

## *The Anesthesiologist in Critical Care Medicine*

### *Past, Present, and Future*

C. William Hanson III, M.D., F.C.C.M.,\* Charles G. Durbin, Jr., M.D., F.C.C.M.,† Gerald A. Maccioli, M.D., F.C.C.M.,‡ Clifford S. Deutschman, M.D., F.C.C.M.,§ Robert N. Sladen, M.B.Ch.B., M.R.C.P.(UK), F.R.C.P.(C), F.C.C.M.,|| Peter J. Pronovost, M.D., Ph.D.,# Luciano Gattinoni, M.D.\*\*

AT the beginning of the new millennium, anesthesia-based critical care medicine (CCM) is at a crossroads. Although anesthesiologists took a leadership role in the initial development of critical care, today the American critical care anesthesiologist is an endangered species, overshadowed in numbers and political clout by colleagues from pulmonary medicine and surgery. In contrast to Europe, where anesthesiologists play a dominant role in critical care, in the United States, anesthesia-based CCM is a peripheral subspecialty of anesthesiology practiced by a small minority. As we seek to broadly redefine the role of the anesthesiologist both inside and outside the operating room, it is timely to ask the question, "Is there a future for anesthesiologists in critical care?" Can we regain a leadership role and thereby enhance our specialty as a whole, or are critical care anesthesiologists doomed to increasing irrelevance as our numbers dwindle toward extinction?

This special article is an editorial essay and reflects the observations and thoughts of the leadership of the American Society of Critical Care Anesthesiologists, a component society of the American Society of Anesthesiologists, as well as the perspective of a distinguished European colleague (L. G.).

### **Development of Critical Care Medicine in the United States**

The neurosurgeon Dr. Walter Dandy (1886-1946) is credited with establishing the first critical care unit in the country at Johns Hopkins Medical Center.<sup>1,2</sup> Anes-

thesiologists first took a prominent role in critical care in the United States during World War II, when surgical casualties were grouped together in shock wards. After the war, postoperative recovery rooms became increasingly common and provided the template for today's surgical intensive care units (ICUs). A seminal event in intensive care was the worldwide outbreak of poliomyelitis in the early 1950s. In Denmark, nurses and medical students ventilated patients manually for days, which lent impetus to the engineering and mass production of positive pressure ventilators. Subsequently, respiratory care units spread through the United States, and by 1958, a unit had been established in 25% of hospitals with more than 300 beds.

In the early 1980s, an attempt was made to form a conjoint Board of Critical Care Medicine representing anesthesiology, internal medicine, pediatrics, and surgery. However, the component boards could not agree on training qualifications, and the initiative failed.<sup>3-5</sup> Instead, in 1986, each individual board established a Certification of Special Competence (Qualifications) in Critical Care recognized by the Board of Medical Specialties and issued by the primary board. The Boards of Anesthesiology and Surgery require 1 yr of critical care fellowship. Pediatric critical care certification requires a 3-yr training program. In addition to offering a separate stand-alone 2-yr critical care fellowship, the American Board of Internal Medicine incorporated critical training into most pulmonary medicine fellowships and extended the fellowship from 2 to 3 yr.<sup>6</sup> As a consequence, almost every graduating pulmonary fellow is board-eligible in both pulmonary medicine and critical care.

Less than 4% of the 25,000 board-certified anesthesiologists in the United States have the Certificate of Special Competence in Critical Care. Of the 7,800 members of Society of Critical Care Medicine in the United States, approximately 35% are internists, 25% are surgeons, and only 12% are anesthesiologists (fig. 1). The relative percentage of anesthesiologists in the Society of Critical Care Medicine has declined over the past decade (fig. 2). Membership has also declined in the American Society of Critical Care Anesthesiologists, which was founded in 1986 to represent the specialty within the American Society of Anesthesiologists.

