Meeting the Need of a Rural State for Primary Care Physicians: A Health Care Reform Challenge

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Objective: Determine current and projected needs for primary care physicians in Kentucky and explore education and workforce policies that can contribute to overcoming physician shortages. Methods: Need and demand for physicians were estimated using an adaptation of the Physician Supply Model and Physician Requirements Model developed by US Health Resources and Services Administration. Data sources included the Kentucky Board of Medical Licensure, Area Resource File, US Census Small Area Health Insurance Estimates, Kentucky State Data Center, and National Resident Matching Program. Results: Between 1527 and 1888 additional primary care physicians are required to meet projected needs and demands by 2020. These requirements are substantially more than current supply trends suggest will be available. Conclusion: No single policy can solve the shortage of primary care physicians; therefore, multiple approaches must be used at the local, state, and national levels. A new system of care, patient centering, to reform the health care system is also suggested.

KEY WORDS: maldistribution, physician shortage, primary care physicians, workforce

Access to vital health care services is currently unavailable to many of Kentucky’s estimated 671,434 uninsured in 2009 and inadequate for many more currently covered by health insurance. A sufficient number of physicians of all specialties, especially primary care, are necessary to ensure that appropriate care is available. On the basis of a 2007 study by the Kentucky Institute of Medicine, Kentucky has a shortage of physicians that is likely to worsen unless appropriate action is taken. The Kentucky Institute of Medicine reported that the State ranked 32nd nationally among states in a physician-to-population ratio of all active physicians, with only 214 physicians per 100,000 residents. This lower ratio is statistically significant (P < .001) when compared with the national ratio of 268. In terms of primary care physicians, Kentucky ranked even worse, 37th, with a ratio of 78 physicians per 100,000, which is also statistically significant (P < .001) when compared with the ratio of 88 for the United States. Correcting Kentucky’s physician shortage is crucial to improving the health status of its citizens, an outcome required for overcoming long-standing rates of high poverty, low levels of education, and poor economic performance in many regions of the State. Access to primary medical care and appropriate specialist care are necessary for nurturing healthy individuals from birth who can be successful in education, work, and other activities throughout their lives.

In contrast to a projected oversupply of physicians 10 years ago, the nation is now thought to have a shortage of physicians. The need and demand for physicians will increase in the future. This is because of factors such as early physician retirement, lifestyle changes among younger practitioners, concerns about litigation, and the ability of Americans to afford health care. Although physicians in most specialties are needed, the projected shortage is particularly acute for primary care physicians. A recent analysis concludes that the nation could face a shortage of more than 40,000 primary care physicians by 2025 and that the workload of family physicians and general internists is likely to increase by 29% from 2005 to 2025. This negative trend could be further exacerbated by new legislation designed to insure between 31 million and 32 million nonelderly individuals through the Patient Protection and Affordable Care Act, which was signed into law March 23, 2010.

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Poorer, more rural states like Kentucky will be disproportionately impacted by these national trends. Kentucky has a major shortage of physicians and a maldistribution of physicians as well. The majority of physicians are located in urban and metropolitan areas. Kentucky is the nation’s sixth most rural state, with 85 of its 120 counties classified as rural according to the US Department of Agriculture’s Rural-Urban Continuum Codes. Forty-three percent of Kentucky’s population lives in a rural area but only 28% of its physicians practice there. In 2008, a total of 80 Kentucky counties were classified as Health Professional Shortage Areas for primary care by the Health Resources and Services Administration’s (HRSA’s) Bureau of Primary Health Care. Nineteen (23.8%) of these HRSA shortage counties are urban and 61 (76.3%) are rural.

The purposes of this article are to determine the current and projected needs for primary care physicians in Kentucky and to explore the education and workforce policies that can contribute to overcoming the State’s serious shortage of these physicians. By primary care physicians, we mean physicians who practice in medical specialties that focus on general care of the patient, including physicians in family medicine, general practice, general internal medicine, or general pediatrics.

**Methods**

Data describing physician demographics and work were provided by the Kentucky Board of Medical Licensure for all physicians licensed in Kentucky. However, this study involved only active physicians, that is, those who practice 20 or more hours per week. Physicians reported as being retired, semiretired, or locum tenens were excluded. Physician age, gender, race/ethnicity, hours worked per week, medical specialty, and practice locations were studied. Hours worked per week were specified for as many as 3 counties, which enabled a more accurate calculation of physician supply by county.

