Trends in Graduate Medical Education in North Carolina: Challenges and Next Steps

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Introduction

Anticipating an increase in the demand for physician services in the near future, North Carolina's two public medical schools recently increased their enrollment. In 2010, The University of North Carolina began to expand their entering classes from 160 entering positions to 180 positions by 2012. UNC also added regional placements in Charlotte and Asheville for 3rd-year and 4th-year students. During the same period, the Brody School of Medicine at East Carolina University expanded from 73 to 80 students per year, with 3rd and 4th-year students training at satellite clinics in the eastern part of the state. Campbell University, a private institution, is building a new school of osteopathic medicine that will admit its first class of 150 students in September 2013.

After graduating from medical school, physicians must complete additional training called "graduate medical education" (GME) to become licensed to practice. Physicians in GME are commonly known as "residents," and these residencies last anywhere from three to seven years and usually focus on a particular medical specialty, such as pediatrics or orthopedic surgery.

The largest single source of funding for the costs of training residents in North Carolina comes from Medicare. Other funding sources include Medicaid, hospital revenues and direct state appropriations. Recent efforts to expand the number of publicly-funded residency slots in North Carolina have not been successful, primarily due to the high cost. Nationally, cost is estimated to average about $143,000 per resident per year,[1] but costs vary widely depending on geography, institution, and medical specialty. Because of the state's current fiscal constraints, future attempts to expand residency training with state appropriations will need to demonstrate that investments of public funds return value to the state either by resolving workforce needs in shortage specialties and underserved communities or by helping small hospitals survive.

Graduate Medical Education represents a significant economic investment of both state and federal dollars, yet there is little accountability for this spending. This factsheet outlines what we know about GME in North Carolina. The analyses investigate whether physicians remain in-state after finishing residency training and whether residency training programs are producing physicians in needed specialties who practice in the communities where they are most needed. The report concludes with some recommendations about how the state might develop a more rational, transparent and accountable system that ensures that public investments in residency training are meeting the health workforce needs of North Carolina.

Methodology & Data

Data in this report were compiled from multiple sources. Information about the North Carolina physician workforce was derived from the North Carolina Medical Board's (NCMB) initial licensure and annual renewal forms, completed by all physicians licensed to practice in the state. Descriptive data from the NCMB system are housed at the North Carolina Health Professions Data System (HPDS) at the Cecil G. Sheps (Sheps) Center for Health Services Research at the University of North Carolina at Chapel Hill. Data on numbers of residents

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coming into or leaving practice in the state and data on retention of physicians in NC after completing North Carolina residency programs were derived from the American Medical Association (AMA) Physician Masterfile. Data from the Association for American Medical Colleges 2011 Physician Workforce Data Book were used for state- and national-level comparisons.

In these analyses, primary care is defined as general practice, family practice, general internal medicine, pediatrics, and obstetrics and gynecology. The data include non-federally employed physicians in active practice, including those involved in non-patient care activities such as teaching, research, administration, etc.

Physicians who reported completing GME training outside of the United States or Canada (n=156, 0.8%) or did not report a location of GME training (n=753, 4%) were excluded from the analysis.

Findings

Location of Residency Training in North Carolina

Residency training occurs at ten major sites in North Carolina. In 2010, North Carolina had 2,681 resident physicians in training. The majority of residents (83%) train at one of the five academic health centers in the state: Duke University Medical Center, UNC Hospitals, Wake Forest Baptist Medical Center, Vidant Medical Center (formerly Pitt County Memorial Hospital), and Carolinas Medical Center. The remainder train at one of the five AHECs with freestanding residency programs (see **Table 1**). WakeMed has approximately 45 residents in training at any given time, but all are on rotation from UNC or one of the other academic medical centers. Additional community-based family medicine residencies are based in Cabarrus County, Hendersonville, and Monroe.

North Carolina lags behind national average in numbers of residents in training per population

Nationally, there were an average of 3.6 residents in training per 10,000 population in 2011; the large number of resident physicians in New York and Massachusetts skews this average upward. With 3.1 residents per 10,000 population, North Carolina has fewer residents-per population than the US average but is above the national median of 2.6. Compared to neighboring states, North Carolina has a higher ratio of residents per 10,000 population than Virginia, (2.6), South Carolina (2.5), and Georgia (2.0), but has a lower ratio than Tennessee (3.4) (**Figure 1**).

Medical School Enrollment Expanding but Increase in GME Slots Not Keeping Pace

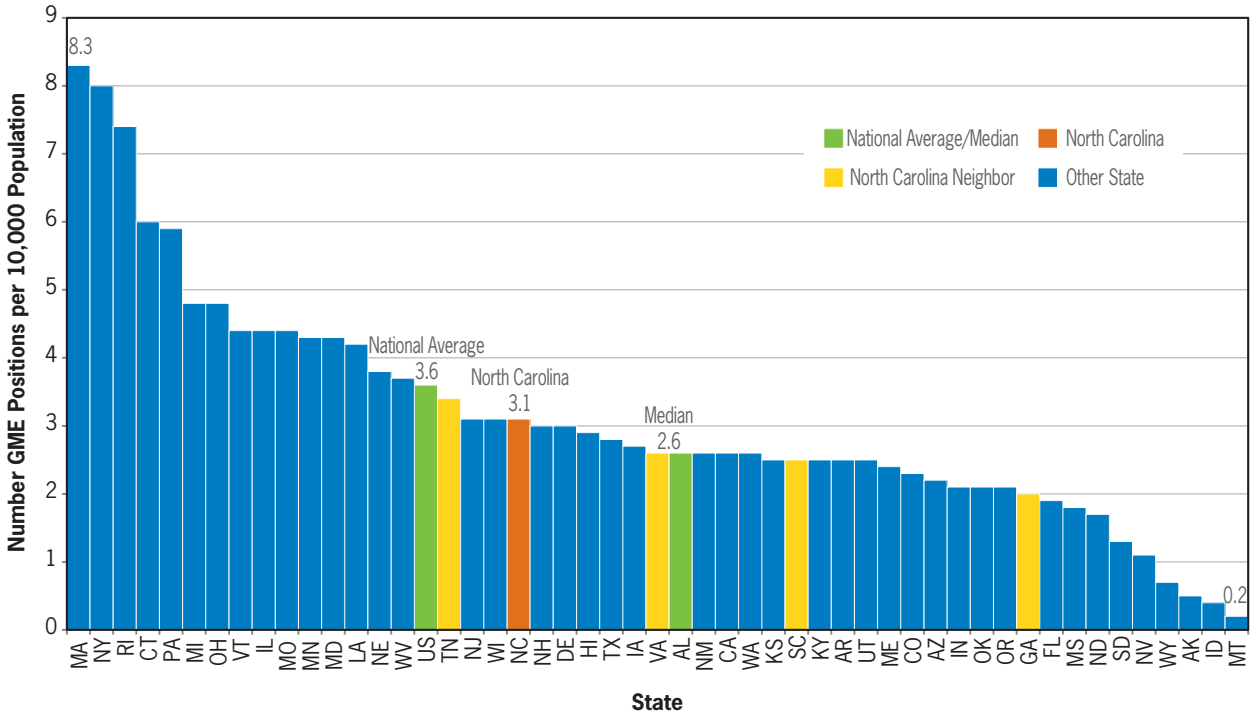
Nationwide, there are more post-graduate-year 1 (PGY1) residency slots than there are graduates of American and Canadian[2] medical schools. However, this gap, currently filled by international medical graduates (IMGs), is narrowing as US medical schools

