

Financial Implications of Different Interpretations of ACGME Anesthesiology Program Requirements for Rotations in the Operating Room

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Abstract

Background The Accreditation Council for Graduate Medical Education (ACGME) standards for resident education in anesthesiology mandate required rotations including rotations inside the operating room (OR). When residents complete rotations outside the OR, other providers must be used to maintain the OR's clinical productivity.

Objective We quantified and compared the costs of replacing residents by using two different working patterns that are compliant with the ACGME anesthesiology program requirements: (1) the minimum amount of time in the OR, and (2) working the maximum amount of time permitted in the OR.

Methods We calculated resident replacement costs over a 36-month residency period in both a minimum and maximum OR time model. We used a range of Certified

Registered Nurse Anesthetist (CRNA) pay scales determined by a local market analysis for cost comparisons.

Results Depending on CRNA pay rates, the cost differentials to replace a resident in the OR between the minimum and maximum OR time models ranged from \$236,000 to \$581,876, assuming a 50-hour resident work week, and \$373,400 to \$931,001, assuming an 80-hour resident work week. This cost was per resident over the entire 3 years of their residency.

Conclusions Varying the amount of time residents work in the OR (as allowed under ACGME program requirements) has significant financial implications over a 36-month anesthesiology residency. The larger the residency, the more significant will be the impact on the department and sponsoring institution.

Introduction

Accreditation Council for Graduate Medical Education (ACGME) standards are designed with the best interests of residents and their future patients in mind. The standards also can have significant effects on departmental and hospital finances. While there are many strict standards in the Program Requirements for Residency Education in Anesthesiology, interpretation of portions of the requirements is left to the individual program. Anesthesiology program requirements allow program directors discretion in interpreting how much time residents spend in the operating room (OR). Because OR staffing is a major

responsibility of anesthesiology departments and outside rotations are not typically a departmental obligation, the amount of time residents work in the OR can have significant financial implications for that department.

When residents work in the OR, they provide direct 1:1 care to patients under the supervision of a faculty anesthesiologist. This allows residents to learn the medical and technical aspects of anesthesia care under supervision. In most departments, if a resident is not providing care in the OR, other anesthesia providers, such as certified registered nurse anesthetists (CRNAs) and anesthesiologist assistants (AAs), must provide care under the direction of an anesthesiologist to maintain the clinical obligations of the department.

Other studies have reported the costs of replacing residents in the OR,^{1,2} but to date, no study has examined the financial impact of different amounts of resident training in the OR permitted under the program requirements and the costs of subsidizing resident time spent in rotations away from the OR. We aimed to quantify how these different interpretations affect the finances of an anesthesiology department if residents spend the minimum

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TABLE 1
MINIMUM OR TIME MODEL, 36-MONTH
ROTATION SCHEDULE

Months	Rotation
In OR required by ACGME guidelines	
1	Introduction/General Anesthesia
2	Pediatric Anesthesia
2	OB Anesthesia
2	Cardiothoracic Anesthesia
2	Neuroanesthesia
Outside OR required by ACGME guidelines	
2	Critical Care Medicine
1	Chronic Pain
1	Acute Pain
1	Preoperative Evaluation
1	Regional Anesthesia
0.5	PACU
Example of program specific out of OR rotations	
6	Research
4	Critical Care Medicine
3	Chronic Pain
1	Trans Esophageal Echocardiography
1	Bloodbanking
1	Physical Medicine and Rehabilitation
1	Neurology
1	Psychiatry
1	Nutrition
1	Infectious Disease
0.5	PACU
36	Total months

Abbreviations: OB, obstetrics-gynecology; PACU, postanesthesia care unit.

versus maximum time allowed by the ACGME to provide hands-on care in the OR setting.

Methods

During a 36-month anesthesiology residency, the ACGME mandates a number of required rotations in which all residents must participate.³ This mandate includes rotations inside or outside of the OR. We interpreted the guidelines in 2 ways to determine a minimum and maximum amount of resident OR training.

