Findings Brief *June 2004*

TRENDS IN THE SUPPLY OF CERTIFIED REGISTERED NURSE ANESTHETISTS IN NORTH CAROLINA, 1992-2002

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Background

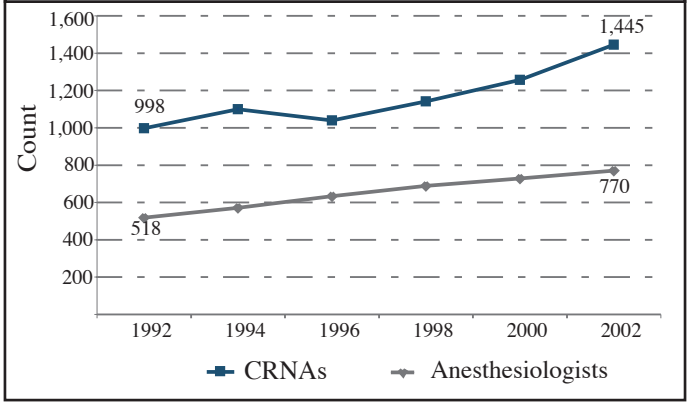
Anesthesia in North Carolina can be administered by either an anesthesiologist (a physician specializing in anesthesia) or a nurse anesthetist (a registered nurse with advanced training in anesthesia). Nurse anesthetists practice in every setting in which anesthesia is administered, including: hospitals, ambulatory surgery facilities, emergency departments, and physician and dental practices. *The Nursing Practice Act* in North Carolina permits qualified nurse anesthetists to perform pre-anesthesia preparation and evaluation, anesthesia administration and maintenance, and post-anesthesia care of patients, in collaboration with a physician, dentist, podiatrist or other lawfully qualified health care provider. Nurse anesthetists may not prescribe medical treatment or make medical diagnoses except under the supervision of a licensed physician.[1] Nurse anesthesia activities can be performed only by a registered nurse licensed by the North Carolina Board of Nursing, who is both a graduate of a nurse anesthesia educational program accredited by the Council on Accreditation of Nurse Anesthesia Educational Programs and credentialed as a Certified Registered Nurse Anesthetist (CRNA) by the Council on Certification of Nurse Anesthetists.

Supply of Anesthesia Providers in North Carolina

In 2002, there were 1,445 CRNAs actively practicing in the state; this represents less than 2% of the registered nurse (RN) workforce in North Carolina. Twice as many CRNAs are in practice as anesthesiologists, yet growth rates over the last 11 years have been similar for both professions. From 1992-2002, there was a 48.6% increase in the number of anesthesiologists (from 518 to 770) compared to a 44.8% increase in the number of CRNAs (from 998 to 1,445) [Figure 1].

Growth in the supply of CRNAs has been faster in metropolitan counties than in non-metropolitan counties since 1992 (46.7% and 37.4%, respectively), while growth in the supply of anesthesiologists has shown the opposite trend. Anesthesiologist supply has increased more rapidly in non- metropolitan North Carolina counties (76.8%), compared to a rate of 43.3% in metropolitan counties. In 1992, the ratio of CRNAs per anesthesiologist was much higher in rural areas (2.5) than in urban areas (1.8).

Figure 1. CRNAs and Anesthesiologists North Carolina, 1992-2002

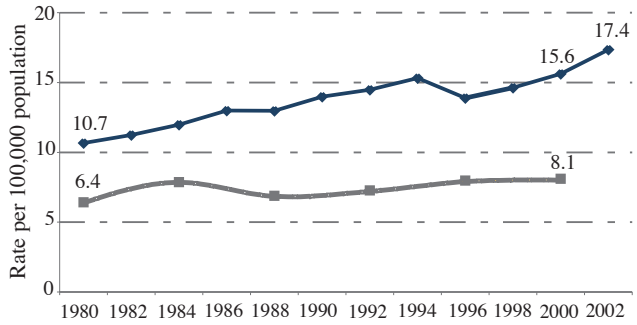


[1] North Carolina Administrative Code, 21 NCAC 36.0226 Nurse Anesthesia Practice

Strong growth in the 1990s in the number of anesthesiologists practicing in rural areas has resulted in relatively balanced ratios of CRNAs to anesthesiologists across both rural (2.0) and urban (1.9) counties in the state by 2002.

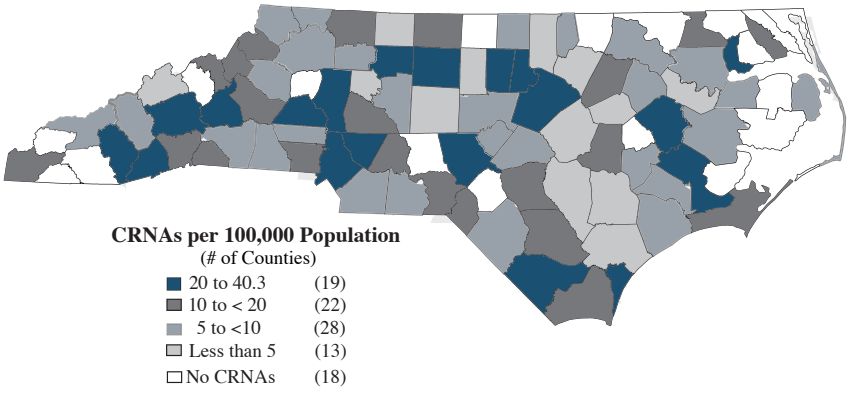
The North Carolina supply of CRNAs relative to population has consistently exceeded that of the United States over the 22-year period from 1980 to 2002 [Figure 2].

