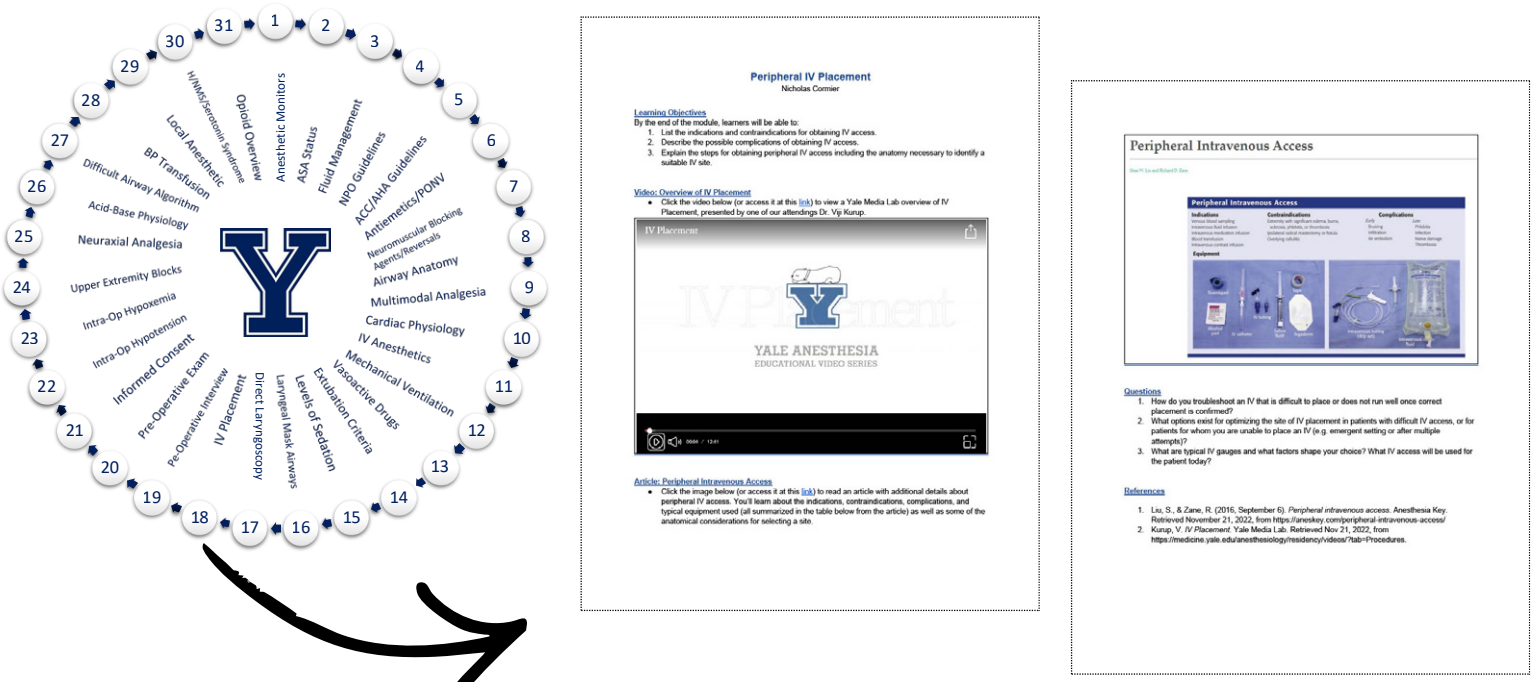
Keywords: Intraoperative teaching, flipped classroom, technology integration, undergraduate medical education, medical student education, anesthesiology rotation

continued on next page

continued from previous page

Figure

Figure 1. *Curriculum interface with an example of module #18 on peripheral intravenous line placement.*



continued on next page

continued from previous page

Tables

Table 1. *Demographics*

	Preintervention n	%	Postintervention n	%	Lost to follow-up[a] n	%
Medical Students	**21**		**17**		**4**	(19%)
Female	12	(57%)	10	(59%)	2	(50%)
M2	6	(29%)	3	(18%)	3	(75%)
M3	6	(29%)	6	(35%)	0	(0%)
M4	4	(19%)	3	(18%)	1	(25%)
≥M5	2	(10%)	2	(12%)	0	(0%)
Prefer not to specify	3	(14%)	3	(18%)	0	(0%)
Attending Educators[b]	**22**		**19**			
Female	4	(18%)	6	(32%)		
1 to <5 years	11	(50%)	8	(42%)		
5 to <10 years	2	(9%)	3	(16%)		
10 to <30 years	6	(27%)	7	(37%)		
>30 years	3	(14%)	1	(5%)		
Resident Educators[b]	**25**		**25**			
Female	6	(24%)	8	(32%)		
PGY2	8	(32%)	8	(32%)		
PGY3	14	(56%)	10	(40%)		
PGY4	3	(12%)	7	(28%)		

Abbreviations: M2 = second year of medical school. PGY2 = postgraduate year 2.

