

Cost of Education and Earning Potential for Non-Physician Anesthesia Providers

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Potential non-physician anesthesia students gauge many different aspects of a graduate program prior to applying, but cost of education and earning potential are typically high priorities for students. Our analysis evaluated the cost of tuition for all certified registered nurse anesthetist (CRNA) and anesthesiologist assistant (AA) programs in the United States, as well as earning potential for both professions. We collected educational cost data from school websites and salary data from the Medical Group Management Association's Physician Compensation and Production Survey: 2012 Report in order to compare the two groups. We found that the median cost of public CRNA programs is \$40,195 and the median cost of private programs

is \$60,941, with an overall median of \$51,720. Mean compensation for CRNAs in 2011 was \$156,642. The median cost of public AA programs is \$68,210 compared with \$77,155 for private AA education, and an overall median cost of \$76,037. Average compensation for AAs in 2011 was \$123,328. Considering these factors, nurse anesthesia school is a better choice for candidates who already possess a nursing license; however, for those prospective students who are not nurses, AA school may be a more economical choice, depending on the type and location of practice desired.

Keywords: Anesthesiologist assistant, cost of anesthesia education, debt, nurse anesthetist, salary.

In the United States, there are two distinct pathways to obtaining a non-physician-based advanced degree in anesthesia. Certified registered nurse anesthetists (CRNAs) are advanced practice nurses who have earned a bachelor's degree—commonly in nursing—practiced at least 1 year as an acute care nurse, and have successfully completed a graduate-level nurse anesthesia program.¹ Anesthesiologist assistants (AAs) earn a bachelor's degree in any field and then complete a graduate-level anesthesia training program.²

Each type of anesthesia professional goes through a different pathway to obtain their credentials. Both types of students earn a degree in a fee-for-service educational system; this can be extremely expensive and often requires students to obtain loans in order to cover the cost of tuition and fees. In addition to the costs of tuition and fees, both AA and CRNA students are so immersed in the training that there is no time for work outside of the educational setting. This leads to the need for loans to cover living expenses as well as tuition. The cumulative effect of school debt can deter people from pursuing advanced degrees in uncertain economic times, unless the earning potential is substantial enough to overcome the debt load. Consequently, there is utility to quantifying the debt load and earning potential one can expect following completion of either AA or CRNA training.

History

Currently, there are approximately 30,000 practicing CRNAs and 1,023 AAs in the United States.³ CRNAs have been administering anesthesia since its inception in the late 1800s. The first nurse anesthesia training program began in 1909, whereas the first AA school opened in 1969—ostensibly in response to a shortage of nurse anesthetists. In general terms, the two professions have similar length of training and preparation for practice, and have previously been compared to each other.⁴ However, there are four main areas of difference between CRNAs and AAs: curriculum prerequisites, scope of practice, governing entities, and practice jurisdictions.

Curriculum prerequisites

Although nurse anesthesia programs do not all stipulate a bachelor's in nursing, there is a requirement that the candidate be a registered nurse with at least 1 year of acute care experience. It is possible for an applicant to have a bachelor's degree in a related field, but in order for them to practice as a nurse, they must have at least an associate's degree in nursing. AA programs do not specify required undergraduate majors; however, certain prerequisite science, math, and English undergraduate classes are required for admission.

Scope of practice

In terms of guidelines from their respective licensing

bodies, the scope of practice of both professions is similar; however, significant differences exist between supervision requirements. AAs must always work under the supervision of an anesthesiologist, whereas CRNAs are not required to be under physician direction. However, although not required by professional scope of practice, in most states there is at least some form of legislative or billing requirement that stipulates supervision of a physician. The physician could be an anesthesiologist or a surgeon, and CRNAs are also permitted to work under the direction of certain other healthcare providers, such as dentists or podiatrists. Despite the use of the term *supervision*, it has been well established legally that when supervised by a non-anesthesia-trained physician, the CRNA is responsible for anesthetic-related negligence.⁵ In addition, 17 states have chosen to “opt out” of a federal rule that stipulates physician supervision and allows independent practice of CRNAs.⁶

Governing entities

As advanced practice nurses, CRNAs fall under the jurisdiction of the Nursing Boards of the state of practice, whereas AAs are regulated by the Board of Medicine. Consequently, practice boundaries are defined by the respective nurse or physician practice acts of each individual state.