Figure 2: CRNAs per 100,000 Population North Carolina and United States, 1980-2002



Sources: North Carolina Health Professions Data System, 2004. The Registered Nurse Population: Findings from the National Sample of Registered Nurses (1980, 1984, 1988, 1992, 1996, 2000); US Census Bureau.

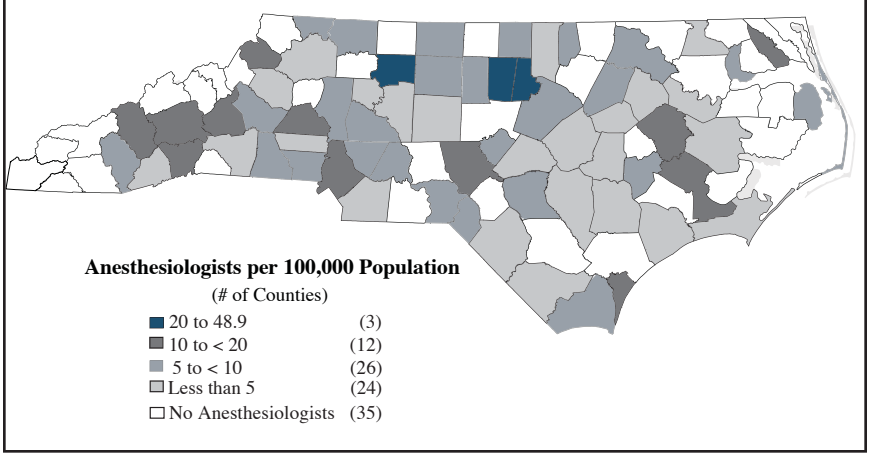
Figure 3a. CRNAs per 100,000 Population North Carolina, 2002



In 2002, 35 of North Carolina's 100 counties were without an anesthesiologist reporting a primary practice location and 18 counties had neither an anesthesiologist nor a CRNA. Of these 18 counties, 15 (83.3%) are designated non-metropolitan [Figures 3a and 3b].

The majority of CRNAs (80.4%) and anesthesiologists (81.2%) practice in urban areas.

Figure 3b. Anesthesiologists per 100,000 Population North Carolina, 2002



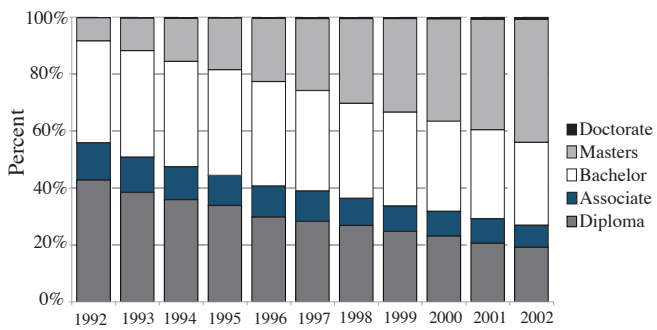
Figures 3a and 3b Sources:
North Carolina Health Professions Data System, 2004: North Carolina Office of State Planning.

Note: Anesthesiologists were mapped according to primary practice location.

Education of Nurse Anesthetists

There are five accredited nurse anesthesia training programs in North Carolina, all of which award a Master of Science in Nursing (MSN) with a concentration in nurse anesthesia. The programs are located at Duke University, East Carolina University, and three collaborative partnerships: the Carolinas HealthCare System/University of North Carolina at Charlotte, Raleigh School of Nurse Anesthesia/University of North Carolina at Greensboro, and Wake Forest University Baptist Medical Center/University of North Carolina at Greensboro.

Figure 4: CRNAs by Highest Educational Attainment, North Carolina 1992-2002



Source: North Carolina Health Professions Data System, 2004.
Note: CRNAs with missing educational data excluded from percentages: 1992 (2), 1993 (2), 1994-1998 (0), 1999 (8), 2000 (2), 2001-2002 (0).

CRNAs in the state are obtaining more advanced education with 73.1% of the work-force holding at least a baccalaureaute degree in 2002, compared with 44.1% in 1992 [Figure 4]. This is partly due to changes in national requirements to become credentialed as a CRNA. The move to a masters degree from a post-RN clinical program has dramatically altered the educational composition of CRNAs in North Carolina. In 1992, the most common educational degree for CRNAs was a diploma (42.7%) and relatively few (8.1%) held a masters degree. By 2002, almost half of CRNAs held masters degrees (43.2%), and relatively few diploma-prepared CRNAs were practicing (19.2%). As the diploma-prepared CRNA workforce retires and new masters-prepared CRNAs enter the workforce, the trend toward holding advanced degrees will continue.

