

Transforming Medical Education is the Key to Meeting North Carolina's Physician Workforce Needs

Paul R. G. Cunningham, Elizabeth G. Baxley, Herbert G. Garrison

To meet the needs of the population of North Carolina, an epic transformation is under way in health care. This transformation requires that we find new ways to educate and train physicians and other health care professionals. In this commentary, we propose that the success of the Brody School of Medicine in preparing a primary care physician workforce can serve as a model for meeting the state's future physician workforce needs. Other considerations include increasing graduate medical education positions through state funding and providing incentives for medical students who stay in North Carolina.

The making of a physician is an arduous, complex, and challenging process. The education and training of physicians who will ultimately practice primary care in rural and underserved areas is even more challenging. Fortunately, a medical school in Greenville, which was envisioned 50 years ago and instituted soon thereafter, has achieving the intended vision. It now serves as a model for creating and sustaining a physician workforce for the next era of health care.

As the story goes, a passionate family physician from Plymouth, a very small town in Eastern North Carolina, convinced the president of East Carolina College, Dr. Leo Jenkins, that the people of the region were dying from chronic diseases at an alarming and unnecessary rate. He told Dr. Jenkins that he was unable to recruit any physicians to the region to help him provide care for these patients.

Dr. Leo Jenkins liked to say that the idea for a medical school at East Carolina College originated with a general practitioner from Plymouth, Dr. Ernest W. Furgurson. As Dr. Jenkins described it, Dr. Furgurson came to the President's house on Fifth Street in Greenville one Sunday afternoon in the spring of 1964. He was very angry...he wanted to know why the college was not carrying through on its promises to the region that supported it. [1]

So began the School of Medicine at East Carolina University, now known as the Brody School of Medicine.

The mission developed for the Brody School of Medicine by the North Carolina General Assembly in the 1970s is tri-

partite: to increase the supply of primary care physicians to serve North Carolina, to improve the health status of the people of Eastern North Carolina, and to enhance the access of minority and disadvantaged students to a medical education. While this mission is a tall order for a brand new medical school in an impoverished region of the state, it has been far exceeded.

This success can be attributed to an intentional and consistent strategy: recruit students only from North Carolina; conduct a holistic review of applicants and look for students with backgrounds that are predictive of primary and underserved care; provide a primary care-focused educational process; and maintain tuition rates at a low level, so that specialty choice is not significantly influenced by student debt. One significant result of this strategy is that Brody School of Medicine is regularly ranked among the top 10 schools in the nation for producing family physicians [2].

Today, North Carolina and the nation are in the midst of a crucial transformation in health care. This transformation will take a generation to complete and will require innovation, flexibility, and engagement in order to achieve success. At its core, progress in this new transformation will be measured by the degree to which the health care workforce is able to absorb a growing population base and an influx of newly insured patients; resolve disparities in health care; and provide excellent care with better outcomes—all at an affordable cost, with greater patient engagement and satisfaction, and with care that is closer to home.

Physician Workforce Needs

Training the right number and mix of health professionals is vital to ensuring access to high-quality, affordable health care services. Between 2013 and 2025, the nation's population is projected to grow by 10%, from 316.5 million to 347.3 million. During this same period, the population

Electronically published March 4, 2016.

Address correspondence to Dr. Paul R. G. Cunningham, Brody School of Medicine, East Carolina University, 600 Moye Blvd, Greenville, NC 27834 (cunninghamp@ecu.edu).

N C Med J. 2016;77(2):115-120. ©2016 by the North Carolina Institute of Medicine and the Duke Endowment. All rights reserved. 0029-2559/2016/77210

aged 65 years and older is projected to grow by 46%, while the population under age 18 years is projected to grow only 5% [3]. The projected increase in senior citizens with relatively fewer young people could mean more patients and not enough health professionals—a potentially dire situation, especially for the physician workforce.

