

A return visit is nice for programs you are very interested in. Although you cannot ask directly about your ranking, many programs will send letters showing interest in late January. For example, some programs send out letters to the top 30 to 40 applicants on their rank list. Don't forget to continue to interact with your advisor at your home institution.

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CHAPTER 13

Osteopathic Student Guide to Applying to Anesthesiology Residency

Christopher Ryan Cook, D.O., PLLC

2008 ASA Resident Component President
Oklahoma City, OK

Patrick W. Hogan, D.O.

Staff Anesthesiologist
Valley Anesthesia Consultants
Phoenix, AZ

Basem Abdelmalak, M.D.

Professor of Anesthesiology,
Director Center for Sedation,
Anesthesiology Institute, Cleveland Clinic

Osteopathic students are in a unique situation as they apply for anesthesiology residency. Important considerations must be made before beginning the process. One of the issues of prime importance is deciding between osteopathic or allopathic anesthesiology residencies. This is a difficult decision and is based on multiple factors including geographic location, size of residency desired, career plans, separate residency match programs, board certification, approval of allopathic internship and residency, licensing exams, and relating with separate professional organizations. All of which can be daunting but well worth the effort.

Geographic location is an important decision based on family, cost of living, or metropolitan versus rural location. There are 11 osteopathic anesthesiology programs located in seven states, including California, Florida, Missouri, Michigan, Ohio, Oklahoma and Pennsylvania.¹ As there are 23 osteopathic schools (soon to be 29) with approximately 3,000 graduates per year, this leaves relatively few osteopathic anesthesiology residencies to

meet the demand by osteopathic students.^{1,2} It is a challenging dilemma for osteopathic students when looking for an osteopathic anesthesiology residency because of the limited geographic locations and the limited number of positions at each site. Due to the small number of osteopathic anesthesiology slots, it is likely that an interested applicant seeking an osteopathic anesthesiology residency may not be granted the opportunity nor be willing to relocate for such an opportunity. There are 129 allopathic anesthesiology programs that exist throughout the United States today, in every state but Hawaii, Alaska, Idaho, Rhode Island, Wyoming, Delaware, Montana and South Dakota.³

Size of anesthesiology residency is important to many osteopathic student applicants. The benefits of small and large programs must be weighed. The largest osteopathic anesthesiology programs have a total of 12 residents compared to allopathic programs that can carry over 100 anesthesiology residents.^{1,3} Possible benefits of training at a smaller osteopathic or allopathic program include greater personal attention by instructors, greater investment in each resident as a reflection of the program, greater emphasis on private practice anesthesiology, and the programs are usually community hospital-based. Potential benefits of larger allopathic programs include larger number of faculty, a greater emphasis on didactics, exposure in training to a vast diversity of pathology accompanied by a higher complexity of clinical cases, more research opportunities, and less need to move to affiliated hospitals to gain subspecialty training.

The data to support what the typical D.O. does after osteopathic anesthesiology residency versus allopathic anesthesiology residency is difficult to gather (academic versus private practice). In general, it is assumed he or she would follow the trend of M.D. residents and enter into private practice at a greater rate. It is important for the osteopathic student to know in general for an osteopathic physician to become a program director or director of medical education at an osteopathic

institution, he or she must have completed an osteopathic anesthesiology residency.¹ It is also important for osteopathic anesthesiology students to know that they are not eligible for dual board certification (ABA/AOBA) unless they complete both residencies. In addition, there are no dually accredited (AOA/ACGME) anesthesiology residency programs like those that exist in primary care specialties.

The American Board of Anesthesiology (ABA) is the certification organization for physicians, both M.D. and D.O., who have completed ACGME-approved anesthesiology residency training. ABA certification requires passing both a written and oral examination. The ABA written examination is administered in July, after graduation from residency. The oral examination requires passing the written exam, and is administered in April or October of the year subsequent to graduation from residency.

The primary certification organization for osteopathic physicians who have completed an AOA-approved anesthesiology residency is the American Osteopathic Board of Anesthesiology (AOBA). The certification process requires completion of a written, oral and clinical examination. The clinical examination requires submission of case totals and medical record numbers for a specific period of time, and involves a board-certified osteopathic anesthesiologist reviewing selected patient charts, and observing one or two anesthetics during a visit to the applicant's clinical practice.

If one matches into an allopathic anesthesiology residency, it is advisable to either complete an AOA internship, or ensure that the AOA will recognize and credit training completed at the intended ACGME internship. Start by contacting the AOA and informing them of the intended institution and the internship rotations it provides. The reason to go through this process is osteopathic physicians are required to have completed an AOA-approved internship in order to receive a medical license in the states of Florida, Michigan, Oklahoma, Pennsylvania and West Virginia. Sometimes there are ways around this stipulation, i.e., practicing at a Veterans Affairs Hospital. An AOA-approved internship is required for application to an AOA-approved anesthesiology residency, and for entrance into the AOBA board eligibility and certification process. AOBA board certification is required to become a director of medical education (DME) or a program director in AOA-approved postdoctoral programs. Since the passage of AOA Resolution 42, a total of 1,241 osteopathic physicians petitioned the AOA for approval of their first year of ACGME postgraduate training. Seven hundred and seventy-four (62 percent) of these applications have been approved and 455 (37 percent) approved pending completion of residency training requirements and 12 (<1 percent) were denied between July 2001 and October 2006.² Finally, there are a few dually accredited internship programs (AOA/ACGME) that allow flexibility for entrance into both allopathic and osteopathic pathways.

Another consideration for internship is the restructuring of the traditional osteopathic internship. Starting July 1, 2008, all osteopathic anesthesiology residencies will be four-year residency positions similar to categorical ACGME programs. This means osteopathic students will match directly into their residency programs.²

The ACGME is also moving towards integrating internship into the anesthesiology residency continuum. Although this will be gradual, it will force change to the AOA internship requirements or mean more DO anesthesiologists may not have AOA approval and they will face geographic practice restraints as previously mentioned.⁴

Currently, there are separate matches for osteopathic and allopathic anesthesiology residencies. According to the D.O.-online website, it is important for osteopathic students to know if they are matched through the AOA match and have also registered to participate in the allopathic match program in the same year they will be withdrawn from the allopathic match program for concurrent programs.²

Osteopathic medical students applying for ACGME-approved residencies may want to consider taking the USMLE Step 1 (United States Medical Licensing Exam). Taking the USMLE is not required; however, osteopathic medical students are essentially prepared for the USMLE when they have studied for COMLEX. Thus, adding USMLE scores to your application only requires an extra day of testing and an exam fee. If you perform well on standardized exams, taking the USMLE may well serve to your advantage. Remember that you are an osteopathic medical student applying for a position in the allopathic training world. Allopathic program directors may be largely unfamiliar with the reputation of each specific osteopathic medical school; therefore, the USMLE provides them with a consistent measure to compare their osteopathic and allopathic student applicants.

Finally, if the osteopathic applicant elects to take only the COMLEX, it would be prudent to send each program director a letter explaining what your COMLEX score represents. Further, please note that in the past, the National Board of Osteopathic Medical Examiners has only released to programs the 3-digit COMLEX score. If you have a strong 2-digit percentile score, it may be beneficial to send it with the aforementioned letter that highlights this information.

The above article is not meant to be a comprehensive guide to making the decision on whether to choose an osteopathic or allopathic anesthesiology residency, but rather a tool to bring up some of the issues that each applicant should consider. To make a final decision on your anesthesiology path please talk with your college advisors, the AOA, and AOCA to find out the current rules and regulations. If you are considering an allopathic residency, speak to the anesthesiology program directors at the specific training programs you are interested in to find out how

they accommodate their osteopathic residents. Be sure to talk with D.O.s in the states in which you would consider practicing who have completed training at an allopathic or osteopathic anesthesiology residency and discuss any issues they have faced. Helpful articles and websites have been referenced for you. I hope I have helped you in your decision-making process and invite you to become involved with the American Society of Anesthesiologists. Even as a student there are opportunities to help lead and shape the future of our specialty.

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I am carrying the cardiac arrest airway equipment bag, they make room for me to get to the head of the bed. After obtaining a brief history, I'll set up to secure the airway. Once the airway is secured, and I write my note, I head back to the O.R. to help expedite the completion of the ongoing cases and start other emergencies. By 7 or 8 p.m., most of the elective cases are wrapping up, leaving emergencies for the rest of the night.. Perhaps we can sit down for some dinner; this is the best part of the evening because not only is the food good (compliments of the attending-on-call), but this gives us a chance to socialize. Over the course of the evening, as everything winds down, I may even get some shut-eye. The arrest beeper will probably go off again but before I know it, it will be 7 a.m. and time to sign-out to the day staff. I'll head home having survived the night as team captain but knowing that I have begun to master what it is like to be a leader of a health care team.

For Henry, however, his alarm has gone off at 5 a.m. He'll leave his apartment and have changed into his scrubs by 6:30 a.m. It still takes him 25 to 30 minutes to set up his room, but he'll get faster with time. He's a first-year anesthesiology resident. He'll go to conference before seeing his first patient. He should already know quite a bit about the patient since laboratory results and history can be obtained from the hospital information system the evening before. He already has an idea about what type of anesthesia he'll recommend since he discussed this with his attending the evening prior as well. His job this morning is to confirm and collect additional data about the patient, discuss the options for anesthesia, explain the risks, benefits and alternatives of these options, calm the patient, and inspire confidence in his ability; all in a short period of time. Despite the patient's multiple comorbid diseases, the anesthesia preparation time (two IVs and an arterial line), induction, maintenance and emergence from anesthesia go without a hitch. During the case, his attending has discussed the anesthetic concerns of a patient with COPD and has given him a morning break. After extubating the patient, he will take him to the

CHAPTER 14

A Day in the Life of an Anesthesiology Resident

Leila Mei Pang, M.D.

Department of Anesthesiology & Pediatrics
Columbia Presbyterian Medical Center
College of Physicians & Surgeons of Columbia University

Hello. I'm Helen, and I'm a third-year anesthesiology resident. I'm the team captain tonight, which means I'll be coordinating the anesthesia service in our hospital. I can sleep as late as I want this morning because my day won't begin until 4 p.m. Nights can be busy, which is why I'm going to need the extra rest. When I arrive at the hospital, my first tasks are to report to the attending-in-charge, review the board that summarizes all the operating rooms still running and their estimated times for finishing, and to pick up the arrest beeper. There's always an attending available to help or ask for advice and guidance, but as team captain, I'm in charge. After reviewing the board, I will make rounds in the PACU to receive sign-out from the PACU resident. Inevitably, the arrest pager will let out its typical adrenaline-provoking beep. I run to the nursing floor and find that a patient has arrested. Others have started basic life support, but since they recognize that

post-anesthesia care unit, give a report to the nurse taking care of him, then go off to set up for and see his next patient. The day will fly by but before he can head home, he will need to check the schedule for the next day and prepare.

Meanwhile, Julie, who is a second-year anesthesiology resident, didn't get out of bed until 5:30 a.m., because she lives in the neighborhood and walks to work. She's rotating in the cardiothoracic ICU this month. She's already had a rotation in the surgical-anesthesia ICU and one in the cardiothoracic rooms. She arrived in the unit at 6:30 a.m., completed her sign-out rounds, looked up lab values, had a chance to go to conference and even had a cup of coffee before rounds with the ICU anesthesiology attending at 8:30 a.m. Our units are "closed," so that the ICU attending has the final word on all decisions. There is a lot of teaching during rounds. As each patient is discussed, the residents try to work as a team: while someone writes the orders, someone else is making phone calls for tests while the resident taking primary care of the patient is making sure that the treatment plan is understood. After rounds, there will still be some time to complete tasks not completed during rounds before the first wave of patients are admitted. There also will be time between patients to grab a bite to eat because they work until 6:30 or 7 p.m. Being in the CTICU is a 12-hour workday with call being about every five days. It's hard work, but residents will learn a lot from their very ill patients and great attendings!

challenging, but he also gets to provide anesthesia for the bread-and-butter cases as well. The surgeons, nurses and anesthesia staff have a great working relationship so that there's a sense of cooperation and teamwork. Bill will be relieved at 3:45 p.m. by either another resident or his attending so he can get to his curriculum lecture session on time. He'll return to his case when the session is over. There is a separate call team for pediatrics, but there are more anesthetizing locations than there are call residents. Bill eventually gets out but he doesn't mind working late because there are excellent teaching opportunities both in and out of the O.R., and there are useful handouts and articles for his and his cohorts' education.

Regardless of where you do your residency, you will see a lot of cases and become skilled at taking care of patients with coexisting medical problems when you work hard. It is important to remain vigilant, be adaptable, anticipate problems, study and ask questions. At the end of your three years of residency, you will be trained to practice competently and independently.

CHAPTER 15

Research Careers in Anesthesiology

Paul Knight, M.D., Ph.D.

