

that an anesthesiologist medically directs depends upon a number of factors, including the available personnel and resources, the severity of illness of the patient, and the complexity of the surgical procedures to be performed.

A nurse anesthetist, also referred to as a Certified Registered Nurse Anesthetist (CRNA), is a registered nurse who has satisfactorily completed an approved nurse anesthesia training program. An anesthesiologist assistant (CAA) is a physician's assistant who has completed an approved anesthesiologist's assistant training program. CAA programs, which operate in the medical school model, have been in existence since 1969 and are presently fewer in number than nurse anesthetist (NA) training programs. The curriculum and prerequisites for entry into an CAA program are comparable to those for NA programs, but typically require pre-med course completion. The pathway into each program requires completion of a bachelor's degree prior to admission. At present, many states do not yet provide licensure for CAAs, although the number of states that formally recognize CAAs has increased in the past few years. Those anesthesiologists who practice in states which allow practice by both CAAs and NAs generally note that CAAs and NAs perform similar roles within the ACT (<http://www.anesthetist.org/content/view/14/38/>). CAAs are generally permitted statutorily to practice only under the medical direction of an anesthesiologist, whereas NAs may be supervised not only by anesthesiologists, but also by other physicians, as well as by nonphysician health care providers such as dentists and podiatrists, depending on the laws within one's state.

When nonanesthesiologists supervise nurse anesthetists, perioperative mortality rates are higher than when an anesthesiologist is performing the anesthetic or is providing the supervision. In a study of nearly 200,000 Pennsylvania Medicare patients from 1991–1994, there were 2.5 more deaths within 30 days of hospital admission per 1,000 surgical patients when no anesthesiologist was involved with the provision of the anesthetic care. When patients experienced complications during the perioperative period, there were an additional 6.9 deaths within 30 days of admission per 1,000 patients when no anesthesiologist was involved, compared to when an anesthesiologist was either performing or directing the anesthesia care.<sup>1</sup>

In summary, anesthesiologists frequently practice in the Anesthesia Care Team mode. The close interaction between the directing anesthesiologist and the anesthesiology resident or nonphysician anesthesia extender (CAA or NA) results in the extremely safe delivery of anesthesia care for patients in a variety of surgical settings.

## Reference:

1. Silber JH, Kennedy SK, Even-Shoshan O, et al. Anesthesiologist direction and patient outcomes. *Anesthesiology*. July;93(1):152-163.

## CHAPTER 5

### A Career in Academic Anesthesiology

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A career as an academic anesthesiologist is a riot. This career affords an opportunity for continuous personal growth while developing the specialty through educating residents, contributing to the literature by scholarship and research, and in this way building upon and further developing the history of anesthesiology.

While most of the academic anesthesiologists practice in 1 of the 125 academic anesthesiology departments in the United States and have built their career after completing residency training, there are colleagues who return to academia later in life while others work outside these centers and so contribute significantly to the development of our chosen specialty. Nevertheless, most successful academic anesthesiologists have chosen this career early on. The skills needed are hard won and the expertise developed takes many years to attain. As an academic colleague of mine states, "Private practice anesthesia is a job, while academic anesthesia is a career."



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## ASA GUIDE TO ANESTHESIOLOGY FOR MEDICAL STUDENTS

More usually, a resident-in-training will develop an interest in pursuing an academic career and then progress from there. While many decry the high salaries that are now prevalent in private practice, I believe that this is an opportunity. Academic salaries – while not as high – are substantial. One can have a very fruitful academic career (under current conditions) without fear of becoming impecunious (and pay off student loans fairly rapidly).