Practice jurisdiction

CRNAs can practice in any state in the US, though with slightly varying supervision requirements as indicated above. AAs face a much different employment market, with only 18 states currently permitting them to practice, and all requiring a supervising anesthesiologist.⁴

Review of the Literature

Surprisingly little research surrounding the cost of non-physician-based anesthesia education has been performed. Multiple healthcare, scientific, education, and other relevant resources were searched, including EBSCOhost, MEDLINE, CINAHL, PsycINFO, SPORTDiscus, ERIC, Academic and Business Search Complete, Google, and Google Scholar. Searches were conducted using keywords, phrases, and database-specific subject headings. Search words related to the topic of nurse anesthetists, anesthesiology assistants, and education costs were used, including variants of the terms: *anesthetist*, *anaesthetist*, or *analgesia*; *nurse* or *assistant*; *education*, *training*, *school*, or *student*; and *cost*, *debt*, or *expense*. Currently, the authors are unaware of any comparisons between cost of education and earning potential of CRNAs and AAs. Due to the limited research available, no search topics were excluded for this report.

Although there are no data comparing CRNAs and AAs, researchers have examined the total cost of educating CRNAs and physician anesthesiologists and concluded that the cost of anesthesia residency is substantially higher than nurse anesthetist training.¹ However,

although CRNAs are less costly to train, earning potential for anesthesiologists was shown to be substantially higher than for nurse anesthetists. The total estimated cost (in 2008 dollars) for CRNA education was \$161,809 vs physician anesthesiologists at \$1,083,795. These costs include direct and opportunity costs as well as the offset of estimated student/resident productivity. Undergraduate degree cost was included in this study, but was identical for both types of anesthesia providers. Importantly, it was also shown that anesthesia care was equally safe and effective for both CRNAs and physician anesthesiologists. The study was funded by the American Association of Nurse Anesthetists, but carried out by an independent research group.

More recently, analysis of the anesthesia labor market has demonstrated a continually increasing demand for all types of anesthesia providers over the past 10 years.³ This report also showed a steady increase of CRNAs and AAs graduating into the workforce over the same time period. In the early 2000s, there was a severe national shortage of both AAs and CRNAs. According to the authors, this was due to a low number of AAs entering the market, and retirement exceeding graduation of new CRNAs. By 2010, there were few regional shortages of CRNAs and a moderate national shortage of AAs (both AA and CRNA schools had substantial increases in enrollment during this time). Continuing this trend, a possible surplus of CRNAs was projected by the year 2020, which is likely to result in a drop in CRNA supply due to decreased interest in pursuing advanced practice degrees as fewer positions become available. The authors also suggest that CRNA training programs should limit their output of graduates until more definitive economic trends and healthcare reform data are available.

In a different approach, current and future demand for CRNAs was assessed by comparing the ratio of CRNAs to surgeries, rather than the number of vacant CRNA positions.⁷ The research identified an increased number of CRNAs entering the workforce, probably as a result of increased capacity in nurse anesthesia schools in response to the prior shortage. However, the authors suggested that the increasing supply of CRNAs would not outpace the market demand.⁷ This is due to multiple factors, including higher volume of surgery (2% per year) and increasing numbers of CRNAs moving into the non-surgical work environment, such as pain management and radiology.⁷

Accurate salary numbers are difficult to determine for CRNAs and AAs. The only source the authors could locate that had consistent data on both CRNA and AA salaries was the Physician Compensation and Production Survey published by the Medical Group Management Association (MGMA).⁸ Other sources list each occupation's salary data separately, and/or with varying ranges instead of a single mean or median salary, making comparison difficult.⁹⁻¹⁴