TABLE 2
MAXIMUM OR TIME MODEL, 36-MONTH
ROTATION SCHEDULE

Months	Rotation
In OR required by ACGME guidelines	
1	Introduction/General Anesthesia
2	Pediatric Anesthesia
2	OB Anesthesia
2	Cardiothoracic Anesthesia
2	Neuroanesthesia
1	Regional Anesthesia
Outside OR required by ACGME guidelines	
2	Critical Care Medicine
1	Chronic Pain
1	Acute Pain
1	Preoperative Evaluation
0.5	PACU
Example of program specific in OR rotations	
6.5	Advanced General Anesthesia
3	Advanced Pediatric Anesthesia
3	Advanced Cardiothoracic Anesthesia
3	Advanced Neuroanesthesia
3	Advanced OB Anesthesia
2	Advanced Regional Anesthesia
36	Total months

Abbreviations: As in TABLE 1.

For the minimum OR time model (TABLE 1), we counted only the ACGME-required months in the OR. We assumed that the time spent training in the OR accomplished all ACGME case requirements for completing the anesthesiology residency and that the remaining time would be spent in clinical settings other than the OR. This model left 27 months of time during residency out of the OR to be covered by the CRNA pool.

For the maximum OR time model (TABLE 2), we subtracted the months that the ACGME specifies must be spent out of the OR and subtracted them from 36 months. This left 30.5 months of OR training time and only 5.5 months of out of the OR time to be covered by the CRNA pool.

In calculating the amount of time worked for each resident per year in both models, we accounted for 3 weeks of vacation time and 1 week of allotted scientific meeting

TABLE 3 CRNA PAY SCALES UTILIZED

CRNA Pay Type	CRNA Rate
New	\$55
Experienced	\$80
Locum Tenens	\$135.32

Abbreviation: CRNA, certified registered nurse anesthetist; Locum Tenens, temporary employee.

time, resulting in a 48-week year. With this method, each rotation equals 4 full work weeks counted as 1 month for our calculations. The total time worked during each rotation was calculated for 2 different scenarios. One scenario involved a 50-hour work week (assuming residents worked 10 hours per day for 5 days a week); the second scenario used the maximum duty hours (80 hours per week) allowed by the ACGME.

Our study was deemed exempt by our institution's Institutional Review Board.

To determine the pay scale for alternate hands on providers, we used local CRNA pay scales derived from market analysis conducted by Mercer and Towers Watson (TABLE 3). A 2010 study performed by the Rand Corporation showed a national average CRNA hourly wage of \$76.08 that is consistent with the Mercer and Towers Watson market analysis.⁴ These figures should be representative of AA salaries as well, given their similarity to those of CRNAs nationally.⁵ From this information, we determined 3 pay levels: new graduate, experienced CRNA, and locum tenens CRNA. In addition to the hourly

replacement rates, we calculated the rates when fringe benefits were included. Finally, because CRNAs are paid at an overtime rate when they work more than 40 hours in a week, we determined the costs when overtime would be required for staffing at the institution.

Calculations for the cost of replacing 1 resident's OR time over the course of 1 month were made using the CRNA pay scales, taking into account both a 50-h/wk schedule and an 80-h/wk schedule. Compensation for overtime was calculated by multiplying the CRNA rate $\times 1.5$ for every hour greater than 40/wk, while costs for benefits were calculated with our institutions own fringe benefit rate of 26% per full time equivalent (FTE). Our equations used were as follows:

- Standard pay scale: CRNA rate \times h/wk \times 4 wks
- Standard pay plus benefits: [(CRNA rate \times h/wk) + (CRNA rate \times 0.26 \times 40 h/wk)] \times 4 wks
- Standard pay plus overtime: [(CRNA rate \times 40 h/wk) + (CRNA rate \times 1.5 \times h $>$ 40/wk)] \times 4 wks
- Standard pay plus benefits and overtime: (CRNA rate \times 40 h/wk) + (CRNA rate \times 0.26 \times 40 h/wk) + (CRNA rate \times 1.5 \times h $>$ 40/wk) \times 4 wks

To determine the costs of replacing a resident's OR time over a 36-month residency, we multiplied the results of these equations by the number of months replaced. Twenty-seven months were entered for the minimum resident OR time model and 5.5 months were entered for the maximum resident OR time model.

