

Education News

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Health educational costs, provider mix, and healthcare reform: A case in point—nurse anesthetists and anesthesiologists

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The appropriate human resources needed for providing anesthesia care in this country have been under debate for at least 50 years. Nurse anesthetists have been the major, hands-on providers of anesthesia services since the late 1870s. According to Rosemary Stevens, during the midst of World War II (1942), there were 17 nurse anesthetists for every one physician anesthesia provider.¹

With the end of the war, and the formalization of the medical specialty in anesthesiology, more medical residencies were established. The American Society of Anesthesiologists (ASA) was not long in stating that its goal was the establishment of an all-physician specialty, i.e., eliminating and phasing out America's nurse anesthetists.² This goal has never been achieved, and the attempt to replace nurse anesthetists limited the vision of medical anesthesiology's leaders in defining what a truly medical role in this specialty should be, then and for the future. Consequently, the medical specialty that developed was patterned after the nursing specialty, thus creating the great functional overlap between medicine and nursing, rather than capitalizing on the unique background of medicine to make that specialty the true internist of surgical care or the expert in critical care and resuscitative medicine.

The resulting conflict concerning the appropriate provider mix in the field of anesthesiology has been long debated, though the number of physicians within this field has seriously limited ASA's ability to achieve its primary goal of replacing nurses in the specialty.

Can prepare 10 CRNAs for the cost of one anesthesiologist

As a part of its data collection in support of

nurse anesthesia, the Texas Association of Nurse Anesthetists (TANA) undertook a study to assess the differential costs of preparing nurse anesthetists and anesthesiologists. Based on data gathered reflecting 1990 and 1991 costs from the Texas Higher Education Coordinating Board^{3,4} and from the Health Care Finance Administration of the U.S. Department of Health and Human Services,⁵ it cost approximately \$635,000 to prepare one anesthesiologist from undergraduate studies through medical school and postgraduate medical education. The average cost of preparing a CRNA in Texas for approximately the same period was \$59,000, with a low-end cost of \$49,700 and a high-end cost of \$75,000 including both undergraduate and graduate educational programs.³ (See Table I and notes.)

Corroboration of medical education costs was sought from the American Medical Association (AMA), the American Association of Medical Schools, and the Liaison Committee on Medical Education. None of the organizations had such data and replied that such data were hard to come by.

Based on the aforementioned costs, 10 CRNAs could be prepared for the cost of preparing one anesthesiologist. In addition, those 10 CRNAs could have entered the work force and collectively provided a total of 35 to 40 years of service as professional nurses or nurse anesthetists by the time the one anesthesiology resident was ready to enter practice.

Provider mix

Both CRNAs and anesthesiologists are appropriate providers for anesthesia care. Outcome studies of care show that in the broad area of overlap between medicine and nursing which includes the majority of the components of anesthesia services, both providers afford the same high quality of services.⁶ Both providers tend to utilize medical consultation for those patients having significant medical problems or complications. As a result of

Table I**Data concerning cost of preparing nurse anesthetists and anesthesiologists in Texas**

Practitioner	BS/BSN degree 36-42 months	Clinical practice as RN ¹	Graduate education 24-30 months ²	Medical education 36 months	Postgraduate education 48 months ³	Total
CRNA ⁴						
high	\$31,758	2-4 yrs	\$42,419	---	----	\$ 75,177
average	\$26,203	on	\$32,950	---	----	\$ 59,153
low	\$ ----	average	\$23,499	---	----	\$ 49,702

Anesthesiologist	Undergraduate	Medical school	Residency	
high				
average	\$20,000 ⁵	\$276,000 ⁶	\$339,348 ⁷	\$635,348 ⁸
low				

1. After graduating from nursing school and attaining licensure, a nurse must work in an acute or critical care nursing setting at least 1 year before applying for entrance into a nurse anesthesia program. Most students enter the graduate nurse anesthesia educational program with 2-4 years of nursing experience. As a result, in the time it takes to prepare an anesthesiologist, a CRNA has practiced nursing and/or nurse anesthesia 3½-4 years.

2. Most nurse anesthesia graduate programs are 24-30 months in length. Some of the cost variance may result from those differences, in addition to those cited in the Texas Higher Education Coordinating Board Report. Upon completion of the program, a graduate is eligible to write the certification examination in the specialty. In Texas, graduates may work without certification, but information from the American Association of Nurse Anesthetists demonstrates that only 6 of some 1,700 CRNAs in the state do not have initial certification, and 25 are not recertified (who are eligible for recertification).