The Physician Supply Model and Physician Requirements Model developed by HRSA were used to make estimates of supply, need, and demand requirements for Kentucky. The baseline estimates of physician supply for Kentucky physicians derived using the Physician Supply Model were entered into the Physician Requirements Model to make projections of the number of primary care physicians necessary to meet the State’s health care need and demand by 2020. These data were arranged by medical specialty, rural or urban status of each county, and the 15 Area Development Districts, which encompass Kentucky’s 120 counties. The Area Development Districts are the State’s designated regional planning and economic development districts.

Additional data from the National Resident Matching Program were analyzed to determine the potential of changes in this program for improving Kentucky’s future supply of primary care physicians. Estimates and projections are based on three general models briefly described below:

- **Supply**, or the State’s projected number of physicians based on those currently in practice using today’s pathways, as well as existing entry levels and retirement rates;
- **Need**, or the number of physicians that will be required to address the projected preventive, acute, and chronic care conditions of patients; and
- **Demand**, or the number of physicians that will be required to provide all the health care services patients might want or can afford in the future.

The Physician Supply Model and Physician Requirements Models are baseline projection models constructed by HRSA using assumptions about trends in physician practice characteristics, utilization of physician services by particular age and socioeconomic population groups, impact of rising income and changing expectations by health consumers on demand, and the likely state of the economy. These models include growth factors (plus or minus) for 18 medical specialties, including primary care, beginning with a base year of 2000 and making projections from 2005 to 2020 in 5-year increments.

The baseline projections made using the Physician Supply Model and Physician Requirements Model assume that current patterns of new graduates, specialty choice, and practice behavior continue. After detailing the characteristics of Kentucky physicians and the number in active practice by specialty, an estimate was made of what the number of Kentucky physicians would be by specialty if the State were at the minimal US ratio of 268 physicians per 100,000 population, rather than its actual rate of 214. These new baseline numbers were included in the HRSA Physician Supply Model and projected for 18 medical specialties from 2009 to 2020. The difference between the current supply, as derived from data from the Kentucky Board of Medical Licensure, and the projected rates were used to determine both current and future shortages of Kentucky physicians by specialty for both the needs and demand models.

**Results**

Kentucky has more than 4.2 million people, with approximately 2.4 million (57%) residing in urban areas and 1.8 million (43%) in rural communities. The projected increase in total population is 11.9% by 2020. All of the Area Development Districts are expected to
increase in population except the rural Appalachian Big Sandy and Kentucky River Districts. Examination of Kentucky primary care physicians by Area Development Districts reveals a significant maldistribution. Thirteen of the 15 Districts have an active physician-to-population ratio per 100,000, which is lower than the national average of 268 per 100,000 population.

Kentucky currently has 9330 active physicians, of which 3168 are practicing primary care. This results in a combined primary care physician-to-population ratio of 74 per 100,000 people, which is a statistically significant lower ratio (P < .001) when compared with the national ratio of 90. Family medicine physicians make up the largest component of primary care physicians in Kentucky (1443), followed by general internal medicine (1143) and general pediatrics (582). It would take at least 674 more primary care physicians to reach the current national primary care physician-to-population ratio (a 21% increase).

We project an increase of 1527 (48.2%) primary care physicians is required to meet the need and 1888 (59.6%) the demand in Kentucky for health services by 2020. The level of increase in primary care physicians required to meet either need or demand by 2020 is far greater than can be achieved at the average annual growth rate of 2.4% from 2000-2010. Compared with the current levels, the greatest primary care physician needs and demand by 2020 are projected to be in internal medicine, 851 to 1014 (74.5%-88.7%); family medicine, 458 to 573 (31.7%-39.7%); and general pediatrics 232 to 301 (48.2%-59.6%).

The state’s workforce continues to be primarily male (76%), but the number of women in the career pipeline is growing. The median age for Kentucky’s male physicians is 51 compared with 44 for women. The average number of hours worked per week was the nearly the same for men (48.3) and women (47.4) in rural areas but somewhat greater for men in urban areas (47.0 vs 42.8).

**Discussion**

A review of the intended specialties of 2009 University of Kentucky medical school graduates reveals a pattern characteristic for most medical schools. Thirty-two and a half percent selected primary care specialties of family medicine (6.4%), internal medicine (16.0%), and pediatrics (10.1%). More osteopathic medical students selected primary care than those of allopathic schools.

