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TRENDS IN PRIMARY CARE SPECIALIZATION AMONG PHYSICIANS AND
NON-PHYSICIAN CLINICIANS, 1989-2009

A Thesis Submitted to the
Yale University School of Medicine
in Partial Fulfillment of the Requirements for the
Degree of Doctor of Medicine

by

Joseph Robert L. Rojas

2011

TRENDS IN PRIMARY CARE SPECIALIZATION AMONG PHYSICIANS AND NON-PHYSICIAN CLINICIANS, 1989-2009.

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An overwhelming body of health policy literature points to an impending shortage of health care providers in the United States, with special emphasis on a growing shortage of primary care providers. As such literature and similar claims made in the mass media influence political debate and government policy, it becomes necessary to determine whether the assumptions on which these predictions are based are, in fact, valid. The purpose of this study is to examine changes in primary care practice among allopathic (MD) and osteopathic physicians (DO), physician assistants (PA), and nurse practitioners (NP) over the past 20 years, specifically, how the proportion of professionals practicing in primary care specialties has changed over time. Data were obtained from previously published, publicly available reports of practice specialty among actively practicing clinicians from each of the provider types and longitudinal changes in practice specialty were characterized using descriptive statistics. The percentage of MDs practicing in primary care fields remained relatively stable over the past two decades thanks to a continuing influx of international medical graduates, while the percentage of DOs in primary care declined slightly. PAs experienced an 18-percent decrease in the percentage of total PAs in primary care practice. NPs were the only group to experience an increase in primary care with a 20-percent increase over the 20-year period. While IMGs and NPs form an increasing proportion of the US primary care workforce, PAs, USMGs, and DOs are less likely to practice in primary care than 20 years ago.

ACKNOWLEDGEMENTS

This work would not have been possible without the inspiration, encouragement, and support of a number of individuals. First, my most sincere thanks to my thesis advisor, Mary Warner, who has been an incredible mentor, advocate, sounding board, collaborator, and friend. Her enthusiasm for this project and belief in me gave me the confidence to pursue this line of research and kept me going whenever I hit a seemingly insurmountable roadblock. Special thanks also goes to Kieke Okma, who first introduced me to the topic of the primary care workforce and the relationships among clinician groups, and to Ted Marmor, who took a chance on a stray first-year medical student with an inchoate interest in health policy. I will be forever indebted to Drs. Okma and Marmor for my first exposure to health policy work, introducing me to an entire body of knowledge and way of thinking about complex social issues. I also owe Dr. Okma an enormous debt for first introducing me to the political philosophy of John Rawls, whose theories of justice have had a profound impact on me. Thanks to my family, who has humored me for years, listening to my countless rants on health policy, medicine, and research. Finally, thanks to the family of friends who have journeyed with me these past five years: Jonathan, Terri, Matt, Barbara, Monica, Sonja, Katherine, and Natalie. They have inspired me with their creativity, intellect, passion, and humor. Together we have weathered the many storms of medical school, debated the profound and the trivial, shared countless laughs and occasional tears, and, I hope, managed to learn a thing or two about medicine and life.

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INTRODUCTION

While providing health insurance coverage for the millions of currently uninsured Americans is an important step toward the goal of improved health, coverage without the personnel to provide health care services is little more than an empty promise. The Obama administration has made a quantum leap in the provision of health insurance for the majority of Americans with the passage of the Patient Protection and Affordable Care Act in March 2010, but this represents only half of the equation in ensuring access to health care. Even if the administration is successful in holding off repeal of this historic legislation – or its death-by-a-thousand-cuts via budgetary maneuvering – under the Republican-controlled House, they will still need to confront the issue of clinician supply in order to successfully implement the new law.¹

Ensuring adequate numbers of health care personnel requires extensive planning and an adequate training infrastructure. From white coat ceremony to completion of residency, it takes at least seven years to produce a fully licensed and practicing physician. Though certainly quicker to produce, even nurse practitioners (NPs) and physician assistants (PAs) require between two and three years from matriculation to clinical practice. With such a significant lag in time between the identification of need and the production of practicing clinicians, reliable estimates of future clinician requirements become increasingly important.

¹ Throughout this text use of the term “clinician” is taken to imply any individual trained and licensed to provide the full range of health care services to patients, including initial assessment, diagnosis, and treatment. The Institute of Medicine has defined clinician as “an individual who uses judgment, science, and legal authority to diagnose and manage patient problems.” As the focus of this work is primary care in the United States, “clinician” refers to physicians (both allopathic and osteopathic), physician assistants, and nurse practitioners. Though several other professional groups can rightly be categorized as “clinicians” (e.g. optometrists, podiatrists, nurse anesthetists, midwives), the specialized, non-primary care nature of their clinical work excludes them from consideration under this term in this text. Institute of Medicine, *Primary Care: America's Health in a New Era* (Washington, DC: National Academies Press, 1996), 36.

Though there have been numerous studies offering projections of the future primary care workforce, to date the majority of manpower research has focused on physicians, much to the exclusion of nurse practitioners and physician assistants. Frequently the results of this research are alternating “feast or famine” predictions of future physician supply.² Acting on these projections, governmental and professional regulatory bodies enact policies that directly impact the country’s educational and training capacity for clinicians. For example, projections of a physician shortage in the 1950s led to a massive increase in medical school capacity across the country in the 1960s. However, when the Graduate Medical Education National Advisory Committee reassessed physician supply and requirements in the early 1980s, their projections of a physician surplus led to a reduction in government support for medical education, effectively freezing growth in educational capacity. Contrast this with new projections of an impending physician shortage and accompanying calls for medical school and graduate medical education expansion, and the impact of these projections – despite their imprecise nature – becomes apparent.

But why is it so difficult to predict the country’s future clinician supply and requirements, and how accurate a picture of our health care system do these projections paint? To understand what is happening now, and to have any hope of understanding what might happen in the future, it is essential to first understand what has already happened. As simple and intuitive as that might seem, till now no one has examined the

² The Health Services and Resources Administration’s 2008 review of physician supply and requirements research includes an extensive review of historical attempts at physician workforce modeling. The HRSA review attempts to place in context these prior workforce models and highlights the strengths and shortcomings of each of these models. Bureau of Health Professions, *The Physician Workforce: Projections and Research into Current Issues Affecting Supply and Demand* (Washington, DC: Health Resources and Services Administration, Bureau of Health Professions, 2008).

primary care workforce in this way. A comprehensive examination of all clinician groups providing primary care services in this country is absent in the literature, though projections of future primary care clinician supply abound. To better appreciate the importance of such an examination of the primary care clinician workforce, it is perhaps useful to first review current workforce projections.

We will begin with an examination of the most common methods for generating physician supply and requirement projections since this body of work forms the basis of more recent efforts to model total clinician requirements and supply, including nurse practitioners and physician assistants. Next, we will discuss two of the most recent and extensive analyses of physician supply and requirements and the mixed messages they send. We will then explore the topic of non-physician clinicians further: who are these individuals and how do they contribute to the health care workforce? A discussion of some of the assumptions underlying physician projections follows, leading to the formulation of the primary question of this work.

Estimating Supply

Supply models are based on several sources of data. At its most basic, calculating supply involves determining the current number of practicing clinicians, subtracting the number of clinicians lost over a defined period of time due to death or retirement, and adding the number of new clinicians produced yearly (see Figure 1). This can be expressed mathematically as the following:

$$\text{(Current \# of Physicians)} - \text{(Physicians Lost)} + \text{(New Physicians)} = \text{Future \# of Physicians}$$

As simple as this formula appears, there in fact exists a great deal of room for interpretation or conflicting assumptions. The most common source of data for the current physician population is the American Medical Association's (AMA) Physician Masterfile, which contains data on more than one million physicians since 1906. Data in the Masterfile is collected and updated by the AMA through information provided by medical schools and graduate medical education (GME) programs, as well as a survey that queries one-fourth of all physicians yearly on a rotating basis.³ Recent evidence, however, suggests that use of the Masterfile overestimates current physician supply.⁴ Staiger, Auerbach, and Buerhaus demonstrated that when compared with the US Census Bureau's Current Population Survey, the Masterfile overestimated the number of physicians aged 55 years and older currently in active practice.⁵ Although the Masterfile also underestimated the number of young physicians currently in practice, the net result was an overestimation of the current physician workforce by nearly 67,000.⁶

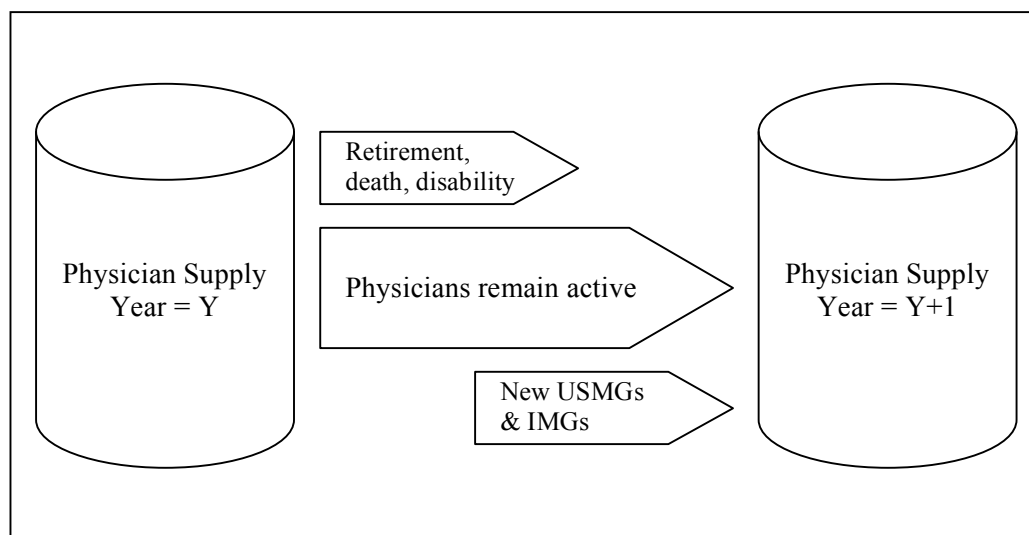
³ American Medical Association, "Surveys And Primary Source Data," American Medical Association, Division of Survey and Data Resources, accessed December 1, 2010, <http://www.ama-assn.org/ama/pub/about-ama/physician-data-resources/surveys-primary-source-data.shtml>.

⁴ Douglas O. Staiger, David I. Auerbach, and Peter I. Buerhaus, "Comparison of Physician Workforce Estimates and Supply Projections," *JAMA* 302, no. 15 (2009): 1674-1680.

⁵ The US Census Bureau conducts the Currently Population Survey monthly on the behalf of the Department of Labor's Bureau of Labor Statistics. The CPS surveys civilian, non-institutionalized individuals over the age of 15 years, though it only reports data on those individuals over 16 years of age. Each month, information on employment and earnings is collected from a sample of 60,000 households, representing nearly 110,000 individuals. Though the CPS surveys significantly fewer physicians each year than the AMA's Physician Masterfile, it does have the advantage of a shorter data lag. At any given time, information on one-fourth of physicians in the Masterfile is four years old, another fourth three years old, another two years old, and the final fourth one year old. Information in the CPS lags real life by only one month. U.S. Bureau of Labor Statistics, *BLS Handbook of Methods*, last modified August 20, 2010, <http://www.bls.gov/opub/hom/homtoc.htm>.

⁶ Staiger, Auerbach, and Buerhaus analyzed the number of active physicians by year and sex based on the CPS and Physician Masterfile between 1979 and 2008. Only those physicians working 20 hours per week or greater were included. The authors found that the Masterfile estimated 67,000 additional physicians in an average year than the CPS. Though both sources were remarkably similar in their estimations of the number of physicians aged 35-54 years, they differed significantly in both the younger and older age groups. The Masterfile estimated an average 22,000 additional physicians per year between 55-64 years, and an additional 35,000 physicians over the age of 65 when compared to the CPS. On the opposite end of the age spectrum, the Masterfile estimated an average 9,000 fewer physicians per year aged 25-34 years

Figure 1. Calculating Physician Supply⁷



Measuring current supply becomes even more complicated if one attempts to move from simple headcounts to more a useful and standardized measure of supply, full-time equivalents (FTE). FTE measurements attempt to generate a more practical unit of supply that takes into account variability in the number of hours per week or year that physicians may work. A physician who works only 30 hours per week provides fewer services than one who works 60 hours, but under many systems of supply projections, the two would be considered equivalent. FTE measurements first define the number of hours a full-time clinician works and then assign a value to each and every practicing clinician based on the percentage of full-time work they perform.⁸ Returning to our previous example, if a full-time physician were considered to work 40 hours per week, the first

than the CPS. While the difference between the two sources remained fairly stable over the time period for the older age groups, it increased significantly for the younger age group between the first and second halves of the time period studied (1979-1993 vs. 1994-2008). During the second half of the time period, the Masterfile reported 17,000 fewer physicians aged 25-34 years than the CPS.