3. Upon graduation from medical school, physicians enter a 4-year anesthesiology residency program: 1 year is dedicated to internal medicine, 2 years to general anesthesiology, and 1 year is spent as a fellow in a subspecialty area or in further basic science education and research. After completion of the fourth year, the graduate is eligible for certification.

4. These figures for the cost of preparing CRNAs in the state of Texas come from the Texas Nursing Education Cost Study and Funding Recommendations, A Report to the Legislative Budget Board in Response to: 71st Legislature, Senate Bill 2222, Article III, rider 25, Regular Session 1989, October 1990.

5. This figure represents a low estimate of the educational costs of obtaining a baccalaureate degree with a pre-medicine major.

6. This figure is based on information from the Texas Higher Education Coordinating Board, printed in the Report of the Texas Health Policy Task Force Report, released in October 1992. The figure quoted was "nearly \$69,000" per medical student per year, "with in-state student tuition of \$5,463 annually and out-of-state student tuition \$21,852 annually."

7. This figure (\$84,837 per resident per year) has been obtained from the director of Hospital Payment Policy, HCFA, in a letter dated July 27, 1992 to Kathleen A. Michels, RN, JD, director of Federal Government Affairs, American Association of Nurse Anesthetists. These figures are for fiscal year 1990, and include data from 1,201 teaching hospitals. This figure is higher, as would be expected than that found reported in the *Journal of Academic Medicine*, 1989;64(6):314-319, for hospital costs in the St. Paul/Minneapolis area in 1983-1984. This study reported that cost to be \$73,000. Most residents are paid a stipend of from \$24,000 to \$32,000 per year. While residents generate revenue from the supervised services performed, that revenue generally goes to the medical school physician practice plan as a supplement to physician salaries paid by the state if associated with a state medical school.

8. Considering the average cost of preparing nurse anesthetists, it becomes apparent that about 10 nurse anesthetists can be prepared for the cost of preparing 1 anesthesiologist. Further, cumulatively nurse anesthetists will have provided at least 35-40 years of nursing and nurse anesthesia services to the community, either as professional nurses or nurse anesthetists, by the time the anesthesiology resident graduates.

Note 1. While this chart reflects the data found concerning the cost of preparing nurse anesthetists and anesthesiologists in Texas, it is probably reasonably accurate for preparing nurse midwives and obstetrician/gynecologists. The cost of preparing nurse practitioners is somewhat less on the average by about \$4,000. The cost of residency education for a primary care physician (internal medicine or family practice) will be \$84,847 less than that of preparing an anesthesiologist, or \$254,511, since the primary care physician has a 3-year rather than a 4-year residency.

Note 2. It should be noted that physicians in the state of Texas who qualify as state residents seldom pay more than 10-15% of the actual cost of their education, while the rest is borne by society. On the average, nurses pay a significantly greater percentage of their educational costs than do physicians.

current patterns of practice (based more on reimbursement patterns than on valid patient care criteria), a variety of provider mix ratios have been suggested. Two federally mandated studies concerning nurse anesthetists and other publications resulting from them have advocated a provider mix of one anesthesiologist to 2 to 3 CRNAs as a basis of affording cost-effective anesthesia to the American public.^{7,8} While the majority of CRNAs in this country work with anesthesiologists, about 20% to 25% of the American public is served solely by CRNAs. Many of these CRNAs reside in rural areas. Anesthesiologists have not found rural America sufficiently fiscally rewarding to move into these areas in significant numbers.

The American Association of Nurse Anesthetists (AANA) has historically contended that fixed ratios as a measure of personnel mix for the nation's health facilities are inappropriate. Fixed ratios fail to take into consideration the population served or the facility's type of workload. Further, CRNAs working alone historically have provided and continue to provide high-quality, essential services which would not otherwise have been available, affording many people healthcare in their own communities.

Rosenbach and Cromwell found that when CRNAs and anesthesiologists work together, each provider was equally likely to be assigned the most complex of cases. They also found that when CRNAs worked alone, the complexity of anesthesia services required was somewhat lower than when CRNAs and anesthesiologists worked together; however, CRNAs working alone did more emergency anesthesia cases on a percentage basis than did anesthesiologists working alone or anesthesiologists and CRNAs working together. The decrease in complexity observed by Rosenbach and Cromwell when CRNAs worked alone reflected only 6% of the surgical procedures for which anesthesia is usually provided.⁹