Significant differences exist in the educational preparation of CRNAs working in rural versus urban counties: CRNAs practicing in urban areas are more educated than those in rural areas. In 2002, nearly one-half of all CRNAs practicing in urban areas held a masters degree (47.1%) whereas a little more than one-fourth of rural CRNAs (27.2%) were masters-prepared [Table 1].

Table 1: CRNAs by Highest Degree Held and Practice Location, North Carolina, 1992 and 2002

	1992		2002	
Highest Degree	Urban	Rural	Urban	Rural
Diploma	41.5%	47.6%	18.0%	24.0%
Associate	12.4%	15.5%	7.2%	9.9%
Bachelor	36.5%	33.5%	27.0%	37.8%
Masters	9.4%	3.4%	47.1%	27.2%
Doctorate	0.2%	0.0%	0.7%	1.1%
TOTAL	100.0%	100.0%	100.0%	100.0%

Source: North Carolina Health Professions Data System, 2004.
Note: CRNAs with missing educational data excluded from percentages: 1992 (2).

Changing Demographics in the Certified Registered Nurse Anesthetist Workforce

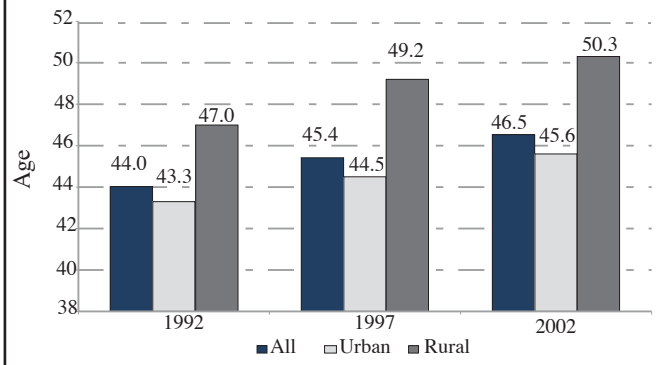
Compared with the total registered nurse workforce in North Carolina, males comprise a larger proportion of CRNAs. In 2002, less than 7% of registered nurses were male, compared with nearly 35% of CRNAs. The percentage of men in the CRNA workforce in North Carolina has changed little since 1992, when 29.7% of the workforce was male.

Nearly 30% of North Carolina's population in 2000 was non-white;[2] however, the CRNA workforce is not as diverse. The racial and ethnic mix of CRNAs has remained relatively stable over the last 11 years; approximately 5.6% of the workforce was non-white in 2002. African Americans made up approximately 3% of the CRNA workforce in the state in 2002.

[2] *United States Census Bureau, 2000.*

The average age of CRNAs continues to rise, from 44 years in 1992 to 46.5 years in 2002. CRNAs working in rural counties are considerably older than those working in urban counties of the state. The average age of rural CRNAs in 2002 was nearly 5 years older than the average age of urban CRNAs [Figure 5]. Significant age differences are seen in the educational attainment of CRNAs; diploma-prepared CRNAs are, on average, 15 years older than those with masters degrees (55.5 and 40.5 years respectively in 2002).

Figure 5. Average Age of CRNAs by Practice Location, North Carolina, 1992-2002



Source: North Carolina Health Professions Data System, 2004.

Regulation of Certified Registered Nurse Anesthetists

The supply and distribution of nurse anesthetists is influenced by state licensure requirements, federal regulations and hospital policies. In addition to North Carolina's nurse licensure requirements, federal regulations for accreditation of hospital facilities under the Medicare and Medicaid programs require that a nurse anesthetist be supervised by an operating practitioner or anesthesiologist; similar regulations are required in ambulatory surgical facilities and Critical Access Hospitals.[3] In November 2001, the Centers for Medicare and Medicaid Services (CMS) issued a regulation providing state governors the opportunity to opt out of the federal supervision requirements in certain circumstances and after consultation with the state boards of medicine and nursing.[4] North Carolina has not sought exemption from this regulation. Hospital policies outlining physician participation in the administration of anesthesia by nurse anesthetists also affect CRNA practice.

[3]Code of Federal Regulations. 42 CFR 482.52; 42 CFR 416.42; and 42 CFR 485.639

[4]Federal Register, [66FR 56762-56769]

Data for this findings brief were derived from the North Carolina Health Professions Data System at the Cecil G. Sheps Center for Health Services Research, 1992-2002. Data on certified registered nurse anesthetists are provided through the North Carolina Board of Nursing and represent licensed, active, in-state registered nurses who indicate a position type as a CRNA. Data on anesthesiologists are provided through the North Carolina Medical Board and represent licensed, active, in-state, non-federal, non-resident physicians who indicate a primary specialty in anesthesiology. Professions are located to their primary practice location and do not reflect secondary practice locations. *This work was supported by the North Carolina Area Health Education Centers (AHEC) Program.*

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