⁷ Adapted from BHP, *Physician Workforce*, 7, Exhibit 1.

⁸ Most analyses use the current average hours per week for either physicians as a whole or a particular specialty (e.g. family physicians) to define the FTE unit. In practice, most analyses divide physicians into age cohorts and calculate the FTE for the cohort as a whole rather than individually.

physician would be 0.75 FTE and the second 1.5 FTE. This method more clearly defines the capacity for medical services, and as we will see, has its corollary in need-based estimations of demand. It also allows analysts to adjust for changes in overall productivity over time. An important consideration in the calculation of current and future supply is the increasing presence of women in the physician workforce. It has been demonstrated that female physicians work fewer hours per week than male physicians and are more likely to work part time or take extended time off.⁹ As the percentage of the physician workforce composed of women increases, the total physician productivity as measured by full-time equivalents will correspondingly decrease.¹⁰ Anticipating future changes in the number of female physicians and the average physician workweek becomes an important component of FTE supply projections.

Calculating the number of clinicians that will be lost to practice over time is also a trickier task than it might appear at first glance. Part of the difficulty is that as social values or the economy change, so too, do retirement rates. As quality of life becomes more important to people, clinicians may decide to retire earlier or to reduce the number of hours they practice per week (what some have called semi-retirement). In good economic times, clinicians may opt for early retirement, whereas during economic recessions clinicians may decide to continue working longer or shift to part-time work rather than outright retirement. On the issue of retirement, we again encounter gender

⁹ Edward S. Salsberg, "The State of the Physician Workforce: With Medical School Expansion Underway, What's Next?" presented at the AAMC Annual Meeting, San Antonio, TX, November 2, 2008.

¹⁰ Recent studies also suggest that the average number of hours worked by physicians per week has steadily decreased over the past decade. According to a 2010 study by Staiger, Auerbach, and Buerhaus, the average physician workweek decreased from 55 hours in 1996 to 51 hours in 2008. The largest decrease was among nonresident physicians younger than 45 years. Douglas O. Staiger, David I. Auerbach, and Peter I. Buerhaus, "Trends in the Work Hours of Physicians in the United States," *JAMA* 303, no. 8 (2010): 747-753.

differences with female physicians retiring earlier on average than male physicians.¹¹ As the demographics of the physician workforce change, such differences will play a larger role in the generation of supply models.

Estimating the number of newly practicing clinicians generated each year is probably the most straightforward of the three components of supply predictions, however, even this is complicated by a number of factors. Though we can predict the number of graduates produced by US medical schools with relative precision, it is nearly impossible to predict in which fields these graduates will practice. Even if we use residency data to predict specialization, we cannot account for those residents who train in more than one specialty or those who fail to complete their residency training. We are also unable to predict the number of international medical graduates (IMGs) entering the country each year.

Both of these issues arise from the lack of central planning or control over residency positions. We are unable to predict from year to year how many residency and fellowship positions will be offered, let alone filled. It is largely left up to individual programs to determine whether they will grow, hold steady, or contract in the coming year. While the Accreditation Council for Graduate Medical Education (ACGME) does provide oversight in approving changes in program size, it does not provide a national, coordinated plan for physician supply.¹² We can analyze data from prior years on the

¹¹ BHP, *Physician Workforce*, 21.

¹² Programs may require approval from the ACGME Residency Review Committee (RRC) for the particular specialty in order to increase or decrease their resident complement. Internal medicine programs require RRC approval for any increase or decrease in resident complement, whereas programs in family medicine and pediatrics only require RRC approval if increasing their resident complement by more than two residents per level. Approval is based on the educational rationale for the change, sufficient patient population, and physician:resident ratio. Accreditation Council for General Medical Education, "Requests For Changes In Resident Complement: Internal Medicine and Subspecialty Programs," Accreditation Council for General Medical Education, accessed February 1, 2011, <http://www.acgme.org/acWebsite>

number of positions offered in various specialties, the number filled by US medical graduates (USMGs) or IMGs, and the number left vacant, but this does not inform us as to how individual programs and hospitals will react to such data. Might they cut funding for positions that went unfilled in the previous year, seek out IMGs to fill these spots, or reassign the position to another specialty to maintain Medicare funding? Will they seek to expand the size of their program to comply with changes in work hour regulations or to staff the new wing of a hospital? And if they expand, will they be successful in filling those new positions? Though these changes likely represent a small portion of total resident positions from year to year, over the course of 15 or 20 years — the period generally used in workforce projections — they may account for a significant number of residents.

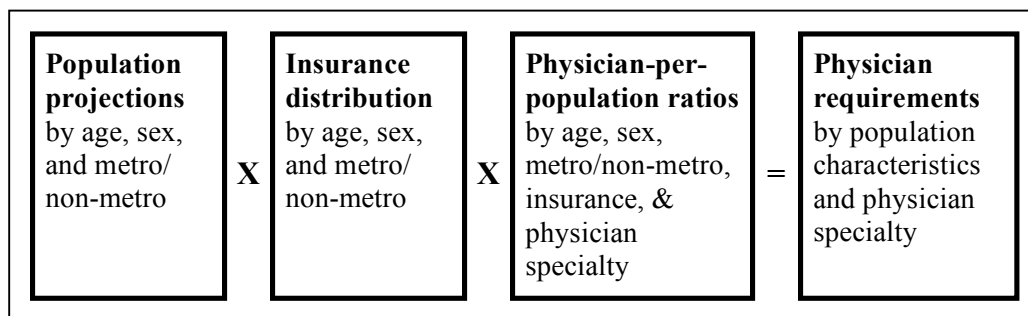
While the estimation of current physician supply may at first seem straightforward, there exist layers of hidden complexity that limit the reliability of any one estimate of supply. And of course determining the three factors that influence physician supply become even more difficult to estimate when we consider them on a local level, where fewer data exist. However difficult this task may be, it represents only half of the problem in our workforce equation. The second half, physician requirements, presents us with an even greater problem.

/RRC_140/140_resComp.pdf. Accreditation Council for General Medical Education, “Requests For Changes In Resident Complement: Pediatrics,” Accreditation Council for General Medical Education, accessed February 1, 2011, http://www.acgme.org/acWebsite/RRC_320/320_resComp.pdf. Accreditation Council for General Medical Education, “Requests For Changes In Resident Complement: Family Medicine,” Accreditation Council for General Medical Education, accessed February 1, 2011, http://www.acgme.org/acWebsite/RRC_120/120_resComp.pdf.

Estimating Requirements

The process of generating forecasts of physician requirements is much more controversial than that of generating supply forecasts. The first problem one encounters is deciding what exactly is meant by “requirements.” Do we mean “demand” or “need”? This represents a subtle, but important distinction.¹³ It also represents the two possible approaches to calculating requirements, each with its own set of limitations. By “demand” we mean the number of physicians that the US population is willing to employ or the amount of services that they are willing to purchase. The simplest method of projecting demand takes the current physician:population ratio and then calculates the number of physicians that would be required to maintain this ratio at some future point in time given expected increases in the population (Figure 2). The current distribution of insurance coverage within the population may also be taken into account since access to medical services is heavily dependent on coverage. Insurance coverage acts to restrict use of medical services and therefore reduces final calculations of demand. Slightly more complex analyses stratify the population into several distinct groups based on age, calculating the physician:population ratio within each age group and then estimating future demand based on the projected age distribution of the population. This method of calculation relies on an important assumption – that the current physician:population ratio represents an equilibrium in physician supply and demand. Put another way, this method assumes that there currently exists neither unmet demand nor an oversupply of physicians – an assumption that many analysts find difficult to support.

¹³ Michael J. Dill and Edward S. Salsberg, *The Complexities of Physician Supply and Demand: Projections Through 2025* (Washington, DC: Association of American Medical Colleges, 2008), 14.

Figure 2. Calculating Physician Demand¹⁴

An alternative method of forecasting based on demand is the “trend approach,” most famously put forth by Richard Cooper. In his work, Cooper argues that trends in physician demand most closely follow trends in per capita gross domestic product (GDP). His theory argues that as per capita GDP increases, people have greater wealth at their disposal and therefore are free to spend more on health care, thus driving health care demand. Whereas the first method of demand calculation discussed assumes that changing population demographics are the primary driver of physician requirements, the trend method assumes that the economy and personal income are the primary drivers. An obvious criticism of the trend method, as formulated by Cooper, is that reliance on a simple correlation does not clarify the nature of the relationship between the two variables. It does nothing to identify other mediating factors or variables that might have a greater effect on demand than GDP. Also, looking exclusively at GDP per capita ignores the reality of income and wealth distribution in this country. While GDP per capita may have increased over the previous three decades, many analyses have shown that almost all the growth in personal wealth has been concentrated in the top one percent of income earners in America, while the majority of Americans have actually

¹⁴ Adapted from BHP, *Physician Workforce*, 38, Exhibit 27.

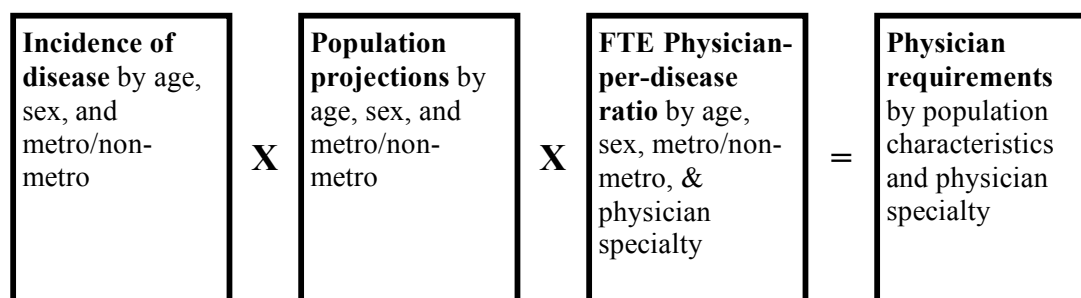
experienced both a relative and an absolute contraction in personal wealth.¹⁵ Growth in disposable income amongst the wealthiest one percent of Americans cannot be responsible for the growth in health care spending and the increasing physician:population ratio, nor will it be the major driver of physician demand in the near and distant future.

“Need” implies a qualitatively different type measurement – not how many physicians or services people are willing to pay for, but rather how many physicians or services are necessary to address all health issues in a population. Attempts to calculate need (current and future) are inherently more complex than calculating demand. In calculating need, researchers analyze the prevalence of various health problems (e.g. breast cancer, heart attack, stroke) in subsections of the general population and the average amount of clinician services required to address each type of problem. Researchers then attempt to determine the future prevalence of the health problems based on projections of demographic changes in the general population and calculate the total number of FTE clinicians required to adequately address those health needs (Figure 3). Of course, this opens the door to such long-standing debates as the level of health people are entitled to. Should a system address all health needs or simply a basic level, and how do we define that basic level of health? The lack of standardized, generally accepted notions of what comprises an adequate level of care leaves any projection based on need vulnerable to instant criticism. The other oft-cited criticism of this approach is that it ignores the realities of our health care system. Not everyone who needs care gets it, nor

¹⁵ Timothy Noah, “Introducing the Great Divergence,” *Slate*, September 3, 2010, <http://www.slate.com/id/2266025/entry/2266026/>.

does everyone receive the same standard of care.¹⁶ While calculation of need might be the ideal in terms of defining requirements, the impracticality of determining need and the lack of agreed-upon objective measures of need generally force analysts to rely on demand models for projecting physician requirements.

Figure 3. Calculating Physician Need



Neither method of calculating requirements is entirely successful in accounting for possible changes in health care delivery. New medical technology, medications, delivery systems, or informatics can both positively and negatively affect physician requirements. For instance, a new medication may cure or dramatically alleviate a chronic condition thereby lessening the number of times a patient would need to see a physician.¹⁷ However, it might also be the case that a new or improved diagnostic imaging modality used for early screening for a particular disease could lead to greater physician demand and usage.¹⁸

¹⁶ BHP, *Physician Workforce*, 2-3.

¹⁷ For example, the discovery of the causative role of *H. pylori* in gastric and duodenal ulcers dramatically decreased the need for general surgeons, who previously performed vagotomies and gastric resections to reduce gastric acid secretion. Peter Malfertheiner, Francis K. L. Chan, and Kenneth E. L. McColl, "Peptic Ulcer Disease," *The Lancet* 374, no. 9699 (2009): 1449-1461.