School type	Cost	
	Median	Range
Public (n=48)	\$37,243	\$15,000-\$84,402
Private (n=60)	\$61,345	\$31,030-\$118,056
Combined (n=108)	\$50,077	\$15,000-\$118,056

Table 1. Cost of Anesthesia School, CRNA

School type	Length (months)	
	Median	Range
Public (n=48)	28	24-36
Private (n=60)	28	24-36
Combined (n=108)	28	24-36

Table 2. Anesthesia School Length, CRNA

School type	Cost	
	Median	Range
Public (n=1)	\$68,210	\$68,210
Private (n=7)	\$71,410	\$42,000-\$96,380
Combined (n=8)	\$71,410	\$42,000-\$96,380

Table 3. Cost of Anesthesia School, AA

Methodology

The cost data collected were obtained from each school's respective website and consist of tuition and fees (see Tables 1-5). For the purposes of this study, tuition and fees refers to the cost of all credit hours needed to graduate, clinical site fees, equipment, and various other university-determined fees. We did not calculate cost of housing or travel, which is difficult to establish without surveying students in each program, and thus beyond the scope of this analysis. Books, licensing fees, and health insurance were also excluded from this report, as these fees are universal for all anesthesia programs and relatively small in the context of total educational costs, and therefore unlikely to influence the overall conclusions. The compared costs for public anesthesia programs are for in-state tuition only. The only exception to our web-based determination of costs was the Mayo Clinic College of Medicine Nurse Anesthesia Program, which was contacted by phone, as per instructions on their website.

The National Center for Education Statistics indicates an average undergraduate four-year degree costs \$88,368.¹⁵ However, the total costs for undergraduate education were not considered in this research, since both CRNA and AA students must have a bachelor's degree prior to starting their respective master's or doctoral program. The focus of this research was on the differences between the advanced degrees earned by each profession.

Since the cost of public and private institutions can

School type	Length (months)	
	Median	Range
Public (n=1)	29	29
Private (n=7)	24	24-28
Combined (n=8)	25.5	24-29

Table 4. Anesthesia School Length, AA

	Median	Mean	SD
CRNA (n=1,901)	\$158,092	\$156,642	+/- \$31,317
AA (n=33)	\$127,020	\$123,328	+/- \$27,250

Table 5. Provider Compensation

vary dramatically, fees were separated into two categories. The total costs and length of each individual program are listed in Table 6. Similarly, the median length of program (in months) was determined for public and private schools separately. The overall median total cost and length of program were also determined for all CRNA and AA institutions, respectively.

The salary data for CRNAs were collected from the *MGMA Physician Compensation and Production Survey: 2012 Report Based on 2011 Data*⁸, and the numbers reported for CRNAs and AAs are for total compensation. Specifically, these totals include salaries, bonuses/incentives, and profit sharing, but not costs incurred funding health insurance, retirement plans, or any business/educational expense reimbursement.

Results

The Council on Accreditation of Nurse Anesthesia Educational Programs (COA) lists 111 accredited nurse anesthesia educational programs.¹⁶ There is one nurse anesthesia program in Puerto Rico from which we were unable to obtain tuition information. Two other programs are military based and do not charge tuition in return for military service. These three programs have been excluded from this analysis.

Of the included nurse anesthesia programs, 60 are private schools and 48 are public institutions. The median cost of the public CRNA programs is \$37,243 compared with a private program cost of \$61,345. The median tuition and fees for all nurse anesthesia programs is \$50,077, and the median program length is 28 months. Data for nurse anesthesia programs are current as of October 2012.