Since the peak of managed care in 1995, the trend among medical students has been to select specialties other than primary care. The reasons are many. Since the decline of a strict HMO model of managed care, the demand for primary care physician gatekeepers is no longer important. The millennium generations of students are more interested in lifestyle, and primary care does not lend itself to a manageable lifestyle. Medical school tuition has increased significantly during the past 10 years along with medical student debt. The average 2008 student debt for US medical school graduates was $143 140 for public schools and $173 304 for private schools. In Kentucky, the average student debt for 2007 is $121800 for the University of Kentucky, $133 100 for the University of Louisville, and $135 200 for Pikeville College of Osteopathic Medicine. In 2004, the median income of specialists in the United States was twice that of primary care physicians, and as Table 1 indicates, primary care medical specialties have lower average annual incomes than most other specialties.

A recent study of a sample of Kentucky middle and high school students aspiring to health care careers revealed that the cost of medical education is a potential major deterrent to consideration of medicine as a profession. The cost of education and subsequent debt might contribute to some students selecting specialties that promise more lucrative income.

A 2008 survey by the Physicians’ Foundation of approximately 12000 physicians, most of them in primary care, indicates that they have a high level of frustration and have contemplated changes in their practices that could worsen the shortage of primary care physicians. Forty-nine percent said that over the next 3 years they plan to reduce the number of patients they see or stop practicing, and 60% would not recommend medicine as a career to young people. In a 2008 survey of nearly 1200 fourth-year medical students, only 2% intended to work in general internal medicine. Many of these medical students showed the same wariness as that expressed by primary care physicians in the Physicians’ Foundation survey, namely, concerns regarding the burden of nonclinical paperwork, declining reimbursement, lower salaries than other specialties, and
the demands of treating a growing number of patients with multiple chronic conditions. These perceptions could be further disincentives for graduating medical students to choose primary care specialties.

Another disconcerting trend is the declining number of US medical school graduates going into family medicine. In October 2007, only 45.4% of all first-year family medicine residents compared with 48% in October 2006 were US Liaison Committee on Medical Education accredited medical school graduates. The 2009 National Resident Matching Program match for Kentucky presents even more alarming results. While family medicine filled 31 of the 34 residency positions offered (91.2%), only 8 (23.1%) were filled by US seniors and 21 (67.7%) by IMGs. Today, 1 in 4 physicians in this country is an international medical graduate. In the 24-year period from 1970 to 2006, non-IMGs grew by 91.4% while IMGs increased by 170.2%.30

International Medical Graduates comprise 18% of Kentucky’s active physicians compared to the high among states of 45% (13617) for New Jersey.31 The number and percentage of IMGs by specialization in Kentucky are family medicine 181 (10.8%), general internal medicine 321 (19.1%), general pediatrics 103 (6.1%), and obstetrics/gynecology 41 (2.4%). While the distribution of IMG specialists relative to the State’s population is disproportionately concentrated in urban counties (63.5%), the distribution of IMG primary care physicians closely approximates Kentucky’s split between rural and urban populations, with 43.2% of IMGs being located in rural counties and 56.8% in urban counties.

The need for physicians could be substantially higher as a result of the recently enacted national legislation, The Patient Protection and Affordable Care Act, which will eventually provide health insurance coverage to a large proportion of the currently uninsured. It is estimated that at least 191 primary care physicians would be needed at the traditional primary care physician to patient ratio (1:3500) if care were suddenly extended to Kentucky’s uninsured. This number will increase to 447 primary care physicians if the ratio of 1:1500 is used. This latter ratio is thought to be more effective because of higher chronic disease rates among a rapidly increasing elderly population, and more time needed to incorporate preventive care into treatment plans.32

Nearly one-half of the medical school students nationwide are now women.33 Increasingly, women are assuming a larger role within Kentucky’s physician workforce. However, most of the growth in the Kentucky’s female physician workforce occurred in urban areas.210 Gender is likely to play an increasing role in primary care medicine in general, but especially in pediatrics. Now women constitute 53.3% of all pediatricians nationally and 49% in Kentucky.24 An implication of the trend toward more women in these medical disciplines is that more physicians will be needed to compensate for women who are more likely to work part-time when their children are young.35 The growth in pediatricians who worked part-time continued from 2000 to 2006, with 1 in 5 pediatricians now working part-time.36 This trend is consistent with the increasing proportion of pediatricians who are female; however, evidence is beginning to develop that many other demographic subgroups of physicians, including men aged 50 or older, are beginning to work fewer hours.36