Table 1: Number of residents-in-training by sponsor location, 2010

Location of Residency Training in North Carolina	County	Residents	Percent
University of North Carolina at Chapel Hill – UNC Hospitals	Orange	714	26.6
Duke University Medical Center	Durham	709	26.4
Wake Forest Baptist Medical Center	Forsyth	506	18.9
East Carolina University – Vidant Medical Center	Pitt	294	11.0
Charlotte AHEC – Carolinas Medical Center	Mecklenburg	254	9.5
South East AHEC – New Hanover Regional Medical Center	New Hanover	62	2.3
Mountain AHEC – Mission Hospital, Margaret R. Pardee Hospital	Buncombe, Henderson	51	1.9
Greensboro AHEC – Moses H. Cone Memorial Hospital	Guilford	47	1.8
Carolinas Medical Center – Northeast	Cabarrus	24	0.9
Southern Regional AHEC – Fayetteville	Cumberland	20	0.7
State Totals		**2,681**	**100**

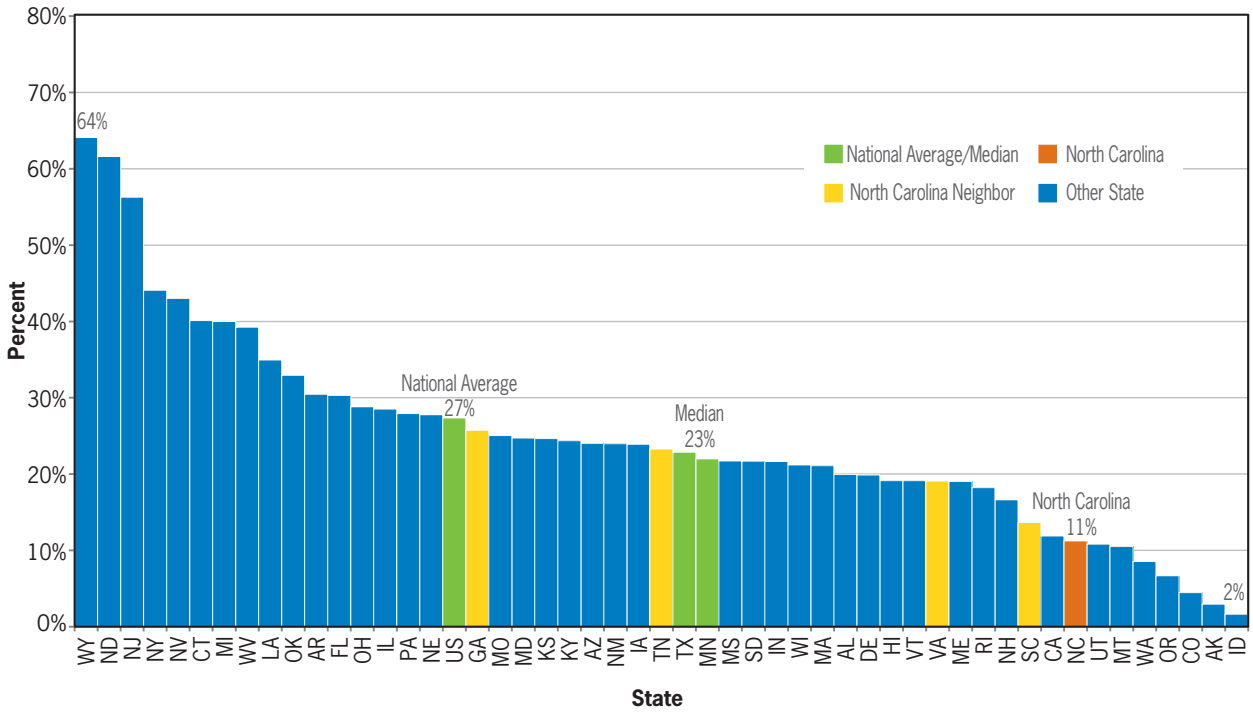
Source: Residency data are received annually from the respective residency programs and are based on the institutions' lists of house staff, residents and fellows as of July 2010.

