The Journal of Education in Perioperative Medicine

Original Research

Methods of Orienting New Anesthesiology Residents to the Operating Room Environment: A National Survey of Residency Program Directors

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Introduction

The initial weeks of anesthesiology residency are a formative period for new trainees. Anesthesiology residents in the United States must complete 12 months of Fundamental Clinical Skills of Medicine (most often internal medicine, surgery, or a transitional year) before beginning 3 years of clinical anesthesiology training.[1] The rapid acquisition of clinical knowledge and technical skills required of trainees during the subsequent transition to clinical anesthesiology training can be challenging and stressful.[2] Informal discussions with colleagues outside our institution suggested that anesthesiology residency orientation methods vary extensively across the United States. First year clinical anesthesiology (CA-1) residents may be instructed by a wide range of individuals including other residents, attending physicians, and nonphysician providers. In addition, orientation curricula may vary in duration, timing, and content from one institution to another. No systematic efforts have been made to describe the strategies currently used in anesthesiology residency programs for orienting new residents to their role as perioperative care providers. The objective of this study was to describe the various methods currently in use for preparing new trainees for the work in the operating room to inform current program directors regarding variations in orientation practices and guide future research into this important area of resident education.

Materials and Methods

After Mayo Clinic College Institutional Review Board exemption (IRB ID 19-009468), a survey was designed with the assistance of the Mayo Clinic Survey Research Center using a modified Delphi technique. The survey underwent 4 cycles of review and revision based on feedback from multiple members of educational leadership at our institution (see Acknowledgments). The survey was deployed digitally using Qualtrics© software (Provo, UT) by the Mayo Clinic Survey Research Center and distributed over the Internet. The text of the survey is included as Appendix A. The survey was distributed to US anesthesiology residency program directors through the Society of Academic Associations of Anesthesiology & Perioperative Medicine (SAAAPM), which sent an email to members of the Association of Anesthesiology Core Program Directors in April 2019 and then included a link to the survey in the June 2019 and July 2019 SAAAPM e-mail newsletters. In October 2019, the Mayo Clinic Survey Research Center emailed the survey link to program directors that had yet to respond using publicly listed e-mail addresses on the Accreditation Council for Graduate Medical Education (ACGME) Web site. Due to a suboptimal response rate, after IRB approval, a gift card incentive was added to reward 10 randomly selected survey respondents at the time of study completion. The survey was distributed again through the SAAAPM newsletter in February 2020 and again through direct email to program directors in April 2020. The survey was closed at the end of April 2020. Survey results were tabulated and analyzed using descriptive statistics to search for trends in orientation practices across the country. Template analysis was used for the thematic analysis of open-ended comments provided by respondents.[3] The analytical process was led by an author (J.H.) with reiterative analysis and input from coauthors.

Results

At the time of initial survey distribution, there were a total of 156 accredited US anesthesiology residency programs listed on the ACGME Web site.[4] A total of 64 survey responses were received over the span of 12 months. After filtering out duplicates, there were a total of 56 unique replies representing a 36% response rate. Forty-eight unique responses (representing a response rate of 31%) were received before adding the cash card incentive, and 8 additional unique responses were received after adding the incentive. Denominators in the data that follow vary slightly, as survey respondents may not have answered every question.

General Information

All geographic regions of the United States were represented (Table 1). The annual resident class size was normally distributed with a mean of 14 (SD 7; range 3 to 30; Figure 1). Forty-eight (84%) of 56 programs

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reported having an integrated intern year managed by the anesthesiology program, and of these programs, 43 (90%) of 48 began anesthesiology-specific didactic sessions before the start of CA-1 year.

Structure of Clinical Training

Fifty-five (98%) of 56 programs structured their clinical orientation by pairing new residents 1:1 with another provider. Thirty-five (63%) of 56 program directors reported pairing multiple different providers 1:1 with CA-1 residents during the course of the orientation period. The survey options did not distinguish whether these pairings occurred sequentially (eg, pairing a new learner with a senior resident for several weeks then with a faculty member thereafter) or simultaneously (eg, a single new resident assigned to both a dedicated senior resident and dedicated faculty member). Programs most frequently paired for a duration of 4 weeks (46%) or 6 weeks (30%). The paired individuals were most often faculty members (75% of all programs) and/or senior residents (70%). An extended view of the duration of pairing and the roles of paired individuals are presented in Table 1. Of the 10 program directors who reported pairing CA-1s together, 3 commented that each CA-1 pair was assigned to a single faculty member and one stated that each CA-1 pair was assigned to a single senior resident.

