Health care workforce projections have been notoriously unreliable because they are often based upon idealized future delivery systems rather than current utilization trends. Recent data suggest that advances in care—such as a 50 percent reduction in mortality for cardiovascular disease—will only expand the need for more physicians.¹

Current utilization patterns suggest that by 2020 there will be a shortage of 91,500 physicians—45,400 primary care physicians and 46,100 subspecialists.² These shortages are driven by the demographic characteristics of the US population, which is growing and aging and whose disease burden is increasing. The shortages are also driven by the demographic characteristics of physicians: One in three practicing physicians are older than fifty-five and are expected to retire in the next ten to fifteen years.³

Physician supply projections are also likely to overestimate physician full-time-equivalents because younger physicians seek to work fewer hours than their predecessors did.⁴

Physician training is inextricably tied to patient care. Since its inception in 1965, Medicare has been the largest single explicit supporter of graduate medical education (GME) programs and has paid for its share of training costs. However, the Balanced Budget Act of 1997 imposed a cap on Medicare-funded GME at 1996 levels, at a time when tightly managed care seemed to be the future of the health care system. The system of tightly managed care networks failed to take hold, and the demand for physicians is growing. Nonetheless, the cap is still in place, limiting teaching hospitals’ efforts to expand or create new programs. Medicare now pays for less than 25 percent of direct training costs for residents and fellows.⁵
Incrementally Increasing The Physician Workforce

Training an additional 4,000 physicians a year would allow the United States to increase its expected supply of doctors by not quite 30,000 by the end of the decade—meeting roughly one-third of the expected shortage. This would represent an expansion of approximately 15 percent over current training levels.

According to the Census Bureau, the US population has already increased by almost fifty million (15 percent) since 1997.6,7 The Congressional Budget Office estimates that under the Affordable Care Act, up to eleven million previously uninsured nonelderly Americans may gain health insurance by 2014, and that number may reach twenty-six million or more by 2022—with many of the newly insured having long-unmet needs for care, especially specialty care and surgical treatments.8

In addition, the number of older Americans will double between 2000 and 2030. Every day for the next nineteen years, 10,000 Americans will turn sixty-five.9 This age group uses more than twice as many health care services as younger adults, as shown in Exhibit 1.

The aging of the population will lead to higher prevalence of cancer and cardiovascular disease.10 The incidence of cancer more than quadruples in the twenty years after an individual turns forty-five.11 As a result of scientific advances, the number of cancer survivors will increase, from fourteen million today to eighteen million by 2022.12 These patients will require recurrent care by primary care physicians, oncologists, surgeons, other subspecialists, nurses, and myriad other health professionals.

In the case of heart disease, one could argue that advances in clinical interventions, coupled with public health initiatives, have increased at breakneck speed and yet have been outpaced by the US obesity epidemic. As heart disease mortality has decreased, longevity has increased. So has the rate of obesity in people ages sixty-five to seventy-four, 42 percent of whom are now obese.13 Unfortunately, obesity—and all of its associated comorbidities, such as diabetes—is likely to continue to be a major risk factor for many Americans into the foreseeable future.1

The nation’s lower age-adjusted mortality is likely to lead to another wave of age-related illness in the coming decades: neurologic disease. A recent study from the RAND Corporation suggests that almost 15 percent of Americans ages seventy-one and older have dementia and that by 2040 more than nine million are likely to have the diagnosis.14 The prevalence of Parkinson’s disease is expected to double between 2010 and 2040.15

Medical advances have also improved the care for illnesses from rheumatologic disease to congenital cardiac disorders for children and young adults. Children suffering from previously fatal diseases will survive into adulthood but require decades of follow-up by primary care providers, pediatric subspecialists, and adult subspecialists. These advances in treatment have increased the need for pediatric subspecialists beyond the nation’s current capacity16 and are likely to cause further pressure on the health system. Absent necessary increases in Medicare-supported residency positions, per capita numbers of physicians will continue to fall as the population grows and ages, with increasing per capita needs.

Lower Mortality, Longer Lives, And Greater Lifetime Utilization

There is little doubt that the current US health care delivery system is less than ideal, and there are opportunities to reduce demand for services without harming patients. However, even if it is fully implemented, the ongoing health care system transformation under the Affordable Care Act—intended to reduce unnecessary health care costs through improved prevention, coordination, and integration of care—offers little evidence of decreased physician demand to date.