Professor

Departments of Anesthesiology and Microbiology
University at Buffalo, SUNY

The term anesthesia comes from the Greek $\alpha\nuαισθησι\alpha$ meaning "insensible" and is defined in the 1771 copy of the Encyclopedia Britannica as "a privation of the senses." For the modern use of the words anesthesia and anesthetics, we are indebted to Oliver Wendell Holmes. Surgical anesthesia is the United States' unique gift to medicine and is primarily responsible for the development of the surgical specialties. At a demonstration of diethyl ether in London for an amputation, the renowned British surgeon, Robert Liston, remarked in December 1846, "This Yankee dodge, gentlemen, beats mesmerism hollow!"

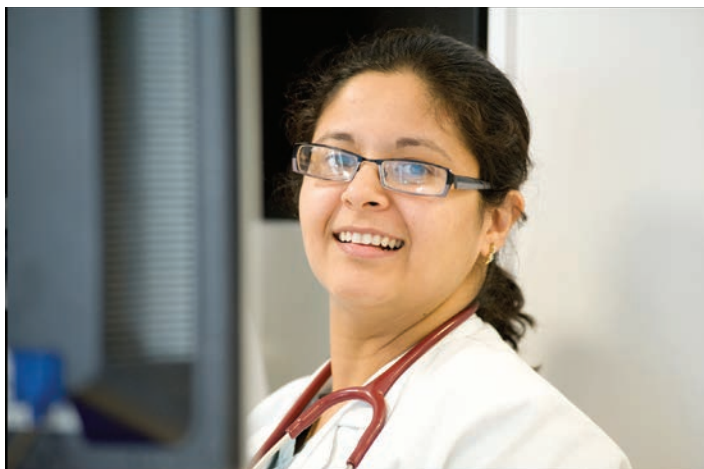
Academic activities performed by anesthesiologists are primarily based within university departments. The scope is quite broad and residents and medical students have always been encouraged to participate. These investigative endeavors range from molecular biology to observational patient studies and clinical trials. Traditionally, physician scientists in our specialty have focused on the pharmacology of drugs used in the perioperative period, as well as management and assessment of pathogenic mechanisms involved in acute pulmonary pathophysiology. For example, a number of anesthesiologists have been the driving force



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Bill is a CA-3 resident rotating through pediatric anesthesia. By 6:45 a.m., he's changed into his scrubs and is already setting up his room. Today is Thursday, so there is a departmental Grand Rounds/QA Morbidity and Mortality conference. All of the O.R.s start one hour later today. After conference, Bill will go see his first patient. His challenge is to handle a newborn for one case and a 19-year-old for another case, not to mention their parents, all in one day. Many of the cases are very complex and

behind the development of cardiopulmonary resuscitation (CPR) paradigms, as our specialty has always been the “gold standard” for airway management and judging the adequacy of ventilation, the “A” and the “B” of basic CPR. There is also major translational research in a large number of areas including the pathogenesis of chronic pain syndromes, as well as brain and cardiac protection in the perioperative period and ICU, to name a few. Probably because of the key role of anesthesiology in the development of modern medicine, many academic departments have faculty interested in the history of medicine and there are many opportunities for students to participate in such studies.



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Of all the medical specialties, the practices and principles of anesthesiology are the most related to the classical basic sciences taught in medical schools, particularly pharmacology and physiology. Thus, it is not surprising that a number of the first academic physicians recruited into the specialty during its formative years came from these basic science departments and much of our translational research has been focused in these disciplines. Anesthesiologists practice acute care medicine, where drugs with a very low therapeutic index are administered by titration. For example, except in the management of chronic pain states, the anesthesiologist usually does not hand the patient a prescription and have them come back in two weeks to assess the efficacy of the treatment. Instead, the anesthesiologist personally administers the drug, immediately (i.e., within five minutes) assesses the response to the therapy, and without delay adjusts the treatment to obtain the desired physiologic response. Research into pharmacokinetics and pharmacodynamics of these potent, fast-acting drugs, performed both in patients and experimental animal models, has long been an area of research performed by many physician scientists in anesthesiology.

As a practice of medicine, anesthesiology focuses primarily on two major areas. The first is the management and alleviation of pain states, be it surgically-induced trauma, or acute or chronic pain syndromes. The second emphasis is on the maintenance of physiologic homeostasis in the presence of severe pathophysiology. Therefore, not surprisingly besides providing perioperative care, the anesthesiologist may also subspecialize in pain medicine or critical care medicine. Anesthesiologists often function as the patient's advocate during the perioperative period. They will see patients in preoperative clinics in order to ensure that they are optimally medically prepared prior to surgery. As a result of this focus, research opportunities in clinical outcome studies exist in many departments of anesthesiology.

Currently, there is a relative shortage of anesthesiologists in most places around the country. In the past, anesthesiologists have been almost exclusively hospital-based physicians; however, while this is primarily the case, the practice of pain management has allowed members of our specialty to expand outside the hospital as part of multidisciplinary practices. Additionally, anesthesiologists often manage freestanding ambulatory surgical centers and in some instances provide anesthesia for minor surgical procedures in an office setting. These practices have had the effect of broadening the traditional research endeavors of our specialty to encompass pharmacologic epidemiology as well as expand the scope of the previously more narrowly-focused neuroscience investigations.

In summary, anesthesiology is a diverse practice of acute care medicine that originally developed out of a need to alleviate patient suffering from the severe pain and to correct the perturbation of physiologic homeostasis that occurs secondary to the trauma of surgery. The research performed in most academic centers reflects these interests. Anesthesiology is particularly well suited for those who like some excitement in medical practice, and like to see the results of their interventions more rapidly than traditional medical practice allows. In many ways the O.R. is a “laboratory” that allows the anesthesiologist to study traumatic perturbations in human physiology and their pharmacologic remedy. In addition to pain medicine and critical care medicine, recognized perioperative subspecialties include pediatric, cardiac, regional, neurosurgical, ambulatory and obstetrical anesthesia. Both patient-oriented and translational bench-top research opportunities exist that are directly germane to these subspecialties. Opportunities to practice clinical anesthesiology in conjunction with research currently exist in many locations. Our specialty is ideally structured to allow the physician to practice a very high level of quality patient care while being able to adapt his/her schedule to a scenario that best suits his/her individual needs and objectives, which might include a career as a physician-scientist. For those who are interested in developing an academic career in which research is a major focus, the earlier you become involved in scientific investigations, the better.

CHAPTER 16

Research as a Medical Student

Mark A. Hoeft, M.D.

University of Vermont College of Medicine
and Massachusetts General Hospital
Boston, MA

Introduction

Research as a medical student can be an exciting and rewarding opportunity to focus on a specific area of interest and give you a break from the long, scheduled hours of the clinic. Anesthesiology provides a unique specialty to be involved in research. We are probably one of the only specialties where the mechanism of action of our mainstay, the inhaled anesthetics, is not fully understood. Anesthesia is also unique in the collaborative approach to research. Any project can span the spectrum of all surgical and medicine specialties, allowing you to network with other physicians outside of the anesthesiology specialty.

Why Research?

Research as a medical student has many potential benefits. First, you have the opportunity to become an expert in a specific subject. I have found attendings in multiple other specialties to be very interested in my past projects and have asked me to present them in rounds or in clinic. Becoming an expert can set you apart from others in your class. Second, when applying for residency programs, a research background can generally give you an inside edge on academic programs and provides a topic of discussion during interviews. It also lends the opportunity to work one-on-one with a mentor who can become your biggest advocate and friend during your medical school career. In contrast to clerkship where you are often in an observational role with minimal responsibility, research provides a period of independence where you are ultimately the only person responsible for patient enrollment and completion of your project. An additional benefit can include a stipend for your work provided by your school, anesthesiology department or an outside source. Finally, some of the most exciting aspects of research are the opportunities to travel and present your project at national meetings and publication of the final manuscript. These are often the most difficult portions of research as you are questioned by national and worldwide experts in your field of investigation. This truly challenges your conceptual understanding of both the basic and clinical science behind your investigation.

Choosing a Research Project

A good research project can best be accomplished during the summer between the first and second years of medical school. This break provides the most natural point to complete a project, as students generally have two continuous free months off from

school. Other opportunities exist as fourth-year elective months, while other students choose to take a year off from medical school to complete more extensive investigations.

Before beginning a research project, you must choose which route you want to take (basic or clinical research) and find a mentor. Clinical research incorporates patient-oriented investigations of human pathology, therapeutic treatments, epidemiologic and behavioral studies, and patient outcomes, all of which can be performed under an M.D. Basic research often involves determining the basic mechanism of a specific phenomenon with much of this occurring through cell and/or animal research or drug development in a Ph.D. laboratory setting. Basic versus clinical research will influence your selection of a mentor as many M.D.s do not participate in basic science research.

When deciding upon a mentor, you must also settle on a specific area of interest in anesthesia (neuroanesthesia, cardiac, pediatrics, pain medicine, etc.). A physician or resident within the anesthesia department or other medical students are often good resources to guide you in the direction of a good mentor. A Medline or PubMed search under potential mentors' names will often provide a quick idea of the types of research they have performed. When meeting with a mentor for the first time, your potential work relationship should never be overlooked. Advantageous qualities in this person include active involvement in research, prior medical student involvement in research protocols, teaching ability, availability to meet and discuss questions (at least weekly), and most importantly, someone who you can see yourself working alongside.

Once meeting with your mentor, you should have a good idea of potential projects that you can further pursue. An important decision to make is if you would like to construct your own research protocol or join a preexisting protocol of your mentor. Joining a preexisting protocol is ideal for those interested in learning about the scientific method and a specific area of interest but who want no strings attached once their research month is over. Designing your own protocol is time consuming and requires much more dedication and initiative prior to and after your actual designated research month, but it is very rewarding in the end when you are the first author on a publication.

Designing a Protocol

Timing is the most important aspect of research as a medical student. While a student might anticipate only spending his or her scheduled one to two months performing research, he or she must have insight and diligence during the time building up to and after the actual data collection portion of the research. It may take up to six months to prepare and obtain institutional review board (IRB) approval for a protocol, analyze data; writing a manuscript and completing edits can also be a very lengthy process. Thus, the medical student must take much initiative in starting and completing his or her project.

When designing your own protocol, it is impractical for a medical student to think he or she will complete a clinically altering, randomized, double-blinded placebo controlled trial in a month or two of research. This does not mean one cannot perform a clinically relevant investigation that can add substantially to existing knowledge. A good medical student-initiated research project often consists of a retrospective chart or radiographic review of normal anatomic and/or pathologic conditions, and/or case reports. Running prospective trials is often cumbersome as patient enrollment is very sporadic, especially when dealing with a limited amount of time.

When designing your own protocol, a general outline is as follows:

1. Find a motivating mentor and choose a project.
2. Perform a literature search and read articles to familiarize you with prior research on your research topic. Finding past publications usually first starts with a literature search on Medline or PubMed, but do not forget to search the references of articles or anesthesia textbooks you read. These are often filled with publications you may have missed through Medline or PubMed.
3. Develop a general hypothesis and write your protocol. If your mentor has written prior protocols, ask to review one so you have a template. Find similar publications to the protocol you are writing and base your methods on this protocol.
4. Discuss the project with a statistician to determine adequate power and sample size. When designing the protocol or analyzing the data, a good, basic knowledge of statistical analysis will usually suffice (mean, standard deviation, confidence intervals, p values, etc.); however, if more advanced statistics are needed, do not hesitate to use a statistician.
5. Submit the protocol for IRB approval. This can take anywhere between two to three months or longer as the IRB will often have questions and ask for revisions.
6. Collect data/enroll patients.
7. Analyze data, write manuscript and submit for publication.

Funding

Many sources are available to fund your project and provide you with a stipend for your work. These can include your medical school, your local anesthesiology department, the Foundation on Anesthesia Education and Research (FAER) (<http://faer.org/medicalstudents.php>), or the National Institutes of Health (NIH). The Medical Student Anesthesia Research Fellowship (MSARF) through FAER is a relatively new opportunity for research in anesthesiology. The application is typically due in January of the year for which you are applying. There are host institutions across the nation, requires an

eight to 12 week commitment, includes 15 percent of your time to be devoted to clinic exposure to anesthesiology, and includes a travel stipend for you to present your work at the annual American Society of Anesthesiologists meeting. For those interested in anesthesiology, this is a great opportunity!

Closing Thoughts

Including a research project at some point in your medical career will expand your understanding of the scientific method, and hopefully, give you a greater ability to scrutinize the many new good and bad research publications that drive change in current medical practice. Performing a successful research project requires much initiative on your part. Start the process early, especially if you decide to write your own protocol. Know your topic thoroughly as it will aid you immensely in writing your manuscript and answering questions, especially when you can quote past publications. Most of all learn a lot and have fun with the project!

CHAPTER 17

Cardiac Anesthesiology

Jeremy D. Kukafka, M.D.