Several recent studies have projected the need for future physicians by taking into consideration anticipated physician retirements; changes in specialty, practice type, and location; and the impact of other health professionals in meeting health care needs [4]. These projections of future supply and demand suggest a shortfall of 46,100 to 90,400 physicians, including a shortfall of 12,500 to 31,100 primary care physicians and a shortfall of 28,200 to 63,700 non-primary care physicians [4].

An important caveat is that the forecasting of physician workforce needs is far from a perfect science. Economists struggle with uncertainties regarding how emerging care delivery models and changing health care practices might affect physician supply and demand, as well as how cli-

nicians and care settings will respond to economic and other trends [4-7]. A crucial factor in such forecasts is the assumptions that are made about the average annual physician productivity in future years. That variable depends chiefly on 2 factors: the number of hours per year that physicians typically devote to patient care [8] and the degree to which physicians delegate tasks for which an MD degree is not required—for example, administrative tasks can be delegated to clerks or business managers, and certain medical tasks can be delegated to physician assistants or nurse practitioners [9].

Practically all graduates of medical school complete residency training in their chosen specialty prior to beginning the independent and unsupervised practice of medicine. Despite a robust and growing pool of medical school applicants, there is evidence for a pending bottleneck in the availability of graduate medical education (GME) residency program positions, the number of which has not increased in concert with the increase in US medical student class size in the past 10 years [10-12]. (In contrast to the many predic-

tions that there will soon be too few GME positions, Mullen and colleagues predict that slight growth in the number of GME positions will mean that US medical students have adequate numbers of residency opportunities [13].)

Legislation is before Congress to increase the number of new residency positions nationally by 3,000 each year between 2017 and 2021 [14]. It is critical that new or existing residency positions be allocated where they are needed most—in primary care, rural areas, and community settings. Whether the forecasters are entirely or partially correct, there are several rural counties in North Carolina with no physicians at all, so there is unequivocally a physician shortage in those communities. Certainly, the way health care is delivered will need to change and adapt. That change must include how we train and educate health care professionals, especially physicians.

Medical Education in the 21st Century

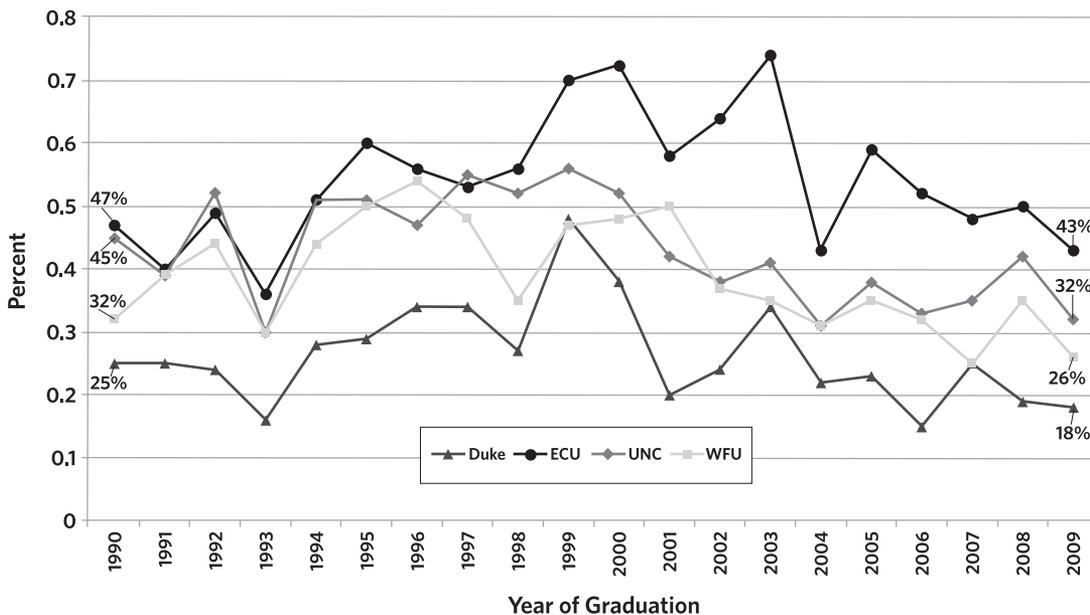
Increasingly, teams of various professionals are providing health care services. At the center of the team is the most

important member—the patient. Other team members include physicians, nurses, nutritionists, patient navigators, nurse practitioners, physician assistants, and social workers. Each member of an interprofessional team can be the key interface with the patient, at different times and with different patients.