Roughly 15 percent of all US primary care practices are now recognized by the National Committee for Quality Assurance as “medical homes.”17 These medical homes are intended to provide high-quality care consistent with

**EXHIBIT 1**

Estimated Requirements For Patient Care Physicians Per 100,000 Population, By Patient Age And Physician Specialty, 2000

<table>
<thead>
<tr>
<th>Age group</th>
<th>Specialty</th>
<th>Primary care</th>
<th>Medical</th>
<th>Surgical</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–17 years</td>
<td>95</td>
<td>10</td>
<td>16</td>
<td>29</td>
<td>149</td>
<td></td>
</tr>
<tr>
<td>18–24 years</td>
<td>43</td>
<td>15</td>
<td>54</td>
<td>48</td>
<td>159</td>
<td></td>
</tr>
<tr>
<td>25–44 years</td>
<td>59</td>
<td>23</td>
<td>52</td>
<td>62</td>
<td>196</td>
<td></td>
</tr>
<tr>
<td>45–64 years</td>
<td>89</td>
<td>41</td>
<td>59</td>
<td>81</td>
<td>270</td>
<td></td>
</tr>
<tr>
<td>65–74 years</td>
<td>175</td>
<td>97</td>
<td>125</td>
<td>145</td>
<td>543</td>
<td></td>
</tr>
<tr>
<td>75+ years</td>
<td>270</td>
<td>130</td>
<td>161</td>
<td>220</td>
<td>781</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>95</td>
<td>33</td>
<td>55</td>
<td>70</td>
<td>253</td>
<td></td>
</tr>
</tbody>
</table>


*Includes general and family practice, general internal medicine, and pediatrics. *Includes cardiology and other internal medicine subspecialties. *Includes general surgery, obstetrics/gynecology, ophthalmology, orthopedic surgery, otolaryngology, urology, and other surgical specialties. *Includes anesthesiology, emergency medicine, pathology, psychiatry, radiology, and other specialties.
the principles set forth at the Alma-Ata conference thirty-five years ago, which declared the need “for urgent action” to provide primary care to protect and promote the health of all people.18

Adding around-the-clock, culturally competent access to the traditional primary care model in the other 85 percent of practices in the United States is likely to improve the nation’s return on investment. However, no marked reductions in health care use or physician demand have yet been demonstrated.19 In 2004 Bruce Fireman and colleagues examined the experience of the Permanente Medical Group in Northern California and found that disease management did not substantially reduce utilization or costs, even when deployed across a tightly managed care network.20

One recent study of imaging utilization at an integrated, closed system with no financial incentives for imaging showed that rates of use have gone up and that they remain highest among the elderly.21 The reasons for increased utilization included improvements in scanning technologies and their applicability.21 Another study, in Ontario, supported these results, finding that the increased use of imaging studies and specialists was directly correlated with better outcomes for patients with complex needs.22

Some researchers have rightly characterized screenings as potentially overused in some populations; however, screenings are likely underused in other populations—for reasons related to geography23 or lack of insurance coverage.24 For example, guidelines would suggest that colonoscopies performed in patients older than seventy-five are unnecessary, but colorectal cancer screening is underused in many patients, particularly those with no insurance or with Medicaid coverage.24 Reducing colorectal screenings in one population but increasing it in others where recommended would not result in an overall reduction in services. Even if reductions in the unnecessary use of screenings or diagnostics are achieved, the expansion of access to health care in the Affordable Care Act and advances in screening and new treatments are likely to increase the long-term demand for appropriate interventions.

Personalized medicine and genomics may also contribute to improved health but may simultaneously increase long-term needs for health care. The sequencing of the genome opened a number of possibilities for patients who previously had little hope for survival. New treatments and protocols such as targeted treatment for colorectal, breast, and lung cancer and personalized pharmacologic regimens;25 prophylactic surgery such as mastectomies for patients who are genetically at high risk for breast cancer; and stem cell therapy are all under intense investigation and development.26

The promise of such new technologies and therapies does not lie in their potential to reduce the lifelong consumption of medical care. Rather, the hope is that these approaches will lead to cures for disease or better treatment, both of which lead to longer and better lifespans. Longer life spans result in more use of medical care over the course of a lifetime for ailments that have become treatable diseases rather than causes of death.

Some have argued that unexplained local variation in the use of health care is evidence of waste or inefficiency and that the use of health care can be greatly reduced. For example, in 2006 the per capita rate of knee replacements in Sioux Falls, South Dakota (14.3 replacements per 1,000 Medicare enrollees), was more than three times the rate of knee replacements in the Bronx, New York (4.1 replacements per 1,000 Medicare enrollees).27 However, recent studies suggest that variation in medical care is not driven largely by providers’ preferences, as has been suggested by researchers with the Dartmouth Atlas Project.28 Instead, differing health status and other individual patient factors continue to contribute to the necessary (if not ideal) variation in utilization.29-32

A Balanced Approach
Population health care needs change over time, and it would be unwise to prescribe a static specialty composition of the health care workforce that would not respond to the dynamic health care environment. Equally, given the long medical training period and the likely modest rate of change in delivery and payment systems, it would be unwise to rely on any expected radical transformation of the health care system to meet...
the projected increase in physician demand. Instead, it would be prudent to incrementally expand the number of federally supported residency positions based on current health care utilization rates and to commit to ongoing analysis of changing demand to inform future workforce planning.