Many attribute the diminishing presence of American anesthesiologists in intensive care medicine to the relatively more favorable economic and working conditions

\* Associate Professor, Departments of Anesthesia, Surgery, and Internal Medicine, § Professor, Departments of Anesthesia and Surgery, University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania. † Professor, Departments of Anesthesiology and Surgery, University of Virginia Health Sciences Center, Charlottesville, Virginia. ‡ Director, Department of Critical Care Medicine, Critical Health Systems of North Carolina, Raleigh Practice Center, Raleigh, North Carolina. || Professor and Vice Chair, Department of Anesthesiology, College of Physicians and Surgeons of Columbia University, New York, New York. # Assistant Professor, Departments of Anesthesiology/Critical Care Medicine, Surgery, and Health Policy and Management, John Hopkins University, Baltimore, Maryland. \*\* Professor, Department of Anesthesia, Istituto di Anestesia e Rianimazione, Dell' Università Degli Studi de Milano, Milano, Italy.

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Address reprint requests to Dr. Hanson: Department of Anesthesia, 5 Founders Building, 3400 Spruce Street, Philadelphia, Pennsylvania 19104. Address electronic mail to: hansonb@mail.med.upenn.edu. Individual article reprints may be purchased through the Journal Web site, www.anesthesiology.org.

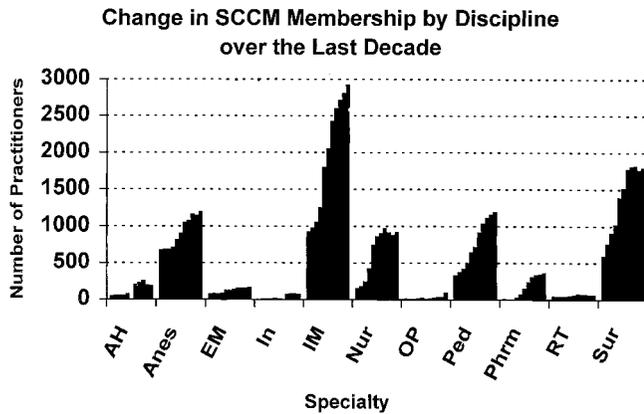


Fig. 1. Growth of anesthesiology membership relative to other disciplines in the Society of Critical Care Medicine (SCCM) over the past decade (each bar in a group represents a separate year). AH = allied health; Anes = anesthesiology; EM = emergency medicine; In = in-training; IM = internal medicine; Nur = nursing; OP = osteopathic; Ped = Pediatrics; Phrm = pharmacology; RT = respiratory therapy; Sur = surgery.

in operative anesthesia. This belief is supported by the fact that many of the “double-boarded” anesthesiologists who entered the discipline in the 1980s after exposure to anesthesiologists in the intensive care environment went on to practice operative anesthesia exclusively.

#### Development of Critical Care Medicine in Europe

It is instructive to review the evolution of intensive care in Europe, which took a different path from the United States after the polio pandemics of the 1950s. Success in controlling respiratory failure by mechanical ventilation led to the development of respiratory intensive care throughout Europe in the early 1960s. European anesthesiologists led the process. There was a parallel development in cardiac resuscitation. Here, too, anesthesiologists were key participants. These two main stems led to differing “flavors” of CCM in various regions of Europe. In the south, intensive care was called resuscitation, *i.e.*, *rianimazione* in Italy, *réanimation* in France, *reanimación* in Spain, indicating the focus on cardiac events. In the northern regions of Europe, the emphasis was more on the respiratory side, and the activity was described as “intensive care.” With a few exceptions, anesthesiologists directed the evolution of European intensive care. The intensive care structure had various legal and academic structures in different countries. For example, the Italian certification board was named “Anesthesia and Resuscitation” in 1968 by law, and this led to an absolute linkage between anesthesia and intensive care in that country.