Associate Professor of Clinical Anesthesiology and Critical Care
Perelman School of Medicine
University of Pennsylvania, Philadelphia

Bonnie L. Milas, M.D.

Professor of Anesthesiology and Critical Care
Department of Anesthesiology and Critical Care
University of Pennsylvania School of Medicine

Cardiac Anesthesiology

The unique characteristics of the cardiac surgical patient led to the development of the subspecialty of cardiac anesthesia. Cardiac anesthesiologists are perioperative physicians who specialize in the anesthetic management of patients undergoing cardiac surgery, including valve replacement and repair; coronary artery bypass grafting; thoracic aortic surgery; repair of congenital heart defects; heart transplantation; and the implantation of mechanical assist devices. Cardiac anesthesiologists also have expertise in anesthesia for thoracic (e.g., lung surgery and transplantation) and vascular surgery. In addition some cardiac anesthesiologists serve as attending physicians in the cardiothoracic intensive care unit (CTICU).

Cardiac anesthesia requires expertise in a number of areas in order to care for the cardiac surgical patient. In-depth knowledge of cardiovascular physiology and pathology is paramount, as is the ability to manage cardiac physiology with an arsenal of vasoactive and cardiotropic medications. The introduction of cardiopulmonary bypass in 1953 revolutionized cardiac surgery and cardiac anesthesiologists must understand its operation, effects on physiology, and risks. Finally, they must be proficient at acquiring vascular access for invasive monitors (e.g., arterial and central venous catheters) and interpreting the data obtained from them.



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In recent years, transesophageal echocardiography (TEE) has developed into an important tool for both cardiac and noncardiac anesthesia. Intraoperatively, TEE has many applications, including the evaluation of valvular and aortic pathology, atrial and ventricular filling and function, regional wall motion abnormalities indicative of coronary artery disease, and congenital heart defects. During cardiac surgery, the TEE examination helps to guide both the anesthetic and surgical management and allows for the immediate evaluation of cardiac repairs. During noncardiac surgery, TEE has become an important tool in determining the etiology and guiding the treatment of hemodynamic instability. Cardiac anesthesiologists were integral in the development of standards for perioperative TEE and continue to develop future applications to improve the safety and efficacy of cardiac surgery.

Prior to beginning subspecialty training in cardiac anesthesia, one must first complete a residency in anesthesiology. Residency training consists of broad training during a clinical base year followed by three years of dedicated training in anesthesiology, pain management and critical care medicine. During residency, those who wish to pursue a career in cardiac anesthesia may apply to fellowship programs, most of which are one year in

duration. Currently, there is no match program for cardiothoracic anesthesia fellowships. Cardiothoracic anesthesia fellowships have been in place for many years and were approved for accreditation by the Accreditation Council for Graduate Medical Education (ACGME) in February 2006.

The ACGME requirements for fellowship education in adult cardiothoracic anesthesiology provide for comprehensive training in the perioperative care of cardiac and thoracic surgical patients. Fellows obtain experience in preoperative evaluation and interpretation of diagnostic studies, such as coronary catheterization. Intraoperatively, Fellows learn the anesthetic management of patients undergoing various types of cardiac, pulmonary, and aortic surgery. Experience is obtained managing patients with various mechanical support devices, such as the intra-aortic balloon pump (IABP), ventricular support devices and extracorporeal membrane oxygenation (ECMO). Cardiothoracic anesthesia fellowship also includes training in perioperative TEE. Upon completion of fellowship training, board certification in perioperative TEE is available from the National Board of Echocardiography (NBE). Finally, Fellows gain experience in postoperative care through rotations in the CTICU.

Obtaining training in pediatric cardiac anesthesia can be done through two pathways. After completing a residency in anesthesiology, one may enroll in an adult cardiothoracic fellowship program and elect to concentrate in pediatric cardiac anesthesia. This provides the ability to care for both adult and pediatric cardiac surgical patients. Alternatively, after completing an anesthesiology residency, one may enroll in a pediatric anesthesia fellowship and concentrate on pediatric cardiac anesthesia. This option provides training in both pediatric cardiac anesthesia and anesthesia for complex pediatric surgery. However, a fellowship in pediatric anesthesia does not provide training in adult cardiac anesthesia. Similar to cardiothoracic anesthesia fellowship programs, pediatric anesthesia fellowships are accredited by the ACGME.

Additional information on cardiac anesthesiology can be found on the Society of Cardiovascular Anesthesiologists website (www.scahq.org). Specific fellowship information can be found on the Accreditation Council for Graduate Medical Education website (www.acgme.org).

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CHAPTER 18

Neuroanesthesia

Richard A. Jaffe, M.D., Ph.D.

Professor of Anesthesiology and Neurosurgery

Department of Anesthesia

Stanford University School of Medicine

Neuroanesthesiologists, indeed all anesthesiologists, owe a debt of gratitude to a medical student named Harvey William Cushing. In 1894, Cushing, a student at Massachusetts General Hospital, challenged fellow student Ernest Amory Codman to see who could achieve the best control over the administration of ether during surgery.¹ The most significant outcome of this competition was the development of the anesthesia record as an important tool in the management of the anesthetized patient.

It is possible that Cushing was motivated to improve the practice of anesthesia by his first experience administering ether as a medical student. Unfortunately, during the induction of anesthesia his patient died. Years later, Cushing (by then a distinguished neurosurgeon) admitted that he had never forgotten that experience in spite of being assured that such events were common and certainly not the fault of the anesthetist.



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As a neurosurgeon, Cushing was quick to emphasize the importance of the anesthetist, stating, “Anesthetization by an expert is absolutely essential. There are trials enough for the surgeon in these cases without the added anxiety in regard to narcosis.”² To that end he employed Dr. S. Griffith Davis as his full-time neuroanesthetist, later stating, “It is entirely due to [Davis’] skill that in over three hundred cranial operations there has been a complete absence of the calamities usually assigned to anesthesia.”² While much of the practice of neurosurgery would still be familiar to Cushing today, he would recognize little of the modern practice of neuroanesthesia, except the anesthesia record.

The current practice of anesthesia for neurosurgical procedures continues to evolve as it benefits from advances in our understanding of neurophysiology, pharmacology and the pathophysiologic (molecular) processes that underlie the nervous system’s response to injury and ischemia. With continuing advances in neuroprotective and neuromonitoring techniques we are increasingly able to target anesthetic-related interventions to specific patient needs. Indeed, much of the “art” of neuroanesthesia has been replaced by evidence-based practice guidance. As Michael Todd said in his Forward in the 4th edition of *Anesthesia and Neurosurgery*, “A large part of what we do in neurosurgical anesthesia isn’t particularly difficult. The young resident ... can quickly be taught a few basic rules about how to anesthetize a patient with a brain tumor, an intracranial aneurysm or a cervical spine injury. Unfortunately, while this may result in the safe care of most patients, it qualifies the individual only as a minimally skilled technician. The rest of neuroanesthesia is ‘the hard part’ and is what distinguishes the technician from the physician and consultant.”³

The interdependence of surgeon and anesthesiologist is nowhere more evident than it is in the operative management of the neurosurgical patient. The perceptive neurosurgeon realizes that the successful outcome of complex neurosurgical procedures is a true team effort. While the perceptive neuroanesthesiologist understands that, although necessary, it is not sufficient to be technically proficient. It is the “rest of neuroanesthesia” that is both the challenge and the reward.

It is ironic that the brain, the most important organ system and principle target of anesthetic action, is still the least understood and most difficult to monitor. In that irony lays opportunity. As a student contemplating a career in neuroanesthesia you can anticipate clinical challenges and practice or research opportunities limited only by your own enthusiasm and desire to learn.

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CHAPTER 19

Obstetric Anesthesiology

Paloma Toledo, M.D.

Instructor in Anesthesiology

Northwestern University Medical Center

Obstetric anesthesiology is the body of anesthesiology knowledge and practice that relates to the anesthetic care of women during pregnancy. Obstetric anesthesiologists are specialized anesthesiologists who have expertise in maternal and neonatal physiology, as well as in regional anesthesia. These anesthesiologists are involved in the care of parturients during the entire duration of their pregnancy. Obstetric anesthesiologists are involved with in vitro fertilization, anesthesia for cerclage placements, nonobstetric surgery for the pregnant patient, fetal surgery, postpartum procedures, and of course, anesthesia for labor and cesarean deliveries.

Obstetric anesthesia is one of the newer subspecialties of anesthesiology. Anesthesia for deliveries has only recently become a well-accepted practice of medicine. In the mid-1800s, it was commonly believed among Western practitioners that uterine pain was inseparable from contractions; therefore, any medication that removed pain would interfere with contractions and the progress of labor. This belief originated from the Bible when God punished Eve for her disobedience in the Garden of Eden. Pain was seen as a punishment for sins; therefore, people believed that it was wrong to avoid the “divine punishment” of labor pain.¹

This belief was ultimately challenged by James Simpson, the inventor of the Simpson forceps, who used diethyl ether to anesthetize a woman with a deformed pelvis for delivery. This sparked a huge controversy in the medical field, and for years physicians debated the use of anesthesia for delivery. It was ultimately public demand for labor analgesia, and the development of safe techniques, that led to acceptance of pain relief for labor.² Obstetric anesthesia primarily relied on inhalation agents and narcotics until the 1950s when regional anesthesia began being used in obstetric settings. Over the last 50 years, anesthesiologists have engaged in research that not only refined the techniques of regional anesthesia, but have also made the delivery of anesthetics safer for both the mother and her baby. General anesthesia is associated with a seven times greater incidence of a failed intubation in pregnant patients when compared to nonpregnant patients due to increased swelling in the maternal airway and difficulty in properly positioning these patients.³ Advances in regional anesthesia have led to a decline in the need for general anesthesia in obstetrics. Accordingly, the number of deaths associated with anesthesia in pregnant patients has decreased.⁴

The increasing use of anesthesia for obstetric purposes, combined with advances in the understanding of the physiologic and pharmacologic differences between pregnant and nonpregnant patients, led to the development of the subspecialty of obstetric anesthesia.

Our obstetric colleagues have recognized the benefits of epidural analgesia. An American College of Obstetrics and Gynecology (ACOG) statement says, “Of the various pharmacological methods used for pain relief during labor and delivery, the lumbar epidural block is the most effective and least depressant, allowing for an alert, participating mother.” An additional benefit of advances in epidural analgesia has been that labor has become more of a “family” event. In the past, fathers were not allowed in delivery rooms, particularly during cesarean deliveries, and instead were forced to pace the halls until their spouse or partner gave birth. Improvements in epidural and spinal anesthesia have permitted the expectant father to enter the labor and delivery suite and become a true partner in the birthing process. Labor epidural catheter placement and anesthesia for cesarean deliveries are the two most common procedures performed by the obstetric anesthesiologist; however, even these common procedures are not without challenges. Medical management of patients with diseases such as preeclampsia, complex cardiac lesions, or neurological processes require not only knowledge of the disease state, but also of the physiologic changes that we cause with our anesthetics.

Training to become an obstetric anesthesiologist generally involves a 1- to 2-year fellowship after completion of an anesthesia residency program. Obstetric anesthesia Fellows learn the skills and techniques necessary to manage high-risk as well as low-risk pregnancies preoperatively, intraoperatively, and postoperatively, as well as the skills necessary to teach and conduct research in the field of obstetric anesthesiology.

There are many exciting developments on the horizon for obstetric anesthesia. New techniques such as ultrasound for epidural placement, new medications, and better understanding of the relationship between our anesthetics and the effect on the parturient, hold promise for greater research opportunities and ultimately advancements in the quality of care for our patients.

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CHAPTER 20

Pain Medicine

James P. Rathmell, M.D.

Professor of Anesthesiology

University of Vermont College of Medicine

Director, Center for Pain Medicine

Pain medicine is the subspecialty of anesthesiology that focuses on the diagnosis and management of patients with acute, chronic and cancer-related pain. The specialty grew from the application of regional anesthetic techniques to help control pain. This subspecialty differs dramatically from the practice of anesthesiology in the operating room; much of what the pain specialist does is carried out in the outpatient clinic and involves the long-term care of patients with chronic illness. For those who enjoy the technical aspects of anesthesiology, particularly regional anesthesia, but long for a bit more of the patient-physician relationship that comes with long-term care and the challenges of diagnostic evaluation, this is just the subspecialty for you.



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How Did the Subspecialty of Pain Medicine Evolve From Anesthesiology?

Much has been written about the origins of pain medicine as a distinct discipline,¹ and anesthesiologists have played a primary role since the start. It began with the introduction of effective general anesthetics in the mid-19th century, when surgical pain could be separated from operation. Almost 100 years later, the late John Bonica, an anesthesiologist at the University of Washington and recognized father of the specialty we now call pain medicine, developed his career promoting multidisciplinary pain care and formal training of specialists. Dr. Bonica recognized the usefulness of regional anesthesia and other types of neural

blockade in treating pain, but he also recognized the complexity of chronic pain. From his life's work we now have extensive ongoing efforts to recognize and treat pain effectively, to train subspecialists, and to conduct basic and clinical research to further our understanding of pain and its treatment.