Figure 1. Average number of GME positions by state per 10,000 population, 2011



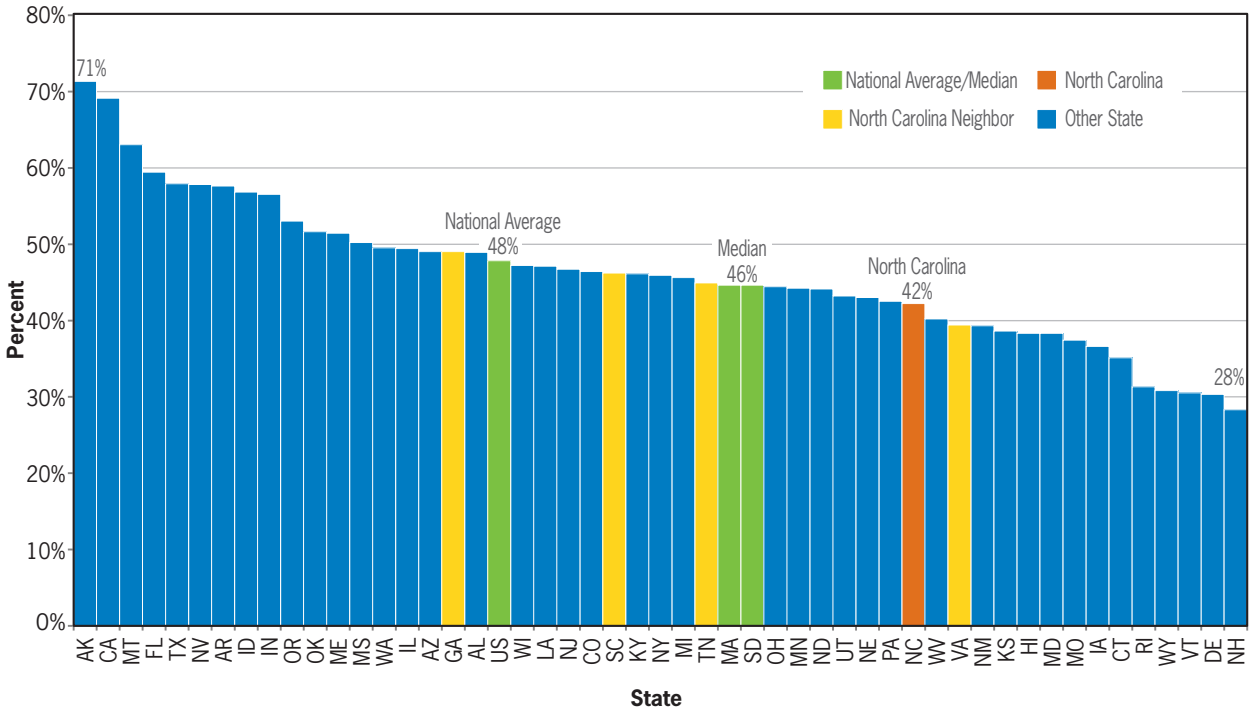
Source: Brotherton, SE, Etzel SI. (2011). Graduate Medical Education, 2010-2011. *JAMA*. 306(9): 1015-1030.

Figure 2. Percent of residents who are International Medical Graduates (IMGs) by state, 2010



Source: AAMC 2011 Physician Workforce Data Book:
"Residents and fellows on duty as of 12/31/2010 in ACGME-accredited programs by medical school type, IMG percent," page 41.

Figure 3. Percent of physicians retained in state after residency, 2010



Source: AAMC 2011 Physician Workforce Data Book:
"Physicians retained from GME, percent active physicians who completed GME in-state and are active in-state," page 52.

have increased enrollment. Data from the 2012 AAMC enrollment report show that by 2016 there will be about 26,700 first year MD/DO students, which is about the same number of PGY1 positions currently offered. Although the number of PGY1 positions nationwide is increasing at a rate of about 1% per year and there are approximately 1,500 additional osteopathic residency entry slots (a number that is growing as new osteopathic schools open), these increases will not keep pace with the growth of US graduates.[3] Unless the number of GME positions increases, competition for PGY1 positions will increase among US medical school graduates (USMGs) and the number of IMGs matching to residency programs will decline.

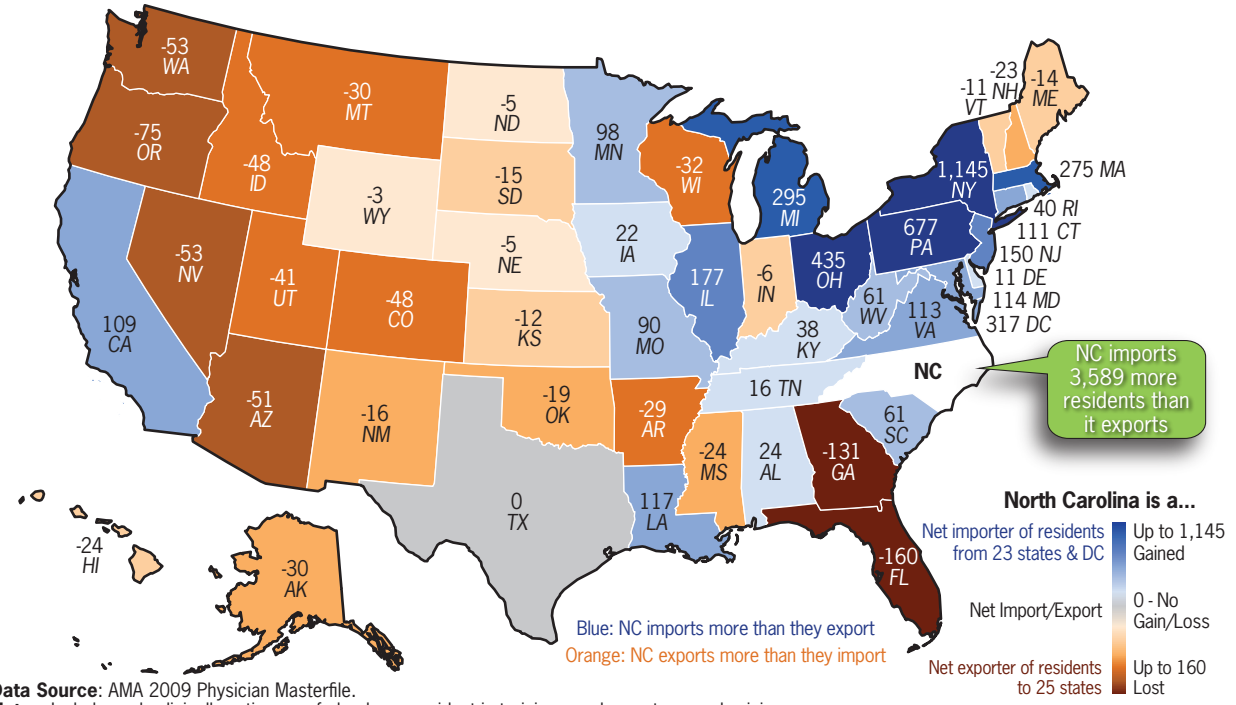
Currently, about one in four (27%) GME slots in the country is filled by an IMG physician (**Figure 2**). IMGs tend to fill residency slots in specialties and geographic locations that are less popular with USMGs. Results from the 2012 Residency Match show that although IMGs comprise 21% (n=4,877) of residents who fill first-year GME slots in the US, they disproportionally go into psychiatry (28%, n=305), family medicine (33%, n=862), and internal medicine (35%, n=1,837).[4] IMGs are also more likely to serve in rural areas than are USMGs.[5,6] With just 11% of our residency slots filled by IMGs, North Carolina ranks 42nd in the nation for percent of residency slots filled by IMGs. South Carolina (14%), Virginia (19%), Tennessee (23%), and Georgia (25%) all have a greater percentage of their GME positions filled by physicians who completed medical training outside of the US or Canada.