¹⁸ Early screening for breast cancer has increased detection rates, as well as false positives, resulting in increased demand for oncologists, radiation oncologists, surgeons, and other ancillary services. Jeanne S. Mandelblatt et al., "Effects of Mammography Screening Under Different Screening Schedules: Model Estimates of Potential Benefits and Harms," *Annals of Internal Medicine* 151, no. 10 (2009):738-747.

Mixed Signals: Current Projections of Physician Supply and Requirements

Currently, most workforce analysts predict an impending shortage of primary care physicians over the next 10 to 15 years.¹⁹ Depending on the combination of assumptions made, the analyses predict a shortage of up to nearly 50,000 full-time equivalent (FTE) primary care physicians. Two major reviews of physician supply and requirements are *The Physician Workforce: Projections and Research into Current Issues Affecting Supply and Demand* from the Health Resources and Services Administration's (HRSA) Bureau of Health Professions, and the Association of American Medical Colleges (AAMC) Center for Workforce Studies' *The Complexities of Physician Supply and Demand: Projections Through 2025*. HRSA generated a "Physician Requirements Model" utilizing a demand-based conception of requirements, taking the year 2000 as their base year. This model relies on the assumption that our current system of health care and its constellation of relationships will continue to be used in the future. According to their estimates, the total physician supply will increase 21 percent between 2000 and 2020, from 713,800 to 866,400 FTE physicians.²⁰ Examining primary care physician supply, they project a 29-percent increase over this same period, from 267,100 to 344,700 FTE physicians. Meanwhile, total physician requirements are expected to increase 29 percent, from 713,800 to 921,500 FTE physicians. Primary care requirements are projected to increase 26 percent over the 20-year period from 267,100 to 337,400. As can be seen, these projections estimate a total physician shortfall of 55,100, but a surplus of 7,300 primary

¹⁹ Dill and Salsberg, *Complexities of Physician Supply*, 24-29; Council on Graduate Medical Education, *Sixteenth Report: Physician Workforce Policy Guidelines for the United States, 2000-2020* (Rockville, MD: Department of Health and Human Services, Health Resources and Services Administration, 2005).

²⁰ HRSA distinguishes from "Total Active Physicians" and "Physicians in Clinical Practice." The figures given here represent the latter. This represents the number of FTE physicians in clinical practice plus residents and excludes physicians not primarily engaged in patient care. Full-time equivalent physicians are based on the average hours worked per week in the reference year 1998.

care physicians. Of course, HRSA’s method of requirement projection assumes that physician supply and demand were in equilibrium in the base year, which few policy analysts would agree with. Therefore, this projected “surplus” of primary care physicians will more likely fill areas of physician shortage that currently exist. It should be kept in mind that these figures are baseline projections and that other scenarios modeled by HRSA arrive at different figures.

Table 1. HRSA Supply and Requirements Projections²¹

		2000	2005	2010	2015	2020
Supply	Total Physicians	713,810	764,950	808,080	842,650	866,440
	Primary Care	267,100	292,070	313,220	331,110	344,710
Demand	Total Physicians	713,810	757,300	805,400	860,600	921,500
	Primary Care	267,100	281,800	297,500	316,300	337,400

The AAMC’s “Physician Supply and Demand Model” examined the period 2006 through 2025.²² Like HRSA’s analysis, the AAMC’s projections are demand-based and rely on the assumption that supply and requirements were in equilibrium in the base year. The AAMC estimated a change in total physician supply from 680,500 to 734,900 over the period, with a change in primary care physicians from 256,500 to 272,700. In their estimates of physician requirements, they projected an increase from 680,500 to 859,300 in total physician demand and an increase from 256,500 to 318,700 for primary care. The

²¹ Adapted from BHP, *The Physician Workforce*, 32-33, Exhibits 21 and 22. Numbers represent FTE supply of physicians in patient care, which includes residents.

²² The AAMC’s figures are for total active physicians, excluding residents and fellows. This includes physicians not engaged in direct patient care, such as researchers and administrators. Full-time equivalent physicians are based on the average patient care hours worked per week in 2006.

result is a net shortage of 124,400 FTE physicians, including 46,000 FTE primary care physicians, or nearly 37 percent of the total shortage.

Table 2. AAMC Supply and Requirements Projections²³

	2006	2015	2020	2025
Supply	680,500	719,000	729,800	734,900
Demand	680,500	758,600	805,800	859,300

As can be seen, these two analyses differ greatly, and in the process illustrate the difficulty of creating public policy interventions based on available reports. Should we expect a 46,000-physician shortage in primary care, or a surplus? Is the AAMC a modern-day Cassandra, or HRSA a Pollyanna? Also as we have seen, there is a long history of incorrect workforce projections. Nonetheless, the importance of estimating future physician requirements drives us to continue trying. In preparing for the worst-case scenario, policy analysts, physician groups, government agencies, and educational organizations have proposed a variety of policy interventions. The AAMC has called for a 30-percent increase in US medical school capacity between 2002 and 2015, or 5,000 additional new medical graduates per year.²⁴ They have also called for a similar expansion in GME capacity to accommodate the new graduates without reducing positions for international medical graduates (IMGs).²⁵ Others, like Richard Cooper, argue for an even greater increase in GME capacity; in the case of Cooper, an increase of

²³ Adapted from Dill and Salsberg, *Complexities of Physician Supply*, 5, Figure 1. Numbers represent total FTE physicians, excluding residents. Unlike HRSA's projections, these figures also include physicians not involved in patient care.

²⁴ Association of American Medical Colleges, *Medical School Enrollment Plans Through 2013: Analysis of the 2008 AAMC Survey*, last modified May 2009, <https://www.aamc.org/download/82788/data/enrollmentreport.pdf>.

²⁵ Association of American Medical Colleges, *Help Wanted: More U.S. Doctors*, last modified February 2006, <https://www.aamc.org/download/82874/data/helpwanted.pdf>.

nearly one-third of the current capacity.²⁶ In addition to calling for an expansion of medical school and GME capacity to produce more physicians, some analysts have suggested that non-physician clinicians (NPCs) – physician assistants and nurse practitioners – could help to alleviate the effects of our impending primary care provider shortage.²⁷

Present but Unaccounted: Non-Physician Clinicians

As previously mentioned, most workforce analyses either completely ignore NPCs or relegate them to an auxiliary role – an interesting aside to be considered if one has time or interest, but not of central importance to workforce planning. Their absence or marginalization in workforce planning might lead a casual observer to conclude that their impact on health care delivery, and especially primary care delivery, in this country is minimal or their presence a relatively new one. Neither of these conclusions could be further from the truth.

Physician assistants and nurse practitioners both emerged on the US health care scene in the late 1960s in response to perceived health care shortages at the time. The idea of creating a “mid-level practitioner” to help alleviate physician shortages in rural and urban underserved areas had been proposed by various groups and analysts

²⁶ Richard A. Cooper, “Myth and Reality Underlying the Needed Expansion of Graduate Medical Education,” *Gastroenterology* 136, no. 7 (2009): 2045-2047.

²⁷ The term “non-physician clinician” has been adopted to jointly describe physician assistants and nurse practitioners in this text in keeping with current convention in health care workforce research. It is not intended to imply any inferiority in skill or clinical ability. Though certain organizations, most notably the American Academy of Nurse Practitioners, object to the use of this term (see American Academy of Nurse Practitioners, *Use of Terms Such as Mid-Level Provider and Physician Extender*, accessed March 29, 2010, <http://www.aanp.org/AANPCMS2/Publications/PositionStatementPapers/MLP.htm>), it is generally viewed as preferable to “mid-level provider” or “physician extender,” which imply a subordinate position that may not exist in many settings. As is frequently the case in the world of health policy, the accepted terminology may change with time to reflect new understandings or relationships that we cannot predict from our current vantage point.

throughout the 1950s and 60s. The first “physician’s assistants” program began at Duke University in 1965, enrolling former military corpsmen who had received basic medical training in the Korean and Vietnam wars. The idea was to create an assistant with skills and expertise somewhere between that of a technician and a physician. Although the first class was initially all male, the profession quickly diversified to include both women and those without military experience.²⁸ An earlier attempt by Eugene Stead of Duke to create an advanced training program for nurse clinicians had been blocked by the National League for Nursing, the national accrediting body for nursing programs, which worried that such a program would exacerbate the current nursing shortage. However, Loretta Ford and Henry Silver were successful in creating a pediatric nurse practitioner program at the University of Colorado in 1965. The pediatric nurse practitioner was created to “furnish comprehensive well child care to children of all ages, to identify and appraise acute and chronic conditions and refer these patients elsewhere as indicated, and to evaluate and temporarily manage emergency situations until needed medical assistance becomes available.”²⁹

Since their creation over 40 years ago, PAs and NPs have taken on additional roles and greater independence from physicians. In almost all states, NPs and PAs can prescribe drugs from DEA Schedules II-V. NPs can practice completely independently of physicians in 24 states (including Washington, DC), while the remaining states require

²⁸ Interestingly, Stead was initially wary of training women for this new role, believing that they were not sufficiently “career-oriented.” In a letter to *JAMA* describing his new program, Stead stated, “Since the long-range goals of most females remove them from continued and full-time employment in the health field, we anticipate that the bulk of the student body will be males.” Women now make up 73 percent of PA students. Eugene A. Stead, Jr., “Conserving Costly Talents - Providing Physicians' New Assistants,” *JAMA* 198, no. 10 (1966): 1108.

²⁹ Henry Silver and Loretta Ford, “The Pediatric Nurse Practitioner at Colorado,” *American Journal of Nursing* 67, no. 7 (1967): 1443.

some degree of physician collaboration, usually involving a written physician collaborative agreement.³⁰ Full-time, on-site physician supervision is no longer a requirement for NPs in any state. The vast majority of PA programs offer masters-level training. Currently, NP programs offer either a master's degree or a certificate for those who already possess a master's degree in a nursing-related field. However, as of 2015, all NP programs will be required to offer training at the doctoral level.³¹

Attempting to estimate the current and future impact of NPCs on the provision of medical care, many analysts have sought to convert the work effort of NPCs into physician full-time equivalents. There is ongoing disagreement as to the number of NPCs required to fill the role of a single primary care physician, commonly referred to as the physician substitution ratio.³² For example, in their analysis of physician supply and demand, Dill and Salsberg assumed that a single NPC was equivalent to 0.5 FTE physicians, though they offer no explanation of how they arrived at this calculation.³³ Larson, Hart, and Ballweg examined PA productivity across the country, comparing the number of outpatient visits performed by PAs per week to the number performed by physicians.³⁴ They found that one generalist PA was equivalent to 0.83 FTE physicians.

³⁰ Susanne J. Phillips, "22nd Annual Legislative Update: Regulatory and Legislative Successes for APNs," *Nurse Practitioner* 35, no. 1 (2010): 26.

³¹ American Academy of Nurse Practitioners, *Position Statement on Nurse Practitioner Curriculum*, accessed March 1, 2010, <http://www.aanp.org/AANPCMS2/Publications/PositionStatementPapers/NPCurriculum.htm>.

³² It should be noted that calculating substitution rates for NPCs involves more than determining what percentage of a physician's normal range of tasks a PA or NP can perform. Substitution rates take into account the number of patients seen over a given time period (per hour/week/year) and the total number of hours worked per week – a calculation of productivity. While there are many studies that examine the range of problems encountered by PAs or NPs, few studies attempt to generate a measurement of productivity that would allow us to determine NPC substitution.

³³ Dill and Salsberg, *Complexities of Physician Supply*, 65.

³⁴ In their study, Larson, Hart, and Ballweg surveyed 5,577 PAs selected as a national sample from the AAPA database. Of the original sample, 3,209 responded to the questionnaire, indicating their practice

In a separate study, Larson et al. state that NPs are likely only slightly less productive than PAs, mostly due to an increased likelihood of working part time, however they do not offer an NP-physician conversion factor.³⁵ Few generalizable studies exist to reliably convert a headcount of NPCs, especially NPs, into FTE physicians. The main limitation is the narrow sample population frequently studied. Often times the population is as limited as a single clinical practice. Even the broadest of studies tend to be limited to the state level, making it unlikely that the results will be able to be generalized to a national population. Many studies of this type, such as the Larson et al. study, rely on professional licensure renewal data, which is collected at the state level, with the frequency of collection and robustness of the data varying greatly between states.³⁶

Though there have been studies of future NPC supply, to date there have been no calculations of NPC demand independent of physician demand. This is likely due to the ancillary role to which many analysts relegate PAs and NPs. It may also be a result of an inability to clearly define the role of NPCs in the primary care workforce and where and how demand for their services may be the same or differ from that of primary care physicians. Part of the difficulty in defining demand for NPC services is reflected in the ongoing debate among workforce planners regarding patient complexity. Some analysts have suggested that the type of patients seen by NPCs in primary care settings is *qualitatively* — not just *quantitatively* — different from the type of patients seen by

specialty, clinical activities, education, and demographics. Eric H. Larson, L. Gary Hart, and Ruth Ballweg, "National Estimates of Physician Assistant Productivity," *J Allied Health* 30, no. 3 (2001): 146-152.