[a]Of the medical students recruited, 4 were lost to follow-up and did not complete the postintervention survey.

[b]The structure of our anesthesia rotation is such that each student is paired with a different attending/resident team every day; therefore, different attendings and residents comprise the preintervention and postintervention groups.

Table 2a. *Effect of the Curriculum on the Teaching–Learning Environment Focusing on Student Self-Assessment*

		Medical Student Self-Assessment					Comparison With Students Lost to Follow-up	
		Pre *mean (SD)*	Post *mean (SD)*	Difference *mean (95% CI)*	*p* value[a]	Effect size (*d*)	Pre *mean (SD)*	*p* value[b]
I came to the OR:	1. With a predetermined learning goal or discussion topic of the day	3.5 (1.1)	4.3 (1.0)	0.8 (0.6, 1.0)	0.03	0.6	3.3 (1.5)	0.8
	2. Having read about a specific topic in anesthesia	3.3 (1.2)	4.4 (1.1)	1.1 (0.9, 1.3)	0.006	0.7	3.5 (1.1)	0.8
	3. With specific questions about an anesthesia topic	3.7 (0.7)	4.2 (1.0)	0.5 (0.3, 0.7)	0.1	0.4	3.5 (1.7)	0.8

[a]Paired *t*-test

[b]Unparied *t*-test

continued on next page

continued from previous page

Tables

Table 2b: *Students' Subjective Appraisals of the Curriculum Format and Content*

	Medical Student Evaluation of Curriculum	Mean (SD)	Min	Max
Having a curriculum with daily learning modules to review the day before:	1. Is valuable	4.2 (1.0)	1	5
	2. Is a reasonable amount of work outside the OR	4.4 (1.0)	1	5
	3. Makes intraoperative teaching more effective	4.0 (1.0)	1	5
	4. Enables me to acquire foundational knowledge about an anesthesia topic	4.4 (1.1)	1	5
	5. Helped me feel more prepared entering a day on the anesthesia rotation	3.9 (1.2)	1	5
	6. Helped me more easily engage with my attending or resident	3.9 (1.1)	1	5
The daily anesthesia modules:	1. Are well organized	4.4 (1.2)	1	5
	2. Are an appropriate length	4.5 (1.0)	1	5
	3. Are written at an appropriate level for my understanding	4.5 (1.0)	1	5
	4. Have clear learning objectives	4.5 (1.1)	1	5

Table 3. *Effect of the Curriculum on the Teaching–Learning Environment Focusing on Attending and Resident Educators' Assessment of Students*

Attending Assessment of Medical Student		Pre *mean (SD)*	Post *mean (SD)*	Difference *mean (95% CI)*	*p* value[a]	Effect size (*d*)
The student came to the OR:	1. With a predetermined learning goal or discussion topic of the day	3.2 (0.7)	4.2 (0.6)	1.0 (0.6, 1.4)	< 0.001	1.5
	2. Having read about a specific topic in anesthesia	3.0 (0.7)	4.1 (0.8)	1.1 (0.6, 1.6)	< 0.001	1.5
	3. With specific questions about an anesthesia topic	3.0 (1.0)	3.9 (0.9)	0.9 (0.3, 1.5)	< 0.01	1.0
Resident Assessment of Medical Student						
The student came to the OR:	1. With a predetermined learning goal or discussion topic of the day	3.2 (1.3)	4.0 (1.3)	0.8 (0.1, 1.5)	0.02	0.6
	2. Having read about a specific topic in anesthesia	3.0 (1.1)	3.8 (1.3)	0.7 (0.0, 1.4)	0.05	0.6
	3. With specific questions about an anesthesia topic	3.8 (1.3)	4.2 (1.3)	0.4 (-0.3, 1.1)	0.2	0.3

[a]Unpaired *t*-test

continued on next page

continued from previous page

Tables

Table 3b: Attendings' and Residents' Subjective Appraisals of the Curriculum Format and Content.

	Attending & Resident Evaluation of Curriculum	Attending Evaluation			Resident Evaluation		
		Mean (SD)	Min	Max	Mean (SD)	Min	Max
Having a curriculum with assigned topics for medical students the day before:	1. Is valuable	4.0 (1.1)	1	5	4.4 (0.6)	3	5
	2. Makes intraoperative teaching more effective	4.1 (0.8)	3	5	4.4 (0.5)	4	5
	3. Enables me to teach to a higher level	4.1 (0.8)	3	5	4.2 (0.8)	3	5
	4. Promoted engagement from the medical student	4.1 (0.8)	2	5	4.2 (0.9)	2	5
	The topic assigned to my student was appropriate for intraoperative teaching	4.2 (1.0)	2	5	4.2 (0.9)	2	5