

Anesthesiology Residency Curriculum and Implementation of a Perioperative Surgical Home Curriculum: A Survey Study

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Abstract

Background The perioperative surgical home (PSH) is a physician-led, interdisciplinary, and patient-centered model of perioperative care that focuses on patient outcomes and comprehensive care management. Many studies to date have looked at the clinical implementation of varied PSH models with promising results discussed. There are no studies directly examining concrete plans for the various Accreditation Council for Graduate Medical Education (ACGME) anesthesiology residency programs to implement augmented PSH training into curricula. The aim of this survey study was to better assess current residency training in PSH.

Methods An 18-question survey developed by a team of research personnel familiar with the PSH was sent to all

ACGME accredited anesthesiology training programs in the United States. Responses were quantified, and construct and external validity of the survey tool examined.

Results 41% of the programs responded. 89% (95% CI 78-96%) of programs reported moderate or better understanding of the PSH. 34% (21-47%) had incorporated additional PSH training in the previous three years, and 32% (with no significant correlation to the previous group) had plans to integrate more training in the next 3 years.

Conclusions Overall, the surveyed program directors voiced understanding of the value of the PSH model in patient care but remained hesitant to incorporate training specific to PSH into the anesthesiology residency curricula.

Background

Perioperative medicine (POM) is faced with major challenges in the cost and quality of care as evidenced by high complication and readmission rates as well as financial incentives to perform surgeries¹. Some approaches to address this problem have focused on further expanding the role of anesthesiologists in the perioperative period and focusing on evidence-based standardization of surgical pathways. This is exemplified by models like the perioperative surgical home (PSH)² and enhanced recovery after surgery (ERAS)³. The PSH is a physician-led, interdisciplinary, and patient-centered model of

perioperative care that focuses on patient outcomes and comprehensive care management⁴ and has been a focus of the American Society of Anesthesiologists (ASA) in recent years. This evolving paradigm for surgical care has been shown to reduce costs while minimizing complications associated with the perioperative timeline⁵.

Training in Anesthesiology has traditionally focused most heavily on anesthesiologists' role in the operating room. Leaders in the ASA, American Board of Anesthesiology, and Accreditation Council on Graduate Medical Education (ACGME) have been diligently

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No financial support received from foundations, institutions, pharmaceutical or other private companies.

collaborating with practicing anesthesiologists to further incorporate educational programs in perioperative care^{6,7}.

In 2004, the ACGME proposed changes in the residency curriculum to increase the duration of rotations beyond the operating room, with particular emphasis on improving critical care medicine and pain medicine training⁸.

Currently, the ACGME outlines that the scope of Anesthesiology "encompasses the pre-operative preparation and their perioperative maintenance of normal physiology, as well as the post-operative relief and prevention of pain...

The anesthesiologist is skilled in... the supervision, education, and evaluation of the performance of personnel, both medical and paramedical, involved in peri-operative and peri-procedural care"⁹. These requirements encapsulate the general concept of POM and emphasize the absolute importance of continuity of care in and out of the operating room. However, there remains much opportunity to further implement pragmatic POM training that best positions future trainees for success in evolving care paradigms featuring comprehensive perioperative management¹⁰.

Many studies to date have looked at the clinical implementation of varied PSH models¹¹⁻¹⁴ with promising results discussed. Interestingly, despite much impetus^{7,15}, there are no studies directly examining concrete plans for the various ACGME anesthesiology residency programs to implement augmented PSH training into forthcoming

curricula. The aim of this survey study was to better assess current residency training in PSH, as well as general sentiments regarding these evolving concepts directly from anesthesiology program directors across the United States. Our hypothesis was that there would be high variability amongst current program directors regarding optimal strategies and absolute importance of further education in PSH.

Methods

Protocol Approval

This study was approved by the IRB of University of California, Irvine (HS# 2016-2580).

Development of Survey

The survey utilized for collecting data in this study was developed by a small team of anesthesiologists and research personnel. The 18-question survey titled "A Survey of Anesthesiology Residency Programs Regarding Perioperative Surgical Home and Perioperative Medicine Curriculum" (Supplemental Digital Content 1) encompassed questions directly assessing the current and future plans for residency programs to incorporate PSH training into curricula. The survey had an estimated completion time of 15 minutes. For each survey question (following a brief set of demographics questions), a Likert scale was used to indicate subjective agreement with the statement (strongly agree, agree, neutral, disagree, strongly disagree). The survey was reviewed by practicing anesthesiologists familiar with the PSH and revisions were made based on feedback, however no formal pilot testing was performed. The final survey tool (Appendix 1) was hosted by Qualtrics: Online Survey Software and Insight Platform (Qualtrics, Salt Lake City, UT).