Fewer residents who train in North Carolina remain in-state after completing training

North Carolina lags behind the national average in retaining physicians in-state after completing residency training. **Figure 3** shows that on average, states retain 48% of their in-state trained GME graduates, while NC retains 42%. North Carolina retains slightly more GME graduates than does Virginia (39%), but fewer than Tennessee (45%), South Carolina (46%), and Georgia (49%).

Physicians are a mobile workforce and tend to relocate practice locations several times over the course of their career, particularly after completing residency training. Some states, including New York, Pennsylvania, and Ohio, have relatively large numbers

Figure 4. North Carolina's trade surplus/deficit: resident physicians



Data Source: AMA 2009 Physician Masterfile.
Notes: Includes only clinically active, non-federal, non-resident in training, non-locum tenens physicians.
Three physicians were missing practice state; 570 physicians practicing in North Carolina were missing residency state.
Produced by: Program on Health Workforce Research & Policy, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill

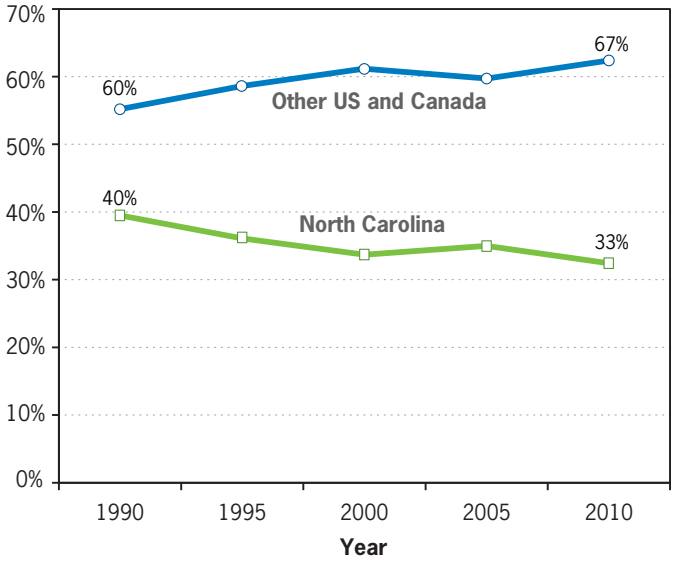
of residency positions per capita and tend to "export" GME graduates to other states. Conversely, states like North Dakota and Wyoming have few residency programs and tend to rely on importing GME graduates from the rest of the country.

As shown in **Figure 3**, North Carolina has fewer residents per capita than the national average and the state retains fewer residents after graduation. The result is that the state's workforce is comprised of more physicians who completed residency training in another state than those who completed residency training in North Carolina. **Figure 4** shows the state-by-state breakdown of this net import/export relationship. Blue states are those from which we import more residents than we export; orange and brown states take more of our residents into their workforce than they export to us.

North Carolina is increasingly reliant on residency programs outside the state

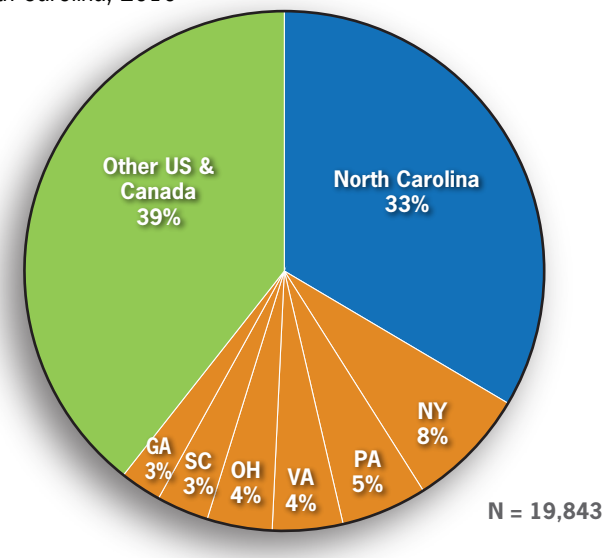
Figure 5 shows that over time North Carolina has become increasingly reliant on expanding its workforce by importing residents trained in other states. In 1990, nearly 40% of North Carolina's physician workforce was made up of physicians who completed a North Carolina residency program. By 2010, this proportion had declined by seven percentage points to 33% of the workforce.

Figure 5. Active licensed North Carolina physicians by residency location, 1990-2010



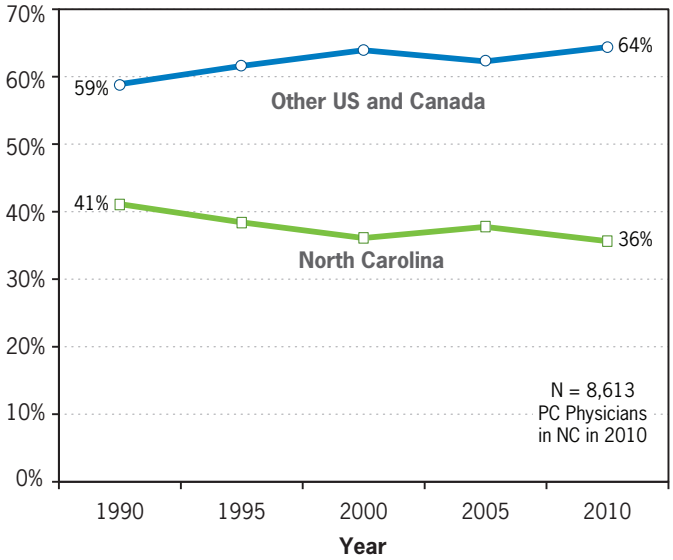
Note: Data exlude physicians missing residency location (N=314 to 753) and those indicating a foreign residency (N=40 to 156). **Source:** NC Health Professions Data System, Cecil G. Sheps Center for Health Services Research, UNC Chapel HIll, with data derived from the NC Medical Board, 2012.