Didactics

All 56 programs reported some form of introductory didactics for new residents distinct from the normally scheduled resident curriculum. These included in-person lectures (98%), simulations/workshops (95%), problem- or case-based learning (55%), and online lectures/content (46%; Table 1). Eight program directors reported additional modalities including checklists, quizzes, and tours (Table 2). Programs reported providing a median of 30 total hours (interquartile range 20 to 45 hours; overall range 2 to 100 hours) of didactics for new trainees targeted specifically to introductory anesthesia and a median of 8 h/wk of orientation-specific didactic time (interquartile range 5 to 10 h/wk; overall range 0 to 45 h/wk; Figures 2 and 3).

Call Duties and Assessments

The time CA-1 residents commence taking call is shown in Figure 4. Thirty-one (56%) of 55 programs begin CA-1 call duties at 6 or more weeks after the start of orientation. Five (9%) of 55 begin during the first week of orientation. Twenty-three (41%) of 56 programs do not formally assess CA-1 residents before initiation of call duties, whereas 6 (11%) use written examinations and 5 (9%) use clinical examinations. Twenty-three (41%) wrote in the free-text comment field that they rely on faculty feedback. Six (11%) program directors reported other forms of formal assessment before starting call duties. These included 3 (5%) who use simulation, 2 (4%) who require clinical competency committee approval, and 1 (2%) who uses an objective task-based passport that must be completed by the resident before call duties. Forty (73%) of 55 program directors agreed or strongly agreed that postponing CA-1 call duties until they attain experience or meet specific performance measures would enhance resident education, while 7 (13%) of 55 disagreed or strongly disagreed.

Training the Trainer

Program directors were asked about their opinions regarding formal education for individuals who are assigned 1:1 to new residents. Twenty-four (44%) of 55 program directors reported providing formal education on teaching to these individuals. Forty-four (79%) of 56 program directors agreed or strongly agreed that providing formal education for trainers would enhance resident education whereas 3 (5%) of 56 disagreed or strongly disagreed.

Comments

Eighteen (32%) of 56 program directors provided free-text comments (Table 3). Most comments centered on call responsibilities. Seven (39%) of 18 felt that due to the educational benefit, CA-1 call should only be postponed due to patient and/or resident safety. One respondent wrote that their CA-1 residents do not take call. Another respondent did not think CA-1 residents should take any 24-hour call, but did not specify their program's practice. Four program directors described the structure of their orientation month as being held during intern year for their categorical residents.

Discussion

To our knowledge, this is the first survey of anesthesiology residency program directors that focuses on the transition into clinical anesthesiology training. Respondents represent programs from a diverse geographic distribution across the United States. Our survey found that 90% of program directors with an integrated intern year began orientation efforts before CA-1 year, which is higher than the 72% reported in previous literature.[5]

Most programs pair new trainees with a specific individual for at least 4 weeks. This duration likely underrepresents the tremendous manpower resources and effort that departments invest in new trainees. One respondent stated, "This survey doesn't capture that we pair our CA-1s with a 'specific' individual for 2 weeks but they are not double-covered, and hence are paired with someone, for 8 weeks." Our survey also did not clearly delineate if CA-1s are simultaneously assigned to both a senior resident and a faculty member supervising only 1 room. In addition, several program directors reported that their residents train at multiple sites during orientation with each location differing in resources and personnel availability.

Most programs pair anesthesiologists and senior residents with their CA-1 residents, which provides several benefits. In addition to being readily available, these individuals are able to relate to new trainees from personal experience and potentially develop a mentoring relationship. In addition, prior literature has demonstrated the value of peer-assisted learning in improving academic performance and procedural skills among multiple medical professions and disciplines.[6–10] Other institutions may use nurse anesthetists or anesthesiologist assistants due to resource availability. These individuals may help introduce learners to the care team model and provide additional perspective. A minority of programs pair CA-1 residents together. These resident pairs are often assigned to a specific faculty member who maintains single-room coverage. This infrequently applied approach may have some advantages as it provides an increased sense of camaraderie among new trainees and helps optimize cognitive load

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by allowing tasks to be divided between residents. For example, one resident may focus on procedures while the other resident learns how to chart.