At the time of this writing, subspecialty certification in pain medicine requires completion of a core residency program in anesthesiology (one year of general medicine and three years of anesthesiology) followed by a one year "fellowship" in pain medicine. The first pain medicine programs recognized by the ACGME were accredited in 1992. The American Board of Anesthesiology, working in parallel with the ACGME, developed a subspecialty certification examination in pain medicine now titled, "Subspecialty Certification in Pain Medicine." The first exam was given in 1993. The number of candidates sitting for the examination has steadily grown since that time. To see a detailed list of the training that takes place during pain fellowship, see the ACGME's program requirements.²

Pain and its consequences draw on resources from all medical disciplines. Dr. Bonica's experiences during World War II suggested that each medical specialist had unique expertise to bring to patients suffering in pain; hence, his consistent and effective promotion of a multidisciplinary process for pain care. Also, thanks largely to Dr. Bonica, anesthesiology has led the development of formal training programs. Indeed, all currently accredited programs reside within academic anesthesiology departments and the majority of program directors are anesthesiologists. Specialists from other disciplines have also focused their clinical and research efforts on pain. The most obvious example is neurology where the majority of clinical treatment and research about headache has arisen. Physical medicine and rehabilitation (PM&R) has also long had a focus and expertise in functional restoration, and many chronic pain rehabilitation programs are led by physiatrists. And, of course, psychiatrists have been closely involved where pain, depression, and substance abuse overlap. During the last decade, specialists from these other disciplines have been seeking subspecialty training in pain medicine with increasing regularity.

What Does a Pain Medicine Specialist Do?

The range of practitioners declaring themselves as pain medicine specialists is extraordinary – from clinics that provide largely or solely cognitive-behavioral approaches to chronic pain (psychiatrists and psychologists) through functional restoration programs (physiatrists) all the way to the type of clinic that offers nothing more than injections of various sorts. The common thread is that all pain physicians care for patients with acute, chronic or cancer-related pain. Due to preference, expertise or the particular patient mix at their own institution, some practitioners have chosen to spend most or all of their time caring for one of these very different types of patient.

Acute pain specialists are often anesthesiologists who have expertise and ability in performing regional anesthesia and have chosen to extend these techniques into the postoperative settings. Anesthesiologists who staff acute pain services often spend part of their day in the operating room providing intraoperative anesthesia care and another part of the day visiting patients on the postoperative ward to manage their pain in the hours and days following surgery. The most common techniques they employ include continuous epidural analgesia and single-shot and continuous nerve block techniques. While some pain specialists care for both acute pain and chronic pain, the focus during fellowship training has turned toward teaching how to care for those with chronic and cancer-related pain. The skills and knowledge needed to establish and run an acute pain service are well covered in the core residency training program.

The majority of pain medicine fellowships spend most of the training year teaching the skills and knowledge needed to care for patients with chronic and cancer-related pain. Most training programs are centered in an outpatient clinic where patients are seen for evaluation and treatment on an elective basis. Comprehensive diagnostic evaluation, medication management, and applying neural blockade to the patient with pain are among the skills needed of the pain specialist. Many pain specialists have also gained the minor surgical skills needed to independently perform implantation of devices used to control chronic pain, including spinal cord stimulators and spinal drug delivery systems.

“Interventional Pain Medicine” is a term that has been coined for those techniques that involve minimally invasive treatments and minor surgery as part of their application, including neural blockade and implantable analgesic devices. There is no single practice pattern that any pain specialist can point towards as the correct way to treat patients with chronic pain. The best pain medicine practitioners strike a reasonable balance between interventional and non-interventional management. This practice pattern is sustainable and those adopting a balanced style of practice will be able to adapt to evolving scientific evidence that appears in support of pain treatment, regardless of the type of treatment. A balance between treatment modalities also allows practitioners to switch from one mode to another or incorporate multiple treatment approaches simultaneously.

Can I Practice Both Pain Medicine and Anesthesiology?

The answer is yes, but the specialized training and skills required for work as an anesthesiologist in the operating room are very different from those required of the pain physician in the outpatient clinic. In recent years many practitioners have found keeping both skill sets up-to-date too difficult and have chosen to practice pain medicine full time.³ In an insightful editorial in the *ASA Newsletter*, Mark Lema wrote knowingly of the everyday tensions that often arise between pain medicine practitioners and their anesthesiology

colleagues practicing exclusively in the operating room setting.⁴ With specialization comes a conscious effort to focus practice so as to become intricately familiar with a more limited realm. The obvious result is a loss of the skills and knowledge needed to practice in the broader parent specialty. My belief is that the specialized knowledge and skills needed to practice pain medicine will make it difficult to practice both anesthesiology in the operating room and pain medicine within the span of my own career. For now the road from anesthesiology to pain medicine provides a focus on neural blockade and core training in pharmacology and physiology that is a solid grounding for treating patients with pain. I would not have chosen any other route.

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CHAPTER 21

Pediatric Anesthesiology

Deborah A. Schwengel, M.D.

Johns Hopkins University School of Medicine
Assistant Professor of Anesthesiology,
Critical Care Medicine and Pediatrics,
Division of Pediatric Anesthesiology
Residency Program Director

What Do Pediatric Anesthesiologists Do, and How is the Field Different Than Other Specialties of Medicine?

Pediatric anesthesiology is the practice of anesthesiology that focuses on the care of children and sometimes young adults. Compared with the practice of pediatrics, pediatric anesthesiology is a procedure-based specialty with a lot of knowledge of general medicine and pediatrics. Anesthesiologists have a great fund of knowledge of all body systems and do not focus on just the function of the heart, lungs and airway, although we are experts in management of the airway. Medical students sometime choose anesthesiology as a career when they learn that they can work with their hands, be in the operating room, and still manage medical conditions like heart disease, kidney disease, hematologic disorders, etc. Anesthesiologists have also been pioneers on the topics of safety and efficiency and must be good team leaders. To be a good anesthesiologist you must be very good at multitasking, troubleshooting, working with your hands, working under stress, and working well with teams of surgeons and nurses. And if you are a compassionate doctor, you can really find satisfaction in your ability to allay fears, treat pain and keep patients safe in the operating room. Anesthesiology is truly an exciting career choice; the work hours are better than many other medical professions, the burnout rate is low, the pay scale is favorable and the job market is excellent.

Children are not just small adults, which is why the subspecialty of pediatric anesthesiology is necessary. The art and science of medicine is blended well in the specialty of pediatric anesthesiology. Although children can be cared for by anesthesiologists with general training, children (especially infants) have differences in anatomy, physiology, pharmacodynamics and behavioral development that can make them challenging candidates for anesthesia. Most general-trained anesthesiologists do not have the comfort level required to care for newborns. Precision in medication dosing is required, and infants desaturate quickly. It is important for the anesthesiologist who is taking care of infants to be comfortable with the fact that systems designed for adults sometimes don't work for babies, and once the surgeon has prepped and draped the patient, there is almost no access to the patient.

Young children are also not capable of understanding the plan or environment, or they need to be NPO. Unfortunately, their coping mechanisms do not lead to cooperation, so techniques of anesthesia care that focus on the developmental capabilities of the patient are needed. A great pediatric anesthesiologist can make all the difference to children and their parents, and research has shown that sensitive preoperative discussions and play techniques on induction can reduce the need for preoperative sedatives; however, sometimes sedatives are a wise choice for extremely anxious patients. The transition from the prep area to the operating room is not only challenging but it can be fun too. This is when the anesthesiologist gets to play with the child, allay anxiety and sometimes act a little like a child. I have anesthetized children on parents' laps, on scooters, in strollers, in wagons and standing, sitting or lying down. There are many options; it is the anesthesiologist's job to pick a technique both safe and best for the psychology of the situation.

Another reason that pediatric anesthesiologists are needed is that children with severe illnesses, chronic illnesses or congenital disorders are more challenging to care for than patients born with perfect bodies. Only pediatric providers really understand how to care for patients with challenging congenital heart defects, metabolic disorders or other birth defects. Some of the care for patients with congenital disorders is so specialized that in many institutions, the pediatric anesthesiologists care for the adult patients with certain congenital disorders. Parents of patients with congenital disorders seem to understand the value of



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specially-trained pediatric anesthesiologists. Parents of healthy children don't have the same hospital experience and thus have a more naive perspective. Just think about your child; if you are the parent, wouldn't you want your child cared for by someone who cares for children every day?

Training Options

Pediatric anesthesiology is an exciting blend of both pediatrics and anesthesiology. Some people decide that they wish to combine the practices of pediatric anesthesiology and pediatric critical care medicine. If that is the chosen path, two residencies are currently required, followed by fellowship training.

The training options include the following:

1. Traditional internship, anesthesiology residency followed by fellowship in pediatric anesthesiology – 5 years
2. Pediatric internship, anesthesiology residency followed by fellowship in pediatric anesthesiology – 5 years
3. Pediatric residency, anesthesiology residency followed by fellowship in pediatric anesthesiology – 7 years
4. Pediatric residency, anesthesiology residency followed by both pediatric critical care and pediatric anesthesiology fellowships – 8 to 9 years

If I Choose to Train as a Pediatric Anesthesiologist, What Are My Career Options?

1. Clinical pediatric anesthesiologist
 - a. Pediatric hospital – 100 percent pediatric cases
 - b. Combined adult and pediatric hospital – depending on the hospital, you might do a mixture of adult and pediatric cases
2. Academic pediatric anesthesiologist
 - a. Clinical specialist
 - b. Educator
 - c. Research track
3. Combined pediatric anesthesiologist and pediatric intensivist
 - a. Clinical specialist
 - b. Educator
 - c. Research track

How Do I Investigate My Interest in Pediatric Anesthesiology as a Career Choice?

Do electives in anesthesiology, pediatric critical care medicine and possibly the neonatal intensive care unit. Talk to the pediatric anesthesiologists in your institution, and pick their brains about what they like and what they dislike about what they do. Ask them how they would train and talk about different career options in the field of pediatric anesthesiology.

CHAPTER 22

Geriatrics and Anesthesia: Everything You Wanted to Know About Anesthesia But Were Too Afraid to Ask

Michael C. Lewis, M.D.

Professor and Chair of Anesthesiology
University of Florida, College of Medicine
Jacksonville, FL

An aging population carries huge consequences for the practice of anesthesiology. Aging issues affect most aspects of anesthesiology. This chapter aims to describe the demographic and physiological changes of aging. I hope after reading this you will join me in being driven to solve some of the challenges that this ever-enlarging patient group offers.

An Ever-Increasing Elderly Population

The roots of this change lay in advances in medicine and progressive social policy. After World War II, fertility rates increased. There was a “baby boom” from 1947 to 1964, and now this generation is growing old. Since Americans are now living longer, the age of the oldest segment of the population has also steadily increased over the last century. The “oldest – oldest” is the fastest growing segment of the elderly population. The number of people over 65 years old has tripled in the last 100 years and is anticipated to further double in size by the year 2040. Such improved life expectancy continues to enlarge that fraction of the surgical patient population that is considered elderly.



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What is Different About These Patients?

Organ function with aging is usually well-maintained under basal conditions. When an organism can maintain a steady state in the face of increased physiological demand, it is said to demonstrate a good functional reserve. Aging manifests as an inability to enhance function in the face of increased demand.

What Physiological Changes are Associated With Aging?

■ Cardiovascular System (CVS)

- Progressive replacement of supple cardiac and vascular tissue by stiff, fibrotic material. The left ventricle (LV) must work harder to eject blood into a rigid aorta. Left ventricular hypertrophy (LVH) develops. This hypertrophy impairs filling because of increased ventricular wall stiffness in early diastole. Loss of the sinus rhythm, a common event during anesthesia, may depress cardiac output and arterial pressure more markedly in the elderly.
- Aging is associated with a decrease in parasympathetic outflow while overall sympathetic neural activity increases. The administration of β -adrenergic agonists elicit reduced responses in the elderly while β -blocking drugs retain their effectiveness.
- The maintenance of hemodynamic homeostasis largely depends upon the baroreflex. Arterial stiffening may reduce the ability of the baroreceptors to transduce changes in pressure.

■ Respiratory System

There are four “core” characteristics of pulmonary aging:

- Reduction in muscle mass and power
- Changes in compliance
- Reduction in diffusion capacity
- Decline in control of breathing

■ Renal System

- Aging results in both structural and functional changes in the kidney that affect drug metabolism and kinetics as well as predisposing the patient to fluid and electrolyte abnormalities.
- Renal mass is lost between ages 40 and 80, mostly from the cortex. Microscopically there is a reduction in the number of functional glomeruli, but the size and capacity of the remaining nephrons increase to partially compensate for this loss.
- Over 30 years of age, renal blood flow (RBF) declines progressively. A majority of this reduction in RBF occurs in the cortex.