³⁵ Eric H. Larson, Lorella Palazzo, Bobbi Berkowitz, Michael J. Pirani, and L. Gary Hart, "The Contribution of Nurse Practitioners and Physician Assistants to Generalist Care in Washington State," *Health Services Research* 38, no. 4 (2003): 1033-1050.

³⁶ Also, renewal of licensure does not guarantee actual clinical practice. Many individuals maintain professional licensure despite not engaging in clinical activities.

physicians.³⁷ They argue that physicians are more likely to deal with severe acute, chronic, or complex illnesses while NPs and PAs deal with less complex medical issues (e.g. wellness checks, urgent care visits, medication monitoring). If this is true, then it is not simply the change in demand for total primary care services that matters when calculating demand, but rather the changes in specific primary care services and subpopulations. A projected increase in patients with chronic or complex illnesses would therefore affect demand for physicians to a much greater degree than for NPCs, whereas a projected increase in demand for preventative or basic acute care services would primarily affect demand for NPCs. It is clear, however, that there exists marked heterogeneity in the acuity of patients seen by NPCs depending on their practice environment and scope of practice as defined by state law. Furthermore, data comparing patient type and complexity between physicians and NPCs is noticeably lacking, making it difficult to support or refute such an argument.

Questioning Underlying Assumptions

As we have seen, projections of future workforce supply and demand are notoriously difficult in part due to lack of a centralized health workforce planning entity. In their comprehensive review of research on physician requirements and supply, HRSA notes the uncertainties of these projected shortages, as well as the ongoing conceptual disagreements over the various methods for generating these projections.³⁸ These predictions combine estimations of future need based on extrapolations of the current

³⁷ Larson et al., *Health Services Research*, 1047; Larson, Ballweg, and Hart, *Journal of Allied Health*, 151; Perri A. Morgan, Nilay D. Shah, Jay S. Kaufman, and Mark A. Albanese, "Impact of Physician Assistant Care on Office Visit Resource Use in the United States," *Health Services Research* 43, no. 5p2 (2008): 1906-1922.

³⁸ BHP, *Physician Workforce*, 1-2.

physician:population ratio with estimations of future supply based on expectations of growth in medical school and graduate medical education (GME) capacity.³⁹ Though we have a decent sense of the educational pipeline, we are unable to predict individual practice specialty, clinical setting, and geographic location. In our current system of medical training, physicians are free to pursue training in the field of their choice, provided there is a training position available to them. The distribution of funded positions has largely been left to the hospitals and medical schools overseeing residency training without much accountability to national health care priorities. Specialty programs, which can be a source of revenue for hospitals thanks to the large disparity between resident costs and what the hospital can bill for their services, have continued to expand despite the cap on Medicare-funded positions.

Primary care specialties, on the other hand, have continued to experience contraction. Even when a graduate enters an internal medicine or pediatrics residency, we cannot say with much certainty that he or she will actually practice in primary care. According to data from the American Board of Internal Medicine, 64 percent of third-year internal medicine residents entered subspecialty training in 2008.⁴⁰ This has increased since 2000, when only 51 percent entered subspecialty training. While NPs receive training and certification in defined specialties, much as physicians, we are similarly unable to predict who might choose to work in subspecialty practice within their area of certification. Further complicating the issue are PAs, who receive general training

³⁹ David C. Goodman, “The Physician Workforce Crisis: Where Is the Evidence?” *Health Affairs* Suppl Web Exclusives (Jan-Jun 2005): W5-109.

⁴⁰ Louis Grosso, William Iobst, Rebecca Lipner, and Carola Jacobs, “American Board of Internal Medicine’s Workforce Data: Residents, Fellows, and Practicing Physicians,” presented at the Sixth Annual AAMC Physician Workforce Research Conference, Alexandria, VA, May 7, 2010.

and then are able to shift specialties throughout their careers, should they choose to do so.⁴¹

Despite the uncertainties of predicting specialty choice, the standard convention in supply forecasting has been to assume that the current specialty proportions will remain constant for the duration of the forecasted period. In other words, it is generally assumed that the present constellation of clinicians will continue unchanged 10, 15, even 20 years from now. This convention is used to simplify the process of generating projections, but assumes a current state of equilibrium without attention to whether such a state in fact exists. A logical extension of this argument would be that the current specialty distribution reflects the historical distribution.

Statement of Purpose

The primary aim of our study is to characterize the primary care practice patterns of allopathic and osteopathic physicians, physician assistants, and nurse practitioners to determine whether such an assumption is supported. In doing so, we seek to describe historic trends in primary care practice for all four clinician groups – something that has not been done in the workforce literature before now. We have chosen to include all primary care clinician groups in this work in order to construct a more complete picture of the US health care system as it appears today, avoiding the profession-centric approach to workforce research that dominates the field. Our hope is that this work, through its retrospective design, will provide workforce analysts with a useful context for understanding and interpreting workforce projections.

⁴¹ James F. Cawley, Roderick S. Hooker, and William Leinweber, “Physician Assistant Specialization and Career Mobility,” presented at the Fifth Annual AAMC Physician Workforce Research Conference, Washington, DC, April 30, 2009.

METHODS

Data Sources

We gathered publicly available data on the estimated number of actively practicing clinicians for each of the four groups. Data for allopathic physicians are from the American Medical Association's annual Physician Characteristics and Distribution in the US (PCD), which is based on data from the AMA's Physician Masterfile.⁴² The Masterfile contains information on every allopathic physician since 1906. An individual's record is established upon matriculating at a US medical school, or in the case of IMGs, upon entering an ACGME residency program or receiving state licensure. Information in the record is updated as an individual completes residency training and receives board certification and state licensure. In addition to this information obtained from outside sources, the AMA collects demographic and practice information through direct survey of physicians. The Division of Survey and Data Resources, which maintains the Masterfile and publishes the PCD, administers the Physicians' Practice Arrangements (PPA) Questionnaire to approximately 250,000 physicians annually, or approximately one-fourth of all physicians on a rotating basis. The Masterfile counts those physicians who are retired, semi-retired, working 20 hours or less per week, temporarily not in practice, or not active for other reasons as "Inactive." Physicians are asked to indicate their major professional activity and based on their response are divided into two categories, Patient Care and Other Professional Activity. Patient Care includes physicians in office-based practice and in hospital-based practice, which also includes resident physicians. Other Professional Activity includes medical teaching, medical research,

⁴² American Medical Association, *Physician Characteristics and Distribution in the US, 2010* (Chicago: American Medical Association, 2010).

administration, and other activities not involving in direct patient care.⁴³ Physicians also identify their practice specialty through the PPA Questionnaire. The latest edition of the PCD included 219 specialties. While the past three editions of the PCD have included a chapter devoted exclusively to osteopathic physicians, data reported elsewhere in the PCD includes only allopathic, or Doctor of Medicine (MD), physicians. In our analysis, we included data from 1989 to 2008, the latest year for which information was available. No data were available for the year 1991.

Data for osteopathic physicians are derived from the American Osteopathic Association's (AOA) Osteopathic Medical Profession Report and Annual Fact Sheet, which are derived from the AOA's Physician Masterfile.⁴⁴ Similar to the AMA, the AOA collects data on all osteopathic medical students and physicians, with initial demographic information obtained from osteopathic medical schools. Like the AMA Masterfile, information on current practice type, specialty, licensure, location, and board certification is obtained from a variety of sources, including commercial sources, state associations, specialty colleges, and surveys of osteopathic physicians. However, unlike the AMA, there is no available explanation of how frequently the AOA performs its surveys or what specific information is collected via survey. Also unlike data from the AMA, data on DOs includes only those in active clinical practice and out of postdoctoral (residency) training. The AOA assumes DOs to be in postdoctoral training for 4.5 years following graduation from an osteopathic medical school. All osteopathic physicians under 65 years

⁴³ Physicians who fail to provide information on their practice or employment are listed as "Not Classified."

⁴⁴ The reports were accessed from the AOA website (<http://www.do-online.org>) between October 15 and November 24, 2009. The AOA website has since moved to <http://www.osteopathic.org>. Only the 2007-2010 Osteopathic Medical Profession Reports are available on the current website. The Annual Fact Sheets for the years 2000-2006 are no longer publicly available online.

of age are assumed to be in active practice, unless specifically known to be inactive or retired. Osteopathic physicians who do not indicate practice specialty and for whom no board certification information is available are categorized as “Unknown.” Data were available for the years 1990, 1994, 1999, and 2001 through 2009. Per the AOA, no other sources of historic data are available for the missing years.⁴⁵

Data for physician assistants were obtained from the American Academy of Physician Assistants’ (AAPA). Similar to the AMA Masterfile, an individual’s record is established upon matriculation at a US PA program and is updated upon graduation and licensure. In addition, the AAPA conducts an annual census of all PAs, which is administered by the AAPA Division of Data Services and Statistics. The census survey collects data on PA practice specialty, geographic location, and practice characteristics. Practice specialty categories are divided among 54 medical and surgical specialties. The AAPA has conducted an annual survey of its members since 1990. Since 1996 the survey expanded to include all PAs, both members and non-members. Response rates for the annual survey have ranged between 25 percent (2009) and 53 percent (1996), with generally higher response rates earlier in the time period. Results of the annual census are reported yearly in the AAPA Physician Assistant Census Report and are also available online to members of the AAPA.⁴⁶ Data for the years 1991 through 1995 were obtained

⁴⁵ Lauren Campbell, “Osteopathic Physician Workforce Data,” e-mail message to author, November 25, 2009.

⁴⁶ The AAPA also maintains a Masterfile of Physician Assistants meant to represent all individuals who have ever been eligible to practice as a PA. Similar to the methods of collecting data for the AMA’s Physician Masterfile, the AAPA Masterfile identifies new students matriculating in PA programs and assigns them a unique personal identification number. Information is updated as students graduate PA programs, pass national certification (National Commission on Certification of Physician Assistants, NCCPA) and recertification (Physician Assistant National Recertifying Examination, PANRE) exams, and are licensed by states. In order to remain certified, PAs must complete 100 hours of Continuing Medical Education (CME) and reregister their certificates with the NCCPA every two years. Additionally, PAs must

from Physician Assistant Statistics and Trends, 1991-1998.⁴⁷ Data for the years 1996 through 2009 were obtained from the AAPA website.⁴⁸

Data on nurse practitioners are from the American Academy of Nurse Practitioners' (AANP) National NP Database and HRSA's 2004 National Sample Survey of Registered Nurses (NSSRN). Information on the NP population and distribution of practice specialty were obtained directly from the AANP. A written request for data was submitted to the AANP Research Department in November 2009. Data reported in the Results section represents the information provided by the AANP in December 2009.⁴⁹ The AANP provided total NP population data for 1989, 1996, 1999, 2001, 2002, 2003, 2005, and 2009. These figures represent all NPs "who have recognition to practice." The AANP estimates that within this total 10 percent are "doing something other than practicing as an NP at any given time."⁵⁰ Data on specialty practice were provided for 1989, 1999, 2004, and 2009. The AANP categorizes NP specialty practice based on clinical track titles in NP programs. Subspecialties (e.g. cardiology, GI, diabetes care) are not listed separately, but instead are grouped under the corresponding "parent" specialty (e.g. cardiology and pulmonology are grouped under Adult).⁵¹ In contrast, the 2004 NSSRN surveyed 1,042 NPs and asked respondents to indicate what "type of patient is

complete the PANRE every sixth year. Therefore data on PAs in the AAPA Masterfile are updated at least every two years.

⁴⁷ American Academy of Physician Assistants, *Physician Assistant Statistics and Trends, 1991-1998* (Alexandria, VA: American Academy of Physician Assistants, 1999).

⁴⁸ American Academy of Physician Assistants, AAPA Membership Database (Alexandria, VA: American Academy of Physician Assistants, Data Services and Statistics Division, 2010).

⁴⁹ American Academy of Nurse Practitioners, AANP Membership Database (Austin, TX: American Academy of Nurse Practitioners, 2010).

⁵⁰ Lauren Apgar, "Nurse Practitioner Workforce Data," e-mail message to author, December 15, 2009.