Several pending bills in Congress (S. 577, H.R. 1180, and H.R. 1201) to expand GME funding take into account the notion that primary care is the foundation of a high-performing health system, but they also note that it is of equal importance to address shortages of subspecialists in many areas. In fact, specialists such as general surgeons, neurosurgeons, and pathologists are facing decreases in their absolute numbers, not just in per capita ratios.

These pending GME bills allocate the specialty composition of residency positions in accordance with physician shortages identified by federal analyses and direct that future specialty allocation be driven by workforce data that are constantly updated and analyzed to reflect trends—for example, analyses of shortages by the Government Accountability Office or the yet-to-be-funded National Health Care Workforce Commission. This approach would allow policy makers to adjust the future numbers of residents in line with population needs.

In 2010 the median ratio of active patient care physicians to the US population was 215.1:100,000. Approximately 37 percent of those physicians were primary care practitioners—a designation that includes providers in the three fields of general internal medicine, family medicine or general practice, and general pediatrics. These three primary care specialties combined accounted for the largest number of active physicians in any single discipline. The remaining 63 percent of active patient care physicians were spread over 155 specialties and subspecialties.

In the 2011–12 academic year approximately 43 percent of all core residents—that is, residents in postgraduate year 1 positions available immediately following medical school—entered primary care specialties, although many of them will choose to subspecialize. Approximately 20 percent of all GME slots are fellowship (or subspecialty) training positions. In comparison to larger specialties such as family medicine (which has approximately 3,400 positions per year) or internal medicine (approximately 7,300 positions), the number of subspecialty positions in any given specialty is relatively small. For example, roughly 500 oncologists are trained annually. Eliminating these fellowship opportunities would not only have a limited impact on growing the primary care workforce, but it would also exacerbate physician shortages for patients with complex and high-acuity health care needs.

Improved access to primary and preventive care should be one focus of workforce expansion. However, improved access will not prevent all patients from ever developing diabetes, cancer, or neurologic disease. The expansion of the specialty workforce should be coupled with more efficient provision of subspecialty care. For example, chronic conditions currently managed by specialists could be treated by primary care physicians. Likewise, providers such as physician assistants and nurse practitioners could care for patients with lower-acuity conditions who are now treated by physicians. This approach could help address barriers to access for patients in communities that consistently struggle to recruit physicians.

Some of these improved efficiencies could be achieved through reimbursement policies that recognized and rewarded cognitive services, such as patient counseling; service in geographically or economically underserved communities; or both. However, these changes likely will take time to implement and are unlikely to alleviate the full burden of physician shortages in the interim.

Conclusion
The Association of American Medical Colleges and the Council on Graduate Medical Education, among others, recommend training additional physicians annually (4,000 and 3,000 more physicians, respectively), while improving the use of existing resources and continually reassessing workforce requirements.

Even if current health care delivery reforms are implemented and successful, the growing and aging US population certainly will need a larger health care workforce, including more physicians. The United States already has fewer
physicians per capita than most of the other countries in the Organization for Economic Cooperation and Development—not only fewer generalists, but in some cases fewer specialists as well.\(^4\) For example, the United States has fewer specialists (65 per 1,000 population, including all specialties of internal medicine) than the United Kingdom (66.1), Luxembourg (68.4), Slovenia (71.1), Italy (75.7), the Czech Republic (76.9), Poland (77.1), and the Slovak Republic (85.4).\(^4\)

The aging of the US population has implications for the metrics used to benchmark the health care workforce, such as the number of physicians per capita. Whereas the numerator (number of physicians) in the United States has increased, the changing nature of the denominator (the number of patients, who collectively are growing older and more diverse and have increasingly complex comorbidities) suggests that an even higher ratio will be needed.\(^4\)

With looming changes in health care treatments, technology, finance, and delivery, researchers and policy makers must understand that an adequate supply of physicians will have to be achieved both through more efficient health care delivery models and through an increased number of GME training positions. States and schools have responded already by increasing the number of medical students, but that independently will not increase the supply. The unwillingness of Congress to fund additional Medicare GME positions may lead to US medical school graduates who lack opportunities to complete their residencies. Just last March, 528 qualified 2013 US medical school graduates were not matched to a residency training position; 758 qualified US medical doctors who had graduated prior to 2013 also failed to be matched.\(^4\)

Current attempts at payment and delivery system reform must be complemented with an adequate supply of physicians and other health professionals in primary care and in medical and surgical specialties. The United States will need to take full advantage of every health professional and every type of technology available to address the needs of an aging, growing population. The exact model of interprofessional collaboration to achieve this goal has yet to be determined. However, ongoing efforts toward a common classification of competencies for the health professions will help improve teamwork across providers and improve access, care, and care coordination for patients.\(^3\) In the meantime, to avoid impediments to access, it would be prudent to increase the number of resident positions that Medicare partially supports.

NOTES


15 Kowal SL, Dall TM, Chakrabarti R, Storm MV, Jain A. The current and projected economic burden of