Figure 6. Residency location of active licensed physicians, North Carolina, 2010



Note: Figures include all licensed, active, instate, non-federal, non-resident-in-training physicians. Data exlude physicians missing residency location (N=753) and those indicating a foreign residency (N=156). **Source:** NC Health Professions Data System, Cecil G. Sheps Center for Health Services Research, UNC Chapel Hill, with data derived from the NC Medical Board, 2012.

Figure 7. Percent of primary care physicians by residency location, North Carolina, 1990-2010



Note: Data exlude physicians missing residency location (N=143 to 383) and those indicating a foreign residency (N=19 to 51). Primary Care includes GP, FM, IM, Ob/Gyn, and Peds. **Source:** NC Health Professions Data System, Cecil G. Sheps Center for Health Services Research, UNC Chapel Hill, with data derived from the NC Medical Board, 2012.

Figure 6 shows where North Carolina's physician workforce completed residency training. A substantial proportion of NC physicians completed residency training in states that tend to be high exporters of GME graduates, including New York (8%, n= 1,493), Pennsylvania (5%, n=1,060), and Ohio (4%, n=804). North Carolina also draws upon physicians trained in neighboring states of Virginia (n=870), South Carolina (n=644), and Georgia (n=512). Combined, those three states prepared 10% of the North Carolina physician workforce.

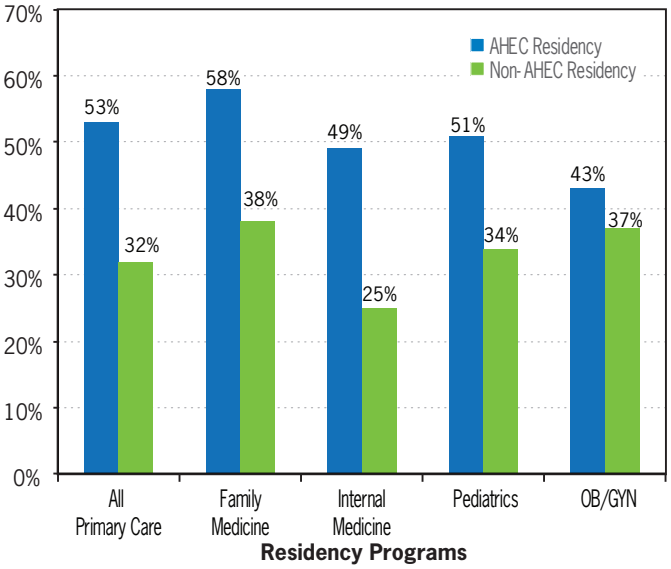
Payment reforms, new models of care and other health reform initiatives have placed an increased focus on preventative and primary care services.[7] The workforce implications of these, and other, health policy reforms are not yet well understood but there is general consensus that they will increase the demand for primary care.[8, 9]

Similar to the trend for all physicians (Figure 5), Figure 7 shows that North Carolina is becoming increasingly reliant on importing primary care physicians who completed residency training outside the state. In 2010, 36% of the NC primary care physician workforce was trained in a North Carolina primary care residency, down five percentage points since 1990. The states from which we draw primary care physicians are similar to those for other specialties. New York (8%, n=721), Pennsylvania (5%, n=441) and Ohio (4%, n=354) are relatively significant contributors. Neighboring states of Virginia (5%, n=425), South Carolina (4%, n=350), and Georgia (2%, n=191) together contribute 11% of the state's primary care physicians.

Role of NC AHEC in residency training in North Carolina

The North Carolina Area Health Education Centers Program (NC AHEC) plays a significant role in GME in the state. Residents who complete an AHEC residency are more likely to practice in-state, are more likely to choose primary care specialties, and are slightly more likely to practice in rural/underserved areas than those who complete a non-AHEC residency. Of all physicians who completed an AHEC residency (n=3,643), 1,491 (46%) were still in active practice in North Carolina in 2011. Thus, AHEC has retained nearly half its residents (46%) compared to only about one-third (31%, n=6,092) of residents who trained in non-AHEC programs. Figure 8 shows that in-state retention is even higher for primary care physicians: 53% (n=1,250) of physicians who completed a NC AHEC primary care residency stayed in North Carolina compared to the

Figure 8. Former North Carolina residents practicing in NC by primary care residency specialty, 2011



Note: "Active" includes federal, as well as non-patient care activities such as teaching, research, administration, etc. **Source:** NC Health Professions Data System, Cecil G. Sheps Center for Health Services Research, UNC Chapel Hill, with data derived from the American Medical Association Physician Masterfile, 2011.

32% (n=2,195) of physicians who completed a non-AHEC primary care residency. Greater AHEC resident retention is particularly striking for residencies in internal medicine (24 percentage point difference) and family medicine (20 percentage point difference).

Approximately $30 million of the NC AHEC's $43 million annual operating budget is allocated to GME. These funds support faculty salaries and other operating costs of the primary care residencies in the AHECs, as well as supporting the departments of family medicine at the four medical schools. An additional $4.3 million in AHEC residency grants are paid annually to the teaching hospitals to help offset the costs of primary care resident salaries and benefits.

Most residents train in programs based in large hospitals. As a result, physicians tend to concentrate in urban areas both during and after residency. Evidence shows that residents trained in community-based settings are more likely than those based in hospitals to ultimately practice in underserved communities.[10, 11, 12]

A substantial proportion of NC AHEC residencies are located within or nearby the more rural areas of the state. Many of these programs were developed with the aim of increasing the number of physicians retained in underserved areas. About 15% (n=224) of physicians who completed an AHEC residency in North Carolina practice in rural areas compared to 12% (n=761) of physicians who completed a non-AHEC residency.