- Glomerular filtration rate (GFR) decreases by approximately 1 mL/min/year beginning by age 40. This decline in GFR is accompanied by a gradual loss of muscle mass and is rarely associated with an increase in serum creatinine. Serum creatinine is therefore a poor indicator of GFR in these patients.
- Under normal circumstances, age has no effect on electrolyte concentrations or the ability of the individual to maintain normal extracellular fluid volume. However, the adaptive mechanisms responsible for regulating fluid balance are impaired in the elderly and the aging kidney has a decreased ability to dilute and concentrate urine.

■ Metabolism Temperature Regulation

- The mitochondria provide the power for all the metabolic functions. The energy required to maintain basic cellular functions is termed basal metabolic rate (BMR) and this falls with advancing age. Decreased BMR is associated with decreased β -receptor sensitivity. This blunting of the β -response has been used to explain predisposition to obesity in the elderly.
- The changes in body composition with aging are due to an increase in the percentage of body fat, loss of protein and intracellular dehydration.
- Body mass index (BMI) is a standardized measure of body habitus. It is defined as the weight of an individual divided by the height squared (kg/m^2). Obesity is defined as a BMI greater than 30, and morbid obesity is defined as a BMI of greater than 40. Visceral, intra-abdominal and intra-muscular fat increases with age.
- Body temperature regulation is impaired in the elderly, making them prone to hypothermia. Anesthesia impairs thermoregulatory responses in all patients but produces even greater impairment in the geriatric population. Perioperative hypothermia lasts longer in geriatric patients. Elderly patients are at greater risk than younger patients from the adverse effects of hypothermia.

■ Neurological

- Postoperative delirium, a transient mental dysfunction, can result in increased morbidity, delayed functional recovery and prolonged hospital stay in the elderly.
- Possibly related to the occurrence of postoperative delirium is the incidence of postoperative cognitive decline. These two concepts are not the same. Those who suffer cognitive loss are generally fully alert and oriented.

■ Follow Basic Rules of Geriatric Anesthesia

- Use smaller doses of medications, as they will have a more profound effect.
- Use shorter acting drugs (i.e., remifentanyl).
- Don't rush! Drugs take longer to work.
- Decreased organ function may increase risk of complications; therefore, choose drugs with fewer side effects.
- Use drugs with less accumulation (i.e., propofol).

Summary

America is experiencing a great challenge, facing the effects of the graying of the population and its impact on our health care system. The preoperative evaluation of the elderly patient is usually more complex. This complexity with increasing age is possibly due to the greater number and severity of coexisting illnesses. The functional status can be difficult to predict, making it a challenge to sufficiently evaluate the patient's ability to respond to the stresses associated with surgery.

CHAPTER 23

Regional Anesthesia

Joseph M. Neal, M.D.
Anesthesiology Faculty
Virginia Mason Medical Center
Clinical Professor of Anesthesiology
University of Washington

Regional anesthesia is the subspecialty of anesthesiology that focuses on the local anesthetic blockade of peripheral nerves and the neuraxis. This is a subspecialty that overlaps acute and chronic pain medicine, in addition to pediatric, obstetric and ambulatory anesthesia. Moreover, regional anesthesia is an essential component of surgical anesthesia, where its applications range from simple plexus blocks for ambulatory hand surgery, to femoral nerve block for analgesia following total knee replacement, to the placement of a thoracic epidural as a key contribution to the multimodal management of colon surgery.

Why Regional Anesthesia?

The regional anesthesia practice of many anesthesiologists is limited to placing lumbar epidurals for labor analgesia. They are missing all the fun! Performing spinal and epidural anesthesia, placing continuous perineural catheters, or anesthetizing the brachial plexus with a single injection is technically challenging and, yes, fun. It breaks the tedium of managing each and every patient with general anesthesia. However, professionalism dictates we have better reasons for choosing an anesthetic technique than our own entertainment. Indeed, regional anesthesia has a number of advantages as either an isolated technique or an adjunct to general anesthesia. Compared to fast-track general anesthetic techniques, upper extremity regional techniques promote faster hospital discharge, fewer opioid-related side effects, and better analgesia during the first 24 hours after surgery. A spinal or epidural anesthetic for knee arthroscopy allows the patient to watch the surgeon repair his or her knee, while epidural anesthesia allows a mother to be awake during the cesarean delivery of her child. As a component of multimodal analgesia, thoracic epidurals play a critical role in perioperative management by promoting faster return of bowel function and fewer pulmonary complications following major abdominal or chest surgery. In short, regional anesthesia is a valuable, enjoyable and ever-broadening facet of anesthesiology practice.

So Why is Regional Anesthesia Not a Part of Everyone's Practice?

Despite its advantages, the actual practice of regional anesthesia can be challenging. The most important impediment to its widespread acceptance is the lack of quality training of residents by well-qualified faculty. This situation is improving. In 1980, most residents' exposure to regional anesthesia was limited to obstetrics. Training in the subspecialty varied widely, ranging from hundreds of spinal anesthetics in some programs, to only three spinal anesthetics in other programs.¹ By the year 2000, the vast majority of residents exceeded the Anesthesiology Residency Review Committee's minimal caseload experience for spinal and epidural anesthesia (50 each), and their experience included not only obstetrical indications but also pain medicine and surgical anesthesia uses. Inter-program variation in regional anesthesia training had narrowed. Despite these gains, 40 percent of residents still failed to attain minimal experience in performing peripheral nerve blocks (n=40).² As would be expected, the more training residents receive in regional anesthesia, the more likely they are to actually perform blocks in practice.³ Indeed, a survey of regional anesthesia fellowship graduates found that regional anesthesia remains a significant part of their caseload, whether in academic or private practice.⁴



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There are other self-imposed barriers to regional anesthesia practice. Many anesthesiologists are concerned about what they perceive as increased liability associated with regional anesthesia; the American Society of Anesthesiologists' Closed Claims database suggests that nerve injury claims have increased as major respiratory claims have decreased over the past two decades.⁵ Yet overall, regional anesthesia remains an extraordinarily safe practice that is linked only rarely to major morbidity. Another challenge that regional anesthesia enthusiasts often face is bringing their techniques to a practice where performing the blocks is perceived to "slow things down." However, after experiencing the advantages afforded by regional anesthesia, surgeons typically become strong advocates of these techniques.

Who Practices Regional Anesthesia?

Regional anesthesiologists are in some ways just a bit different from those who deliver only sedative hypnotic drugs and volatile gases. Regional anesthesiologists tend to be good with their hands, they like handling needles, and they enjoy the challenge of finding the epidural space in a 450-pound patient. They are committed to the belief that their extra efforts, at the very least, provide their patients with superior analgesia as compared with traditional opioid-based modalities.⁶ Regionalists generally have great communication skills and enjoy chatting with an awake patient during arthroscopic knee surgery. Finally, because regional anesthesia carries the risk of not being as effective as expected, it presents a challenge. The job of the regional anesthesiologist is to make the imperfect perfect, and then to research ways to make it even better.

What is the Future of Regional Anesthesia?

In the last decade, the practice of regional anesthesia has experienced advances not witnessed since the introduction of local anesthetics at the end of the 19th century. Regional anesthesia and acute pain medicine research is vibrant, particularly in the area of peripheral nerve blockade. Outcome studies have further defined the benefits of regional anesthesia in selected subgroups of patients, both those undergoing relatively minor ambulatory procedures and those having more complicated operations. Improvements in the technology of peripheral nerve stimulation and ultrasonography have the potential to revolutionize how we localize nerves destined for blockade. Technical and material improvements in perineural catheters have opened new doors for postoperative analgesia that were previously closed by concerns regarding neuraxial anesthesia during concomitant anticoagulation. Contemporary anesthesiologists believe that regional anesthesia will become an increasingly important part of their future practice,⁷ surgical and postoperative analgesia indications are growing, and residents and Fellows are becoming better trained.⁸ The future of regional anesthesia is bright. No matter what subspecialty of anesthesiology you eventually choose, regional anesthesia will likely be a much larger part of your daily practice than it was for the generation before you.

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CHAPTER 24

Critical Care Anesthesiologists

Antonio Hernandez, M.D., FCCM

Associate Professor of Clinical Anesthesiology
Director, Cardiovascular Intensive Care Unit
Division of Critical Care Medicine &
Cardiothoracic Anesthesiology
Vanderbilt University Medical Center
Nashville, TN

Elizabeth Cordes Behringer, M.D.

Professor of Anesthesiology & Critical Care Medicine
Department of Anesthesiology
Cedars Sinai Medical Center
Los Angeles, CA

The Field of Anesthesiology and the Critical Care Anesthesiologist

Anesthesiology provides many challenges in daily practice as well as a variety of exciting opportunities in subspecialty training. The claim by uninformed clinicians that the practice of anesthesia involves “95 percent boredom and 5 percent terror” could not be further from the truth!

The anesthesiologist, utilizing a diverse array of anesthetic techniques, is the perioperative physician for surgical patients undergoing a wide variety of surgical procedures. Today’s practicing anesthesiologist is involved with the preoperative evaluation and preparation, intraoperative management, and postoperative care of surgical patients. Additionally, anesthesiologists undergoing subspecialty training in critical care medicine are leaders in postoperative care in the Surgical Intensive Care Unit.

There are a variety of subspecialties within the field of anesthesiology. An individual may pursue further training following successful completion of a residency in anesthesiology. The available subspecialties include pain management and regional anesthesia, obstetric anesthesia, pediatric anesthesia, transplant anesthesia, neuro-anesthesia, cardiothoracic anesthesia and critical care medicine, just to name a few. Anesthesiologists also excel in research, whether it’s clinical or lab-based. A research fellowship may also be pursued following completion of residency in anesthesiology.

Once a physician completes residency in anesthesiology, there are a myriad of practice opportunities available. Anesthesiologists can pursue careers in private practice, industry or academia. The goals of academic anesthesia practice remain excellence in teaching, clinical care and research. Further information about a career as an anesthesiologist can be found at the American Society of Anesthesiologists website (www.asahq.org).

Role of the Critical Care Anesthesiologist — Clinician/Perioperative Physician

Intensivists, or critical care physicians, comprise a diverse group of clinicians. Pulmonary specialists, trauma surgeons, pediatricians, as well as anesthesiologists, all may receive specialized training in the art and science of critical care medicine. Currently, certification in critical care medicine may be achieved through several different credentialing entities (e.g., American College of Surgeons for Trauma Surgeons or the American Board of Anesthesiology for Anesthesiologist-Intensivists). Physicians who have successfully completed residency in anesthesiology are eligible for additional training in the anesthesiology subspecialty of critical care medicine.

Like other critical care physicians, critical care anesthesiologists assess and develop a plan of care for the individual patient. Critical care anesthesiologists generally care for pre- and post-surgical patients. Skills unique, but not exclusive to critical care anesthesiologists, include airway and ventilator management, as anesthesiologists are considered to be “airway experts.”

Fellowship in critical care anesthesiology is diverse. The minimum time commitment for a critical care fellowship in anesthesiology is one year. Training may include a wide variety of skills including organization and daily running of an Intensive Care Unit, invasive monitoring, ventilator management, transesophageal echocardiography as well as subspecialty rotations in nutrition, infectious disease, or general radiology. Critical care Fellows may rotate through a wide array of critical care settings. These include trauma ICU, neurosurgical ICU, cardiothoracic ICU, transplant ICU, burn ICU and surgical ICU.



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Many critical care anesthesiology teams function as a consulting service. They directly participate and coordinate patient care as part of a multidisciplinary team approach. Like other intensivists, they take a multidisciplinary approach to the individual patient and direct his or her care with the participation of the primary admitting service (surgeon). Other essential team members include respiratory therapists (RRTs), registered dietician, pharmacists Ph.D. (Pharm.D.), occupational and physical therapists, social worker, chaplain, and of course the critical care nursing staff. In academic practices, the critical care team includes a variety of residents (surgery and/or anesthesiology) as well as medical students. As a team, they manage the care of the individual patient and coordinate the surgical intensive care unit operation from infection control, quality control and improvement practices through the collection of data. This information is used to provide excellent health care as well as the conservation of limited and expensive resources. Collection and analysis of data become a vital role for the intensivist in order to improve quality of care, patient outcome and risk assessment, as well as cost reduction strategies. Further information on the field of critical care anesthesiology can be found at the Society of Critical Care Anesthesiologists (SOCCA) formerly ASCCA website (www.soccca.org).

For more information on the field of critical care medicine, please see the Society of Critical Care Medicine website (www.sccm.org).