Although such teams will increasingly become the norm, most medical students, nursing students, and other allied health students are not currently being taught how to work successfully in such teams and have few models of interprofessional collaboration. The health education silos of the past must come down in favor of providing interprofessional education [9].

In addition to teamwork, other aspects of health systems science—including population health, patient safety, quality improvement, and systems thinking—are looming as areas of expertise that will be critical for tomorrow's physicians. Some are now calling health systems science the critical third science in medicine—in addition to basic science and clinical science, which all physicians learn in medical school,

FIGURE 1.
Percentage of North Carolina Medical Graduates Practicing in Primary Care^a 5 Years After Graduation, Classes 1990-2009



Note. ECU, East Carolina University; UNC, University of North Carolina; WFU, Wake Forest University.

^aPrimary care was defined as family medicine, general pediatric medicine, general internal medicine, internal medicine/pediatrics, and obstetrics/gynecology.

Sources: Data are from the North Carolina Health Professions Data System, the North Carolina Area Health Education Centers program, Duke University, the University of North Carolina at Chapel Hill, East Carolina University, Wake Forest University, the North Carolina Medical Board, and the Association of American Medical Colleges.

residency, and fellowship training [15]. There must be additional emphasis placed on health systems science as an invaluable part of a physician's education and training.

The Brody Model

The American Medical Association (AMA) recently awarded a \$1 million grant to Brody School of Medicine—1 of only 11 such grants in the nation—to support the development of new ways of educating medical students. With this award, Brody School of Medicine has focused on improving the competency of its graduates in health systems science, critical aspects of which include patient safety, quality improvement, team-based interprofessional care, population health, and systems thinking.

To help prepare the faculty to institute the curricular emphasis on health systems science, Brody School of Medicine used funding from the AMA to create a Teachers of Quality Academy (TQA). To date, the TQA has graduated 1 cohort of interprofessional faculty who are teaching and serving as role models of 21st-century physicians—that is, health care providers who have clinical expertise but who also know and practice health systems science.

In addition to improving its curriculum and training its faculty, Brody School of Medicine is reemphasizing its original tripartite mission of focusing on primary care, improving health in Eastern North Carolina, and enhancing access of

minority and disadvantaged students to medical education. This last part is especially critical at a time when there are still disparities in health care, especially among vulnerable populations.

A key to reducing disparities is to train physicians from underrepresented populations, as evidence shows that a diverse health care workforce is effective in providing equitable care [16-18]. However, the racial and ethnic diversity of North Carolina's current health care professionals does not match the state's population in terms of diversity [19].

With Brody's mission focus on providing medical education for underrepresented students and students from disadvantaged backgrounds, as much as one-fifth of each medical school class is comprised of minority students (compared to a national median of about 6%), and there have been improvements in class diversity over time. These Brody graduates are more likely to locate in rural and underserved areas after training and to provide culturally concordant care to minority populations who suffer the greatest health disparities.

Where Do We Go From Here?

Even with a more deliberate and vigorous interprofessional education process and with curricular emphasis on health systems science, the process of training physicians requires further overhauling to produce physicians who are

ready for primary care and rural practice. North Carolina already relies on residency programs outside of the state to supply some of our physicians [20]. To reverse (or at least ease) our reliance on out-of-state residency programs, North Carolina must find ways to increase GME positions in the state, particularly in rural areas and in community-based settings. A potential model is a program in Georgia that established new teaching hospitals and programs to meet the state's current and future physician workforce needs [21]. To achieve the goal of raising the number of physicians practicing in rural areas, we must create more opportunities for medical school graduates to do at least part of their residency training in such settings in North Carolina [22, 23].