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### Career Path

After residency, the usual route is to do a fellowship in one's area of interest. This can be a clinical fellowship or a research fellowship. American College of Graduate Medical Education (ACGME)-accredited fellowships are now available in pediatric and cardiac anesthesia as well as pain medicine and critical care. An ACGME-approved obstetric anesthesia fellowship is likely in the future. Some institutions provide fellowships in regional anesthesia and neuroanesthesia. The importance of a fellowship is that it builds an area of clinical subspecialty expertise upon which you can build your career. A research fellowship is an outstanding opportunity, as this allows one to really develop the necessary expertise for a research career in the future, which includes learning to write manuscripts and apply for grants. During the time of your fellowship, you will also prepare for the oral board examinations. A further benefit of a fellowship in an academic department is that you will continue in an academic environment during the period of preparation for these examinations. Instead of the fellowship, some institutions will have a 2-year clinical rotating instructor position, allowing you to gain expertise as a consultant while preparing for the boards.

Once this fellowship or clinical instructorship has been completed and board certification has been achieved, the individual will be appointed as an assistant professor of anesthesiology.

### Promotion and Tenure

The promotion and tenure process may be different in many institutions. Suffice to say that most clinical anesthesiologists are not promoted on the tenure track and that most institutions (and departments of anesthesiology) have well-defined promotion guidelines upon which the promotion to associate professor and subsequently (full) professor are based. The promotion to associate and then full professor usually takes at least six years for each step. With this promotion, in most departments there is an incremental increase in base salary scales, although nationally there is a trend for narrowing the gap between base salaries of assistant and full professors.



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### Tracks

While there are no well-defined steps on building an academic career one can review the careers of previous academic anesthesiologists and characterize these loosely into tracks. The key is the development of unique expertise, upon which scholarship and possible research can be based.

Although research is not essential to an academic career, believe scholarship, the collation of (new) knowledge and wide dissemination of this through peer-reviewed mechanisms, is absolutely essential.

In the past, academic anesthesiologists were expected to be "Triple Threats," i.e., clinicians, researchers and educators.

This requirement is unrealistic today; however, the successful academician is often a “Double Threat,” both experts in a subspecialty clinical area and in education, administration or research.

### Clinical Subspecialty

This “track” could be developed as follows: the assistant professor, having done a fellowship in cardiac anesthesiology, decides to develop clinical expertise in echocardiography, with a special interest, for example, in intraoperative evaluation of mitral valve disease. The assistant professor will start by building his or her knowledge of echocardiography, lecture to the residents and Fellows, and design a research project around this subject area of interest. He or she will give a Grand Rounds lecture in his or her institution on the subject and progress to lecture locally and then nationally on the subject of interest. The research project will be written first as an abstract for presentation at a national meeting and then as a full manuscript of the completed research project. Additionally, a case report and/or a review article on the subject could be written and published. Hence, the assistant professor evolves into an expert on the subject, and soon will be invited to speak nationally, and possibly internationally, on the subject.

### Education/Teaching

This “track” would develop as follows: the assistant professor has decided that education is the area of his or her interest. Education is clearly not just teaching but all that goes with providing an environment in which medical students and residents may develop and learn. This includes developing and implementing the structure, curriculum and evaluation of the education process. The assistant professor would start by developing expertise in education. Joining the Society for Education in Anesthesia, [www.seahq.org](http://www.seahq.org), would be a good start in support of this endeavor. The assistant professor would serve on medical student and/or resident education committees with the goal of eventually heading a clinical competency committee, medical student rotation or residency program in the department. Along the way, the individual would become particularly interested in a certain area, such as resident evaluation systems, and study and develop these, and so become a regional and, possibly national, expert on this subject. From this would flow scholarship which could be presented and published.

### Simulation/Education

Another track would be developing expertise in education through simulation in its many forms. Well-known examples are the full-body simulation systems, but any model used to allow practice independent of patient care can be used in simulation to achieve this.



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### Research

This “track” is often preceded by a research fellowship, but the latter is not a prerequisite.

This can take the form of clinical, education or basic science research. Substantial additional training is often required and it is essential to have appropriate mentorship within the department and/or the institution to assure that the assistant professor does not become frustrated and give up on a promising career.