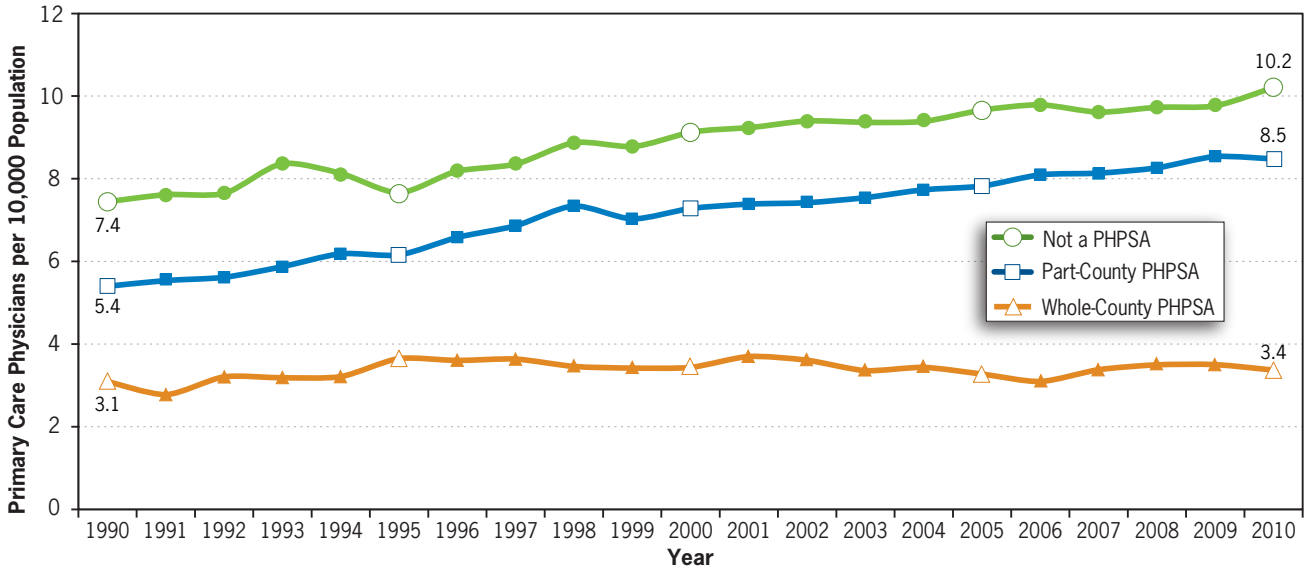
Concerns about an inadequate supply and poor distribution of primary care physicians have triggered substantial policy action. However, though less-well publicized, general surgery faces similar pressures such as increasing sub-specialization, erosion of scope of practice, diminished attractiveness to medical students, and a need for enhanced community-based training.[13] In rural areas, the lack of a surgeon may result in patients delaying or forgoing medical care, due to length of travel time or problems accessing transportation.[14] Although the numbers of surgical residents completing an AHEC residency is small, AHEC-trained surgeons are significantly more likely to practice in rural areas after completing their training than surgeons who completed a non-AHEC residency (30%, n=16 versus 19%, n=35 respectively).

Overall Supply of Physicians is Adequate but Maldistribution Remains a Persistent Problem

While North Carolina's supply of primary care physicians relative to population has increased over time, supply in our most underserved counties has remained flat over the past 20 years. **Figure 9** shows that primary care supply has been stagnant in areas of the state that have been designated as whole county persistent health professional shortage areas (PHPSAs). In the last ten years, there has been a widening gap in supply between these shortage and non-shortage counties.

In addition to AHEC's efforts to provide more community-based training opportunities, UNC's family medicine residency program recently created two new residency slots per year focused on community-based training—an expansion of six new positions by July, 2013—these residents are providing continuity of care for patients at Prospect Hill Community Health Center, a rural Federally Qualified Health Center that provides primary care to an underserved community. The New Hanover Regional Medical Center Residency in Family Medicine in Wilmington received a HRSA primary care residency expansion grant in 2010 to expand from four residents per year to six residents per year. This grant will provide financial support for five years, after which time additional funding will need to be considered to

Figure 9. Primary care physicians per 10,000 population by Persistent Health Professional Shortage Area (PHPSA) status, North Carolina, 1990 to 2010



Notes: Figures include all active, instate, nonfederal, non-resident-in-training physicians licensed as of October 31st of the respective year. Primary care physicians include those indicating a primary specialty of family practice, general practice, internal medicine, Ob/Gyn or pediatrics. Persistent HPSAs are those designated as HPSAs by HRSA from 1999 through 2005, or in 6 of the last 7 releases of HPSA definitions. **Sources**: North Carolina Health Professions Data System, 1979 to 2010; North Carolina Office of State Planning; North Carolina State Data Center, Office of State Budget and Management; Area Resource File, HRSA, Department of Health and Human Services, 2006.

maintain the expansion. UNC also expanded pediatric residencies by four slots per year for three years with training based in clinics at Guilford Child Health. Mountain AHEC's Hendersonville Family Medicine Residency will increase its total number of residency positions by three additional slots (one in each year of training) over the next two years. Residents will train at Blue Ridge Community Health Services, Inc., a Federally Qualified Health Center. These expansions were funded using a combination of support from UNC, federal resources from Health Resources and Services Administration (HRSA) and the Blue Cross and Blue Shield of North Carolina Foundation. The federal funds were allocated under the Teaching Health Centers program authorizes by the Affordable Care Act. While they represent a formative step in the state's effort to provide residency training in community-based settings, they are small expansions that have not secured sustainable funding.