Study Participants and Data Collection

Data collection for this study took place in June and July of 2016. Study subjects were ACGME-accredited anesthesiology program directors (PD). The recruitment script and a link to the online survey tool were distributed to

program directors and program chairs (who were asked to encourage the program director to complete the survey) via their publicly available email addresses. The email included a voluntary request for the PD to complete the survey, as well as a study information sheet that included information about the purpose of the survey and the anticipated time to complete. Participants were provided two weeks to complete the initial survey before a subsequent email was sent requesting completion.

Participants in the survey were asked to identify their program in order to objectively track completion, but this information was stripped by research staff before analysis and program identity remained blinded throughout.

Data Analysis

Responses to the questions were first analyzed using Microsoft Excel via simple quantification for each question that included calculating the number and percentage of respondents selecting each option.

SPSS was used to evaluate two subtypes of construct validity (discriminant validity and convergent validity) and external validity. The PSH survey questions and demographic characteristics were correlated using the Spearman rank correlation (ρ) to determine statistical significance at $p < 0.01$. Point estimates (percentages) are reported as “% (95% confidence interval)”, with CI’s calculated by the Clopper-Pearson method.

With a maximum recruitment of 132 ACGME member programs and a targeted completion rate of 30%, we hoped to receive 40 completed surveys by participants of the study, which would give us an approximate $\pm 14\%$ 95-percent confidence interval for point estimates of the full population. Statistical analysis was done using Microsoft Excel (Microsoft, Redmond, WA) and SPSS version 11.0 (SPSS Inc., Chicago, IL). Clopper-Pearson confidence intervals were calculated with R (R-project, <https://www.r-project.org/>).

Results

264 survey requests were sent via direct email to anesthesiology program directors and department chairs. Of the 132 anesthesiology programs solicited, 72 (55%) completed the survey, including 17 responses that were not from program directors which were discarded to avoid possible duplication from the same program. Ultimately, 55 total responses (representing 41% of the programs) that were completed by anesthesiology residency program directors were statistically analyzed in this study. Program demographics from respondents are shown in Table 1.

Primary Outcome: Incorporation of Perioperative Medicine Training into Anesthesiology Residency Programs

Self-reported understanding of the PSH model is shown in Table 2. Of respondents, 89% (CI 78-96%) reported extremely good or moderate understanding of the PSH (41.5% “extremely familiar” and 47.3% “moderately familiar”), with 9.1% reporting they are “somewhat familiar,” 1.8% are “slightly familiar,” and 0.0% are “not at all familiar.” 34% (CI 21-47%) of programs had incorporated additional PSH training in the previous three years, and 32% (CI 20-46%) of programs currently have plans to add such training in the next five years. There was no correlation between understanding of PSH and the prior addition of POM training in the previous 3 years ($p = 0.69$) or planned addition for the next five years ($p = 0.48$).

Additional Survey Responses

Degree of agreement and disagreement regarding integration of the PSH model into the residency curriculum is summarized in Table 2. More than half of respondents agreed (56%, CI 42-70%) that implementation of additional training specific to perioperative care would be valuable for future trainees, 27.3% “neither agree nor disagree,” and only 7% “disagree” or 9.1% “strongly disagree.” Also, the majority of respondents (65%) agreed that additional competencies in perioperative medicine can be adequately incorporated without an expansion in residency length, with 24% “neither agree nor disagree,” and only 10% expressing

disagreement. Agreement that residents would support additional training in perioperative medicine was more evenly spread, with 40% expressing agreement, 38% neutral, and 22% disagreeing. More than 84% of respondents were neutral or negative on the idea of expanding the length of anesthesiology residency to incorporate more perioperative medicine training. There was a negative correlation between program directors who have held the position for a longer period of time and belief that their residents would support additional training in perioperative care ($\rho = -0.345$, $p = 0.001$; 99% CI).

Construct Validity

In terms of convergent validity, there was a positive correlation between a stronger belief that anesthesiologists should explore more combined residencies such as anesthesiology/ IM or anesthesiology/ pediatrics and support of additional PSH training ($\rho = 0.643$, $p < 0.001$), belief that their residents will be supportive of implementing additional PSH training ($\rho = 0.428$, $p = 0.001$), and belief that anesthesiology residency will benefit from expansion to a 1+4 year structure ($\rho = 0.358$, $p = 0.007$). In terms of discriminant validity, there was no correlation between belief that implementing additional training specific to perioperative care during PGY 1-4 years may compromise intraoperative training, and belief that anesthesiology should explore more combined residencies ($p = 0.152$); neither was there a correlation between the prior statement and the belief that more PSH training would be beneficial ($p = 0.73$). There was no correlation between the belief that the current curriculum is adequate and opinions of how residents would feel about additional PSH training ($p = 0.68$).