Approximately half of programs that responded to the survey question provide formal education regarding the training process and teaching strategies to those who clinically educate incoming CA-1s. The goal of "training the trainer" is to enhance resident education by improving content delivery by the trainers. Trainer confidence in their instructional abilities may also be bolstered by formal didactic sessions on teaching, although this may vary by instructor classification (eg, resident, attending anesthesiologist, certified registered nurse anesthetist). We previously surveyed our anesthesiology residents for their perspectives on orientation practices and several senior residents requested additional preparation for their role as a trainer. We subsequently designed and implemented a curriculum for senior residents that demonstrated a significant increase in confidence in their ability to orient a new resident (manuscript submitted). Programs may consider adding formal education training if it suits their practice and resources.

Duration of orientation-specific didactics vary widely, given the differences in program size and characteristics. The vast majority of programs use traditional lectures and simulations/workshops to orient new residents. Many use digital content and problem-/case-based learning. Digital content may provide significant benefit for those programs that have not yet engaged in this form of instruction. Electronic content has been shown to improve clinical base year residents' impressions of the anesthesiology residency program and their sense of preparedness for residency.[11] It also improves access to didactics, providing flexible learning regimens that are highly desired by today's learners. In addition, recent events have dramatically increased the importance of digital delivery due to social distancing requirements in the setting of the global COVID-19 pandemic. Finally, problem-based learning and case-based learning promote learner interaction and peer education, which increases self-directed learning among residents and improves resident satisfation.[12,13]

While prior literature[14] has shown that performance outcomes do not differ between residents who participate in categorical versus advanced programs, we believe that there may be value in having an integrated intern year managed by the anesthesiology residency program. For example, by starting the orientation process before CA-1 year, new trainees may transition more smoothly into the operating room environment and begin taking call earlier. Easing this progression may decrease trainee stress and burnout, improve patient safety, and reduce the demands on the personnel who supervise new trainees in the operating room.

The program director comments in Table 2 reveal opposing viewpoints on CA-1 call. Several program directors start CA-1 call as soon as possible, but one respondent does not have CA-1 residents take overnight call. We believe that although call provides educational value, it is paramount to manage cognitive load during the critical orientation period, allowing trainees to focus on acquiring essential information and skills.[15] The optimal duration of training before assuming call responsibilities will vary by program and depends on other nuances, such as the specific role of the resident on call. Programs with an integrated intern year may be in a better position to start call duties sooner due to having more time to prepare their residents during intern year. Some programs introduce call responsibilities in a graded fashion, which may provide similar benefits to early orientation and allow for more rapid initiation of call duties. Although most programs do not perform a formal assessment before the start of call duties, many programs rely on some form of faculty feedback to assess trainee readiness. We likely did not capture the true utility of faculty feedback in assessing readiness because the information was provided spontaneously by respondents in the free-text comment field. In addition, many did not specify if they used formal or informal feedback.

The Anesthesiology Knowledge Test (AKT) designed by the Inter-Hospital Study Group for Anesthesia Education is intended to "assess baseline knowledge of anesthesiology and the growth of knowledge during… clinical training."[16] In our survey, 2 program directors commented on the use of the AKT-1 examination during orientation, with one using the exam to help learners identify topics to review and the other using it as a pre/post assessment to demonstrate to both CA-1s and their CA-3 trainers how much they had learned over the month. Both responses illustrate the usefulness of this standardized examination during the orientation process.

Limitations of this study include the low response rate and the lack of clinical or academic outcomes. Although the response rate for our survey was only 37%, the respondents reflect a diverse geographic distribution of programs across the United States, which may provide a more representative sample than the small response would suggest. Another limitation is that some of the data may be skewed by programs that begin orientation during the intern year rather than CA-1 year.

Future research into anesthesiology resident orientation practices is warranted. Specifically, relating orientation methods to objective performance outcome metrics would be informative to all program directors. We propose that metrics for measuring the quality of orientation process should include assessments of both clinical knowledge and technical skills. Clinical knowledge could be assessed using scores on written examinations (such as the change in AKT-0 vs AKT-1 performance), whereas technical skills could be assessed through simulation. The survey establishes a baseline for future surveys to assess changes in nationwide trends over time.