⁵¹ Choices provided for "main area of NP specialization" included the following: acute care, adult, emergency, family, gerontological, neonatal, occupational, oncology, pediatric, psych/mental health, school, and women's health.

primarily treated in the unit/organization” in which they work.⁵² Respondents were given a list of 12 patient types as well as the opportunity to write-in a patient type not included on the list; ultimately respondents identified 31 different patient/specialty types (including “work with multiple patient types”).⁵³ A de-identified Public Use File available from HRSA’s Geospatial Data Warehouse was accessed for independent analysis.⁵⁴

Definitions and Analysis

For the purposes of this study, we used the Institute of Medicine’s (IOM) 1996 definition of primary care to differentiate between primary care and specialty care fields. The IOM defines primary care as the “provision of integrated, accessible health care services by clinicians who are accountable for addressing a large majority of personal health care needs.”⁵⁵ Integrated care is further defined by the IOM as being comprehensive, such that a primary care clinician can address “any health problem at any given stage of a patient’s life cycle.”⁵⁶ Primary care practice was limited to family medicine, internal medicine/adult, pediatrics, medicine-pediatrics, general practice,

⁵² Bureau of Health Professions, *The Registered Nurse Population: Findings from the March 2004 National Sample Survey of Registered Nurses* (Washington, DC: Health Resources and Services Administration, Bureau of Health Professions, 2006), C-8.

⁵³ Patient types listed in the survey were: adult care (general), cardiovascular, chronic care, neurological, newborn, obstetrics/gynecologic, oncology, orthopedic, pediatric, psychiatric, rehabilitation, and renal. “Work with multiple patient types” and “other” were also options. Respondents choosing “other” were asked to specify the patient type via write-in.

⁵⁴ Bureau of Health Professions, 2004 National Sample Survey of Registered Nurses General Public Use File, HRSA Geospatial Data Warehouse, accessed November 25, 2009, <http://datawarehouse.hrsa.gov/nursingsurvey.aspx>.

⁵⁵ Institute of Medicine, *Primary Care*, 32.

⁵⁶ *Ibid.*

adolescent medicine, and geriatrics.⁵⁷ Obstetrics/gynecology and women’s health were not included under the definition of primary care, though many analyses include these fields in their counts of primary care clinicians. While we recognize that these clinicians often serve as the primary medical resource for women, we believe these clinicians to be primarily responsible for reproductive and sexual health, not the broad range of health care needs required of a primary care physician. The specific specialties included for each clinician group are listed in Table 3.

Table 3. Specialty Groups Included in Study

Allopathic Physicians	Osteopathic Physicians	Physician Assistants	Nurse Practitioners
Internal Medicine Adolescent Medicine Internal Medicine/Family Medicine Geriatrics Pediatrics Adolescent Pediatrics Family Medicine Adolescent Family Medicine Family Geriatrics Medicine-Pediatrics General Practice	Internal Medicine Pediatrics Adolescent Medicine Family Medicine General Practice	Internal Medicine Pediatrics Family Medicine	Adult Gerontologic Pediatrics Family

In our analysis of allopathic physicians, we included only those physicians categorized by the AMA as “Patient Care,” excluding residents and fellows. Residents/Fellows are listed separately under “Hospital-Based Practice” within the

⁵⁷ Medicine-pediatrics and general practice are specialty categories utilized only by physicians. The AOA reported data for family medicine and general practice together; we were therefore unable to separate the data for these specialties in a similar manner as was done for allopathic physicians.

“Patient Care” category of “Major Professional Activity,” allowing us to easily exclude them. We separately analyzed the specialty distributions of USMGs and IMGs. The number of USMGs practicing in a given specialty was calculated by subtracting the number of IMGs active in patient care from the total number of non-resident physicians active in patient care for the specialty.

The numbers reported for osteopathic physicians reflect the total number of active physicians excluding osteopathic physicians in residency training and those categorized as “unknown” under specialty practice. The AOA provided data on the number of physicians categorized as “unknown” for the years 1990, 1999, 2001, 2002, and 2003, allowing them to be excluded from the total number of actively practicing physicians. It is unclear whether physicians in this category were excluded by the AOA from their counts of active physicians or simply included under “other specialty” for the years 2004-2009. In situations where data between one or more sources or publication editions did not agree, data from the most recent source were used.

The AAPA reported data on PA specialty practice as percentages of respondents to the annual census survey. Estimates of the actual number of PAs in each specialty were generated by multiplying the percentage of respondents in a given specialty with the total number of active PAs as estimated by the AAPA Masterfile. Data from the 2009 AAPA Physician Assistant Census Report indicate that this method may overestimate the number of PAs in primary care specialties. According to this report, 35.7 percent of respondents indicated working in primary care specialties, compared to 27.1 percent of

non-respondents.⁵⁸ Prior reports do not provide this data for comparison, therefore it is not possible to determine how reliable or accurate the estimations are for earlier years.

As previously mentioned, the AANP provided data for multiple years for both the total NP population and specialty distribution. Though data on the NP population were available for eight years, data on their specialty distribution were available for only four years. We therefore analyzed data only for those four years (1989, 1999, 2004, 2009). Data from the 2004 NSSRN Public Use File were analyzed using SPSS. Because the NSSRN surveys registered nurses (RNs), which includes but is not limited to nurse practitioners, we had to select only the subset of the sample that actively practices as NPs. We selected those RNs with greater than three months of advanced practice preparation as a nurse practitioner who were currently employed with the title of “nurse practitioner” in the US.⁵⁹ Area of specialty practice was determined from the “Primary Type of Patient” field. Estimates of the total number of NPs working in each specialty were generated from the sample using a weighting system. For each individual in the sample survey, HRSA calculated a “Basic Weight.” This value represents the number of nurses the subject likely represents based on his/her probability of being selected for the survey, with adjustments for potential nonresponses and multiple practice licenses.

We utilized simple descriptive statistics to characterize changes in primary care practice over two decades. For each group, we calculated the number of primary care

⁵⁸ The AAPA includes Obstetrics and Gynecology in its definition of primary care, though this represents only 2.3 percent of respondents. Although it is not explicitly stated, it is likely that the figure for nonrespondents is based on data from the AAPA Masterfile. American Academy of Physician Assistants, *2009 AAPA Physician Assistant Census National Report* last modified January 2010, <http://www.aapa.org/about-pas/data-and-statistics/aapa-census/2009-data>.

⁵⁹ The exact language of the filter we employed was the following: (Q12 = 1) AND (Q12A_D = 1) AND (Q12B_D > 1) AND (Q19 = 1) AND (Q24 = 20) AND (RN_POP = 2).

clinicians per 100,000 population, utilizing US Census Bureau data (Table 4).⁶⁰ We also calculated the percentage of total active clinicians comprised by primary care clinicians for each group. Finally, we calculated the percentage of the total primary care workforce comprised by each clinician group. We then calculated the percent change between the first and last year of available data for each of the above.

Table 4. Total US Population and Primary Care Clinician Estimates⁶¹

	1989	1994	1999	2004	2009
Total US	246,819,230	260,327,021	272,690,813	293,045,739	307,006,550
MD	138,823	156,154	186,128	212,444	—
DO	—	12,183	23,689	20,873	25,762
PA	—	11,410	18,225	20,830	24,179
NP	14,400	32,292	50,184	73,235	99,375

RESULTS

Allopathic Physicians

Since 1989, there has been a 30-percent increase in the number of primary care MDs per 100,000 population, from 56 in 1989 to 73 in 2008 (Figure 4). When we separated MDs into USMGs and IMGs, we observed that IMGs accounted for most of this growth. The number of primary care IMGs per 100,000 increased 93 percent, from 14 to 27. USMGs, on the other hand, only grew by 10 percent, from 42 to 46. Figure 5

⁶⁰ Future projections of the US population are generated by the US Census Bureau. U.S. Census Bureau, Population Division, *Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2009 (NST-EST2009-01)*, last modified December 2009, <http://www.census.gov/popest/states/NST-ann-est.html>.

⁶¹ Total US population data from US Census Bureau, *Population Estimates*. Data for DOs and PAs not available for 1989. Data for MDs not available for 2009. NP data for 1994 estimated based on assumption of linear growth of NP population between 1989 and 1999.

shows that the overall percentage of non-resident MDs active in primary care fields has remained fairly stable around 35 percent over the past 20 years (range, 33.42 percent in 1994 to 35.65 percent in 2003). When we again separated USMGs and IMGs, we observed a decline from 33.21 to 29.83 percent for USMGs, but an increase from 38.90 to 51.54 percent for IMGs. A decline in general practitioners (GPs) corresponded to the decline in the percentage of USMGs active in primary care. Though IMGs experienced a similar decline in GPs, a 12-percent increase in the percentage of total IMGs in internal medicine outweighed the loss of GPs (four percent). IMGs also experienced 2.99 and 1.74 percent growth in family medicine and pediatrics, respectively. If we look at MDs as a percentage of the total primary care workforce, we observe a decline from 77.19 percent in 1991 to 60.98 percent in 2008. USMGs decreased from 57.20 to 38.57 percent over this period, while IMGs increased slightly from 19.99 to 22.41 percent.

Figure 4. Primary Care Clinicians per 100,000 Population, 1989-2009

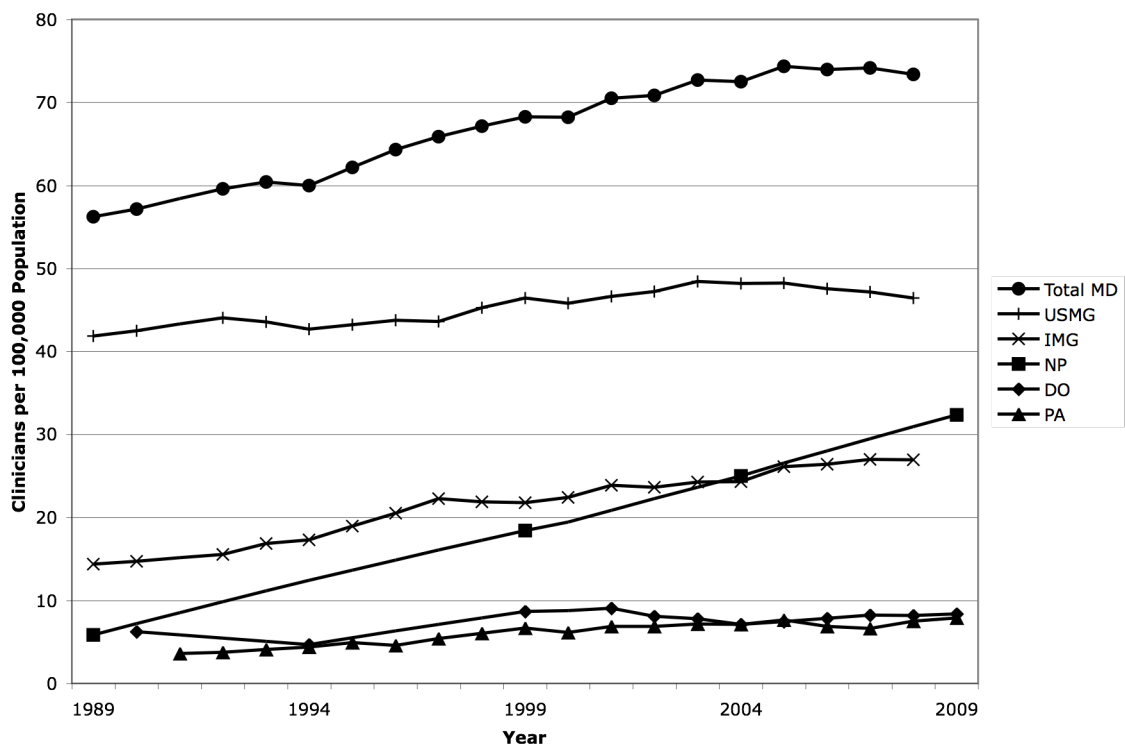
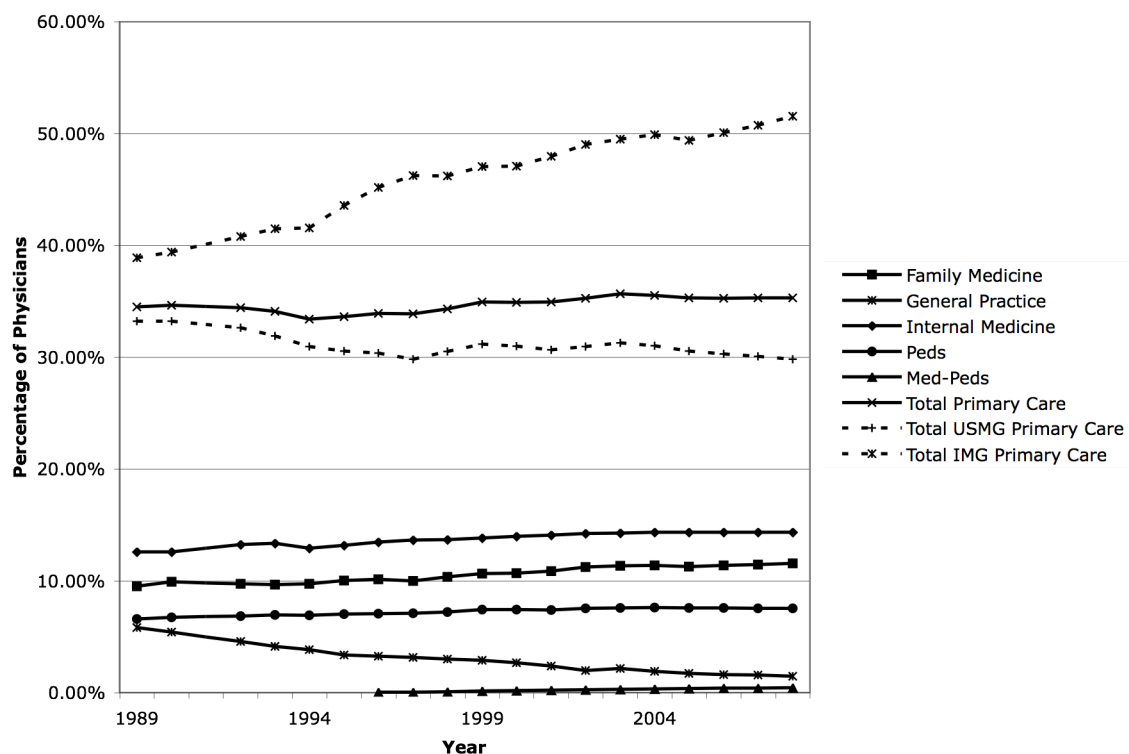