There are currently a variety of intensive care structures in Europe, ranging from strict linkage between anesthesia and intensive care, as in Italy, to a mixed approach in which anesthesiologists, internists, and pulmonologists all have some responsibility for intensive care. In Spain, intensive care has developed as an inde-

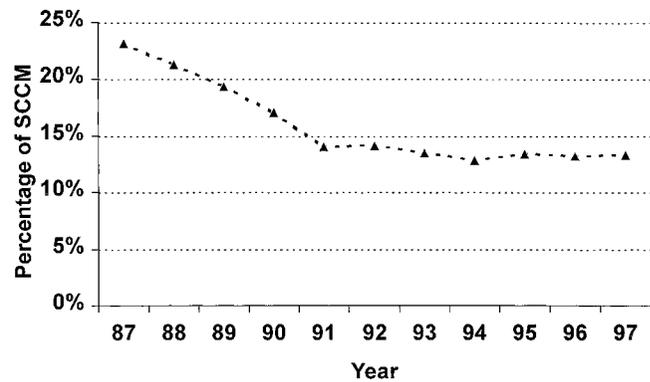


Fig. 2. Percentage of anesthesiologists as members of Society of Critical Care Medicine (SCCM) over the past decade.

pendent specialty. According to the European Society of Intensive Care Medicine, anesthesiologists provide more than half of European intensive care (fig. 3).

The European philosophy of CCM explicitly recognizes the distinct skills required of an intensivist. European intensivists are specifically dedicated to the care of ICU patients rather than caring for them in conjunction with other duties, which differs from the typical American ICU, where the patient is cared for by a team of specialty consultants. This is only one of several differences between the practice of CCM in the United States and Europe. The European intensivist practices that discipline exclusively rather than dividing his or her time between the operating room and the ICU. Finally, European intensivists are salaried, whereas American intensivists are typically reimbursed for visits and procedures. Regardless of their original derivation, the most prominent contributors to European critical care literature recognize themselves as intensivists. The establishment of a separate identity of this sort clearly supports the evolution of CCM as a distinct discipline.

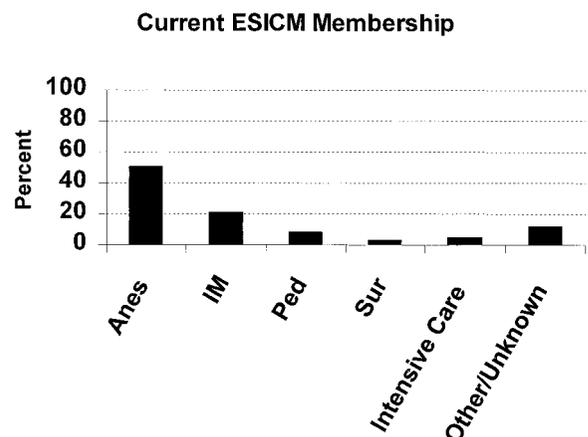


Fig. 3. The membership of the European Society of Intensive Care Medicine (ESICM) broken down by percentage (compare with fig. 1). Anes = anesthesiology; IM = internal medicine; Ped = Pediatrics; Sur = surgery.

### *Critical Care and Career Choice*

The choice of a specialty by graduating medical students is a complex process. Personal biases and experiences acquired before entry into medical school are further shaped during the medical education process, ultimately influencing the decision to enter (or avoid) a particular field of medicine. The culture of an individual medical school and its mission hones students' perceptions of a particular specialty, as do the perceptions of society at large. Most students decide on a discipline by the end of the third year of the 4-yr program. However, experiences in the fourth year, during internship and early residency, result in modifications in specialty training for a significant number of young physicians.

One of the most important factors in the choice of a specialty is early exposure to the field and its mentors during medical school. With the accelerated advance of managed care in 1992, the US government anticipated an oversupply of specialists and mandated that medical schools ensure at least 55% enrollment in the primary care specialties (family medicine, internal medicine, and pediatrics). Studies suggest that the mandatory early rotations in these areas favorably influenced students' attitudes toward them.<sup>7-15</sup> The overall impact of this process during the past 8 yr has been an increase in primary care trainees and a decreased pool of students entering specialty training programs.<sup>7</sup>

Anesthesiology was especially hard hit in the movement toward primary care. Very few students enter medical school intending to become an anesthesiologist. Responsible factors include the limited exposure of the public to anesthetic practice, limited exposure to and lack of understanding of anesthetic practice, the absence of public promotion of the specialty, inaccurate depiction of anesthesiologists in films and television shows, and the quiet, unglamorous behind-the-scenes nature of anesthetic practice. Recently, the situation appears to have been exacerbated by political competition with nurse anesthetists, a transitory (perceived) lack of job opportunities, declining salaries, and a lack of institutional support for anesthesiology training programs. As a result, the number of filled anesthesiology residency positions decreased dramatically from a high of approximately 1,300 in 1988 to approximately 800 in 1999. Only half of the available positions were filled in 1997, and only half of these were filled with American medical graduates.