Discussion

Expanding enrollments in North Carolina's medical schools without concurrently expanding residency training will do little to increase physician supply in the state because a large portion of the state's medical school graduates will leave North Carolina for residency training. For example, the goal of UNC medical school's expansion to Asheville was to bring physicians to the western part of the state. Yet the only residencies currently offered in this region are in family medicine and obstetrics/gynecology. This means that students wishing to pursue training in other specialties will have to move from western North Carolina to more urban areas of the state or leave North Carolina. Although some of these students may ultimately return to NC to practice after completing residency training elsewhere, physicians are more likely to set up practice where they did their residency than where they attended medical school. For example, about 42% of physicians who completed a North Carolina residency were in active practice in North Carolina in 2011 compared to 40% of physicians who completed medical school in-state. The most significant increase in physician supply in North Carolina would come from programs that encourage students to complete both their medical school and residency training in-state; 69% of these physicians were retained in active practice in North Carolina in 2011.

If GME training in NC is not expanded, our state will become increasingly dependent on recruiting physicians

trained outside the state. Although this might appear to be a "cost-effective" way to expand the state's physician workforce rather than investing in GME expansion, it is an increasingly risky strategy as the demand for physicians continues to increase nationwide. Growing our own workforce by expanding GME slots will enable us to put in place programs and policies that specifically address the needs of North Carolina's citizens, prioritizing medical specialties in greatest need and encouraging practice in underserved areas.

Research shows that residents trained in community-based settings are more likely than residents trained in hospitals to ultimately practice in underserved communities and needed specialties.[15,16,17] Data from North Carolina support this national trend; graduates of NC AHEC residency programs are more likely to practice in primary care and AHEC general surgeon residents are more likely to locate in rural areas. These findings were used to inform plans for a new general surgery residency program in Asheville through a Mission Hospital/MAHEC collaborative. The program aims to address a growing shortage of general surgeons in the smaller and more rural hospitals in the mountain region. This initiative, combined with other efforts to move residency training out of hospitals into community-based settings at Prospect Hill Community Health Center, Guilford Child Health, Blue Ridge Community Health Services and Coastal Family Medicine, will need to be expanded significantly to meet the needs of the North Carolina's most underserved populations and shortage specialties and geographies.

The largest barrier to expanding residency training is lack of funding. The Balanced Budget Act of 1997 capped the number of GME positions supported by Medicare. During the 112th Congress, four bills, two in the House of Representatives and two in the Senate, were introduced to expand or alter GME. Three of these bills (HR.6352, HR.6562, S.1627) proposed an increase in the number of Medicare-funded GME slots by 3,000 per year over five years, for a total of 15,000 new slots. One-quarter of these GME slots were reserved for primary care and general surgery residencies. The fourth bill (S.3201) sought to reform Medicare payment policy for GME, based on a pay-for-performance system. Thus far, none of these proposals has moved beyond committee review and additional Medicare funding to expand residency training does not seem like a likely scenario.

Additional federal GME funds are available via the Teaching Health Centers (THC) development grants, funded under the Patient Protection and Affordable Care Act. Teaching Health Centers (THCs) are community-based, ambulatory care centers that provide residency training in family medicine, internal medicine, pediatrics, internal medicine-pediatrics, obstetrics and gynecology, psychiatry, and/or geriatrics, as well as dentistry and pediatric dentistry.[18] The idea behind THCs is to move primary care training out of the hospital and into the community setting, where most primary care physicians eventually practice. Unlike federal GME support provided through the Medicare program, THC program funding is explicitly tied to evaluation metrics, including the number of graduates that practice in underserved areas.[19] However, THC funding is only secured through 2015 and may not be a sustainable funding source for GME expansion.

In the absence of federal funding, the onus is on the state to find a way to increase the number of residents trained in North Carolina. Following the 2007 NC Institute of Medicine's report on North Carolina's primary care and specialty workforce,[20] then-UNC system president Erskine Bowles convened a GME taskforce composed of leaders from academic medical centers and AHEC to review the status of residency education in the state. In 2008, the GME taskforce recommended that the state legislature create a GME Board to oversee a variety of GME-related matters, including how any new GME funds should be allocated among specialties, geographies and institutions to best address the workforce needs of the state. The GME taskforce requested a state appropriation to support the administration of the GME Governance board and to carry out a GME expansion demonstration project. Due to tightening of state budgets following the 2008 recession, the proposal was not approved.

Given the pressures of health reform and the increasing number of medical students who will be graduating from North Carolina medical schools in the coming years, the need to expand residency training has taken on new urgency. Under the current system, each teaching hospital makes GME expansion decisions independently based on the needs of their individual health care system and there is no coordination in ensuring GME expansion meets the overall needs of the state. As a result, the growth in residency slots tends to

be in medical subspecialties. National data indicate that between 2001 and 2010, the growth in GME subspecialty graduates increased by 54%, whereas graduates of core medical specialties leading to initial board certification increased by just 5%.[21] Furthermore, the number of national GME graduates decreased in obstetrics/gynecology (-1%), general surgery (-1%), family medicine (-7%), pediatrics (-7%), and psychiatry (-15%). During this time period, national growth in GME graduates only occurred in four core medical specialties: internal medicine (+6%), diagnostic radiology (+33%), emergency medicine (+28%), and anesthesiology (+24 %).

During the 2011 session of the North Carolina General Assembly, legislation was proposed that sought to move the state toward a more coordinated approach to GME that would routinely assess state health care needs, identify priority physician specialties, and prioritize consideration of state needs when allocating new GME funds.[22] The bill (Senate 696) recommended developing innovative GME models targeted at expanding physician services in underserved communities and in rural areas as well as increasing underrepresented minorities in medicine. Although the bill passed in the State Senate, it did not move beyond committee review in the House. While the proposed legislation would address some of North Carolina's physician workforce needs, the state needs an even more systematic, coordinated, data-driven approach to GME expansion. To do this, legislation would need to include four core elements:

1) Funding for timely data collection and analysis of workforce shortages by specialty and geography so that GME funds can be targeted to high priority needs;
2) Creation of a governance structure to make decisions about allocating new GME funds between specialties, geographies and training sites;
3) Development of a sustainable funding model that includes third-party payers; and
4) Implementation of a resident tracking system so that the state can assess its return on investment for public monies spent on GME expansion.

This approach is based on an extensive review of best practices from other states. The most effective state level approaches bring together a diverse group of stakeholders to engage in discussions and make decisions about reforming their GME governance and financing systems. In North Carolina, reform discussions could include representatives from academic health centers and their corresponding health systems; other teaching hospitals in the state; the NC AHEC Program; the North Carolina Community Health Center Association; the North Carolina Hospital Association; the Office of Rural Health; the Old North State Medical Society; the North Carolina Medical Society; the North Carolina Division of Medical Assistance and health insurers; philanthropic health-related foundations; and other relevant stakeholders.

