

Carolinas Medical Center Academic Infrastructure: Implications for Physician Workforce Expansion

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The city of Charlotte is known for being the second largest banking center in the country after New York. Its growth rate in recent years—in terms of new businesses, jobs, and population—has been nothing short of explosive. While such distinctions are positive, Charlotte has one other distinction that renders the city something of an anomaly in the world of medical education: it is one of the largest cities in the United States without a medical school.

However, this may change. Late in 2006, leaders of the University of North Carolina School of Medicine (UNC-SOM) approached Carolinas HealthCare System (CHS) with a proposal to develop a second UNC medical school campus in Charlotte. The plan as initially proposed by UNC would expand the existing class size by 50 students, from 160 to 210. The students would complete their first two years of training in Chapel Hill. To accommodate the expanded class during the last two years of training, a new campus would be developed in Charlotte in association with the Carolinas Medical Center (CMC).

One major advantage of the UNC proposal is that it builds on the existing academic infrastructure at CMC. Carolinas Medical Center, the 861-bed flagship facility of CHS, has a long history of involvement with education and research and serves as one of 5 state designated academic medical center teaching hospitals. The academic nature of the other 4 hospitals is probably more apparent because all are affiliated with highly visible universities (Duke University, Wake Forest University, The University of North Carolina at Chapel Hill, and East Carolina University). Nonetheless, CMC hosts residency and fellowship programs that serve over 200 medical school graduates at a given time. These students come from 32 states and represent 84 different US medical schools. In fact, CMC has hosted approximately 1000 medical students from UNC-SOM in the

past 4 year years alone as part of the school's normal clinical rotations. As a result, the addition of a more formal program, should it occur, would be a fairly logical extension of current capabilities.

There is growing consensus that North Carolina, and the nation, face a significant physician shortage. The Association of American Medical Colleges, for example, recently called for a 30%

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increase in the number of trainees being produced by American medical schools over the next decade.¹ The North Carolina Institute of Medicine recommends similar sharp increases in training of physicians and other health care practitioners.² To better understand the benefits of a proposed collaboration between UNC-SOM and CHS, it is helpful to know something about the origins of CHS and its long history of involvement in both medical education and research.

Carolinas Medical Center traces its history, which is extensively documented,³ to the years following the Civil War. In 1876, Charlotte Home and Hospital of St. Peter's Episcopal Church was established as the state's first civilian general hospital. The hospital grew and relocated several times during the next 50

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years, and the name eventually changed to St. Peter's Hospital.

By the 1930s, local physicians were pioneering a movement to construct a new public hospital that would be spacious enough to eventually accommodate more than 800 patients. Their goals at the time were to practice medicine to the best of their abilities, serve the community, including the indigent population, and reflect the superior training of Charlotte's physicians through high-quality care. Other key objectives were to take advantage of that same physician training to educate and train medical residents and encourage research.³ After start-up proposals were thoroughly investigated and justified, a decision was made to construct a new facility known as Charlotte Memorial Hospital. Charlotte Memorial, which formally opened in 1940, was constructed utilizing land donated by St. Peter's Hospital.

The hospital grew steadily over the years and in 1990 was renamed Carolinas Medical Center to more accurately reflect the growth and regional presence of the institution. Today, CMC is the highest-volume provider of tertiary/quaternary medical services in the state. During this same period CMC's parent corporation, Carolinas HealthCare System, was beginning a period of steady regional expansion that involved acquiring, leasing, or managing hospitals and physician practices primarily in North Carolina but extending into South Carolina as well. Today CHS is the third largest public health care system in the United States behind only the University of California system and the nationwide system of Veterans Affairs hospitals.

Carolinas HealthCare System owns, leases, or manages 19 hospitals and has two more under development. Including 11 nursing homes, the system has nearly 4500 licensed beds. CHS has more than 150 delivery sites in all, including 75 Carolinas Physician Network medical practices, and employs approximately 29 000 part- and full-time employees. Carolinas Medical Center's commitment to graduate medical education took root at the time of its founding, in 1940 with the establishment of a variety of graduate training programs. Residency programs grew steadily during the 1960s, prompting CMC to begin recruiting full-time teaching faculty to supplement the strong support already being provided by private practitioners.

Physician residency programs are currently offered in 10 fields including emergency medicine, pediatric emergency medicine, family medicine, rural family medicine, internal medicine, obstetrics and gynecology, orthopedic surgery, pediatrics, physical medicine and rehabilitation, and general surgery. Fellowships are offered in medical toxicology, sports medicine, orthopedic trauma, vascular surgery, and thoracic surgery. In addition, CMC is actively considering the addition of fellowships in gastroenterology and pulmonary/critical care medicine. All programs are fully accredited by the Accreditation Council for Graduate Medical Education (ACGME) and are competitive in attracting the best qualified of the nation's medical students. After completion of residency, approximately 80% of CMC-trained physicians enter practice directly while 20% pursue fellowship training. Current plans for CHS to merge with NorthEast Medical Center in Cabarrus County will also complement the overall educational portfolio. When the merger

is complete, it will result in the addition of an innovative family medicine training experience that incorporates a strong rural focus as a part of CHS's expanding commitment to general and graduate medical education.