Given recent trends, having more opportunities for training is critical. During his October 2015 report to the Board of Governors of the University of North Carolina, Dr. Warren Newton, director of the North Carolina Area Health Education Centers program, showed data indicating an ongoing decline in the number of primary care physicians who choose to practice in North Carolina. This decline is particularly evident in rural and economically depressed areas of the state (see Figure 1). Countering this trend is the relative success of Brody School of Medicine and the high percentage of its graduates who choose primary care and remain in practice within the state (see Figure 1). While slightly concentrated in Eastern North Carolina, Brody School of Medicine graduates provide care throughout the entire state to individuals, families, and communities, where they are enhancing the health of the state's population (see Figure 2).

The challenge of meeting North Carolina's physician workforce needs is considerable and complex. As a state, we must create policies, mechanisms, and incentives that will help us meet the health care needs of the future. Using the past as a guide and Brody School of Medicine as a model, we know there are several critical elements: keeping tuition low, recruiting underrepresented students, emphasizing primary care, and creating a curriculum that includes health systems science. In addition, it is time to consider providing incentives to certain students entering medical school in our state

to entice them to stay in rural North Carolina. These incentives might include paying all or part of their medical student debt or providing a cash incentive to help primary care physicians establish a practice in one of North Carolina's health professional shortage areas. Additionally, expanding the class size at North Carolina public medical schools for students who commit to primary care and rural service is worth serious consideration. With or without medical school class size expansion, the North Carolina General Assembly should look at supporting additional funding for GME positions, specifically in rural and community settings, in order to support an appropriately-sized and distributed health professional workforce. *NCMJ*

Paul R. G. Cunningham, MD, FACS dean, Brody School of Medicine; senior associate vice chancellor of medical affairs, Brody School of Medicine, East Carolina University, Greenville, North Carolina.

Elizabeth G. Baxley, MD senior associate dean of academic affairs, Brody School of Medicine, East Carolina University, Greenville, North Carolina.

Herbert G. Garrison, MD, MPH associate dean of graduate medical education; professor, Emergency Medicine, Brody School of Medicine, East Carolina University, Greenville, North Carolina.

Acknowledgments

The authors would like to thank Katherine Jones, PhD, of the East Carolina University Department of Public Health for creating the map shown in Figure 2.

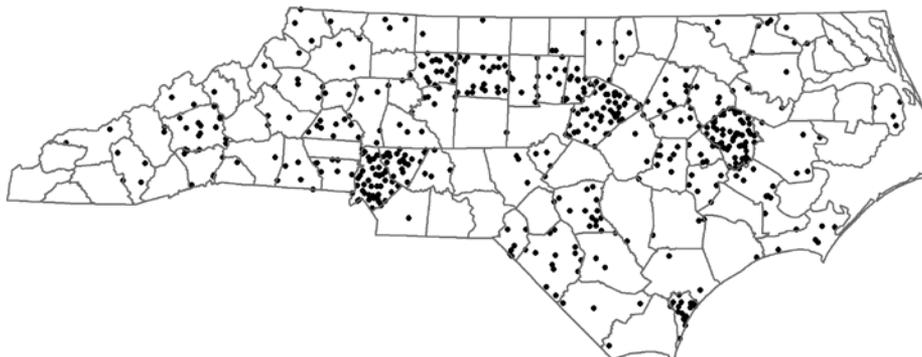
Potential conflicts of interest. All authors have no relevant conflicts of interests.

References

1. Williams WC. *Beginning of the School of Medicine at East Carolina University, 1964-1977*. Greenville, NC: Brookcliff Publishers; 1998.
2. Kozakowski SM, Fetter G Jr, Bentley A. Entry of US medical school graduates into family medicine residencies: 2014-2015. *Fam Med*. 2015;47(9):712-716.
3. United States Census Bureau. 2014 National Population Projections. United States Census Bureau website. <https://www.census.gov/population/projections/data/national/2014.html>. Accessed January 29, 2016.
4. IHS, Inc. *The Complexities of Physician Supply and Demand: Projections from 2013-2025*. Washington, DC: Association of American Medical Colleges; 2015.
5. Schwartz WB, Sloan FA, Mendelson DN. Debating the supply of physicians: the authors respond. *Health Aff (Millwood)*. 1989;8(2):91-95.
6. McNutt DR. GMENAC: its manpower forecasting framework. *AJPH*.