The annual production of anesthesia-based CCM diplomates has remained low, averaging 50-60 per year over the past 10 yr. This is most likely a result of the fact that medical students with an interest in caring for the critically ill are not aware of the fact that anesthesiologists practice as intensivists. Furthermore, although some students enter anesthesiology residencies with an expressed interest in critical care training, that interest decreases as year of residency increases.<sup>16</sup>

Residents with little patient care responsibility during intensive care rotations express little interest in critical care training, and the general lack of administrative leadership by anesthesiologists in ICUs negatively affects resident interest.<sup>16</sup> Although many anesthesia programs label themselves "Departments of Anesthesia and Critical Care Medicine" (or some variant), many of these programs include CCM in name only. Current American Board of Anesthesiology and Residency Review Committee specifications require only a brief period of exposure to the ICU during residency. The interest of residents in critical rotations is significantly greater at institutions where anesthesiologists have a leadership role in the administration and delivery of intensive care.

### *Current Basic Training Requirements in Critical Care for Anesthesiologists*

Two months of critical care training are required during the 4-yr continuum of anesthesiology residency. As a result, the exposure of anesthesiology residents to critical care faculty role models is limited. At present, there is no requirement for critical care training during the clinical base year or for a progressive increase in ICU responsibility during the residency. The Residency Review Committee (RRC) requirements for critical care training describe a "critical care rotation, to include active participation in patient care by anesthesia residents in an educational environment in which participation and care extend beyond ventilatory management; (with) active involvement by anesthesiology faculty experienced in the practice and teaching of critical care. (This training must take place in units in which the majority of patients have multisystem disease. The post-anesthesia care unit experience does not satisfy this requirement.)" Note that the specification does not require participation of faculty who are certified in critical care.

### *Requirements for Anesthesiology Critical Care Fellowship*

The Accreditation Council of Graduate Medical Education must accredit a fellowship program before it can provide eligibility for board certification in critical care. The anesthesiology critical care fellowship consists of 12 months of continuous training after the 4-yr continuum (*i.e.*, CA-0 to CA-3) has been completed. Of this, at least 9 months must be spent practicing in ICUs. It is emphasized that fellows should develop skills in clinical care, judgment, teaching, administration, and research, and be exposed to a wide variety of clinical problems.

Since its inception in 1986, the American Board of Anesthesiology has provided the CCM examination every second year, most recently in 1999; effective 2001, the examination will be conducted annually. To date, critical care subspecialty certification has been awarded to 957 of its diplomates. Many of the applicants for the examination between 1986 and 1991 qualified on the

basis of temporary practice criteria, *i.e.*, were “grandfathered.” After the 1991 examination, all applicants had to complete 1 yr of training in a critical care anesthesiology program that was accredited by the Residency Review Committee for Anesthesiology. At the present time, more than half (57%) of all current certificates have been issued through the grandfather clause. The number of graduates increased steadily to 80 in 1995, but then appeared to reach a plateau over the next 4 yr before dipping to 67 in 1999. This decline will doubtless continue, reflecting the dramatic decrease in the numbers of graduating anesthesiology residents after 1992.

#### *Anesthesia Research and Critical Care Medicine*

Anesthesiologists have a long and proud history of contributing to investigative endeavors in medicine, biology, and physics. This includes important contributions into our understanding of basic cardiovascular behavior, respiratory physiology, fluid dynamics, gas exchange, hepatic detoxification, and basic pharmacokinetics and pharmacodynamics. One exciting avenue that has great potential for future exploration involves the inflammatory changes that follow surgery or trauma. Potentially pathologic alterations in physiology, metabolism, and organ function occur after tissue injury. This opens up a broad horizon to extend and expand the scope of research involving anesthesia-based intensivists in the future. Another promising area for anesthesia-based intensivists is the application of outcomes-based tools to postoperative issues. Anesthesiologists have a history of examining how different intraoperative techniques and approaches alter long-term outcome.<sup>17-25</sup> The same tools that have been used to investigate the long-term consequences of ischemia or the value of a specific analgesic regimen can be applied to common problems in the ICU.