External Validity

Several demographic or practice-related characteristics were correlated with responses regarding the implementation of PSH training in anesthesiology residency programs. Smaller programs were positively correlated with the belief that implementing additional training specific to perioperative care in the residency program is valuable for future trainees

($\rho = -0.282$, $p = 0.048$), but this statistical significance is weak given the multiple comparisons being made. The only demographic feature we found more strongly statistically correlated with a specific finding was that larger programs and university programs were associated with the belief that additional training in perioperative care during the PGY 1-4 years of anesthesiology residency may compromise intraoperative training ($\rho = 0.309$, $p = 0.029$). Obviously, there may be other demographic features of programs not accounted for in our survey that may limit external validity.

Discussion

This study surveyed anesthesiology residency program directors' views on strategies to further implement training in competencies specific to perioperative care throughout residency curricula. The majority of respondents reported a fair or good understanding of the PSH. More than half of program directors believed that implementing additional training specific to perioperative care in residency programs is valuable for future trainees. However, only 14.5% of program directors agreed or strongly agreed that expansion of the residency length to a 1 + 4 structure for the purposes of perioperative medicine training was appropriate. Nearly a third of respondents believed that implementing additional training specific to perioperative care may compromise intraoperative training during the PGY 1-4 years. Only about a third of residency programs surveyed have had curricula changes in the past 3 years to include additional PSH training, and only a third of program directors have planned curriculum changes over the next five years to include additional PSH training.

The current healthcare landscape is dynamically evolving in efforts to improve patient satisfaction while mitigating cost escalation and patient morbidity¹⁶. Longitudinal clinical dispositions such as return to baseline function and quality of life are anticipated to play an integral role in forthcoming care paradigms¹⁷. Within this context, a broadened perspective regarding the scope of future anesthesiology practice is increasingly being endorsed. This is exemplified by Grocott and Pearse,¹⁸ as they outline,

“perioperative medicine is the future of anaesthesia, if our specialty is to thrive.” ‘Perioperative medicine’ is succinctly defined by Grocott and Mythen as “the practice of patient-centered, multidisciplinary, and integrated medical care of patients from the moment of contemplation of surgery until full recovery.”¹⁹

With the insight of the importance of propagating educational foundations in PSH (and more broadly in POM) in parallel with expanding our practice, there are specific competencies that are anticipated to be requisite for future success. Some of our own work at UC Irvine described the tangible implementation of a comprehensive curriculum specifically designed to augment competencies in PSH², but numerous manuscripts are highlighting the importance of investing in research and education in POM in general^{7, 10, 20-23}. With the goal of transforming perioperative education in a manner that accentuates both patient satisfaction and safety, King et al keenly voice, “if the specialty wants to embrace perioperative care of surgical patients, anesthesiology resident training needs expansion past its traditional core rotations into the perioperative arena.”²⁰

Overall, the surveyed program directors voiced understanding of the value of the PSH model in patient care but remained hesitant to incorporate training specific to PSH into the anesthesiology residency curricula. Interestingly, larger programs had program directors who had been in their position for a longer amount of time, and they were positively correlated with the belief that implementing additional training in PSH may compromise intraoperative training. A little over a third of respondents thought that future PSH curriculum changes should be initiated by a combined effort of specific ACGME residency programs, the Residency Review Committee of the ACGME, American Society of Anesthesiologists (ASA), and the American Board of Anesthesiology (ABA). The second largest amount of votes went to the Residency Review Committee of the ACGME as the most appropriate group to initiate future PSH changes.

While the survey queried perceived understanding of PSH, it did not objectively measure understanding. The

majority of anesthesiology residency program directors perceive value in the PSH model. However, it is not surprising that many program directors were hesitant to actually implement additional training competencies of PSH into the residency curriculum because the logistics and specific training objectives for PSH remain unclear at the moment.

Study Limitations:

This study presents some limitations. First, the response rate for the survey was low (41%) and some of the responses had to be dropped because they did not come from the PD. A comprehensive search was conducted online to find the email addresses of anesthesiology residency program directors and department chairs, but the ultimate accuracy of the collected addresses was uncertain. Another limitation is the potential for bias in the response population, which may have given a skewed representation of the demographics of ACGME accredited anesthesiology residency program directors. To extrapolate these results to the entire population of anesthesiology residency directors in the United States, the results would need to be corrected for differences between the sample population and the whole target population on the variables presented above.