FIGURE 2.

Primary Care Physicians With Degrees From East Carolina University Brody School of Medicine



Note. Each dot represents 1 physician.

Source: Data were collected from the North Carolina Medical Board on January 1, 2015.

- 1981;71(10):1116-1124.
7. Association of American Medical Colleges. 2011 State Physician Workforce Data Book: Center for Workforce Studies. Washington, DC: Association of American Medical Colleges; 2011.
 8. Staiger DO, Auerbach DI, Buerhaus PI. Trends in the work hours of physicians in the United States. *JAMA*. 2010;303(8):747-753.
 9. Baxley EG, Cunningham PR. Meeting North Carolina's health care needs through interprofessional education and practice. *N C Med J*. 2014;75(1):65-67.
 10. Medical school applicants, enrollees reach new highs [press release]. Washington, DC: Association of American Medical Colleges; October 22, 2015. <https://www.aamc.org/newsroom/newsreleases/446400/applicant-and-enrollment-data.html>. Accessed November 13, 2015.
 11. Rieselbach R, Sundwall D, Shine K. Graduate medical education: the need for new leadership in governance and financing. Health Affairs website. <http://healthaffairs.org/blog/2015/01/14/graduate-medical-education-the-need-for-new-leadership-in-governance-and-financing/>. Published January 14, 2015. Accessed January 29, 2016.
 12. Eden J, Berwick D, Wilensky G, eds. Graduate Medical Education That Meets the Nation's Health Needs. Washington, DC: National Academies Press; 2014.
 13. Mullan F, Salsberg E, Weider K. Why a GME squeeze is unlikely. *N Engl J Med*. 2015;373(25):2397-2399.
 14. The Resident Physician Shortage Reduction Act of 2015 (H.R. 2124). Association of American Medical Colleges website. <https://www.aamc.org/download/431122/data/theresidentphysicianshortageredu> ctionactof2015.pdf. Accessed November 13, 2015.
 15. Vassar L. New "third science" a bedrock for transforming med ed. AMA Wire website. <http://www.ama-assn.org/ama/ama-wire/post/new-third-science-bedrock-transforming-med-ed>. Published June 9, 2015. Accessed February 13, 2016.
 16. Smedley BD, Stith AY, Nelson AR, eds. Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care. Washington, DC: National Academies Press; 2003.
 17. Jackson CS, Gracia JN. Addressing health and health-care disparities: the role of a diverse workforce and the social determinants of health. *Public Health Rep*. 2014;129(suppl 2):57-61.
 18. Cohen JJ, Gabriel BA, Terrell C. The case for diversity in the health care workforce. *Health Aff (Millwood)*. 2002;21(5):90-102.
 19. McGee V, Fraher E. The Diversity of North Carolina's Health Care Workforce. Chapel Hill, NC: Cecil G. Sheps Center for Health Services Research; 2012.
 20. Fraher E, Spero J, Lyons J, Newton H. Trends in Graduate Medical Education in North Carolina: Challenge and Next Steps. Chapel Hill, NC: Cecil G. Sheps Center for Health Services Research; 2013.
 21. Nuss MA, Robinson B, Buckley PF. A statewide strategy for expanding graduate medical education by establishing new teaching hospitals and residency programs. *Acad Med*. 2015;90(9):1264-1268.
 22. Curran V, Rourke J. The role of medical education in the recruitment and retention of rural physicians. *Med Teach*. 2004;26(3):265-272.
 23. Rabinowitz HK, Diamond JJ, Markham FW, Rabinowitz C. Long-term retention of graduates from a program to increase supply of rural family physicians. *Acad Med*. 2005;80(8):728-732.