Role of the Critical Care Anesthesiologist – Investigator

Standardized practice in the ICU setting has resulted in a marked reduction in the morbidity and mortality of critically ill patients. Initiation of conservative ventilation practices, conservative blood transfusion, and aggressive glycemic control are a few strategies that have recently demonstrated improved outcome. The intensivist frequently has the opportunity to enroll patients in clinical research trials in an effort to improve

patient outcome. Some clinicians dedicate a large amount of their time conducting clinical and/or basic science research. This practice is not specific to critical care anesthesiologists, but mentioned for those interested in becoming a clinician-investigator.

Conclusion

The field of anesthesiology is one that provides the opportunity to participate in the care of essentially all patient populations. The anesthesiologist intensivist has the opportunity to implement many of the techniques unique to anesthesiology training in order to provide exceptional care of critically ill surgical patients. Such techniques vary as follows: one patient may require transesophageal echocardiography for evaluation of hemodynamic instability while another may require regional anesthesia to alleviate pain or improve vascular compromise by creating a selective sympathectomy.

Critical care anesthesiologists can tailor their practice from critical care medicine to a combination of both critical care and anesthesiology. Medical students with an interest and aptitude for the surgical specialties, a lifelong love of learning and “cutting edge” medicine should strongly consider a career in anesthesiology as well as subspecialty training in critical care medicine.

CHAPTER 25

Political Activism and The American Society of Anesthesiologists Political Action Committee

Anne T. Lunney, M.D.

Department of Anesthesiology
Geisinger Medical Center
Danville, PA

The American Society of Anesthesiologists Political Action Committee (ASAPAC) was formed in October 1991 by a vote of the American Society of Anesthesiologists (ASA) House of Delegates. The goal of the ASAPAC is to allow ASA membership to participate fully in the United States political process. The ASAPAC’s mission statement is: “To advance the goals of the medical specialty of anesthesiology through the bipartisan support of candidates who demonstrate commitment to patient safety and quality of care.”

Since its inception, ASAPAC has provided a unified and empowered voice to ASA and its individual members. ASA is the largest physician PAC and consistently in the top 50 of the over 3,000 association and corporate PACs. ASAPAC consistently raises over \$3 million in an election cycle.

The PAC provides a legal channel for political contribution of ASA members to collectively support election campaigns. The committee is registered with the Federal Election Commission (FEC) and is held to the standards of the 1975 Federal Election Campaign Act. All campaign contributions are openly monitored and follow the FEC guide for corporations and labor organizations. The ASAPAC is a Separate Segregate Fund PAC, as opposed to a non-connected PAC, which enables the PAC to solicit contributions only from individual dues paying members within the ASA.

The ASAPAC provides political support for ASA's advocacy efforts related to anesthesiology-related regulations and legislation, e.g., legislation which influences Centers for Medicare & Medicaid (CMS) reimbursement, patient safety, medical liability reform, physician supervision and pain management. In 2008, the ASAPAC was instrumental in helping House Resolution 6331 not only pass in Congress, but also override President Bush's veto of the bill. This bill helped reverse previous legislation that had singled out anesthesia teaching programs for unfair reimbursement practices (a.k.a. "The Teaching Rule") and blocked cuts in Medicare payments to physicians.

Since 1991, the ASAPAC has directly supported political candidates and ASAPAC members have participated in fundraising for countless political campaigns.

The political activities of ASAPAC allow anesthesiologists to participate directly and tangibly in the political process. With ASA membership support, the ASAPAC has the ability to positively influence the future of anesthesiology practice.



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CHAPTER 26

The Key to Your Future: The ASA and the AMA

John B. Neeld Jr., M.D.

Chairman, Northside Anesthesiology Consultants
CEO, Sentinel Healthcare Services
Atlanta, GA

This chapter outlines the overriding importance of organized medicine, such as the American Society of Anesthesiologists (ASA) and the American Medical Association (AMA), to your future.

Let's begin at what turned out to be my earliest statement about organized medicine: "I have no interest in medical politics. I simply want to be a good doctor." These words were in response to a question posed by my soon-to-be wife in 1974, and I sincerely meant every word.



I believe today's students would champion a similar idealistic view such as that from Benjamin D. Unger, M.D., 2006 President of the ASA Resident Council Governing Council, "I like to consider myself of the generation of doctors whose practice is evidence-based and data driven."¹ His views are similar to mine but couched in the language of today's medicine.

I soon learned, however, as you will, that being a good physician is necessary but not sufficient to fulfill our duty to protect and improve the health of our patients and to advance medical knowledge.

While physicians deal very effectively with the needs of their individual patients on a micro-level in their practices, the future of our profession and of health care in the United States will be determined at the macro-level by the federal government in Washington, D.C., and in the various states by legislators and regulators. It is only through the strength of organized medicine, the ASA and AMA, where physicians can influence processes that will shape their futures.

Consider the following:

1. The United States spends more than any other nation on health care, some \$6,300 per person annually or 15 percent of the Gross Domestic Product.²
2. Forty-five million Americans are uninsured.
3. Some sources rank the United States 37th in the world in terms of value received for money spent on health care.³
4. Voters consistently rank “affordability of health care” second only to the economy as a major concern.⁴
5. Levels of reimbursement are not controlled by physicians but are dominated by the federal government through the Medicare program, which determines both the manner and amount of reimbursement for physician services.
6. In the private sector, the consolidation of health plans into a few dominant payers, who frequently reimburse a percentage of Medicare’s payments for similar services (sometimes less than 100 percent), has severely limited the ability of physicians and physician groups to negotiate for non-government controlled payments.
7. The hugely flawed sustainable growth rate (SGR) formula for determining physician reimbursement under Medicare has resulted in reimbursements falling behind the government’s own estimates of the growth in practice costs by 12 percent over the last 4 years with further **reductions** projected to be 37 percent by 2015, a period during which practice costs are projected to rise by 22 percent. Clearly we cannot sustain these reductions.
8. The Affordable Health Care Act and its impact on patients, doctors, different health care providers and the health care industry in general.

Can you and I resolve these enormous issues individually? Of course not. Under the leadership of AMA, ASA, all specialty societies and the state medical associations, we must come together with all of our colleagues to exert our collective influence at the national level. If we fail, the increasing number of uninsured and underinsured, ever rising costs for patients and their employers, and the growing perception that the

quality of American health care has declined, make the threat of a single-payer system very real. A decision to move to such a plan will be irrevocable and the fate of medicine’s future will be sealed. Failure to actively participate in the political process is not an acceptable or realistic option for any physician in today’s world.

Even as AMA and ASA deal with these complex and dangerous issues at the national level, we must also deal with the annual efforts of non-physician practitioner groups in state legislatures to expand their scope of practice by regulation, not education. Organized medicine does not battle these efforts to “protect our turf” or enhance income; it does so solely to protect our patients, who know virtually nothing about the education and qualifications of health care providers, from being misled about the identity and qualifications of different providers.

The AMA and ASA are responding effectively in this arena. The AMA House of Delegates, at its June 2006 meeting, passed ASA Resolution 211 titled, “Need to Expose and Counter Nurse Doctoral Programs (NDP) Misrepresentation.” The resolution was prompted because of a plan by the American Association of Colleges of Nursing to convert their advanced practice nursing degrees from a master’s level to a doctor of nursing practice degree by 2015. ASA was concerned that patient safety could be jeopardized in the clinical setting by nurses and other NPPs identifying themselves as “doctors” when they have not earned a medical degree.

Additionally, in February 2005, the AMA created the Scope of Practice Partnership (SOPP), which includes ASA as a member of its executive board, to coordinate nationwide activities concerning practice issues with the various specialty and state medical associations.

The creation of the SOPP is clearly “on target” based on the June 2006 creation of the Coalition for Patients’ Rights (CPR), which consists of some 25 organizations of NPPs including the AANA, various other nursing organizations, chiropractors, psychologists and physical therapists. The CPR attempts to counter the SOPP’s efforts to clarify the true qualifications of NPPs for the public by characterizing it as an effort to “reduce provider options for patients.”

Excerpts from the CPR’s Joint Statement include the following:

1. “It is inappropriate for physician organizations to advise consumers, legislators, regulators, policy makers or payors regarding the scope of practice of licensed healthcare professionals whose practice is authorized in statutes other than medical practice acts. **The erroneous assumption that physician organizations should determine what is best for other licensed healthcare professions is an outdated line of thinking that does not serve today’s patients.**” (Emphasis added)

2. “With America’s population aging, we are the answer to the challenge of keeping pace with the demand for quality health care services.”
3. “Our members are not physician adjuncts, and are independently responsible for their actions, regardless of whether physicians are involved.”

You have probably heard little, perhaps nothing, in your medical school education about the issues I have briefly addressed, yet these are major, “real world” issues that ASA and AMA are attempting to address on behalf of every physician in the nation. The outcome of these issues will affect the way you practice medicine for the rest of your career.

Staying on the sidelines, “above the fray,” with others fighting the battle for you is not an honorable or acceptable option. The minimal acceptable level of participation is membership in the organizations of medicine (your local and state medical associations, the AMA, your local and state anesthesia societies and the ASA) and at least the minimum contributions to all of these organizations’ PACs (political action committees).

Let me close with the wise words of the 2006 president of the ASA, Dr. Orin F. Guidry: “We must be politically active and politically astute in medical politics as well as in governmental politics. AMA is important (really important!).”⁵

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CHAPTER 27

Pediatric Anesthesiology and The Society for Pediatric Anesthesia

Anne T. Lunney, M.D.

Department of Anesthesiology
Geisinger Medical Center
Danville, PA

Pediatric Anesthesiology

The practice of pediatric anesthesiology is an exciting and challenging subspecialty of anesthesiology practice. Working with children requires a broad understanding of the fundamental anatomical, physiologic and pharmacologic differences between the pediatric and adult populations. The unique mix of developmental age, temperament, parental relationships, health, illness and surgical needs ensure that the practice of pediatric anesthesiology is consistently engaging.

It is not uncommon when having a routine procedure, such as tonsillectomy, that the parent is most concerned about the anesthetic. The art of pediatric anesthesiology entails the ability to communicate effectively with children and parents, and engender their trust in a limited period of time.

Since the inception of anesthesiology practice in the 1840s, anesthetic techniques have evolved and are increasingly tailored to the unique needs of children. The ability to perform increasingly complex surgical procedures is a direct result of the increased safety of pediatric anesthesiology perioperative care. Pediatric anesthesiology practice has progressed from the ability to provide three to four minutes of unconsciousness after inhaling from an ether-soaked rag to the ability to safely anesthetize a 600 gram, 24-week premature infant for a tracheoesophageal fistula repair.

Anesthesiology residency training can include exposure to general pediatrics during the intern year and pediatric anesthesiology rotations during the CA-2 and CA-3 years (though some programs offer rotations during the CA-1 year). The goal is for the resident to manage the perioperative care for children with diverse age ranges, variations on the health-illness continuum, and who require a variety of surgical procedures. The management of pediatric acute, chronic and perioperative pain is also an important aspect of pediatric anesthesia practice.

Additional training through a one-year fellowship in pediatric anesthesia is available. Pediatric fellowship presents the opportunity to develop the clinical judgement and skills to provide perioperative care for complex patients such as neonates, children with craniofacial and metabolic syndromes, and children with congenital cardiac defects. The fellowship also includes experience in the management of critically ill children in the pediatric intensive care unit, management of chronic pain, and performance of regional techniques such as peripheral nerve blocks and epidurals under general anesthesia.

The Society for Pediatric Anesthesia

The Society for Pediatric Anesthesia (SPA) has been and continues to be instrumental in the advancement of pediatric anesthesiology. Established in 1986, their mission “to foster quality anesthesia perioperative care and alleviate pain in children” is an ongoing venture. This mission is accomplished by: 1) Assembling in one group anesthesiologists who practice and have a strong interest in pediatric anesthesia, 2) Advancing the study of pediatric anesthesia and contributing to its growth and influence, 3) Encouraging research and scientific progress in pediatric anesthesia, 4) Serving as a forum for discussion of issues (scientific and political) of importance to pediatric anesthesia, and 5) Supporting the goals of the American Society of Anesthesiologists (ASA) and the American Academy of Pediatrics (AAP).

The membership of the SPA includes more than 3,000 members from the United States and abroad, and the membership is comprised of anesthesiologists from a broad spectrum of practice models. The biannual SPA meetings, held in conjunction with the American Academy of Pediatrics (AAP), provide a venue for critical review of current research, lectures, skills workshops and networking. The membership of the AAP provides invaluable expertise regarding the care of the pediatric patient, and the SPA–AAP collaboration is a key component to the richness of the SPA learning experience.

Subspecialty research grants are provided by the pediatric counsel of the Foundation for Anesthesia Education and Research (FAER). The grants target budding researchers at both the resident and faculty level. The research grants support individuals with a focus on education, clinical and basic research, and development of the skills required to compete for National Institutes of Health funding.