Currently, CMC's residency program includes 212 physicians. Additionally, there are 193 faculty members (up from three dozen less than 25 years ago) teaching in the following primary care and subspecialty departments: pediatrics, family medicine, internal medicine, obstetrics and gynecology, emergency medicine, general surgery, physical medicine and rehabilitation, orthopedics, oral medicine, vascular surgery, thoracic surgery, and neurology. All faculty physicians at CMC are expected to make contributions in the 3 areas of clinical care, education, and research.

Carolinas Medical Center has also served as a primary regional training site for medical students since the inception of UNC-SOM. Initially, UNC students received clinical experience in internal medicine at CMC. That program was soon expanded to include obstetrics and gynecology and pediatrics. The list of established clinical rotations has since expanded to include general surgery, family medicine, emergency medicine, physical medicine and rehabilitation, orthopedics, plastic surgery, and psychiatry. Although most of the student rotations at CMC are filled by UNC students, clinical rotations are also offered to medical students nationally. During the 2004-2005 academic year, approximately 444 undergraduate student months were provided through CHS facilities and physicians.

Supplementing its role in physician education, CHS also trains allied health professionals. The Carolinas College of Health Sciences (CCHS), located on CMC's main campus in Charlotte, educates nursing students and other personnel. The school was initially established as the Charlotte Memorial Hospital Authority School of Nursing in the late 1980s after a comprehensive feasibility study supported the need for more nurses, both locally and statewide. The school's name was changed to CCHS in 1996 when programs expanded to include disciplines other than nursing. Carolinas College of Health Sciences is fully accredited by the Commission on Colleges of the Southern Association of Colleges and Schools and currently has an enrollment of 450 students. Academic programs and courses are offered for prenursing; nursing; emergency medical sciences; radiologic, surgical, and medical technology; general education (ie, liberal arts); and nurse aide training.

Carolinas Medical Center also has a long history of involvement in continuing education. In 1972, CMC was invited by UNC-SOM to become one of 9 Area Health Education Centers (AHECs) in North Carolina. Area Health Education Centers act as regional extensions of universities and teaching hospitals, providing educational programs to physicians, health care professionals, and other students. The Charlotte AHEC serves an 8-county area. The AHEC programs reached approximately 27 000 care practitioners during the 2005-2006 academic year alone.

Charlotte AHEC also offers a variety of ancillary programs. For example, training opportunities in diversity management, foreign languages, and cultural immersion are offered to improve

services to underserved populations. The AHEC digital library has facilitated the delivery of certain courses, educational materials, and literature online. This level of accessibility has vastly expanded the opportunities available for community-wide involvement. Finally, CHS and Charlotte AHEC have developed a program called Health Career Education—Reaching Out to Excellent Students (HEROES). This program is designed to educate precollege students, especially underrepresented minorities and disadvantaged populations, about health careers.

Carolinas HealthCare System has also invested heavily in medical research. The James G. Cannon Research Center, which opened in 1991, attracts clinical and basic science researchers to CMC. Cannon currently houses active laboratory research programs in general surgery, urology, emergency medicine, orthopedic biology/engineering, obstetrics-gynecology, internal medicine, and pediatrics. Additionally, it houses the McColl-Lockwood Laboratory for Muscular Dystrophy Research and the Heineman Medical Research Laboratories for cardiovascular disease research. More research laboratories are located in the Blumenthal Cancer Center.

Carolinas Medical Center-based investigators have contributed to expanded knowledge and successful outcomes in medicine. For example, recent work helped to develop a new technique to transplant insulin-producing cells into Type I (insulin-dependent) diabetics.^{4,6} The first pancreatic islet transplantation in North or South Carolina was performed in Charlotte, and follow-up studies showed the recipient to be free from exogenous insulin injections 2 years postsurgery. The patient requires minimal immunosuppression.

Additionally, novel use of antisense oligonucleotide mediated therapy was used to improve Duchenne muscular dystrophy in an animal model.⁷ Yet another CMC laboratory has identified an array of genes implicated in the progression of ovarian cancer.⁸ These genetic markers may potentially serve as the basis for novel

treatment strategies and/or the development of more sensitive and earlier screening tests. NIH funding has been utilized at CMC to support the development of a Carboximeter.^{TM9} The purpose of the device is to detect pulmonary emboli quickly and easily by means of a bedside test. Another NIH-funded study is focused on identifying oral cavity pathogens that may correlate strongly with ventilator associated pneumonia.

The R. Stuart Dickson Institute for Health Studies is a program of applied research and public health studies that is geared toward facilitating improvements in the quality of care and the effectiveness of clinical practice. Dickson staff members include epidemiologists, biostatisticians, health services researchers, database analysts, and database developers.

As this article goes to press, the feasibility of starting a Charlotte Campus of UNC-SOM is still being analyzed. If the initiative does come to fruition, however, the new campus will not need to be built from scratch. The proposed expansion will capitalize upon a long established and mature relationship between UNC-SOM and CMC. A large part of the infrastructure necessary to support expanded medical educational opportunities is already in place. Additionally, a tradition of high educational standards, in conjunction with top-quality patient care and cutting-edge research, is well established. Therefore, the main questions under review tend to revolve around funding, logistics, timing, and capacity.

The medical school expansion concept proposed by UNC-SOM builds upon existing strengths of two organizations with a long-standing commitment to educating tomorrow's physicians. Assurance of an adequate supply of accessible physicians is an issue of seminal importance to the public today and for years to come. The UNC proposal represents a means of increasing the state's production of physicians in a rapid and cost effective manner. **NCMJ**

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