The ASA has advocated medical direction of all nonphysician anesthetists, generally at a 1:2 anesthesiologist:CRNA ratio. And, in the development of Medicare reimbursement regulations for CRNAs and anesthesiologists, ASA supported this recommendation, often citing quality as the basis for that decision. However, based on the lobbying by the AANA and its members and support from many anesthesiologists who work with CRNAs, a 4:1 CRNA:anesthesiologist ratio was established as the maximum number of concurrent cases for which an anesthesiologist could gain reimbursement for medical direction of CRNAs. Attempts by ASA to use such ratios for qualitative purposes or as a standard of care were disavowed by the Health

Care Financing Administration (HCFA), which stated the ratio served no other purpose than to define the requirements for reimbursement of anesthesiologists who practiced in a medical direction mode of practice.¹⁰

The effectiveness of CRNAs working alone or working without medical direction or supervision has long been established in rural settings and in many community hospitals, even when CRNAs are competing with anesthesiologists for cases. However, most anesthesiologists continue to espouse medical and/or anesthesiologist supervision of CRNAs for administration of all anesthetics. While many such proponents put a quality spin on their arguments, economics and ego are often the hidden motivations, whether conscious or not.

Fassett and Calmes, in a study performed in 1992 and reported in 1995, found that in an urban community hospital there was general consensus among anesthesiologists and CRNAs that only about *one-fourth* of the anesthetics given required either medical direction or a second pair of educated hands, and when this finding was operationalized, the cost of anesthesia services could be reduced within that facility.^{11, 12} This number probably will vary somewhat among facilities based on the providers from whom consensus on this issue is sought, on the population actually served, and the characteristics of the workload of a facility. However, the workload depicted in Fassett and Calmes' study is reasonably characteristic of many suburban community hospitals.

The Fassett and Calmes' study tends to support the views of some CRNA leaders who, in projecting anesthesia personnel needs nationwide, believe that preparing one anesthesiologist for every 4 to 6 CRNAs prepared could achieve an anesthesia provider mix that would not compromise the quality of anesthesia services but would at the same time achieve maximum cost-effectiveness. However, greater involvement of anesthesiologists in anesthesia-related services, such as consulting for and participating in the preparation of critically ill patients for anesthesia, management of acute and chronic pain, and affording intensivist services to critically ill or injured patients before, during, and following anesthesia and surgical intervention, the educational preparation ratio might more appropriately be one anesthesiologist to 3 to 4 CRNAs.

Long-term costs of preparing nurses versus physicians

In 1992 in the State of Texas, we were graduating 88 to 95 anesthesiologists and about 40 CRNAs annually, a situation totally antithetical to cost containment and improved access to care.^{7,8, 11} Further,

when considering cost of preparation of both providers solely for their anesthesiology training (based on figures in Table I), it was costing \$30.0 to \$32.3 million to prepare anesthesiologists annually, while only \$2.64 million was spent to prepare CRNAs.

If the numbers of each provider prepared had been reversed (i.e., graduating 88-95 CRNAs and 40 anesthesiologists annually), about 50% or \$15 million could have been saved in training costs annually. When comparing total educational costs, an output of 95 anesthesiologists a year represented an investment of \$60.3 million, as compared to an output of 40 CRNAs representing an investment of \$2.36 million. Again, if these figures had been reversed and 95 CRNAs and 40 anesthesiologists had been prepared annually, the total annual educational investment would have been reduced by approximately \$30 million.

During the 1980s, a large number of nurse anesthesia programs within academic health centers were terminated to utilize the educational space to increase the number of anesthesiology residency slots. It was also relatively common to hear anesthesiologists who were physician residency program directors express the notion that it was cheaper to train residents than employ CRNAs in teaching hospitals. This was not true. In 1990, the cost of preparation of residents was \$84,837 per resident per year.⁵ The average income of CRNAs for 1990, as reported by the AANA, was \$76,000; the net median earning before taxes for anesthesiologists as reported by the AMA for the same year was \$207,400. Further, in this type of situation, comparing the cost of employing CRNAs and the cost of training residents was answering the wrong question. The questions should have been, what was the differential cost of preparing a nurse versus a physician as an anesthesia provider, and what would be the impact of such preparation on long-term costs of anesthesia care?