This study demonstrated areas of consensus and variation in current orientation practices among US anesthesiology residency programs. We hope that this information will help program directors assess how their orientation practices compare to other programs within the United States and identify best practices that can be adapted into their unique circumstances.

Acknowledgments

The authors thank the following individuals for their feedback on the design and content of the survey: Arnoley Abcejo, MD; David

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Cook, MD; Niki Dietz, MD; Charles Sims III, MD; Paul Warner, MD; Mark Warner, MD; and Tasha Welch, MD. The authors thank Melissa Rathburn and the Mayo Clinic Survey Research Center for assistance with survey design and distribution.

The authors thank Andrew Bronson and the SAAAPM for assistance with survey distribution.

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Disclosures: *This project was supported by Clinical Translation Science Award Grant number UL1 TR002377 from the National Center for Advancing Translational Science. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the National Institutes of Health.*

Abstract

Background: The initial weeks of clinical anesthesiology are a formative period for new residents. Trainees may be clinically educated by a variety of individuals, and introductory didactic structure likely differs between institutions. This study was undertaken to define current orientation practices in US anesthesiology residency programs.

Methods: A survey was created using Qualtrics© software and distributed to all US anesthesiology residency program directors through the Society of Academic Associations of Anesthesiology & Perioperative Medicine email newsletter and through direct email to program directors.

Results: Fifty-six unique survey responses were received of 156 total programs. Eighty-nine percent of programs with an integrated intern year begin anesthesia-related orientation before the first year of clinical anesthesiology. Sixty-three percent of programs pair trainees with more than one specific individual during orientation. Programs most frequently pair trainees with anesthesiologists (75%) and/or senior residents (70%). Forty-six percent maintain this pairing for 4 weeks and 30% for 6 weeks or longer. Forty-three percent provide education on teaching practices to trainers. Introductory didactics last a median of 30 hours. Programs may blend lectures, simulations/workshops, digital content, problem-based learning, pocket references, and/or checklists into a cohesive introductory curriculum. Fifty-six percent begin call responsibilities in the sixth week of orientation or later.

Conclusions: Orientation practices for clinical anesthesia training vary across residency programs in the United States. We hope this information will help program directors compare their orientation practices to other programs and identify best practices and potentially useful variations.

Keywords: Education, residency, anesthesiology, operating rooms, graduate medical education, orientation