#### *Intensivist Supply and Demand Mismatch*

As healthcare expenditures have grown, there has been increased interest in modeling future demand for physician services.<sup>26</sup> Predicated on the belief that there is an oversupply of specialty physicians, efforts have been made to redirect resident training toward primary care (*vide supra*). One influential study estimated that there would be a significant oversupply of specialist physicians in the year 2000 because of the continued growth of managed care and lower use of specialists.<sup>26</sup> However, managed care has not been shown to decrease the demand for critical care services. In fact, it may increase it.<sup>27</sup>

The process of estimating future supply and demand for physician services is complex and requires many assumptions; yet despite the existence of well-defined models, the future supply of physicians is often determined by perceptions of demand rather than empiric data. The recent fluctuation in resident applicant num-

bers and the supply and demand for trained anesthesiologists provides an example where perceptions appear to have had a greater impact than the true ratio between supply and demand.

Three professional societies (American College of Chest Physicians, the American Thoracic Society, and the Society of Critical Care Medicine) recently commissioned an assessment of current and projected demand for critical care services: they formed the Committee on Manpower for Pulmonary and Critical Care Societies. This committee used clinical judgment to evaluate current work patterns for critical care and estimated future supply of and demand for these services up to the year 2030 during alternative scenarios (sensitivity analyses).<sup>27</sup> The models included estimates of US population growth, work hours, practice patterns, and age and disease-specific use of ICUs.

In estimating demand for critical care services, the study determined that more than half (56%) of all ICU days were used by people aged 65 yr and older. On the supply side, only 10% of ICUs had high-intensity ICU physician staffing (defined as either a closed ICU, where patients are transferred to an intensivist on arrival, or a unit in which consultation of an intensivist is mandatory). Intensivists provide some care for at least one patient in 59% of the ICUs and are more likely to practice in medical ICUs, in hospitals with more than 300 beds, and in hospitals with a large percentage of managed care patients. Physicians trained in pulmonary medicine provide the majority of this care (79%), with anesthesiologists providing only 6% of the total intensive care in the United States. Of the anesthesiologists that practice some critical care, approximately 60% are certified in critical care, and 35% practice in an academic setting, 50% in a single specialty private practice group, 6% in a multispecialty group, and 8% in a hospital or on the staff of a health maintenance organization.

Although the supply of intensivists is predicted to remain stable up to year 2030, the Committee on Manpower for Pulmonary and Critical Care Societies study estimates that demand will increase significantly, driven largely by the demographics of aging baby boomers. As a result, supply is expected to decrease approximately 22% short of demand by the year 2220 and 46% by 2030.

The anticipated shortfall may actually be worse than predicted because of changes in the marketplace. The models did not anticipate recent efforts by large employer groups that may further increase the demand for critical care services. In an effort to increase patient safety and the value of purchased healthcare services, the Leapfrog group, an organization that represents Fortune 500 companies, has created three new purchasing specifications for managed care companies with which they contract.<sup>28</sup> Based on strong evidence that ICU physicians improve patient outcomes, much of which comes from research by anesthesia-based intensiv-

ists,<sup>29-38</sup> one specification proposed by this group requires that contract care be provided only at hospitals with physicians who are trained in CCM and exclusively dedicated to the ICU. Phased implementation will occur over the next several years. Given the aggregate purchasing power of these large corporate consumer groups and their broad geographic distribution, it is fair to assume that this specification will have a significant and widespread impact on the organization and delivery of critical care services over the next decade. The Committee on Manpower for Pulmonary and Critical Care Societies study also indicates that surgical ICUs are particularly underserved by intensivists compared with medical units,<sup>39</sup> despite literature that clearly indicates that intensivists improve outcomes and reduce costs in surgical ICUs.