Rosenbach and Cromwell reported that the Kaiser Permanente Hospitals they studied had a ratio of nurse anesthetists to anesthesiologists which ranged from 1:1 to 4:1, and that the provider mix did not seem to be a function of the case mix, since the tertiary care facility had a 3:1 ratio. They also reported that in 1986 there were 1.2 CRNAs for every one anesthesiologist. They projected that with the increasing number of graduates of anesthesiology residencies and the decreased number of nurse anesthesia graduates, that ratio would be 1:1 by 1996 and society would be in danger of losing its chance for a more cost-effective anesthesia service.¹²

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Durham, North Carolina, in a presentation on the anesthesia work force at the AANA Assembly of States meeting, St. Louis, November 1995, reported that the current ratio of nurse anesthetists to anesthesiologists was 1:1.2, a reverse of the 1986 ratio and considerably ahead of Cromwell and Rosenbach's projections.¹³

The considerable increase in the number of anesthesiologists prepared has been reflected in significantly higher costs for anesthesia services, particularly within the private insurance sector. Further, the current estimate is that under a managed care delivery system, there are approximately 13,000 too many anesthesiologists.¹⁴ In training costs (1990 to 1991 dollars), we have expended something more than \$8.25 billion for this overage. Had all 13,000 of those physicians who trained as anesthesiologists been trained as primary care physicians where a shortage continues to persist, we could have still saved \$1.1 billion.

Joseph Califano, President Lyndon Johnson's Secretary of the Department of Health, Education, and Welfare, during the period of Medicare enactment and implementation, wrote:

"Anticipating sharply increased demand for health-care services, we pushed through Congress laws to train more doctors and nurses, build more hospitals, and set up community health centers. The assumption was that we were playing by traditional economic rules: the more doctors and hospitals, the more competition, the more efficient and less costly the services.

By 1967 and 1968 we realized how misguided this assumption was. The rise of healthcare costs was accelerating dramatically."¹⁵

Uwe Rheinhardt, a healthcare economist who studied the Medicare program at the time of its enactment as the basis for his doctoral dissertation, disagreed with the common wisdom of the time that a physician shortage existed. From his research, he concluded that if physicians utilized support personnel more efficiently, there would be adequate numbers of physicians to meet the health needs of the nation.¹⁶ No one listened, and federal and state governments put up the money to significantly increase the number of medical schools and double the output of physicians prepared, which to this day, goes unabated, though efforts are being expended to trim residency training and shift more resources to preparation of primary care providers. Unfortunately, the Texas logic to meet the greater needs for primary care physicians was to simply add 20 more spaces to each medical school class and obtain agreement from newly admitted students to fill the primary care residencies, rather than imposing such requirements on existing students, a move medical school deans opposed.

Conclusions

Today, most health analysts agree that we have too many physicians, particularly specialists. There are estimates that the overage of medical specialists will reach 160,000 by the year 2000. If this is accurate, in 1992 dollars, we have expended slightly more than \$101 billion educating that overage. Further, in changing from a private, fee-for-service delivery system to a capitated managed care system, that excess of specialists may become even greater.

The cost data in the TANA study indicate a need for a change in state and federal policy with regard to the funding of health professional education, particularly as relates to CRNAs, nurse midwives, and nurse practitioners who serve as cost-effective alternative providers for physicians in the delivery of health services wherein the legal scopes of practice of these providers overlap. These cost data, along with the myriad of research demonstrating the high quality of services provided by many nonphysician providers, indicate that the health provider mix can be a critical factor in containing costs in healthcare. Fewer physicians and more advanced practice nurses and other nonphysician providers would lead to more disease prevention and health maintenance services and less procedural medicine. The overuse of procedural medicine has often been cited as one of the causes of ever-increasing healthcare costs.

Unfortunately, no study to date in the United States had determined the actual numbers of health providers we need, including the appropriateness of the provider mix, to truly operate and maintain a cost-effective health delivery system. Of greater concern is the fact that no such study can be accurately made without a national policy addressing our commitment to a defined level of health services that should be universally available to the American public, a political issue with which this nation has had difficulty coming to grip.

Neither can the nation rely on health professionals alone to determine and achieve a cost-effective workforce, for a variety of reasons, two of which stand out: (1) professional self-interest when governmental or other money is available for education, and (2) the potential liability under the anti-trust laws for attempting to control the workforce to promote professional self-interest. However, in the 1980s had anesthesiology departments not closed or reduced in size their nurse anesthesia educational programs, transferring those spaces to anesthesiology residency training, we would not have had the degree of overage of anesthesiologists being reported today, and Medicare's graduate medical education costs might have been somewhat less.

It is imperative that a national study be commissioned to determine an appropriate provider mix in the health workforce. Until such data can be a part of our healthcare planning and implementation, a cost-effective healthcare system will remain a dream, and healthcare reform will continue to haunt federal and state legislative agendas ad infinitum.

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