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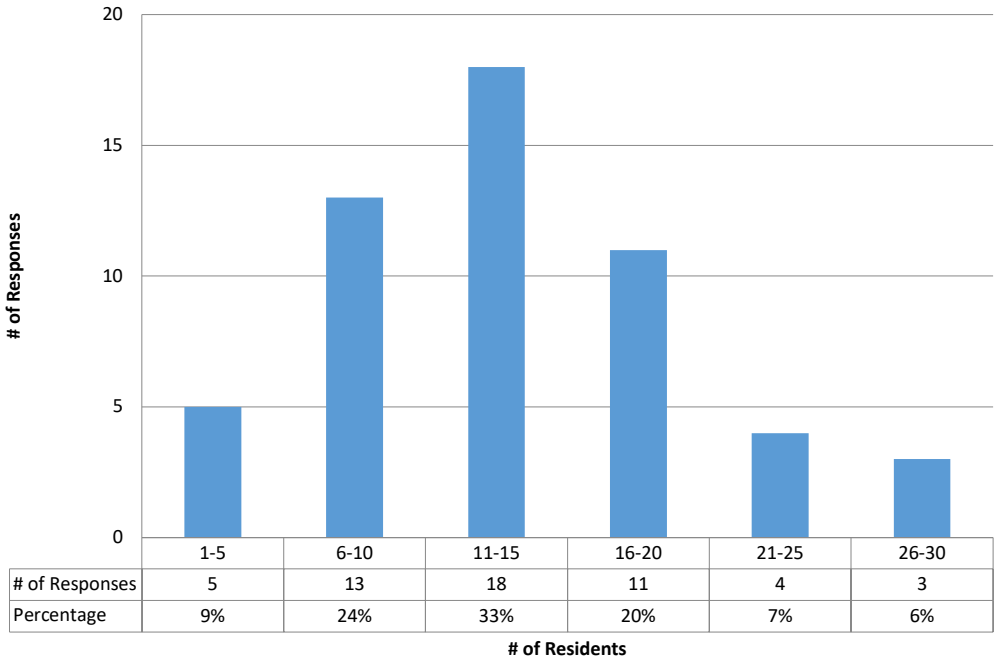
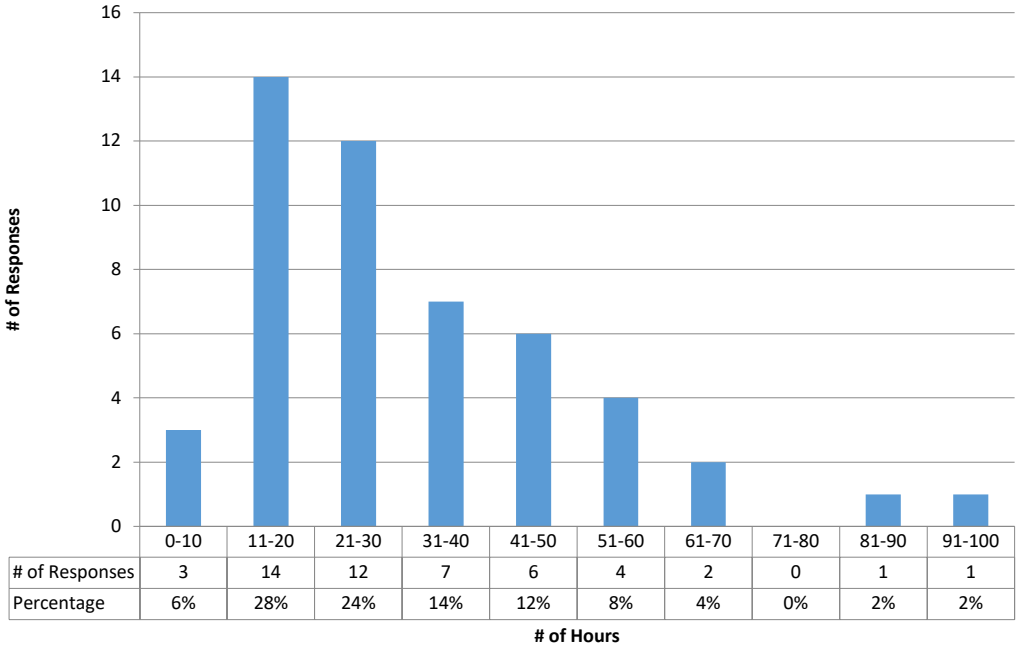
Figures

Figure 1. *Residency class size. Fifty-four of 56 program directors answered this question.*



	1-5	6-10	11-15	16-20	21-25	26-30
# of Responses	5	13	18	11	4	3
Percentage	9%	24%	33%	20%	7%	6%

Figure 2. *Total hours of introductory didactics. Introductory didactics were defined as those targeted specifically to introductory anesthesiology, distinct from the normally scheduled didactic program for other residents.*



	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
# of Responses	3	14	12	7	6	4	2	0	1	1
Percentage	6%	28%	24%	14%	12%	8%	4%	0%	2%	2%