Figure 5. Specialty Distribution of Active, Non-Resident Allopathic Physicians in Primary Care, 1989-2008

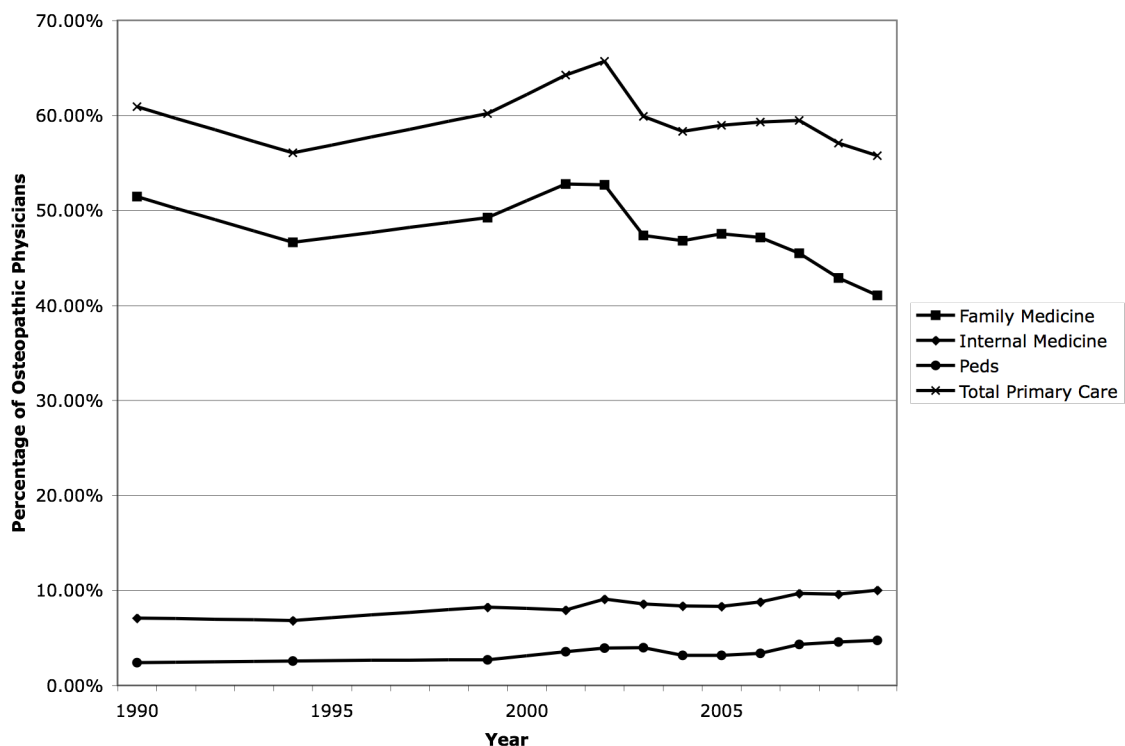


Osteopathic Physicians

The number of primary care DOs per 100,000 population fluctuated over the twenty-year period, with a net increase of two per 100,000 (Figure 4, Table 4). DOs are more likely to practice in primary care fields than allopaths, though the percentage of non-resident DOs active in primary care has declined between 1990 and 2009 (Figure 6). In 1990, 60.92 percent of DOs were in primary care fields compared to 55.78 percent in 2009 (range, 56.04 percent in 1994 to 65.69 percent in 2002). Family medicine accounts for the largest portion of DOs by far (41.06 percent in 2009) and fluctuations in the total percentage of DOs in primary care most closely follow fluctuations in family medicine. DOs also experienced growth in internal medicine (7.09 to 10.00 percent) and pediatrics (2.39 to 4.72 percent). The percentage of the total primary care workforce comprised by

DOs remained relatively stable, decreasing from 7.71 to 6.78 percent between 1991 and 2008.

Figure 6. Specialty Distribution of Active, Non-Resident Osteopathic Physicians in Primary Care, 1990-2009

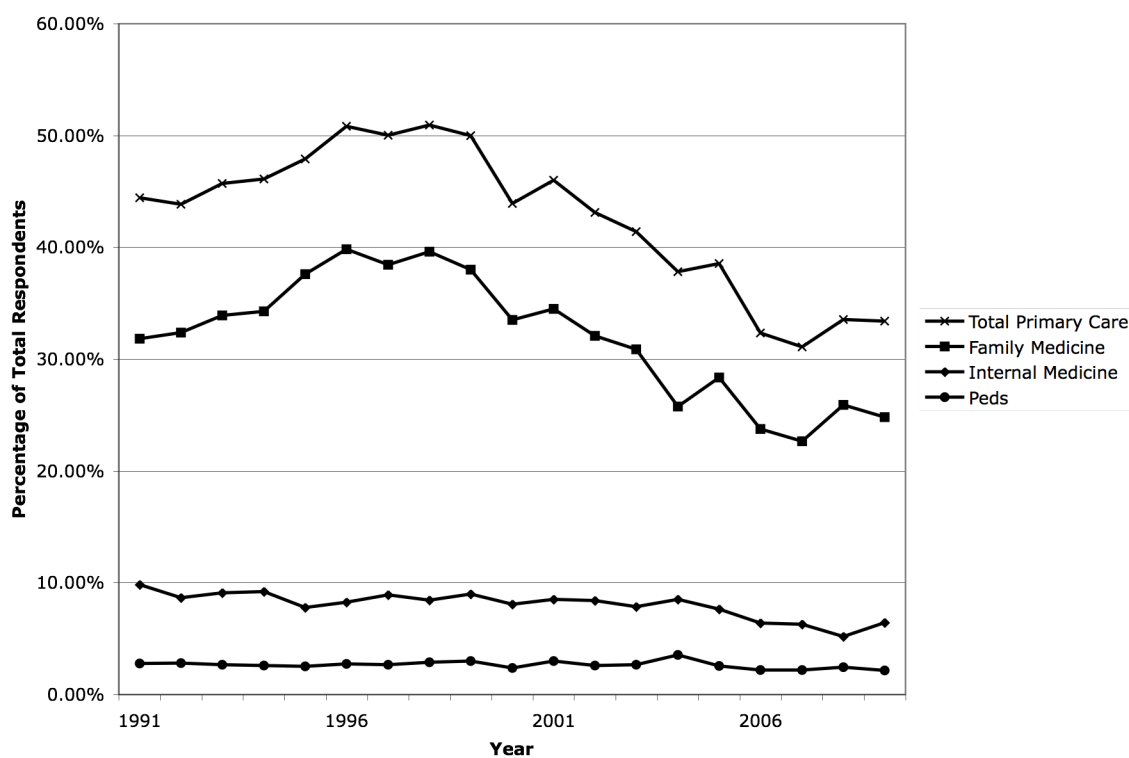


Physician Assistants

The number of primary care PAs per 100,000 population doubled between 1991 and 2009 (four to eight) (Figure 4). Though the absolute number of PAs in primary care has increased over the past 19 years (9,083 to 24,179), faster growth in specialty fields since 1999 has meant that the relative proportion of PAs active in primary care has decreased over time. As Figure 7 demonstrates, the percentage of PAs working in primary care fields initially increased from 44.42 percent in 1991 to a peak of 50.95 percent in 1998. However, since then it has decreased dramatically, reaching 31.11 percent in 2007. PAs experienced a decrease in the percentage of its members practicing

in all three primary care fields, but the largest decrease was within family medicine (FM, 31.82-24.82 percent; IM, 9.84-6.41 percent; Peds, 2.76-2.15 percent). Though the percentage of the total primary care workforce comprised by PAs increased 1.48 percent between 1991 and 2008 (4.76 to 6.24 percent), they remain the smallest group within the primary care workforce.

Figure 7. Specialty Distribution of PAs in Primary Care as Percentage of Total Respondents to AAPA Census, 1991-2009

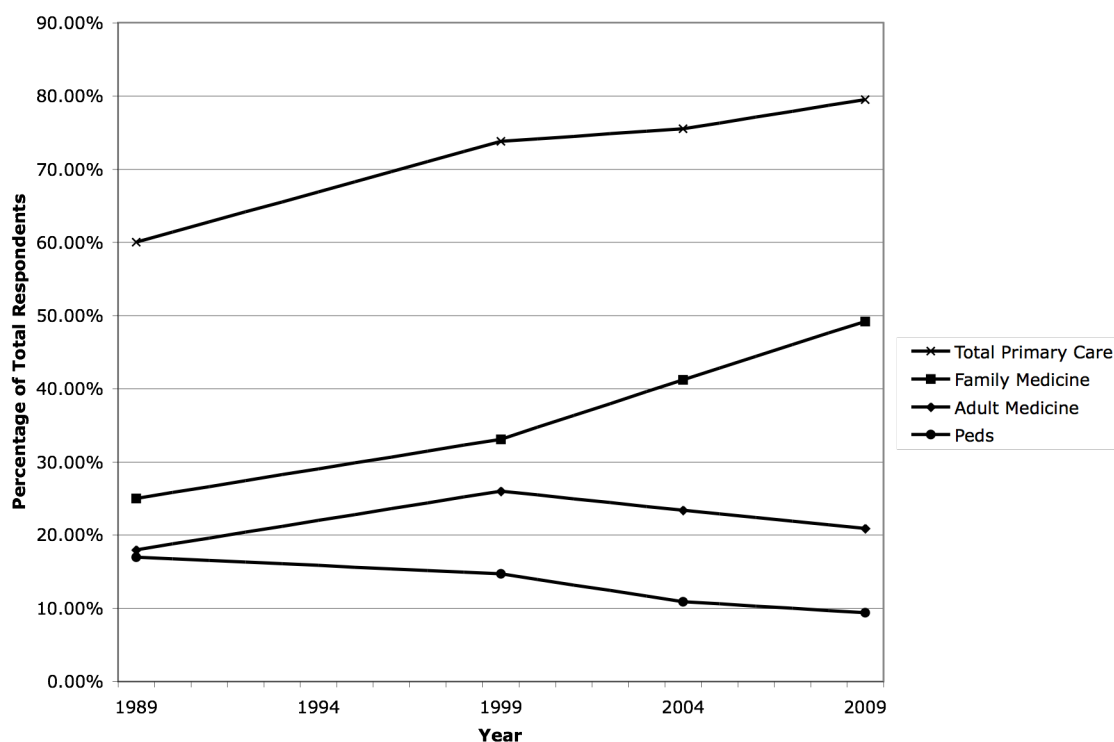


Nurse Practitioners

Nurse practitioners experienced the greatest growth of the four clinician groups examined. In 1989, there were an estimated six primary care NPs per 100,000 (Figure 4). By 2009, this had increased 500 percent to 32 per 100,000. The percentage of NPs practicing in primary care fields also increased over this period, from 60 percent in 1989 to 79.50 percent in 2009 (Figure 8). Most of this growth was due to a growth in family

nurse practitioners (25 percent, or 6,000, in 1989 to 49.20 percent, or 61,500, in 2009). The percentage of adult NPs increased slightly from 18 to 20.90 percent (4,320 to 26,125). Though the percentage of pediatric NPs decreased nearly eight percent over the 20-year period, their absolute numbers still increased from 4,080 to 11,750. The percentage of the total primary care workforce comprised by NPs increased from 10.34 percent in 1991 to 26 percent in 2008.