In one national study for obstetrician/gynecologists younger than 40 years, 23% of female physicians reported reducing their hours or stopping practice altogether for an extended period to meet family needs, compared with 5% of male physicians in the same age group. From ages of 40 to 50 years, 11% of both men and women reported having reduced their work schedules. In the groups older than 50 years, female physicians were more likely than their obstetric/gynecologist colleagues to reduce their workload for an extended period.37

A major challenge for improving health care in Kentucky is getting more physicians to practice primary care in the State and more to locate in its rural and underserved areas. Kentucky medical schools must first increase class size and the number of residency programs, especially those in primary care disciplines. One method of expansion would be the addition of regional campuses with students spending the first 2 basic science years of medical education on the main campus followed by the 2 clinical years at a regional, more rural campus. Pipeline programs must encourage more students from rural areas to enter the medical profession and those students should be trained in rural areas if physicians are expected to practice there. Debt relief and other incentives can be offered to recruit and retain physicians in rural and underserved areas, such as the expansion of the National Health Service Corps by the federal government with new incentives to practice in rural areas. Title VII, Section 747 of the Public Health Service Act programs have been found to be effective in supporting primary care medical education and training.38 However, on the basis of the numbers from the 2008 edition of the HRSA Area Resource File, only 12.9% (27) of the 210 federal service physicians practicing in Kentucky in 2007 practiced in rural counties. Another possibility is scholarships based on future rural and underserved area community service. Reducing the expenses of a medical practice, such as lower liability premiums,39 and a decrease in regulations will
also help to retain primary care physicians in needed areas. Higher reimbursement rates and other financial incentives for those practicing in rural and underserved areas could help to attract and retain much-needed primary care physicians to these areas. Practices could also restructure themselves around concepts such as patient centering to involve patients more directly in their care and to better use physician time by substituting other practitioners, for example, physician assistants, nurse practitioners, and other nonphysician clinicians. Patient safety measures could be gained and medical errors reduced by the implementation of electronic medical records. Medical team building could be strengthened by early and continual interdisciplinary training of medical, nursing, and other health care professions students.

Limitations and Need for Further Research

The HRSA Physician Supply and Requirements models are bound by the key assumption that recent trends will continue into the future. Both of these models are constructed to acknowledge the impact of variables such as age and the increasing number of women physicians on the estimates and projection of physician numbers. For example, age is correlated with retirement probability and annual hours worked; this creates a concern that must be addressed because a growing proportion of physicians are nearing historical retirement age as illustrated by the shifting physician age distribution. Another issue is that during the past 3 decades the proportion of new medical graduates who are female has risen from 10% to close to 50%. Second, the growth in female representation is a relatively recent phenomenon, and it is now predominantly male physicians who are nearing retirement age. In some studies, it is estimated that female physicians work less time than male physicians. At least for the time period covered by our data, female physicians in Kentucky worked about the same hours as male physicians. This is 1 of many issues that should be tracked over time for improved physician workforce planning.

Increased attention must be given to trends that can influence physician supply and requirements such that new model inputs are necessary to the contingencies of useful workforce estimators for use in the physician supply and requirements models. Some important trends deserving attention are retirement patterns, hours worked, part-time work, and medical specialization. These trends should be examined specific to age, specialty, and gender. The impact of Federally Qualified Health Centers, nonphysician clinicians, and new concepts in health care, such as patient centering, on physician requirements should be examined.

Missing shifts in patterns related to the variables addressed earlier could result in current estimates and projections of physician workforce supply and requirements that fail to inform policy makers and lead to erroneous conclusions. However, our experience and that of others suggest that these models are sufficiently flexible so that model inputs can be adjusted to accommodate a range of scenarios related to physician supply and requirements.

Reinhardt has observed that estimating physician supply and requirements years into the future is a daunting enterprise because any variable used in a model can change over time, the model can fail to include important variables, or data for some variables cannot be available.

The Association of American Medical Colleges advises that the best way to test and eventually verify workforce projection models, given their complexity, is to repeat them as often as possible so that their projections can be tested against actual supply and practice outcomes.

Conclusion

No single policy can solve the shortage of primary care physicians that confronts the nation and especially rural states. Other states may wish to conduct analysis of their physician workforce issues and with these supporting analyses, physicians, legislators, medical educators, and other policy makers can come together to craft comprehensive workforce policies for change that have the potential to meet the specific primary care needs. The individual state actions could provide insights into needed national policy changes that would benefit the nation’s rural health.

REFERENCES