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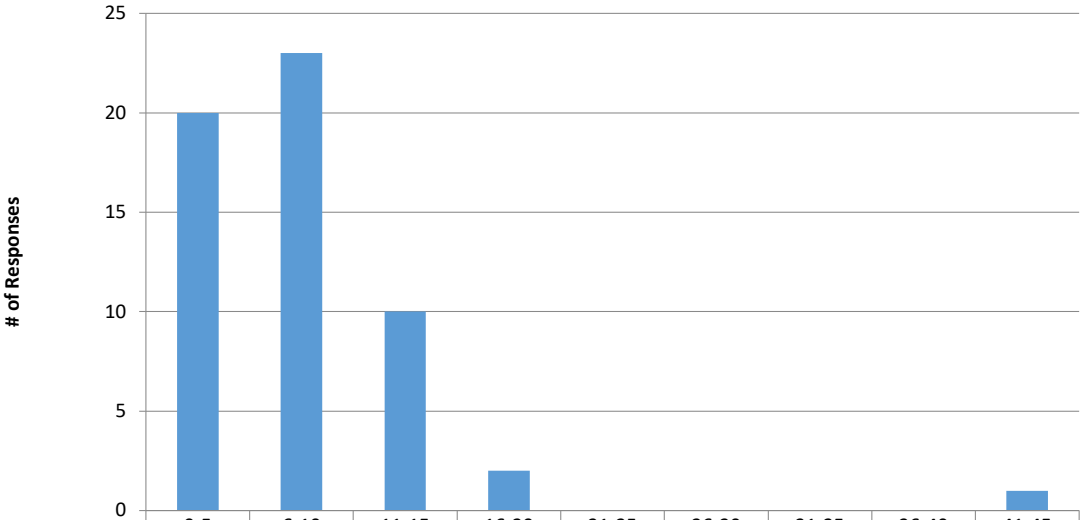
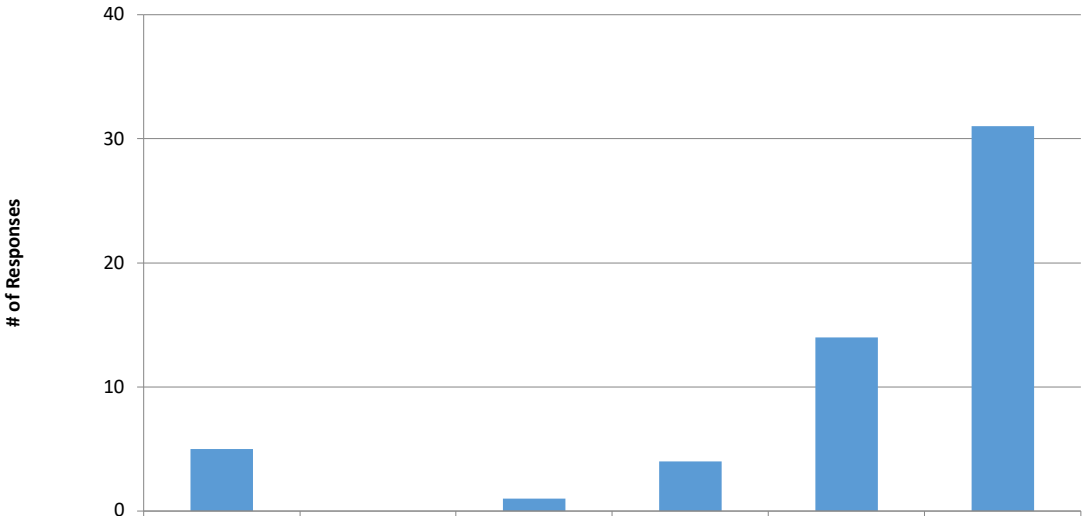
Figures *continued*

Figure 3. *Hours per week of introductory didactics. Hours per week was calculated from the total hours of introductory didactics divided by the number of weeks that first year clinical anesthesiology residents are paired with specific individuals.*



	0-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45
# of Responses	20	23	10	2	0	0	0	0	1
Percentage	36%	41%	18%	4%	0%	0%	0%	0%	2%

Figure 4. *Timing of clinical anesthesiology year 1 commencing call duties. Fifty-five of 56 program directors answered this question.*



	Week 1 (Days 1-7)	Week 2 (Days 8-14)	Week 3 (Days 15-21)	Week 4 (Days 22-28)	Week 5 (Days 29-35)	Week 6+ (Day 36+)
# of Responses	5	0	1	4	14	31
Percentage	9%	0%	2%	7%	25%	56%

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Tables

Table 1. *Program Characteristics and Orientation Practices*

Characteristic	No. of Respondents (% of Total)
Region of the country (n = 56)	
Northeast	17 (30)
Midwest	8 (14)
South	17 (30)
West	11 (20)
Not provided	3 (5)
Duration CA-1 residents paired through orientation (n = 56)	
2 wk	3 (5)
3 wk	6 (11)
4 wk	26 (46)
5 wk	3 (5)
≥6 wk	17 (30)
Not applicable	1 (2)
Individuals paired 1:1 with CA-1 residents (n = 56)[a]	
Another CA-1 resident	10 (18)
Senior resident	39 (70)
Anesthesiologist	42 (75)
Nonphysician provider[b]	7 (13)
Not applicable	1 (2)
Modalities of introductory didactics (n = 56)[a]	
In-person lectures	55 (98)
Online lectures/content	24 (46)
Problem-/Case-based learning	31 (55)
Simulations/Workshops	53 (95)
Other	8 (14)

Abbreviation: CA-1, first year clinical anesthesiology.

[a] Respondents were able to select more than 1 answer to these questions.

[b] Nonphysician providers include certified registered nurse anesthetists and anesthesiologist assistants.