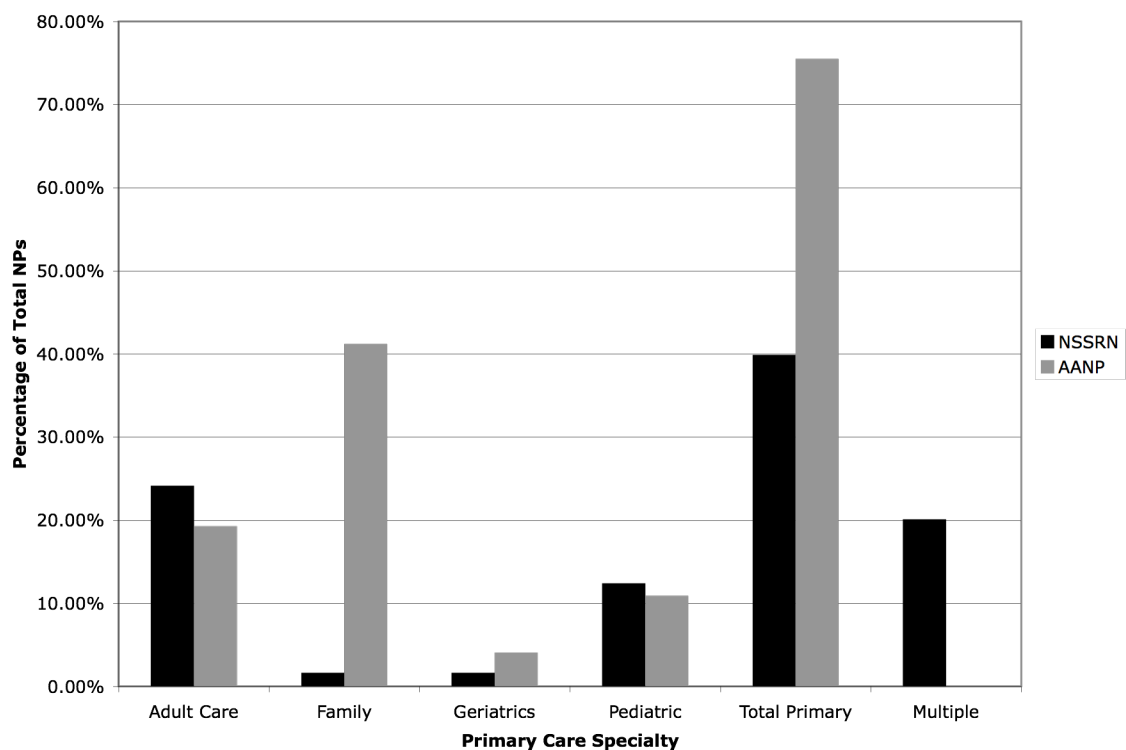
Figure 8. Specialty Distribution of NPs in Primary Care as Percentage of Total Respondents to AANP Survey, 1989-2009



If we compare data from the AANP to HRSA's 2004 National Sample Survey of Registered Nurses (NSSRN), we see some striking differences. According to the NSSRN, approximately 40 percent of NPs practice in primary care specialties compared to the 76 percent reported by the AANP in 2004 (Figure 9). The largest discrepancy is seen among family nurse practitioners. According to the AANP, 41 percent of NPs worked as family

NPs in 2004. However, the NSSRN estimated less than two percent were working as family NPs in the same year. The NSSRN, unlike the AANP, allowed respondents to select “multiple patient types,” which 20.14 percent of respondents chose. We are unable to further clarify the meaning of “multiple patient types” as a response. “Multiple patient types” likely represents a rather heterogeneous mixture of specialties and practice patterns, from NPs working with adults and children in a single primary care practice to NPs who split their time between various specialty practices (e.g. cardiology and adult primary care, women’s health and oncology, adult endocrinology and pediatric endocrinology).

Figure 9. Specialty Distribution of NPs in Primary Care in 2004, AANP vs NSSRN Data



DISCUSSION

Primary Conclusion

Though the specialty distribution of allopathic physicians remained relatively stable over the 20-year time period, this was not true of the other clinician groups. While the majority of DOs continue to practice in primary care fields, after a period of fluctuation, there was a small net decrease in the percentage of total DOs in primary care. PAs witnessed a dramatic shift away from primary care in the past 10 years. NPs, on the other hand, experienced continuous growth in primary care over the past 20 years, at least according to AANP data.

As might be expected, allopathic physicians remain the single largest group of clinicians practicing in primary care. Nurse practitioners are a rapidly growing group and in 2003 surpassed IMGs in terms of absolute numbers. NPs remain the group with the highest proportion of primary care clinicians, and in fact this proportion appears to have actually increased over the past 20 years. However, we must keep in mind that NPs typically work fewer hours per week and see fewer patients per hour than physicians, therefore their contribution to the primary care workforce may be slightly overstated when viewed in terms of headcounts. Osteopathic physicians and physician assistants remain a small portion of the total primary care workforce, but both professions noted increases in the absolute number of primary care providers over the past 20 years.

Results of this study indicate that the assumption of a stable specialty distribution for physicians and NPCs is not supported by historical data. The constantly changing and unpredictable nature of clinician specialty distribution supports the notion that there is no “state of equilibrium” on which to base future health workforce projections. If we had

relied on this assumption for PAs in the late 1990s, we would have greatly overestimated the current primary care workforce. Conversely, making the same assumption with NPs would have resulted in an underestimation of their current primary care workforce. The fluctuating trends contribute to the alternating and often inaccurate “feast or famine” projections of workforce supply. This work highlights that changes in specialty trends must be considered based on both historical and current data.

Important Issues Highlighted by This Work

In analyzing the trends for allopathic physicians, we see how the US has become increasingly reliant on IMGs for its supply of primary care physicians. In 1989, there were 35,481 active, non-resident IMG physicians in primary care. By 2003, this number had nearly doubled and in 2008 there were over 82,000, representing a third of the total primary care physician population (MD and DO combined). IMGs currently represent 39 percent of primary care residents. The new ACGME regulations for resident work hours will likely only further drive our reliance on IMGs as a source of additional manpower. As programs struggle to staff hospitals with the 16-hour work limit for interns, many may choose to expand their intern classes in order to achieve sufficient coverage. With a fixed number of new USMGs, the only flexible variable is the number of IMGs a program recruits. Though some hospitals and programs may opt to hire more hospitalist physicians or non-physician clinicians to fill the gap, the supply of these alternatives is relatively fixed as well, especially given the limited educational training capacity for NPCs.⁶²

⁶² Richard A. Cooper, “New Directions for Nurse Practitioners and Physician Assistants in the Era of Physician Shortages,” *Academic Medicine* 82, no. 9 (2007): 828.

Our heavy (and growing) reliance on IMGs raises serious ethical concerns. The majority of IMGs are from lower-income countries, such as India, the Philippines, and Pakistan.⁶³ Though sub-Saharan African countries contribute fewer IMGs in terms of absolute numbers, the impact on the physician workforce for those countries is much higher than for other countries. Because the total physician workforce is smaller in sub-Saharan African countries, the physicians they contribute to our workforce represent a greater proportion of their total workforce.⁶⁴ Starfield demonstrated that countries who contributed a disproportionate number of primary care physicians to the US had gross national incomes nearly one-fifth of the US's and physician-to-population ratios of approximately 1:3000.⁶⁵ Primary care supplier countries also had worse indices of health status (child mortality, life expectancy at birth, and rates of childhood immunizations) than the US. Though some would argue that there is reciprocal benefit to the countries of origin in exporting physicians, such as income that is sent back to family members, the practice of relying on IMGs leads to a net loss to countries of origin, both in terms of educational costs and human capital. Given the impact of this physician brain drain on developing countries, we must consider steps to secure physicians from our own populace to address our shortages.⁶⁶

⁶³ It should be noted that the US is the second largest source of IMGs in the US. US citizens who complete medical school abroad and return to the US to practice are considered IMGs. As of 2005, they accounted for 12 percent of IMGs practicing in the US. Fitzhugh Mullan, "The Metrics of the Physician Brain Drain," *NEJM* 353, no. 17 (2005): 1810-1818.

⁶⁴ Ibid.

⁶⁵ Approximately 31 percent of USMGs are considered to be working in primary care practice. Therefore, a disproportionate contribution is defined as greater than 31 percent of physicians from the country of origin practicing in primary care in the US. Barbara Starfield and George E. Fryer, "The Primary Care Physician Workforce: Ethical and Policy Implications," *Annals of Family Medicine* 5, no. 6 (2007): 486-491.

⁶⁶ Fitzhugh Mullan, "Time-Capsule Thinking: The Health Care Workforce, Past and Future," *Health Affairs* 21, no. 5 (2002): 112-122.

The trend for DOs raises an issue of concern for the osteopathic community – a shift away from primary care. Osteopathic organizations frequently reference osteopathic medicine’s “proud heritage of producing primary care practitioners,” and many osteopathic medical schools specifically state that their mission is to produce primary care physicians.⁶⁷ With primary care being so central to the osteopathic identity, a trend toward specialization, even a relatively small one (when compared to PAs, for example), should give osteopathic leaders pause. While elucidating the cause of such a shift in specialization is beyond the scope of this work, we can at least highlight some of the potential causes that have been postulated by osteopathic researchers. Chief among these is a growing convergence between osteopathic and allopathic training.

Newer osteopathic colleges, which have proliferated since 2000, tend to be located in regions without osteopathic training institutions or a long-established history of osteopathic medicine.⁶⁸ In these areas, supervision and mentorship by osteopathic physicians is rather limited and osteopathic hospitals are essentially nonexistent. Even in areas with long-established osteopathic colleges, osteopathic trainees and physicians have seen osteopathic hospitals close or merge with allopathic hospital systems.⁶⁹ The end result has been osteopathic medical students training in allopathic hospitals under the supervision of MD physicians and alongside allopathic medical students. At the same time, osteopathic GME began to converge with allopathic GME. Since the early 1990s, approximately two-thirds of DOs in residency training have been in ACGME programs.

⁶⁷ American Association of Colleges of Osteopathic Medicine, “What Is Osteopathic Medicine?” American Association of Colleges of Osteopathic Medicine, accessed March 29, 2010, <http://www.aacom.org/about/osteomed/Pages/default.aspx>.

⁶⁸ Mark Cummings and Kathleen J. Dobbs, “The Irony of Osteopathic Medicine and Primary Care,” *Academic Medicine* 80, no. 7 (2005): 703.

⁶⁹ Stephen C. Shannon and Howard S. Teitelbaum, “The Status and Future of Osteopathic Medical Education in the United States,” *Academic Medicine* 84, 6 (2009): 709.

A more recent phenomenon has been dual ACGME/AOA accreditation of GME programs, known as parallel-accredited programs, whereby ACGME programs can apply for AOA accreditation. This represents a way for allopathic programs to recruit DO graduates who are interested in qualifying to take osteopathic board examinations and is most commonly seen in pediatrics and family medicine programs.⁷⁰

An AOA survey in 2001, indicated that many DO graduates choose to enter ACGME programs due to a perceived inferiority of training at osteopathic institutions and a lack of osteopathic GME programs in many geographic locations.⁷¹ While some have postulated that the shift in DO training from osteopathic to allopathic sites and greater collaboration with allopathic physicians has led to less of a primary care orientation among DOs, the data do not seem to support this theory.⁷² While 47 percent of DOs in ACGME programs were in primary care residencies in 2007, only 33 percent of DOs in AOA programs were training in primary care.⁷³ The interesting phenomenon, however, has been the growth of non-primary care specialty programs at osteopathic institutions. Some analysts have argued that the increase in specialty programs represents osteopathic medicine's response to the pull of ACGME programs on DO graduates. According to this argument, osteopathic GME programs have sought to retain DO graduates – and the Medicare funding they bring to an institution – by offering more

⁷⁰ Cummings, *Osteopathic Medicine*, 703.

⁷¹ Ibid.

⁷² Antoinette S. Peters, Nancy Clark-Chiarelli, and Susan D. Block, "Comparison of Osteopathic and Allopathic Medical Schools' Support for Primary Care," *J General Internal Medicine* 14, no. 12 (1999): 736.

⁷³ National Resident Matching Program, National Resident Matching Program Database (Washington, DC: National Resident Matching Program, 2010); Elizabeth Freeman and Terri A. Lischka, "Osteopathic Graduate Medical Education," *J American Osteopathic Association* 109, no. 3 (2009): 135-145, 196-198.

training positions in attractive specialties like emergency medicine and ENT.⁷⁴ In doing so, osteopathic programs may be promoting the belief that specialty training is more prestigious than primary care training, thereby implicitly supporting and furthering the trend of increased specialization.