#### *Typical United States Practice Models*

Unlike many other medical disciplines, anesthesia is hospital-based. Many anesthesiologists practice close to ICUs and often provide services such as endotracheal intubation and line placement in those units. The Committee on Manpower for Pulmonary and Critical Care Societies data cited above suggest that anesthesiologists participate in the provision of intensive care in a variety of ways. Many anesthesiologist-intensivists are members of large faculty practices and part of active, dedicated, university-based critical care services. However, it is noteworthy that, of the anesthesiologists that practice critical care, the majority do so as part of a single specialty private practice group.

Academic anesthesia critical care practices have been successfully implemented throughout the United States. Anesthesia faculty members practice critical care exclusively or split their clinical effort between the ICU and the operating room. These practices have many formats, including specialty (*i.e.*, cardiothoracic) and joint practices shared with other departments.

Several large private practice anesthesiology groups (*e.g.*, Raleigh, NC; Demarest, NJ; Bismarck, ND; Orlando, FL) also practice CCM. As with academic practices, there are several practice models: the Bismarck group, for example, is a partnership of anesthesiologists, cardiologists, and pulmonologists in a single critical care group. Most services require the intensivist to be dedicated to the ICU and not concurrently directing intraoperative anesthesia. When daytime ICU rounds are completed in the Raleigh practice, the intensivist supports other departmental activities, such as preoperative consultations on in-house patients (who are likely to require postoperative intensive care) and code call coverage. Nighttime admissions to the ICU are "emergent" and thus exempt from compliance rules, and as a result, a single physician can simultaneously direct in the operating room, field calls about intensive care patients, and admit new patients to the ICU. With this arrangement, a second physician must be readily available on backup should simul-

taneous operative and critical care interventions be required.

Private practice critical care requires the commitment of an entire group and not just the few who are considered intensivists. An intensivist can generate a significant amount of revenue usually sufficient to support a mean salary of \$225,000 plus \$90,000 benefits. Hospital financial support for an anesthesia-based intensivist who serves as the Medical Director for an ICU represents a potential additional source of revenue to the group.

The experience of the private practice groups suggests that there are additional important indirect benefits that accrue to a group by providing critical care. Unlike their academic counterparts, private-practice surgeons are not typically interested in providing comprehensive management of patients requiring perioperative intensive care. They are more likely to undertake more complicated operative procedures in higher-risk patients when they have confidence in a critical care practice group, particularly one whose members are involved in the intraoperative care of those same patients. The resulting expansion in the scope of the surgeon's practice synergistically supports the anesthesia group practice.

#### *Analysis: Why Is This Relevant?*

Critical care medicine has deep roots in anesthetic history and practices, and anesthesiologists were integrally involved in the evolution of the discipline in the United States. However, a generalized consensus approach to the delivery of critical care has not emerged. Data from several large studies characterizing American CCM show that there is no standard of practice and that regional practice patterns vary substantially. The most prevalent model for the delivery of CCM is one in which multiple consultants provide specialty care in conjunction with a primary physician who is not an intensivist, despite a growing body of literature showing that intensivists provide more efficient care and better outcomes. This information suggests that there is an opportunity for anesthesiology to systematically reengage in the practice of CCM and simultaneously benefit the patients for whom we already care in the operating room.

We believe that several forces are currently converging that will substantially alter the way in which critical care is delivered in the United States over the next 5 yr. The projected increase in demand for critical care services, the current "vacuum" with regard to entrenched disciplines in the ICU, and the documented benefits of intensivists (which have come to the attention of large consumer groups) will compel change. The opening "window of opportunity" has not gone unnoticed by the hospitalists,<sup>40</sup> who are similar to anesthesiologists in that they are hospital-based (and therefore available) and have a natural relationship with a group of patients regularly admitted to the ICU. Anesthesiologists have

additional skills that they lack, such as procedural expertise and familiarity with the diagnosis and treatment of pain and respiratory and hemodynamic instability, which are hallmarks of the intensive care patient.