Medical students who are interested in anesthesiology, pediatrics, pain management, teaching and research will find the subspecialty of pediatric anesthesiology to be a fulfilling career.

Please refer to the SPA website (www.pedsanesthesia.org) for additional information about pediatric anesthesiology, SPA, and the SPA quarterly newsletter.

CHAPTER 28

The American Board of Anesthesiology: Part of Your Lifelong Career

Patricia A. Kapur, M.D.

American Board of Anesthesiology

The American Board of Anesthesiology (ABA) is the certifying body for physicians who have completed residency training from a residency program accredited by the Accreditation Council for Graduate Medical Education (ACGME). The ACGME accredits residency programs in all specialties and many subspecialties. As distinct from board certification, ACGME accreditation of a residency program signifies that the program is meeting national standards for its faculty, its breadth of patient conditions and types of clinical training, its teaching facilities, and its educational and research programs. Board certification of individuals who graduate from such programs indicates that they have satisfactory professional standing and have demonstrated expertise in the specialty at the level of a consultant. The key distinction is that the ACGME and its individual Residency Review Committees (RRCs – one for each specialty) accredit programs, while the ABA certifies individuals.

Anesthesiology residency training consists of a clinical base (CB) year plus three years of clinical anesthesia training (CA-1 to CA-3 years). Prospective anesthesiology trainees entering the National Internship and Residency Matching Program (NIRMP) may match either into a categorical internship as part of an overall four-year CB and CA program. Alternatively, they may match into a preliminary internship that will serve as the CB year, plus match into a separate “advanced” anesthesia residency position for the CA-1 through CA-3 years of training. On a case-by-case basis, departments can apply to both the Anesthesiology RRC and the ABA for approval to offer a prospective combined five-year program consisting of a CB year, a residency, plus an extra year of unaccredited research, or a CB year, a residency, plus an extra year of accredited fellowship training. In the scenario of a combined residency plus fellowship, at least three-fourths of the fellowship training time must occur in the fifth year, when the resident has sufficient experience to function at the fellowship level. A department offering either or both such an options usually has a small number of such positions, e.g., one to five. There can be a separate NIRMP match number for those five-year combined programs, requiring a commitment from the graduating medical student for the full five years.

A prospective anesthesiologist's lifelong record with the ABA is opened at the moment when the residency program enrolls them with the ABA. This occurs either at the beginning of the CB year for a categorical program or at the beginning of the CA-1 year for an advanced anesthesiology position. Thereafter, the residency program submits a clinical competency report to the ABA for each resident every six months throughout the individual's entire training period. The ABA requires that each training program have a Clinical Competency Committee (CCC), composed of a number of faculty experienced in residency education, chaired by a faculty member who is neither the residency program director nor the department chair. The every-six-month CCC reports include evaluations of character traits such as reliability, accountability and responsibility, as well as evaluations of other matters such as professionalism, clinical and technical skills, medical knowledge, judgement, interpersonal skills, ability to work within the health care system, and so on.

Based on the resident's satisfactory CCC reports, a final end-of-training approval by the residency program director solicited directly by the ABA, and satisfactory medical licensure standing, the ABA may approve the application of a residency graduate to enter the ABA's examination system. The examinations for primary certification in the specialty consist of two examinations, taken at minimum nine months apart.

The ABA Part 1 examination is a written examination of factual knowledge in the field of anesthesiology and in related medical and scientific content areas. It is administered in commercial computerized testing centers over a several day window once per year, currently in August. Applications are taken via the ABA website approximately eight to 10 months in advance. All final application deadlines are absolute. After approval of the prerequisite qualifications by the ABA, candidates are contacted by the testing company to select a testing venue and date for their Part 1 examination. Grading and equating of the examination to national standards are done and results are available four to six weeks following the examination dates.

The ABA Part 2 examination is an oral examination. The ABA administers its Part 2 examination twice a year in the spring and fall, each in a hotel in a single city over a one-week period. The Part 2 examination experience consists of an initial orientation session, followed by two 35-minute examination sessions in two adjacent hotel rooms, separated by a 10-minute gap for the candidate to change rooms. Each 35-minute session has its own question material and is conducted by two anesthesiologist examiners who are selected and have no knowledge of or acquaintance with the candidate. Thus, the candidate will be examined by a total of four examiners. While the Part 1 examination is designed to test factual knowledge,

the Part 2 examination is designed to test judgement in clinical situations, application of knowledge to clinical care, adaptability of knowledge to changing clinical situations, and the ability to organize and present clinical information at the level of a consultant anesthesiologist. The evaluations by the examiners are psychometrically analyzed and results are available on the ABA website within approximately four weeks following the Part 2 examination.

The oral examiners are outstanding anesthesiologists in academic or private practice, who make a great commitment of 19 years for participation in the examination process, giving up a week of their other commitments each time they contribute. The examiners already have a track record of educational and clinical accomplishment to be selected, are heavily mentored the initial years, and are audited throughout their entire tenure as oral examiners to ensure consistency in administration of the oral examination.

All ABA certificates issued after the year 2000 are valid for 10 years. Once an anesthesiologist achieves board certification, he or she is automatically enrolled in the ABA's Maintenance of Certification in Anesthesiology (MOCA) program. Completion of a 10-year MOCA cycle assures that a diplomate's certificate remains valid for the subsequent 10 years, as long as they continue to participate actively in the MOCA program, completing a cycle every 10 years. The American Board of Medical Specialties (ABMS), which oversees over 20 member boards in various specialties, has mandated MOC in every specialty to assure the public that certified physicians are keeping up with advancing knowledge in their specialty as time goes by following their initial certification. The ABMS requires that MOC in every specialty includes a 1) secure examination (SE), 2) lifelong learning and self-assessment (LL-SA), 3) participation in practice performance assessment and improvement (PPAI), and 4) satisfactory professional standing (PS).

Each successive MOCA cycle is 10 years long, commencing on January 1 of the year following the year of initial certification or of the year following completion of a prior MOCA cycle. Satisfactory PS is demonstrated by maintenance of unrestricted medical licenses in every state in which the MOCA participant holds a license. LL-SA is demonstrated by the physician recording learning activities on their personal portal on the ABA website. LL-SA activities can include continuing medical education (CME) credits acceptable for the American Medical Association (AMA) Physician Recognition Award category 1, such as attendance at CME-approved medical education meetings or participation in approved CME online educational activities, or category 2 activities such as professional committee work, teaching hours, and the like.

PPAI is met by participating in one of three categories of activities in each of the three-year segments composing years one to nine of the MOCA 10-year cycle. The three PPAI activity categories are: 1) participating in a practice improvement activity from one's own practice, by comparing baseline clinical outcomes to published benchmarks or to evidence-based standards, implementing a change in practice, and then measuring the improvements in patient care; 2) completing an ABA-approved patient safety education module, currently from the ABMS; and 3) participating in a human patient simulator education course. The ASA Committee on Simulation certifies simulation education centers to offer courses that meet the ABA MOCA PPAI requirement.

Like the initial ABA certification Part 1 written examination, the SE for MOCA is administered at commercial computerized testing sites. It is administered during one-week testing windows, twice a year. Following acceptance by the ABA that all SE prerequisites have been met, the SE may be taken any time after the seventh year of the 10-year MOCA cycle. If the examination is taken and passed prior to the end of the 10-year MOCA cycle, the certification period still extends to December 31 of the tenth year following the prior certification. The subsequent MOCA cycle will start on January 1 of the eleventh year after the prior certification was achieved.

If an ABA diplomate fails to complete a MOCA cycle before the end of their 10 years of certification, his or her certificate will expire, the ABA website will no longer list that physician as a certified anesthesiologist, and he or she can no longer represent himself or herself as a board certified anesthesiologist.

The ABA also administers subspecialty certification programs for ABA diplomates who are graduates of ACGME-approved subspecialty fellowship programs in either pain management or critical care. Fellows in those subspecialties similarly are enrolled with the ABA and have CCC reports submitted to the ABA every six months during their fellowship. After a candidate meets all of the other ABA subspecialty prerequisite requirements, the ABA may admit the candidate to its subspecialty examination systems. The subspecialty certification examinations are written examinations administered in commercial computerized testing centers. Following initial certification in an anesthesiology subspecialty, the subspecialty diplomates are eligible to become recertified prior to the tenth year expiration of their subspecialty certificate, by demonstrating satisfactory PS and taking a recertification examination. It is expected that the subspecialties that have ABA certification programs will also come to have fully developed subspecialty MOCA programs, including the LL-SA and PPAI components.

All of the details of the ABA examination programs are updated annually in the spring of each year and are published online in the ABA's Booklet of Information, which may be accessed at the ABA's website (www.theABA.org). Residency programs also have helpful information for residents regarding how to ensure that the appropriate ABA prerequisite requirements will be met in order for their graduates to be eligible for acceptance into the ABA's examination systems. Residency programs also regularly assist residents to prepare for both the primary anesthesiology certification Part 1 and Part 2 examinations.

The ASA, on behalf of its members, works with the ABA to facilitate the board certification and MOCA processes. First, the ASA and the ABA together administer the ASA-ABA in-training examinations for residents at the end of the CB and CA-1 to CA-3 years, to assist residents in assessing their progress during residency, as well as for preparation for the ABA Part 1 examination. Second, the ASA has representatives participating on the Council for the Continuous Professional Development of Anesthesiologists (CCPDA). The CCPDA advises the ABA on the structure and content of the MOCA program. Third, the ASA has a Patient Safety Education Editorial Board that develops and maintains a patient safety education module to meet MOCA PPAI requirements. Finally, the ASA Committee on Simulation is identifying and approving simulation centers that can offer simulations education sessions to meet the MOCA PPAI simulation education requirement.

CHAPTER 29

The Society for Obstetric Anesthesia and Perinatology (SOAP) and Its Relationship With ASA

Joy L. Hawkins, M.D.

Director of Obstetric Anesthesia
University of Colorado School of Medicine
Denver, CO

The Society for Obstetric Anesthesia and Perinatology (SOAP) is a group of roughly 1,000 members who share an interest in the care of the pregnant patient and newborn. Founded in 1968, SOAP provides a forum for discussion of problems unique to the peripartum period. To quote from the SOAP website: "The mission of the Society is to promote

excellence in research and practice of obstetric anesthesiology and perinatology. Through the newsletter, Internet site, and annual meetings, this Society allows practitioners of several specialties to meet and discuss clinical practice, basic and clinical research, and practical professional concerns.”

SOAP is the official obstetric anesthesia subspecialty society of the American Society of Anesthesiologists (ASA), representing those members who include care of the pregnant woman in their practices. As a subspecialty society, SOAP chooses a delegate and alternate delegate who attend the ASA House of Delegates’ meetings at the annual meeting. SOAP members plan the obstetric anesthesia track at the ASA annual meeting. Additionally, SOAP has a journal affiliation with *Anesthesiology*; a journal-sponsored, scientific, oral-presentation session at the ASA annual meeting highlights the best research in the subspecialty area. Furthermore, the *ASA Monitor* (formerly *ASA NEWSLETTER*) has a yearly article authored by the SOAP president that describes issues addressed and activities organized within SOAP, keeping the general ASA membership updated on topics and concerns in obstetric anesthesia practice.

The ASA also has a Committee on Obstetric Anesthesia whose members are virtually always active in SOAP. The chairperson of the ASA Committee sits on the SOAP board of directors and also serves as the liaison to the American College of Obstetricians and Gynecologists (ACOG). This liaison activity with ACOG has led to collaboration on an excellent ACOG practice bulletin, “Obstetric Analgesia and Anesthesia,” and a joint ASA/ACOG patient education pamphlet entitled “Pain Relief During Labor and Delivery.” Through the ASA Committee, several additional documents related to obstetric anesthesia have been produced and are available at the ASA website. These include: “Pain Relief During Labor” (jointly with ACOG), “Optimal Goals for Anesthesia Care in Obstetrics” (jointly with ACOG), and the “Guidelines for Regional Anesthesia in Obstetrics.” Having the chairperson of the ASA Committee on Obstetric Anesthesia sit on the SOAP board of directors ensures these documents are developed with close collaboration. Thus the activities of ASA and SOAP are intertwined on many levels.

SOAP has a variety of activities centered on its annual meeting in the spring. A variety of research presentations, pro-con debates on controversial issues, panel presentations and discussions, case-based learning, and “What’s New” lectures educate and invigorate members. Obstetric anesthesia practice includes labor analgesia, cesarean anesthesia, postoperative pain management and critical care management of obstetric patients. The scope of active research includes safety and outcomes measurements, genomics and physiology of labor pain.

An affiliation with the Obstetric Anaesthetists Association (OAA) brings its president and many of our British colleagues to the SOAP meeting, as well as sending the SOAP president to the OAA meeting each year. Cooperation with the North American Society of Obstetric Medicine (NASOM), a group of internists specializing in medical care of pregnant women, has led to obstetric anesthesia speakers at their annual meeting and a “What’s New in Obstetric Medicine?” lecture at the annual SOAP meeting.