Such an approach is based on best practices from other states actively engaged in reforming their GME governance and financing systems. States have been experimenting with all-payer approaches to GME expansion, where all major insurers provide some level of funding for GME, instead of solely relying on public funding from Medicare, Medicaid and state appropriations. Under this approach, insurance companies and hospitals benefit by having an adequate supply of appropriately trained physicians to serve their patients. All-payer approaches in Maryland, Massachusetts and New York are underway and could provide valuable evidence of the outcomes of such an approach.

Several states have created governance bodies tasked with GME coordination in the state. For example, in Florida, the State Legislature mandated the creation of the Physician Workforce Advisory Council in 2010. The Council's GME workgroup has a strategic plan that emphasizes a) analyzing the Florida's physician workforce needs; b) developing and financing new GME positions, based on the state's needs as determined by analysis of data; and c) analyzing and documenting the costs and funding sources of GME programs in Florida. In New York, the Department of Health manages GME decision-making in collaboration with external stakeholders (e.g. the NY Hospital Association and deans of medical schools) and with the New York State Council on Graduate Medical Education (NY COGME). The NY COGME was created in 1987 to advise the Governor, Commissioner of Health, and State Legislature on policies related to the management of GME programs.[23] Among other GME-related projects, NY COGME funds are used to promote entry into primary care, recruit underrepresented

minorities, and support training programs in ambulatory care settings.[24, 25] Funding in the amount of $516,000 has been authorized but not appropriated for the creation of a physician workforce study program, charged with the development of an evidence base for policies related to the provision of physician services as well as GME.[26]

In Utah, GME decision-making is led by the Utah Medical Education Council (UMEC), a state agency presided over by an eight member board appointed by the Governor. The UMEC conducts workforce assessments, seeks and distributes GME funds, and sponsors rural workforce development initiatives. From 2003-2010, UMEC managed Utah's GME demonstration project awarded by the Center for Medicare & Medicaid Services (CMS). During that time, all Medicare "direct" GME funds were distributed to training programs by the UMEC.[28, 29] In Georgia, the Southwest Georgia Regional AHEC and five independent and often competing hospitals came together to form the South Georgia Medical Education & Research Consortium in 2012. Hospital partners and Georgia Health Sciences University-Medical College of Georgia have invested $2 million in seed funding for GME expansion, including an appropriation from the Georgia legislature of about $700,000 for GME expansion in priority specialties of internal medicine, family medicine, emergency medicine, general surgery, obstetrics and gynecology and pediatrics.[30] The aim of the consortium is to increase residency positions in the region by 150 new slots over the next five to ten years.

GME represents a significant economic investment at both the state and federal levels, but little effort has gone into tracking the outcomes of these investments. Evaluating the outcomes of GME programs would provide evidence of the return on investment for North Carolina's citizens, as well as promote accountability for expenditures of public funds. Example evaluation criteria include: the percentage of residents in primary care, the percentage of generalists in internal medicine, the number of residents in general surgery, the number of state GME graduates serving in HPSAs and medically underserved areas (MUAs), and acceptance rates of new Medicaid or Medicare patients.[31] The data could provide much needed evidence to guide decisions about successful programs that merit expansion and the specialties, geographies and institutions toward which to target increased funding.

Specialty Designation as a Limitation

Decisions about how to count physicians by specialty are surprisingly complex. The current definition of a primary care physician used in North Carolina includes physicians specializing in general practice, family medicine, internal medicine, pediatrics, and OB-GYN. However, if we were to count graduates of internal medicine and general surgery programs as primary care we would ignore the fact that a substantial portion of these physicians go on to train in sub-specialties after their initial residency. Furthermore, the types of care provided by physicians in various specialties often overlap. For example, physicians other than those that traditionally fall under the classification of primary care, such as general surgeons, emergency physicians, and other specialties, may also provide primary care depending on their geographic location and the types of patients under their care. To account for the decrease in general practitioners due to the time required for subspecialty training, longitudinal tracking should take place ten years into practice, rather than at completion of initial residency training.

Conclusion

Expanding enrollments in North Carolina's medical schools without concurrently expanding residency training will do little to increase physician supply in the state. If residency expansion does occur, a data-driven system that addresses how to best distribute new positions between specialties, geographies and institutions must be put in place so that new dollars are spent addressing the health care needs of North Carolina's population. For example, residents who train in community-based settings and in rural areas are more likely to practice in underserved areas. Yet, the bulk of residency training in North Carolina (as in most states) occurs in teaching hospitals in urban areas. To better align the GME with the state's health care needs, training needs to occur in ambulatory settings.

North Carolina has taken important first steps in expanding residency opportunities to community-based centers, but further expansion, with a sustainable funding source, is needed. Beyond funding, other obstacles that will need to be addressed include accreditation challenges, ensuring an adequate patient volume/case mix[32] and overcoming administrative complexity.[33]

A possible way forward would be for North Carolina to create a GME board responsible for making decisions about GME financing and distribution throughout the state. Such a mechanism would be based on similar models operating in other states. The GME board would represent a wide variety of health workforce stakeholders and would coordinate and prioritize new GME funds and positions based on evidence of need. Unlike many states, North Carolina already has a robust source of physician workforce data that are annually cleaned, updated, and analyzed as part of the Health Professions Data System at the Sheps Center. These data, as well as the Sheps Center's capacity to track, analyze, and evaluate new GME programs and initiatives, would provide the board with information on which to base GME allocation decisions and to track the return on investment for expenditures of public funds.

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Data Notes

Unless otherwise noted, the data included in this report include active, in-state, non-federal, non-resident-in-training physicians licensed in North Carolina as of October 31 of the respective year. Primary care includes family practice, general practice, general internal medicine, OB/GYN and pediatrics. Data are self-reported annually by physicians at time of their initial application for licensure and subsequent renewals. **Source**: North Carolina Health Professions Data System, Program on Health Workforce Research & Policy, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, with data derived from the North Carolina Medical Board.

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