Anesthesiologists are well positioned to take on a more prominent role in the practice of CCM, and there are reputational, financial, and professional reasons to evaluate the opportunity at this time. American anesthesiology is currently defending itself from a major incursion by nurse anesthetists and the perception that anesthesiologists are mere technicians. One of the consequences of the way in which we currently practice is that the patient does not typically understand what we do, and we are essentially anonymous when viewed from their perspective. Unfortunately, we are often equally anonymous to many of our nonsurgical colleagues. As a result, we are vulnerable to the technician label. This impression may be perpetuated by the success with which we have systematically evaluated and eliminated the sources of unnecessary morbidity and mortality during anesthesia. Anesthesiology was cited in a recent Institute of Medicine Report<sup>41</sup> for reducing anesthetic mortality from 1:10,000 to 1:250,000.

One relatively simple way to address this perceptual problem is to enhance our visibility outside of the operating room—with patients, families, and colleagues. By increasing our commitment to the support and development of anesthesia-based CCM and our presence in the ICU, we can significantly change the perception that anesthesiologists are pure technicians. The intensivist is routinely involved with the patient and family during periods of vulnerability and intense stress and is usually a physician with whom the family identifies. An expanded role in CCM would significantly increase the value we bring to patients and to the medical community.

Finally, diversification is a time-honored business strategy for risk management in times of rapid change. To the extent that nurse anesthetists are seen as being capable of performing in our place in the operating room, we are vulnerable. Diversification into the ICU is one defensive strategy. Anesthesiology can credibly claim both precedence and a proven track record in defending a systematic (re)expansion of the practice of anesthesia-based CCM. The anticipated increase in demand for intensivists is one that the discipline of anesthesiology is capable of filling. Many of the best applicants to anesthesia residencies apply because of an interest in CCM. We already teach and practice many of the necessary skills: the practice of anesthesiology necessitates intimate familiarity with acute pathophysiology, pharmacology, and airway management. Most importantly, anesthesiologists have improved safety and outcomes in both the operating room and the ICU.



Fig. 4. Percentage of residents who were international medical graduates in otorhinolaryngology (ORL) and anesthesia in 1981 and 1998.

#### *Opportunities: How Can We Effect Change?*

It is unrealistic to expect that we can plausibly engage in the practice of CCM or identify our discipline with CCM to the extent the Europeans have without retooling and refocusing our strategic objectives. However, there are several encouraging recent examples where substantial and rapid change has resulted in the creation of new disciplines (e.g., emergency medicine, hospitalists) or the reinvention of old ones (the transmutation of ear-nose-throat surgery into otorhinolaryngology). The latter example is particularly instructive. The ear-nose-throat specialty was undersubscribed and unattractive to American medical graduates in the early 1980s. Diversification into new surgical procedures (e.g., sinus endoscopy, radical cancer operations) and the adoption of a more aggressive attitude (“the dura to the pleura”) have reinvigorated the specialty. The success of otorhinolaryngology (relative to anesthesiology) in attracting American medical graduates over the past two decades is shown in (fig. 4).

Any substantive change in our commitment to CCM will realistically require the collaboration of the groups that steer the discipline, including the American Society of Anesthesiologists, the American Board of Anesthesiology, the Residency Review Committee, and the academic chairs.

According to the American Society of Anesthesiologists web site, it is “an educational, research and scientific association of physicians organized to raise and maintain the standards of the medical practice of anesthesiology and improve the care of the patient.” There is an ample and growing body of literature, much of it published by anesthesiologists, indicating that intensivists improve patient care and resource utilization in the ICU. The American Society of Anesthesiologists would be acting in a manner consistent with its stated goals by

explicitly embracing the practice of CCM as a component of the "medical practice of anesthesiology."

In its role as the public voice of the profession, the society should draw attention to relevant literature using venues such as the Public Education portion of the web site. The society should continue to act as an advocate in critical care billing issues. The annual meeting and other American Society of Anesthesiologists-sponsored educational forums are excellent venues for the promotion of critical care material. The society should create workshops to educate practice groups about the advantages that can be derived from the provision of critical care expertise (including the creation of a revenue stream separate from operating-room anesthesia), and how to build CCM into a practice. The potential benefit to the society and its members is self-evident: by claiming an interest in and making an overt commitment to the practice of CCM, the American Society of Anesthesiologists reinforces its contention that anesthesiologists are different from alternative anesthesia providers.