Obstetric anesthesia is a unique part of an anesthesiologist’s practice that differs from typical practice in the general operating room setting. We become an integral part of an intimate event, one of the most important in a woman’s life. We interact with the woman’s spouse, family members and friends for hours or days and even bring them into the operating room during cesarean delivery. We rarely use sedatives or hypnotics, instead relying on various regional anesthetics and our interpersonal skills for their comfort. We often perform these regional anesthetics in the presence of a spouse or family member. Many or most of our patients on labor and delivery come with preconceived ideas of how they wish their care to be provided, including an array of opinions (valid or not) about anesthesia. Although these may have come from the Internet, friends or magazines rather than medical sources, we need to be aware of what our patients are reading and hearing. Women may have a desire to experience “natural childbirth” and may be using a variety of complementary and alternative therapies that can have importance for drug interactions. Despite their initial intentions, over 90 percent of women will ultimately require some kind of pain medication and roughly 60 percent of those will receive a neuraxial (spinal and/or epidural) anesthetic. About 30 percent of deliveries in the United States are now performed by cesarean, and all of those women will require our services. Our goal is to help all these women achieve the childbirth experience they desire.

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CHAPTER 30

The Role of the American Society of Regional Anesthesia and Pain Medicine

Jan J. Kraemer, M.D.

St. Annes Hospital
Fall River, MA

Richard Rosenquist, M.D.

Professor of Anesthesiology
Chair, Department of Pain Management
Cleveland Clinic, Cleveland, OH

Introduction

The American Society of Regional Anesthesia was founded by Gaston Labat and his colleagues in New York City in 1923.¹ Subsequently, ASRA joined with another New York society to create the American Society of Anesthesiologists. (The history of the creation of the ASA is well described as: “On October 6, 1905, a small group of nine physician-anesthetists whose particular interests centered on anesthetics met at Long Island College Hospital at the invitation of Dr. A. Frederick Erdmann for the purpose of “promoting the art and science of anesthesia.” From this small group came the Long Island Society of Anesthetists and it was this organization that gave rise to organized anesthesia in the United States and its present body, the American Society of Anesthesiologists (ASA) (www.asahq.org).

As interest in anesthetics and the scientific sessions of the new society grew throughout those first years so did the need to broaden the scope of membership. On October 28, 1911, at the New York Academy of Medicine, 40 East 41st Street in Manhattan, the name of the society was changed to the New York Society of Anesthetists. On February 7, 1912, its new constitution reiterated the precepts of its founders for “the advancement of the science and art of Anesthesia ...” (www.nyssa-pga.org/about).²

Reformed in 1975, ASRA has been working closely with the American Society of Anesthesiology in all issues related to regional anesthesia and pain medicine. Today, there are more than 7,400 members in ASRA. The mission of the organization is to address the clinical and professional educational needs of physicians and scientists practicing regional anesthesia and pain medicine; to assure excellence in patient care utilizing regional anesthesia and pain medicine; and to investigate the scientific basis of the specialty.

Regional Anesthesia

Regional anesthesia will be one of the most exciting parts of your anesthesia training. During your CA-1 year you will learn to perform many basic blocks such as axillary blocks to provide anesthesia and analgesia for the forearm and hand, and interscalene block for shoulder, arm and elbow surgeries. You will

learn about spinal and lumbar epidural anesthesia, and thoracic epidural analgesia, commonly used to provide postoperative analgesia for thoracic and abdominal procedures. Anesthesia of the lower extremities may be provided by femoral, sciatic and popliteal blocks, while anesthesia for obstetrics may be performed with combined spinal-epidural blocks.

In the past, many patients believed that general anesthesia was the only option for surgery. However, an increased number of studies have demonstrated the benefits of intraoperative and postoperative regional anesthesia, the Internet has made information readily available, and our patients are more aware now of regional anesthesia as an alternative to general anesthesia for many surgical procedures. Regional anesthesia provides anesthesia not only during a surgical procedure but also provides analgesia after the procedure, thus reducing the requirements for opioids and the possible side effects of those medications. For example, for outpatient shoulder surgery, patients may have the option to receive both an interscalene block, which can be performed in the holding area, and general anesthesia for the surgery itself. A patient who receives these two types of anesthetics (a combined technique), will wake up from anesthesia without pain, require less anesthetic during the surgery, and require less opioid after the surgery. The patient can be sent home the same day of the surgery without any discomfort. The only disadvantage is that the shoulder may be numb until the next day.

Increasingly, patients have the option of going home after surgery with a catheter that an anesthesiologist will place when performing the regional anesthetic. This catheter allows patients to get a continuous infusion of a local anesthetic that provides analgesia at home for a few days after the surgery. This procedure reduces the amount of pain medication needed, increases functional status of the patient, and encourages early physical therapy and return to daily activities and work.

The field of regional anesthesia and the number of procedures are becoming so complex that after finishing your anesthesia training you will have the option to acquire more expertise in the field by doing a 12-month fellowship in regional anesthesia. Guidelines have been published for this training. A recent survey among anesthesiologists who completed a regional anesthesia fellowship revealed that 95 percent were pleased with the quality of their education, and 75 percent of them viewed their fellowship credentials as a positive influence on their employability and their relative attractiveness as a candidate for jobs in anesthesia.

Pain Medicine

Pain is considered by some as the “fifth vital sign.” Pain medicine is the fastest growing field among the subspecialties of anesthesiology. During your anesthesia training you will learn the basic skills to diagnose and manage some of the common acute and chronic pain conditions, as well as the different treatment options to manage acute postoperative pain.



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During your pain management rotation and patient encounters during residency, you will learn that every patient is different. You will learn a variety of approaches to deliver steroids into the epidural space, such as lumbar epidurals, caudal epidurals or transforaminal selective nerve root blocks, and to perform other interventional procedures using fluoroscopic guidance. You will become familiar with normal spine anatomy and will learn how to identify those structures on X-ray.

Patients who in the past had no other option after failing back surgery, or who refused surgery as the first alternative, now have many medical, physical and interventional pain procedures as alternatives.

If you desire additional training in this area, a pain medicine fellowship is an ACGME-accredited fellowship that consists of 12 months of pain medicine training after completing your residency. Anesthesiologists trained as pain physicians can offer many alternatives to their patients such as spinal cord stimulation, intradiscal electrothermal annuloplasty, intrathecal pumps, nucleoplasty, vertebroplasty and more advanced, fluoroscopically-guided blocks.

The ASRA is actively involved with anesthesia pain medicine programs. They have developed the ASRA Pain Medicine Fellowship program to advance training and education within the area of pain medicine. ASRA's goal is to financially support

pain medicine training centers dedicated to train Fellows in state of the art pain medicine evaluation and treatment modalities, with three \$60,000-fellowship grants per year.

ASRA

As a medical student you have the opportunity to learn more about ASRA and even become a member at no charge. ASRA hosts two meetings each year. The fall meeting is primarily about chronic pain. During these meetings you will meet the experts in the field of pain medicine and you will be exposed to all the new trends in the field. The spring meeting is primarily about regional anesthesia and acute postoperative pain, with experts from the United States and other countries around the world as faculty. Residents and Fellows can attend regional anesthesia workshops in basic procedures as well as advanced procedures such as ultrasound-guided blocks. Every year ASRA sponsors the airfare and hotel fees for a number of residents who submit abstracts to the national meetings.



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Residents can opt to become members of the resident section of the ASRA. The resident section is a great forum where you can voice your concerns and ask questions about regional anesthesia, and is a great opportunity to meet other residents interested in regional anesthesia from all parts of the United States. You will also have the opportunity to attend workshops and meet all the experts in this interesting field. This is definitely a unique experience.

Conclusion

Regional anesthesia and pain medicine will be two of the cornerstones of your anesthesia training. ASRA can provide you with the tools you need to become a consultant in these fields during your training and during your professional career as an anesthesiologist.

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CHAPTER 31

Ambulatory Anesthesia

Shireen Ahmad, M.D.

Professor of Anesthesiology and Obstetrics & Gynecology
Northwestern University Feinberg School of Medicine
Chicago, IL

Ambulatory anesthesia is defined as a formal, organized program for conducting anesthesia for elective surgical procedures, in patients who are admitted and discharged from the facility on the same day. The earliest written reference to an ambulatory surgical facility appeared in the *American Journal of Surgery* in 1919. The legendary United States anesthesiologist, R. M. Waters, M.D., opened the Downtown Anesthesia Clinic in Sioux City, Iowa, where he provided care for dental and minor surgery cases. The next written description of an ambulatory surgery center appeared in *Arizona Medicine* in 1969. John Ford, M.D., and Wallace Reed, M.D., published an article in which they described their concept of a “Surgicenter.” They opened the Phoenix Surgicenter in 1970, the first “free standing surgicenter.”

The Society of Ambulatory Anesthesia (SAMBA) was organized in 1984 and was the first subspecialty society to be formed within the American Society of Anesthesiologists.

The primary mission of SAMBA is to encourage specialization in the field of ambulatory anesthesia, to contribute to the growth of the subspecialty and to foster research, education and scientific progress in ambulatory anesthesia and thereby encourage high ethical and professional standards in ambulatory anesthesia.

SAMBA has approximately 1,669 members who practice throughout the United States and 83 international members. The majority of the members devote a significant percentage of their professional activity to the perioperative care of the ambulatory surgery population.

SAMBA is committed to providing high-quality continuing education activities for physicians and other health care professionals. Since 1991 the Society has also had its own annual meeting, which focuses on various aspects of ambulatory anesthesia and in 1997 a mid-year meeting was established that also continues to be held yearly. The Society for Ambulatory Anesthesia held its first educational meeting in April 1986. Since then SAMBA has held an annual and a mid-year meeting each year. The meeting focuses on presentation of scientific abstracts and discussions of practice trends in the field of ambulatory anesthesia. The annual meeting in 2006 presented four days of refresher course lectures, interactive workshops, problem-based learning and lecture sessions on a broad range of topics related to ambulatory anesthesia.



The Society also participates in the development and promotion of the programs of the American Society of Anesthesiologists (ASA) and other organizations relating to ambulatory anesthesia. In 1987, SAMBA was granted membership on the ASA Committee on Subspecialty Representation and hosted the first breakfast panel on ambulatory anesthesia at the ASA annual meeting that year and topics on ambulatory anesthesia continue to be a major component of the ASA annual meeting. This session continues to be very popular at the annual meeting of the ASA. Additionally, as of 2007, ambulatory anesthesia has been designated one of the 10 “learning tracks” at the ASA annual meeting with refresher course lectures, panels, clinical forums, workshops and general sessions devoted to topics related to ambulatory anesthesia. The SAMBA leadership has been actively involved at all stages in the development of this ambulatory anesthesia track.

Anesthesia and Analgesia, which is the oldest anesthesiology journal in the United States and has been published continuously since 1922 by the International Anesthesia Research Society (IARS), has been the official journal of the Society of Ambulatory Anesthesia (SAMBA) since 1995. This journal has an international circulation in excess of 21,000 and has a monthly section on ambulatory anesthesia.

SAMBA has published the newsletter “*Ambulatory Anesthesia*” since 1986. This newsletter continues to be published each month since that time and is distributed in print and electronic versions.

Another goal of SAMBA is to support, encourage, and participate in the development and promotion of policies and programs of the American Society of Anesthesiologists and other professional organizations regarding ambulatory anesthesia. In 1989, national recognition of the SAMBA was enhanced by it being represented in the ASA House of Delegates as an anesthesia subspecialty organization. As of 1992, SAMBA members have served as representatives for the ASA to various health care organizations, such as the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and its Professional and Technical Advisory Committee (PTAC) and the Accreditation Association for Ambulatory Health Care (AAAHC), in accordance with the Society’s mission to participate in the development of policies and programs related to ambulatory anesthesia, at a national level.

SAMBA has an active resident membership category whose 2,850 members are residents in anesthesiology training programs throughout the United States. The mission of the resident section is to encourage resident interest in ambulatory anesthesia, and to inform residents of the purpose of SAMBA in promoting research and education in ambulatory anesthesia administered in a hospital outpatient center, an ambulatory surgery center or in an office setting; and to encourage continued membership involvement during residency and beyond.

The resident committee organizes resident education seminars regarding the practice and current issues of ambulatory anesthesia and encourages residents to gain experience in organized medical societies, thereby promoting their development in the future.

In 1987, SAMBA established awards for the best scientific research presentations and in 1991 the first Resident Travel awards were presented for resident physicians presenting research abstracts at the annual meeting.

SAMBA has participated in the development of guidelines for postgraduate education for qualification as a subspecialist in ambulatory anesthesia and guidelines for approval of postgraduate training programs in ambulatory anesthesia.



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