Conclusion

In this study, we found that program directors amongst ACGME accredited anesthesiology residencies perceive value in further incorporating POM into future clinical practice paradigms. However, many respondents remain less enthusiastic about implementing training objectives specific to POM into curricula. This finding may be explained by a paucity of literature and guidance on how to initiate this process within the confines of current training requirements. This study illustrates that the majority of current program directors endeavor to incorporate additional education in POM in training curricula; however, further consensus and leadership is needed to help guide future educational efforts.

Table 1: Characteristics of Survey Respondents

Characteristics	Respondents* % (n)
Region	
West	13 (7)
Midwest	22 (12)
East	55 (30)
South	9.1 (5)
Program Size	
Small (1-10 residents/yr)	30 (15)
Medium (11-20 residents/yr)	46 (23)
Large (>20 residents/yr)	24 (12)
Length of Time as Program Director	
0-1 year	24 (13)
2-5 years	26 (14)
5-10 years	22 (12)
10-15 years	18 (10)
>15 years	9.1 (5)
Practice Setting	
University-affiliated	82 (41)
Community-based university affiliated	18 (9)
Program offers integrated medicine curriculum	
Yes	20 (7)
No	80 (28)
Offers additional training/ education experiences beyond accredited length	
Yes	34.3 (12)
No	65.7 (23)

*Percentages are reported per responses received for that item. Counts may not add to 55 in the event of incomplete responses.

Table 2: Degree of Agreement/ Disagreement Among US Anesthesiologists Survey Respondents
Regarding Integration of PSH model into Residency Curriculum

	Extremely Familiar, % (n)	Moderately Familiar, % (n)	Somewhat Familiar, % (n)	Slightly familiar, % (n)	Not at all familiar% (n)
Extent of familiarity with the concept of ASA Perioperative Surgical Home (PSH)	42 (23)	47 (26)	9.1 (5)	1.8 (1)	0.0 (0)
			Neither		
	Strongly Agree, % (n)	Agree, % (n)	Agree nor Disagree, % (n)	Disagree, % (n)	Strongly Disagree, % (n)
Current curriculum is adequate to prepare residents to practice within a PSH upon graduation.	5.5 (3)	40 (22)	31 (17)	24 (13)	0 (0)

Implementing additional training specific to perioperative care in the residency program is valuable for future trainees.	18 (10)	38 (21)	27 (15)	7.3 (4)	9.1 (5)
Residents in the program would support additional training specific to perioperative care.	9.1 (5)	31 (17)	38 (21)	11 (6)	11 (6)
Implementing additional training specific to perioperative care during the PGY 1-4 years of anesthesiology residency may compromise intraoperative training.	7.3 (4)	26 (14)	31 (17)	27 (15)	9.1 (5)
Anesthesia would benefit from expanding the residency length to a 1 + 4 structure for purposes	1.8 (1)	13 (7)	22 (12)	31 (17)	33 (18)

of perioperative medicine training.					
Additional competencies in perioperative medicine can be adequately incorporated without an expansion in residency length.	18 (10)	47 (26)	24 (13)	5.5 (3)	5.5 (3)
Anesthesiologists should explore mandating fellowship training (ACGME and non-ACGME).	1.8 (1)	18 (10)	9.1 (5)	27 (15)	44 (24)
Anesthesiologists should explore more combined residencies (ex. IM/anesthesiology, peds/anesthesiology)	1.8 (1)	22 (12)	22 (12)	22 (12)	33 (18)
	Very Adequate, % (n)	More than Adequate, % (n)	Adequate, % (n)	Somewhat Inadequate, % (n)	Inadequate, % (n)

Adequacy of the current 1+3 year structure for residency programs for incorporation of PSH curriculum	13 (7)	9.1 (5)	42 (23)	26 (14)	11 (6)
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*Percentages are reported per responses received for that item. Counts may not add to 55 in the event of incomplete responses.

	Yes, % (n)	No, % (n)
Residency program has had curriculum changes in the past 3 years to include additional PSH training	34 (19)	66 (36)
Residency program has planned curriculum changes for the next 5 years to include additional PSH training	33 (18)	67 (37)

*Percentages are reported per responses received for that item. Counts may not add to 55 in the event of incomplete responses.

Table 5:

Specific ACGME Residency programs, % (n)	Residency Review Committee of the ACGME,	American Society of Anesthes- iologists (ASA),	American Board of Anesthes- iology (ABA),	Combined effort, % (n)	No need for this, % (n)
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		% (n)	% (n)	% (n)		
What group	9.1 (5)	24 (13)	3.6 (2)	11 (6)	36 (20)	16 (9)
should						
initiate						
should						
future PSH						
curriculum						
changes?						