Average provider compensation for CRNAs in 2011, as reported by the *MGMA Physician Compensation and Production Survey*⁸, was \$156,642. Median compensation was \$158,092. The highest CRNA compensation was reported in the Midwest region of the United States (median \$166,752). The lowest compensation was in the

CRNA School - Public	Cost^a (\$)	State	Length of program (mo)	Degree type^b
University of Alabama at Birmingham	46,899	AL	27	
Arkansas State University	30,600	AR	28	
Kaiser Permanente School of Anesthesia California State University, Fullerton	26,259	CA	24	
Loma Linda University	84,402	CA	30	
New Britain School of Nurse Anesthesia	24,199	CT	29	
Hospital of St. Raphael School of Nurse Anesthesia	37,553	CT	29	
Florida Gulf Coast University	30,125	FL	28	
Florida International University	49,247	FL	28	
University of South Florida	57,600	FL	28	
University of North Florida	48,000	FL	28	
Georgia Health Sciences University	58,364	GA	28	
University of Iowa	59,000	IA	36	DNP
Southern Illinois University Edwardsville	47,841	IL	31	
University of Kansas	45,946	KS	36	DNP
Trover Health System/Murray State University	53,822	KY	28	
Louisiana State University	27,684	LA	32	
University of Maryland	46,839	MD	28	
Michigan State University	45,100	MI	28	
Oakland University William Beaumont School of Medicine	48,675	MI	28	
University of Michigan, Flint Hurley Medical Center	30,849	MI	24	
Wayne State University	39,112	MI	24	
Mayo Clinic College of Medicine	21,000	MN	30	
University of Minnesota	71,109	MN	36	DNP
St. John's School of Nurse Anesthesia at Missouri State University	36,764	MO	30	
Truman Medical Center	32,600	MO	36	
University of North Carolina, Charlotte	29,216	NC	28	
East Carolina University	19,389	NC	28	
Raleigh School of Nurse Anesthesia, University of North Carolina at Greensboro	28,500	NC	24	
Western Carolina University	28,768	NC	28	
University of North Dakota	25,038	ND	28	
University of Medicine and Dentistry of New Jersey	45,608	NJ	28	
SUNY Health Science Center at Brooklyn	27,734	NY	27	
SUNY at Buffalo	38,759	NY	36	DNP
University of Akron College of Nursing	31,280	OH	27	
University of Cincinnati	56,598	OH	28	
St. Elizabeth Health Center	36,933	OH	27	
Geisinger Health System, Bloomsburg University	35,394	PA	33	
University of Pittsburgh	56,344	PA	28	
Memorial Hospital of Rhode Island	23,500	RI	29	
Medical University of South Carolina	55,094	SC	28	
University of South Carolina PRMH Graduate Program	58,715	SC	27	
University of Tennessee	33,423	TN	31	
University of Tennessee, Chattanooga	29,225	TN	27	
University of Tennessee Health Science Center	56,718	TN	36	DNP
University of Texas at Houston Health Science Center	23,538	TX	32	
Old Dominion University	33,800	VA	28	
Virginia Commonwealth University	41,184	VA	28	
Franciscan Skemp Healthcare	15,000	WI	27	

