2016 Update

The Complexities of Physician Supply and Demand: Projections from 2014 to 2025

Final Report

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Association of American Medical Colleges

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IHS Inc., *The Complexities of Physician Supply and Demand 2016 Update: Projections from 2014 to 2025.*

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EXECUTIVE SUMMARY

The need to assess the capacity of the nation's future health care workforce overall—and physician workforce in particular is more important now than ever for both public and private sectors to act and make the investments needed for a health care system that provides high-quality, cost-efficient health care while also developing the physicians needed to transform the current system and to maximize population health. The pace of change in the world of health care delivery and finance necessitates an almost constant updating and improvement of workforce projections and projections models. That is why in 2015, the Association of American Medical Colleges (AAMC) made a commitment to commission updated national physician workforce projections annually. The purpose is threefold:

- **Update Projections** - Support the ongoing development of up-to-date projections of the physician workforce based on the most recent and best quality data and respond to questions raised by previous reports;
- **Present New Analyses** - Produce research and data on specific topics to further develop the physician workforce projections; and
- **Identify Future Directions for Research** - Identify specific areas for future research, data collection, and analysis that will also strengthen future projections work and support the decision making that guides alignment of the nation's health workforce with its health needs.

Through these efforts, the AAMC intends to invite discussion to continue to develop better projections. In other words, these annual reports seek to advance our collective capacity for developing continually improved health workforce projections with data-based analysis.

This 2016 update to the 2015 report reflects the AAMC's commitment to produce annual, refined physician workforce projections that incorporate the most current and best available evidence on health care delivery. Like the 2015 report, this 2016 report examines five scenarios commonly expected to affect physician supply (e.g., early or delayed retirement of physicians) and six scenarios expected to affect the demand for physician services over the next decade (e.g., changing demographics, greater adoption of managed care models, or greater integration of advanced practice registered nurses and physician assistants). The decision to simulate multiple scenarios is an attempt to demonstrate the complex and evolving health care environment and the inherent uncertainty associated with such an exercise. Though the microsimulation model and supply and demand scenarios are identical to those in the 2015 report, the inputs to them have been updated with the latest data and with improvements suggested by commentators responding to the projections in the 2015 report. We have also added a special section that looks at the implications of potentially unmet need.

This 2016 report compares each supply scenario with each demand scenario to estimate the likely magnitude of the shortfall when looking at each scenario in isolation. Because it is impossible to predict with certainty the degree to which each scenario will manifest, this analysis reports the projected shortfalls as a range (based on the 25th to 75th percentile of the projections) rather than a single projection. The resulting findings therefore offer stakeholders insights into the directional changes

expected in the physician workforce by 2025. All supply and demand projections are reported as full-time-equivalent (FTE) physicians, where an FTE is defined for each specialty as the average weekly patient care hours for that specialty.[1]

Key Findings

- **Physician demand continues to grow faster than supply leading to a projected total physician shortfall of between 61,700 and 94,700 physicians by 2025. As with the 2015 projections, under every combination of scenarios modeled, an overall physician shortage is projected.** Though this total projected shortfall exceeds the 46,100 to 90,400 physician shortfall estimated by the 2015 study (Exhibits ES-1 and ES-2), the 2016 updated projections of a physician shortfall in 2025 are of a similar magnitude to the 2015 projections. Differences between the 2016 update and the 2015 projections largely reflect the use of more recent data and improvements to methods.
    - **Projected shortfalls in primary care range between 14,900 and 35,600 physicians by 2025.** This is directionally consistent with the 12,500 to 31,100 primary care physician shortfall projected in the 2015 report.[2] As part of the ongoing effort to improve our projections, primary care–trained hospitalists were excluded from primary care projections for the 2016 update. If they had been included (as was done in the 2015 report), the updated estimated primary care shortfall would be in the 1,900 to 22,600 range.
    - **Projected shortfalls in non-primary care specialties range between 37,400 and 60,300 by 2025.** This range is directionally consistent with the shortfall projections in the 2015 report (28,200 to 63,700 physicians).
- **Under virtually all scenarios, the supply of surgical specialists is projected to decline by 2025; in contrast, the supply of primary care physicians, medical specialists, and other specialists is projected to grow over this period in nearly all supply scenarios.** Based on current trends, the supply of several larger surgical specialties (e.g., ophthalmology and urology) will fall, as future attrition is likely to exceed the number of new entrants. In other words, there will be fewer surgical specialists in 2025 than are practicing today (Exhibit ES-3). Yet there continues to be strong projected growth in demand, leading to a projected shortfall of between 25,200 and 33,200 surgeons by 2025. These surgical workforce projections are in the aggregate, and projections for individual surgical specialties may vary significantly.
- **For all specialty categories, physician retirement decisions are projected to have the greatest impact on supply, and over one-third of all currently active physicians will be 65 or older within the next decade.** Physicians between ages 65 and 75 account for 11% of the active workforce, and those between ages 55 and 64 make up nearly 26% of the active workforce. Projected shortfalls for