Results

Depending on CRNA pay rates, the cost differentials to replace a resident in the OR between the minimum and

TABLE 4 COST TO REPLACE A RESIDENT WHEN OUT OF THE OR OVER A 36-MONTH RESIDENCY AT 50 HOURS PER WEEK

CRNA Pay Type	Minimum Resident OR Time (9 Months)	Maximum Resident OR Time (30.5 Months)	Difference
New	\$297,000	\$60,500	\$236,500
Experienced	\$432,000	\$88,000	\$344,000
Locum Tenens	\$730,728	\$148,852	\$581,876
New + Benefits	\$358,776	\$73,084	\$285,692
Experienced + Benefits	\$521,856	\$106,304	\$415,552
New + OT (>40 h/wk)	\$326,700	\$66,550	\$260,150
Experienced + OT (>40 h/wk)	\$475,200	\$96,800	\$378,400
New + Benefits + OT (>40 h/wk)	\$388,476	\$79,134	\$309,342
Experienced + Benefits + OT (>40 h/wk)	\$565,056	\$115,104	\$449,952

Abbreviations: CRNA, certified registered nurse anesthetist; Locum Tenens, temporary employee; OT, overtime.

TABLE 5 COST TO REPLACE A RESIDENT WHEN OUT OF THE OR OVER A 36-MONTH RESIDENCY AT 80 HOURS PER WEEK

Certified Registered Nurse Anesthetists Pay Type	Minimum Resident OR Time (9 Months)	Maximum Resident OR Time (30.5 Months)	Difference
New	\$475,200	\$96,800	\$378,400
Experienced	\$691,200	\$140,800	\$550,400
Locum Tenens	\$1,169,165	\$238,163	\$931,002
New + Benefits	\$536,976	\$109,384	\$427,592
Experienced + Benefits	\$781,056	\$159,104	\$621,952
New + OT (>40 h/wk)	\$594,000	\$121,000	\$473,000
Experienced + OT (>40 h/wk)	\$864,000	\$176,000	\$688,000
New + Benefits + OT (>40 h/wk)	\$655,776	\$133,584	\$522,192
Experienced + Benefits + OT (>40 h/wk)	\$953,856	\$194,304	\$759,552

Abbreviations are as in TABLE 4.

maximum OR time models ranged from \$236,000 to \$581,876, assuming a 50-hour resident work week, and \$373,400 to \$931,001, assuming an 80-hour resident work week. This cost was per resident over the entire 3 years of their residency. Differential costs between the 2 models and pay scales are depicted in TABLES 4 and 5.

Discussion

Our study shows the variable expenditures that can be incurred within existing ACGME anesthesiology requirements. Studies in other specialties have highlighted the value of resident physicians to academic institutions. Research analyzing the costs of replacing residents with alternate providers due to Institute of Medicine suggestions for decreased duty hours showed a national annual cost of \$1.6 billion.⁶ This illustrates how dramatically policy could affect health care expenditure.

While the potential costs to anesthesiology departments from varying the amount of OR training for anesthesiology residents can be significant, education of the future leaders in the field is of utmost priority. Broad medical training is a defining feature of anesthesiologists as providers of perioperative care. This scope of practice should be preserved despite the costs associated with training outside of the OR. Other specialties will have similar decisions to make regarding service versus education and cannot rely on ACGME requirements to protect all educational missions of a residency program.

Our analysis has several limitations. The only cost we assessed is replacement of residents with other hands-on anesthesia providers in the operating room. In some departments the cost incurred by replacing a resident with

a CRNA or AA in the OR might be offset by the shift of resident work to locations such as the intensive care unit and pain service. Our analysis involves some of the most costly physician extenders available, CRNAs and AAs, whose salaries range from \$90,536 to \$154,168.⁷ We also calculated replacement costs on a “months-replaced” basis. In contrast, residents represent a fixed cost that is paid regardless of whether the resident is providing OR staffing or working elsewhere in the hospital. The national average annual reimbursement for resident staff in 2011–2012 was \$64,706.14, including stipend and benefits.⁸ Additionally, staffing, billing methods, and payment from insurance companies may differ for other institutions based on departmental practices in each of these models. Finally, we performed this analysis to illustrate the differences that could occur under the current program requirements. We do not assume that the minimum model is representative of current national anesthesiology residency practice, that it would ensure compliance with required resident case numbers, or that it would pass a review by the Residency Review Committee for Anesthesiology.

Conclusion

Our findings show that an extreme interpretation of ACGME resident OR time requirements would have a considerable financial impact on the department and sponsoring institution. More subtle interpretations could still significantly affect an anesthesiology department's bottom line. Future study may help define high value areas of instruction that provide the most beneficial tools for future anesthesiologists.

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