CRNA School - Private	Cost^a (\$)	State	Length of program (mo)	Degree type^b
Department of Nurse Anesthesia Ida V. Moffett School of Nursing Samford University	60,571	AL	28	
Midwestern University	71,266	AZ	27	
National University, Fresno	36,837	CA	27	
Samuel Merritt University	66,114	CA	27	
University of Southern California	69,285	CA	24	
Fairfield University and Bridgeport Hospital	67,200	CT	36	DNP
Georgetown University	42,916	DC	27	
Adventist University of Health Sciences	66,314	FL	28	
Barry University	46,155	FL	28	
Gooding Institute of Nurse Anesthesia	63,340	FL	28	
University of Miami	62,000	FL	28	
Wolford College	32,854	FL	28	
NorthShore University	57,895	IL	36	DNP
Rosalind Franklin University	57,414	IL	27	
Rush University	75,208	IL	27	
The Millikin University and Decatur Memorial Hospital Nurse Anesthesia Program	50,400	IL	31	
Newman University	43,540	KS	24	
Our Lady of the Lake College	69,553	LA	28	
Boston College	69,440	MA	27	
Northeastern University Bouvé College of Health Sciences	59,395	MA	32	
University of New England	62,100	ME	27	
University of Detroit	52,255	MI	27	
Minneapolis School of Anesthesia	31,840	MN	27	
Saint Mary University of Minnesota	35,470	MN	28	
Goldfarb School of Nursing at Barnes-Jewish College of Nursing and Allied Health	76,648	MO	28	
Webster University	72,410	MO	30	
Duke University	88,850	NC	28	
Wake Forest University	31,030	NC	24	
BryanLGH College of Health Sciences	56,776	NE	33	
Clarkson College	49,200	NE	30	
Our Lady of Lourdes Medical Center	74,400	NJ	27	
Albany Medical College	49,754	NY	28	
Columbia University	75,088	NY	27	
Cleveland Clinic Foundation	101,190	OH	28	
Frances Payne Bolton, Case Western	101,190	OH	28	
Lourdes University	69,110	OH	28	
Otterbein University	64,935	OH	28	
Oregon Health and Science University	70,310	OR	27	
Allegheny Valley Hospital / La Roche College School of Nurse Anesthesia	38,245	PA	24	
Commonwealth Health / University of Scranton	33,360	PA	25	
Crozer Chester Medical Center / Villanova University	40,015	PA	28	
Drexel University	65,415	PA	28	
Excela Health School Anesthesia	49,000	PA	27.5	
La Salle University, Frank J. Tornetta School of Anesthesia	64,855	PA	27	
York College of Pennsylvania / WellSpan Health	65,330	PA	32	
Nazareth Hospital	61,083	PA	27	
Thomas Jefferson University	43,382	PA	30	
University of Pennsylvania	118,056	PA	24	
UPMC Hamot School of Anesthesia	37,680	PA	28	
Saint Joseph Hospital School of Anesthesia for Nurses	64,690	RI	27	
Mount Marty College	51,616	SD	30	

reported, the gap between the salaries could potentially be smaller, as AAAA claims.

Lastly, the authors acknowledge that there are several different options for obtaining a bachelor's degree in nursing other than the traditional 4-year route. These alternative programs were not considered for analysis in this study.

Discussion

There are many factors to consider when comparing educational routes to become a non-physician anesthesia provider. However, from an economic standpoint, our analysis indicates that whether a prospective student either has no undergraduate education or has already received a bachelor's degree in nursing, nurse anesthesia school is the better method. We found that the average cost of CRNA education is \$24,317 less than AA education. Furthermore, while the additional cost of the DNP degree mandated for CRNAs effective in 2025 would decrease this difference, it would remain less costly to complete CRNA education in comparison to AA (net difference of \$9,611). In addition, depending on the type of employment arrangement for a nurse anesthetist, there is a higher earning potential for CRNAs than AAs and no geographical practice restrictions in the United States.

However, if a prospective student has a bachelor's degree in any major other than nursing, anesthesiologist assistant school could be a more economical option. Our analysis shows the average cost of a second bachelor's degree plus nurse anesthesia school would be \$140,088 (assuming all 4 years are needed to obtain the necessary bachelor's degree). This does not account for students who may be able to matriculate through an accelerated BSN program, or those who took an associate's degree; however, either route would still result in increased cost due to additional undergraduate education. While AA school is more expensive than CRNA school, our analysis suggests it is less costly (by \$64,052) and faster than completing a second bachelor's degree in nursing and a nurse anesthesia program. Though alternate routes to a nursing licensure are less expensive, the net outcome—more costly education—is similar.

Summary

Overall, nurse anesthetists have better opportunities to attain a higher income due to fewer restrictions on practice, geographic mobility, and a wider distribution of available positions. Unless a prospective student is considering anesthesia with a bachelor's degree in a subject other than nursing, decreased cost of education, higher earning potential, wider scope of practice, and more job opportunities indicate becoming a CRNA is a more practical and economical choice.

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