*Percentages are reported per responses received for that item. Counts may not add to 55 in the event of incomplete responses.

Table 6:

Lack of experience of faculty, % (n)	Lack of resident motivation, % (n)	Lack of funding , % (n)	Lack of department support, % (n)	Lack of direction to include such addition al training, % (n)	Lack of time while meeting other educational competencies, % (n)	No barrier , % (n)
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Most	16 (9)	3.6 (2)	20 (11)	11 (6)	15 (8)	20 (11)	15 (8)
encountere							
d barriers if							
the							
decision is							
made to							
implement							
additional							
PSH							
training							

*Percentages are reported per responses received for that item. Counts may not add to 55 in the event of incomplete responses.

1) Are you currently the Program Director for an Accreditation Council for Graduate Medical Education (ACGME) anesthesiology residency program?

Yes

No

2) Which of the below choices most accurately depicts how many cumulative years you have been Program Director for an ACGME accredited anesthesiology residency?

a) 0-1 year

b) 2-5 years

c) 5-10 years

d) 10-15 years

e) > 15 years

3) On average, over the past 5 years, how many residents graduated per year from your residency program?

a) 1-5

b) 6-10

c) 11-15

d) 16-20

e) > 20

4) Which of the below descriptors most accurately depicts your familiarity with the concept of the ASA Perioperative Surgical Home (PSH)?

Not at all familiar

Slightly Familiar

Somewhat Familiar

Moderately Familiar

Extremely Familiar

5) The current curriculum at your program enlists competencies specific to both immediate and extended perioperative care in a manner that is adequate for preparing residents to practice within a perioperative surgical home model upon graduation.

Strongly Disagree

Disagree

Neither Agree nor Disagree

Agree

Strongly Agree

6) Implementing *additional* training in competencies specific to perioperative care during residency training is of value for future trainees that graduate from your program.

Strongly Disagree

Disagree

Neither Agree nor Disagree

Agree

Strongly Agree

7) Residents at your program would likely support *additional* training in competencies specific to perioperative care.

Strongly Disagree

Disagree

Neither Agree nor Disagree

Agree

Strongly Agree

8) Implementing *additional* training in competencies specific to perioperative care during the PGY1-4 years of anesthesiology residency may compromise intraoperative training.

Strongly Disagree

Disagree

Neither Agree nor Disagree

Agree

Strongly Agree

9) How adequate do you think the current 1 + 3 year structure for residency programs is for incorporation of competencies specific to perioperative medicine?

Inadequate

Somewhat Inadequate

Adequate

Moderately Adequate

Very Adequate

10) The field of anesthesia would benefit from an expansion in residency length to a 1+ 4 year structure (for purposes of perioperative medicine training).

Strongly Disagree

Disagree

Neither Agree nor Disagree

Agree

Strongly Agree

11) Additional competencies in perioperative medicine can be adequately incorporated without an expansion in residency length.

Strongly Disagree

Disagree

Neither Agree nor Disagree

Agree

Strongly Agree

12) Anesthesiologists, in general, should explore mandating fellowship training (includes any ACGME and non-ACGME fellowships offered at this time in the US for anesthesiologists).

Strongly Disagree

Disagree

Neither Agree nor Disagree

Agree

Strongly Agree

13) Anesthesiologists, in general, should explore more combined residencies (example internal medicine/anesthesiology, anesthesiology/pediatrics)

Strongly Disagree

Disagree

Neither Agree nor Disagree

Agree

Strongly Agree

14) In your opinion, from what group should future, if any, perioperative medicine curriculum changes for ACGME anesthesiology residencies be initiated?

Specific ACGME residency programs

The Residency Review Committee (RRC) of the ACGME

The American Society of Anesthesiologists (ASA)

American Board of Anesthesiology (ABA)

Combined effort from aforementioned groups

No need for this

15) Has your residency program made curriculum changes in the past 3 years to include additional training in perioperative care?

Yes

No

16) Does your residency program have curriculum changes planned for next 5 years to further include training in perioperative medicine?

Yes

No

17) Which barrier would you anticipate encountering most if decision is made to implement additional perioperative medicine training (please select one)

- a) Lack of experienced faculty
- b) Lack of resident motivation
- c) Lack of funding
- d) Lack of department support
- e) Lack of direction to include such additional training
- f) Lack of time while meeting other educational competencies
- g) No Barrier

18) If you have any thoughts or comments, please include them in the space provided.

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