Table 2. *Selected Program Director Comments Regarding Other Modalities of Introductory Didactics*

"Tutorial notebook"
"Operative checklist signed off by supervising resident/faculty of certain skills"
"In operating room, specific topics each day to be covered by the supervising attending"
"Tours of hospital and operating room"
"Embedded videos"
"Study tools specifically for understanding anesthesiologist's thought processes"
"Lectures 3 days per week for 6 weeks to cover foundational topics. Online quizzes that match the book chapters. All [residents] recently had an Intern Orientation month… where they had several basic simulations and a 2-day 'boot camp'"

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Tables *continued*

Table 3. *Representative Comments From Program Directors*

"CA-1 residents should/do not take any call due to patient and resident safety."
"CA-1 residents should begin call as soon as safely possible because it is beneficial to resident education."
"Our categorical interns have an anesthesiology orientation month during the final month or final quarter of the clinical base year."
"Residents take the AKT before and after orientation to illustrate growth and assess areas for improvement."
"An objective assessment (eg, checklist, case logs, OSCE) determines when CA-1 residents can safely be unpaired or begin call."

Abbreviations: CA-1, first year clinical anesthesiology; AKT, Anesthesiology Knowledge Test; OSCE, objective structured clinical examination.

Appendix

Appendix A. Survey Document

Q1: What is the name of your program? (free-text response)

Q2: How many incoming CA-1s do you typically have in your program on a yearly basis? (free-text numeric response)

Q3: For how long are new CA-1s paired with other individuals to orient the CA-1s to the operating room environment?

- One week (1 to 7 days)
- Two weeks (8 to 14 days)
- Three weeks (9 to 21 days)
- Four weeks (22 to 28 days)
- Five weeks (29 to 35 days)
- Six weeks or longer (36 days or more)
- Not applicable – New CA-1s are not paired with specific individuals in the operating room

Q4: Who trains the CA-1s in the operating room during the orientation period?

- 1 to 1 pairing with another CA-1
- 1 to 1 pairing with senior resident (CA-2 or CA-3)
- 1 to 1 pairing with faculty member
- 1 to 1 pairing with non-physician provider (eg, CRNA or AA)
- Other (please comment): _____
- Not applicable – New CA-1s are not paired with specific individuals in the operating room

Q5: Do you provide formal education on teaching to the individuals who are in the operating rooms orienting your new CA-1s?

- Yes
- No
- Not applicable – New CA-1s are not paired with specific individuals in the operating room

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Appendix *continued*

Q6: How many total hours of didactics targeted specifically to introductory anesthesiology do your new CA-1s receive? (ie, distinct from your normally scheduled didactic program for other residents) (free-text numeric response)

Q7: Which of the following items are included in the introductory didactics?

- In-person lectures
- Online lectures/content
- Problem-based/Case-based learning
- Simulation/workshops
- Other (please comment): _____
- Not applicable – New CA-1s do not receive distinct introductory didactics

Q8: If your program has an integrated intern year managed by the anesthesiology program, do you begin anesthesia-related training for your rising CA-1 residents prior to July of their CA-1 year? (For example: anesthesia-related didactics or an introduction to the operating room during intern year)

- Yes
- No
- Not applicable – Anesthesiology program does not manage the intern year

Q9: How soon after the first day of orientation do CA-1 residents begin taking overnight calls?

- First week (day 1 to day 7)
- Second week (day 8 to day 14)
- Third week (day 9 to day 21)
- Fourth week (day 22 to day 28)
- Fifth week (day 29 to day 35)
- Sixth week or later (day 36 or later)

Q10: How do you assess new CA-1 residents prior to starting call responsibilities?

- Written exam
- Clinical exam (ie, objective structured clinical examination [OSCE])
- Other (please comment): _____
- Not applicable - No formal assessment prior to starting CA-1 call responsibilities

Q11: Please indicate your agreement with the following statement:

Providing formal education on teaching to the individuals who orient the new CA-1 residents in the operating room enhances resident education.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

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Appendix *continued*

Q12: Please indicate your agreement with the following statement:

Postponing CA-1 resident call responsibilities until they attain experience or meet specific performance measures enhances resident education.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Q13: Do you have any additional comments? (free-text response)

Abbreviations: AA, anesthesiology assistant; CA-1, first year clinical anesthesiology; CRNA, certified registered nurse anesthetist.