Of the four groups, PAs are the most rapidly specializing, with only one in three active PAs currently practicing in primary care fields. The cause (or causes) of this dramatic shift to specialty practice remains unclear. Some have implicated the 80-hour resident work week in causing this shift toward specialization, arguing that PAs have been increasingly hired to fill roles traditionally filled by medical and surgical house staff. Certainly many hospitals expanded their hiring of PAs in 2002 in anticipation of the implementation of the 80-hour workweek in July 2003.⁷⁵ During this time, PAs moved into areas where there may have had a much smaller presence prior to the work hour regulations, especially in surgical fields, where PAs were hired to cover floor patients.⁷⁶ Despite these observations, our results demonstrated that while this may have contributed to an *ongoing* decline in primary care PAs, the downward trend actually began in 1999 – four years prior to the implementation of the 80-hour workweek in 2003.

Others have suggested the influence of the close collaboration between PAs and physicians and training within the “medical model” as important factors. If physicians leave primary care practice, PAs will also be forced to follow since their scope of practice

⁷⁴ As Cummings notes, osteopathic programs are able to avoid a reduction in GME training positions due to unfilled positions by converting primary care positions into specialty ones. By maintaining their cap, the programs avoid a loss of GME funding from the Centers for Medicare and Medicaid Services. Cummings, *Osteopathic Medicine*, 703-704.

⁷⁵ Christopher Doscher, “PAs Finding Opportunities as Hospitals Adjust to New Rules on Residents' Hours,” AAPA News, last modified November 15, 2002, <http://www.aapa.org/advocacy-and-practice-resources/practice-resources/hospital-practice/575-pas-finding-opportunities-as-hospitals-adjust-to-new-rules-on-residents-hours>.

⁷⁶ Hillel Kuttler, “At Yale, New Rules Create Jobs for PAs,” AAPA News, last modified July 30, 2002, <http://www.aapa.org/news/26--general-/576-at-yale-new-rules-create-jobs-for-pas>.

is based on the physician-PA team collaboration. Unlike NPs in several states, PAs do not practice independently without physician supervision. This also does not fully explain the observed trend. In 2008, there were 248,181 primary care physicians (MD and DO) and yet only 22,844 PAs working in primary care, nearly a 11:1 ratio of physicians to PAs. Does this truly represent a shortage of physician supervisors? Finally, this change in course came during a period of rapid expansion in PA programs. Between 1995 and 1999, 54 new programs opened, representing a near doubling in the number of first-year students.⁷⁷ It is possible that the students entering these new programs were qualitatively different from previous matriculates and had a greater orientation toward specialty care. A difference in selection criteria at these programs may have also played a role, however, research would be needed to confirm this possibility.

Data on NPs suggests a strong orientation toward primary care practice. Whether this is due to an inherent bias toward primary care among those who choose to become NPs, the influence of the NP curriculum and training, or greater incentives and opportunities for primary care practice created by the void left by physicians – or a combination of these – remains unclear. Further study is needed to verify the current picture of NP practice specialty choice. HRSA's 2004 National Sample Survey of Registered Nurses (NSSRN) found only 40 percent of NPs to be working in primary care fields, compared to the 76 percent reported by the AANP in 2004. Methodological differences between the surveys, including sampling methods, response rates, and specialty categories, limit our ability to clearly explain this variation. While the NSSRN data calls into question the accuracy of the AANP data, we cannot accept the NSSRN

⁷⁷ Physician Assistant Education Association, *Twenty-Fourth Annual Report on Physician Assistant Educational Programs in the United States* (Alexandria, VA: Physician Assistant Education Association, 2009), 8.

data as fact either. Of the specialty tracks available in NP programs, the Family Nurse Practitioner track is by far the most popular with nearly 54 percent of NP graduates training in this track. It therefore seems unlikely that fewer than two percent of practicing NPs work as family NPs, as the NSSRN reports. Some NSSRN respondents may have chosen to respond as working with “multiple patient types,” but at most this would account for only 22 percent of NPs. It is possible that subspecialization occurs among family NPs to a degree that is unseen among family physicians or perhaps many family NPs work with only one age group, adults or children, and indicated this in their response. The AANP data highlight a key problem with survey data – results are only as good as the survey instrument. In this case, the survey instrument limits our insight into practice specialty distribution due to the framing of questions. We are unable to determine the extent of specialization among NPs because the AANP simply does not ask about the phenomenon in their survey. Even if an NP worked in a subspecialty practice, he/she would be forced to choose a category of practice, such as Adult NP, that does not fully capture the type of work he/she may be doing.⁷⁸ If we are to know what people are really doing, we will have to ask the appropriate questions.

Practice trends from PAs and DOs underscore an important, but frequently overlooked fact – that incentives for specialization exist for all clinician groups, not just

⁷⁸ Of course, part of the problem is the belief, expressed by many analysts and NPs, that even when NPs are employed in a subspecialty practice they are working in a “primary care capacity.” This belief is used to argue that NPs are chiefly primary care clinicians, even when they may not appear as such. The logic of this argument is inherently flawed. Clinicians across all specialties perform tasks that on their surface may resemble primary care tasks. However, a key component of primary care is the broad range of issues that are addressed over time--issues that are not confined to one or two organ systems. While an NP working for a cardiology practice may be responsible for monitoring a patient’s blood pressure, dosing medication and adjusting dosage as needed, and coordinating care with other clinicians, these do not constitute primary care. A cardiologist performing the same tasks would not be considered a primary care clinician for the reasons listed above, and we do not believe that a nurse practitioner or physician assistant working in a similar capacity can be correctly categorized as a primary care clinician either.

allopathic physicians. However, the flip side of this observation offers a potential solution to observed trends – incentivizing primary care can draw clinicians from all groups. Financial incentives for physicians continue to be proposed. However, recent analysis of physician income and wealth differentials demonstrated that to reach career wealth equivalency between cardiologists and primary care physicians, cardiologists would need to take a 20-percent pay reduction and primary care physicians would need a pay increase of 50 percent.⁷⁹ Included under the Patient Protection and Affordable Care Act are payment incentives for primary care practices for the next five years.⁸⁰ While some worry that such incentives will only raise the already astronomical cost of health care in this country, there is some evidence to suggest that such initiatives could pay for themselves by decreasing costly specialist care.⁸¹ Though we do not yet see a trend toward specialization for NPs, financial incentives for specialization also exist for this group. Total annual income for NPs in emergency departments is \$118,380 compared to \$92,080 for NPs in pediatrics.⁸² Though some would have us believe that NPs are not affected by such considerations as financial gain, we must accept that NPs are rational actors like physicians and any other professional. Financial incentives, professional recognition, and

⁷⁹ Bryan T. Vaughn, Steven R. DeVrieze, Shelby D. Reed, and Kevin A. Schulman, “Can We Close the Income and Wealth Gap Between Specialists and Primary Care Physicians?” *Health Affairs* 29, no. 5 (2010): 936.

⁸⁰ Under this legislation, family medicine, general internal medicine, pediatric, and geriatric physicians whose Medicare charges for office, home, and nursing facility visits comprise at least 60 percent of their Medicare charges are eligible for a 10-percent bonus payment for their services. Association of American Medical Colleges Center for Workforce Studies, *Health Care Reform and the Health Workforce: Workforce Provisions Included in the Patient Protection and Affordable Care Act, P.L. 111-148 (Hr 3590)*, last modified April 14, 2010, <https://www.aamc.org/download/124782/data/healthcarereform.pdf>.

⁸¹ Fewer specialty physicians might in and of itself lead to health care savings. Several studies have demonstrated greater health care spending in areas with a greater proportion of specialty physicians. For example, see Katherine Baicker and Amitabh Chandra, “Medicare Spending, the Physician Workforce, and Beneficiaries’ Quality of Care,” *Health Affairs* Suppl Web Exclusives (Jan-Jun 2004): W184-97.

⁸² American Academy of Nurse Practitioners, *2009-10 AANP National NP Sample Survey: Income and Benefits*, accessed August 30, 2010, <http://www.aanp.org/AANPCMS2/ResearchEducation/Research/2009-2010+NP+Sample+Survey+Income.htm>.

perceptions of prestige will impact specialty practice decisions for NPs just as they do for physicians. The physician assistant trend away from primary care could also be explained by salaries, as there is a 16-percent difference in mean incomes between family medicine and emergency medicine.⁸³ PAs are in a unique position to be affected by incentives for primary care practice. Of the four clinician groups, PAs have the greatest career flexibility thanks to their generalist training. As PA researchers have noted, PAs are readily able to switch practice specialty and as many as 50 percent of PAs will practice in at least two different specialties in the course of their careers.⁸⁴ PAs switch back and forth between primary care and specialty practices, but the net flow of PAs is from primary care to specialty care fields. Among the many reasons for changing specialties, PAs listed scope of practice, compensation, and fringe benefits as the most important factors. Clearly this could be used to the advantage of primary care if compensation and fringe benefits were improved and made at minimum equal to specialty practices. While it would be misguided to believe that money is the only motivating factor for clinician specialty choice, it is equally misguided to ignore its powerful influence. It is almost certain that any attempt to successfully attract clinicians into primary care practice will have to include improved compensation in its equation.

Limitations

Limitations include differences in the type of data sources available for each of the four clinician groups, with data for some groups based on survey results and for others based on a masterfile that combines data from multiple sources. For groups that

⁸³ Perri A. Morgan and Roderick S. Hooker, "Choice of Specialties Among Physician Assistants in the United States," *Health Affairs* 29, no. 5 (2010): 890.

⁸⁴ Cawley, Hooker, and Leinweber, *PA Specialization*.

rely on surveys to gather information, the variability of national survey sampling methods between groups limits the accuracy of any comparisons. The differing methods of sampling utilized by each professional group were previously discussed in the Methods section of this work. Though the quality of data sources varies between the four groups, the quality of data within each group was relatively consistent.

Also of concern was the inability to analyze much of the data firsthand. Since workforce data is often considered to be proprietary information belonging to individual professional organizations, we were not able to analyze the primary data ourselves and had to rely on reports provided by the organizations. This was true of data for NPs and DOs and therefore limits our confidence in these data. However, given the dearth of public data to study these groups, we believe the data reported herein to be the most accurate currently available.

The data, as presented, assume the survey results from all four clinician groups are equal in sampling techniques and representative of their respective populations. Though we reported the results as actual numbers, it is perhaps best to view these as estimations in light of the differing sampling methods. Furthermore, data reported in this study are based on “headcounts” rather than full-time equivalents, which would more closely characterize productivity. Of the groups, MDs and DOs are generally regarded as having the highest level of productivity in terms of number of hours worked per week and the number of patients seen per hour. The use of headcounts rather than FTEs

minimizes the contribution of physicians to the primary care workforce while inflating the contribution of NPs and PAs.⁸⁵

Finally, data in this study do not distinguish between inpatient and outpatient clinicians, leading to an overall overestimation of the available primary care workforce. While it would have been possible to remove inpatient clinicians from the allopathic physician data, this was not possible with the three remaining groups. This likely does not affect data on those clinicians in family practice, but it does affect those in internal medicine/adult and pediatrics. Many clinicians from these specialties work as generalists or hospitalists in hospitals and though they may treat a wide range of diseases, they lack the continuity of care that is one of the hallmarks of primary care.

A Final Word

This study is the first of its kind to report the longitudinal trends in primary care practice for all primary care providers. It provides a comparison of the four clinician groups responsible for the delivery of primary care in this country, giving us a more complete picture of our system and its workforce. Though retrospective analyses cannot tell us what the future will look like, they provide the context within which we understand workforce issues. An understanding of how our current constellation of providers evolved over time is important for constructing more accurate projection models. Furthermore, such studies allow us to interpret workforce projections with a better grasp on their limitations.

⁸⁵ More so NPs than PAs, as demonstrated by Roderick S. Hooker and Linda E. Berlin, "Trends in the Supply of Physician Assistants and Nurse Practitioners in the United States," *Health Affairs* 21, no. 5 (2002): 174-181.

This study also highlights the highly decentralized nature of workforce data collection and analysis in the US. The collection of workforce data has largely been left to individual professional associations, each with different sampling methodologies and frequencies, and with different political agendas. The resulting patchwork of data is difficult to compare, where it exists. In many cases, data is considered to be proprietary information and is not made available to outside researchers for firsthand analysis. We believe that workforce research and planning would be aided by the centralization and standardization of data collection with a centralized data repository that captures practice settings, specialty, and geographic location for all health care providers. As such, we look forward to the contributions of the newly authorized National Center for Workforce Analysis, which was created as part of the Patient Protection and Affordable Care Act of 2010. In order to be effective in advancing workforce research, the new Center must work to establish better compliance with practice reporting, standardization of terminology and sampling frequency, and researcher access to collected data. The potential for contributing to a better understanding of workforce issues is great, but only if it learns from the current shortfalls.

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