The American Board of Anesthesiology has already recognized the importance of postoperative and intensive care. The proportion of the oral board examination that is dedicated to this area was increased to 30% in 1998. The fraction of the residency that is explicitly dedicated to critical care training is proportionately slight, however, and would need to be increased as a part of any broad-based effort. Increased critical care training will benefit the training of anesthesia residents as we operate on older and sicker patients. We believe that a broad understanding of CCM improves anesthesia care and vice versa. Although it is unlikely that the current 4-yr residency will be lengthened, it is appropriate to reconsider the content of the clinical base year. The American Board of Anesthesiology should consider a requirement that the clinical base year include a specified period of critical care training as well as rotations on services that will prepare the trainee to provide care in the ICU (e.g., nutrition, infectious disease).

The Residency Review Committee has recognized the importance of the milieu in which CCM training is provided. By strengthening the language prescribing the medical direction of the ICU in which anesthesia-based critical care fellows train, the Residency Review Committee implicitly acknowledges the importance of anesthesia-based role models in the training of its CCM fellows. The Residency Review Committee should be similarly prescriptive in its requirement for anesthesia-based CCM training during residency. The emergency medicine Residency Review Committee, for example, is explicit in requiring that "residents within the emergency department must be under the supervision of emergency medicine faculty in the emergency department at all times . . ." This statement leverages the ability of an emergency medicine program to control the education of its residents in the emergency medicine depart-

ment, a "territory" that is in many ways analogous to the ICU. An institution that wishes to support a residency program in a given discipline must make certain provisions to accommodate the Residency Review Committee requirements of that discipline.

The academic chairs are responsible for the training of residents and the direction of anesthesia departments, which interface both with other departments and the institutions in which they reside. Any effort to modify the clinical base year, increase the amount of time devoted to critical care training, and change the nature of resident supervision in the ICU must ultimately be implemented by the chairs. Required changes in training must therefore be reasonable in scope and time scale. It is clearly unrealistic to require an anesthesia chair to create a self-sustaining, anesthesia-based critical care service *de novo* to retain accreditation. It is, however, both realistic and appropriate for the American Board of Anesthesiology and the Residency Review Committee to set more ambitious goals for the critical care training of anesthesia residents.

One approach to a general increase in the critical care training of anesthesia residents would be to modify the curriculum so as to ensure that all board-certified anesthesia residents are also certified by the American Board of Anesthesiology as intensivists, and to completely eliminate or refine the critical care fellowship accreditation. This approach is unlikely to receive widespread support at present given the likelihood that such a course would require additional training time and the current lack of the infrastructure required to provide training from within the discipline. A desirable alternative would be the development of a long term (10-yr) strategic plan eventually resulting in dual certification at the conclusion of the anesthesiology residency. The design of such a strategy would necessarily fall to the American Board of Anesthesiology and the Residency Review Committee. A gradual evolutionary approach would permit the development of the necessary training programs and curriculum.

An appropriate first step would involve modification of the curriculum to prepare a new generation of anesthesiologists to function comfortably in the ICU as part of the continuum of anesthesia practice. Rather than extending the residency, it would be more logical to develop a set of requirements for rotations during the clinical base year that are pertinent to intensive care practice, such as infectious disease and nutrition. Additional intensive care training could be interspersed through the remainder of the residency and include 4-6 months of postanesthesia care and critical care rotations. This approach would acknowledge a special role for anesthesiologists who are particularly trained for leadership in ICU administration, education, and research. These individuals will complete intensive care

fellowships and be accredited with special qualifications in CCM by the American Board of Anesthesiology.

## Conclusions

Anesthesiologists played a major role in the creation of CCM, which is a logical extension of anesthesia practice. However, American anesthesiologists currently play a smaller role in CCM than their counterparts in the rest of the world. We are also subject, perhaps not coincidentally, to competition and negative perceptions that are specific to the United States. These considerations and the projected increase in demand for intensivists strongly suggest that the next several years are a time of opportunity. The authors suggest that the leadership of the discipline should promptly evaluate the merits of and possible approaches to substantial reengagement in the practice of CCM.

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