### Operating Room Management and Administration

With the increasing complexity of perioperative care as well as the administrative processes within the departments of anesthesiology, there is an increasing trend for academic anesthesiologists to build a career around scholarship in these areas.

### Skills and Expertise

There is a great deal that needs to be developed in an academic anesthesiology career beyond the obvious need to be a knowledgeable and consummate clinical anesthesiologist. Below is a brief summary by way of illustration.

### Teaching

Teaching can take many forms. All require special expertise and knowledge. By way of example, one will need to develop different expertise whether one is teaching in the operating room, a small group, conducting a problem-based learning discussion or giving a lecture in an auditorium filled with 200 to 300 people.



### Presentation

The development of presentation skills is crucial to an academic career. Think only of how differently you would approach preparing a poster at an academic meeting, illustrating the presentation of an anatomy lesson for medical students, putting together an instructive talk on your area of expertise, or presenting options for analgesia to expectant mothers planning to visit the obstetric unit. Oscar Wilde has said, when talking of a presentation, “I would have made it shorter but I did not have enough time.”

### Writing

The skill of writing for publication will be one that requires support and practice to develop. A way that you can learn this is through a good mentor who supports you in writing, from your first case report to manuscripts and grant submissions. While this may seem trivial, the writing of a case report teaches one to be singularly focused on teasing out the key issues and writing this down in an instructive, readable, yet parsimonious fashion.

### Leadership and Management and Communication

As you grow in your area of expertise, you will be asked to become a director of a division, chair of a department of hospital committee, chief of a clinical service, a residency or fellowship program director, or perhaps even a departmental chairman. Clearly you will need to develop skills in administration and leadership to help create an environment that brings out the best in your colleagues.

### Conclusion

I hope that I have been able to encapsulate what a career in academic anesthesiology may look like. As in life, there is no set path. Half the fun is the journey. If you want to make a difference to your chosen specialty and help build its history, academic anesthesia beckons. Will you take the challenge?

## CHAPTER 6

### Anesthesia in the Armed Forces

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#### Introduction

A former chairman once said to me, “I wish I could hire a department full of former military anesthesiologists. Their expertise, maturity, work ethic, sense of duty and ability to adapt are simply amazing, which are qualities that would solve many of the problems that I face as a chairman in anesthesiology.” He asked me, “How is it that the military generates such exceptional providers?” Although I acknowledged many influences that shape these providers, our discussion highlighted several ideas that uniquely describe anesthesiology in the military.

#### Military Unique Activities

The fundamental distinction of military anesthesiologists is in their military unique activities. A casual inspection of military anesthesiology reveals a work environment similar to any American civilian institution with its equipment, supplies and anesthetic approaches common to most anesthesiologists. However, a closer inspection discovers the military anesthesiologist removed from comfort zones to face tasks and circumstances that demand his or her deepest reserves of expertise, endurance and emotional resolve. Some find themselves in the tensions of war, the extremes of natural disasters or the medical hunger of third-world countries.

Following a mass casualty experience, an anesthesiologist stationed in the Middle East stated that “while six anesthesia providers ran six operating rooms in three 15-foot-by-15-foot tent rooms, we completed over 80 trauma cases in the first 24 hours, which included 40 percent craniotomies and some of the most complex multi-trauma injuries I have ever seen. We had no complaints or perioperative complications. We just had 80 excellent resuscitations and anesthetics.”

Another provider described the destruction of Hurricane Katrina as absolute chaos. He found the city of New Orleans submerged to its roof tops without food, power, communication or transportation. Helicopters served as ambulances and a collection of tents on an airport runway served as the only medical system for the tens of thousands of patients and evacuees. While one military anesthesiologist was performing an emergency cesarean section by flashlight, another initiated on a chalkboard the plans for a medical triage and evacuation system, which spanned across multiple services, technologies and aircraft. Military anesthesiologists can find themselves on humanitarian missions