[1] For example, if average patient care hours per week in a particular specialty were 40 hours, but an individual physician in that specialty with a given age and sex was projected to work 35 hours, then that physician would be counted as 0.875 FTEs (=35/40 hours). Average patient care hours worked per week ranged from a low of 35.3 hours for preventive medicine to a high of 54.3 hours for neonatal & perinatal medicine.

[2] One update to the 2016 projections update was to identify and move primary care–trained hospitalists out of primary care and into their own specialty category. If primary care–trained hospitalists were included with primary care physicians (as was done in the 2015 report), the estimated primary care shortfall would be in the 5,600 to 28,300 range.

the Other Specialties category (which includes emergency medicine, neurology, pathology, and psychiatry) are particularly sensitive to retirement assumptions.

- **Demographics—specifically, population growth and aging—continue to be the primary driver of increasing demand, with the older population expected to experience the greatest growth in demand from 2014 to 2025.** During this period the U.S. population is projected to grow by close to 8.6%, from about 319 million to 346 million. The population under age 18 is projected to grow by only 5%, while the population aged 65 and over is projected to grow by 41%. Because seniors have much higher per capita consumption of health care than younger populations, the percentage growth in demand for services used by seniors is projected to be much higher than the percentage growth in demand for pediatric services.
- **Expansions in medical insurance coverage due to the Patient Protection and Affordable Care Act (ACA) and the economic recovery have reduced the number of uninsured. However, ACA-related expanded coverage is only projected to increase demand by another 10,000 to 11,000 physicians (1.2%).** Projections in the 2015 report estimated that expanded medical coverage achieved under ACA once fully implemented would likely increase demand by about 16,000 to 17,000 physicians (2.0%). Because the numbers of uninsured people have continued to drop due to the ACA, the projected future impact is smaller than in the 2015 report.

Exhibit ES-1: Total Projected Physician Shortfall Range, 2014-2025

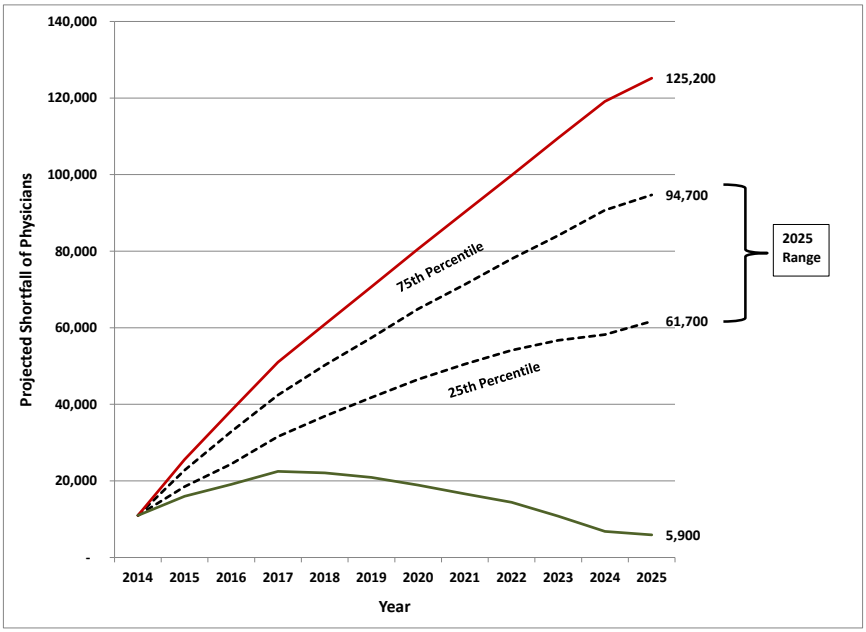


Exhibit ES-1: As complex systems have internal "checks and balances" to avoid extremes, we believe that the 25th to 75th percentile of the shortage projections continues to reflect a likely range for the projected adequacy of physician supply. For this update, that projected shortfall of total physicians is 61,700 to 94,700.

Exhibit ES-2: Projected Total Supply and Demand for Physicians, 2014-2025

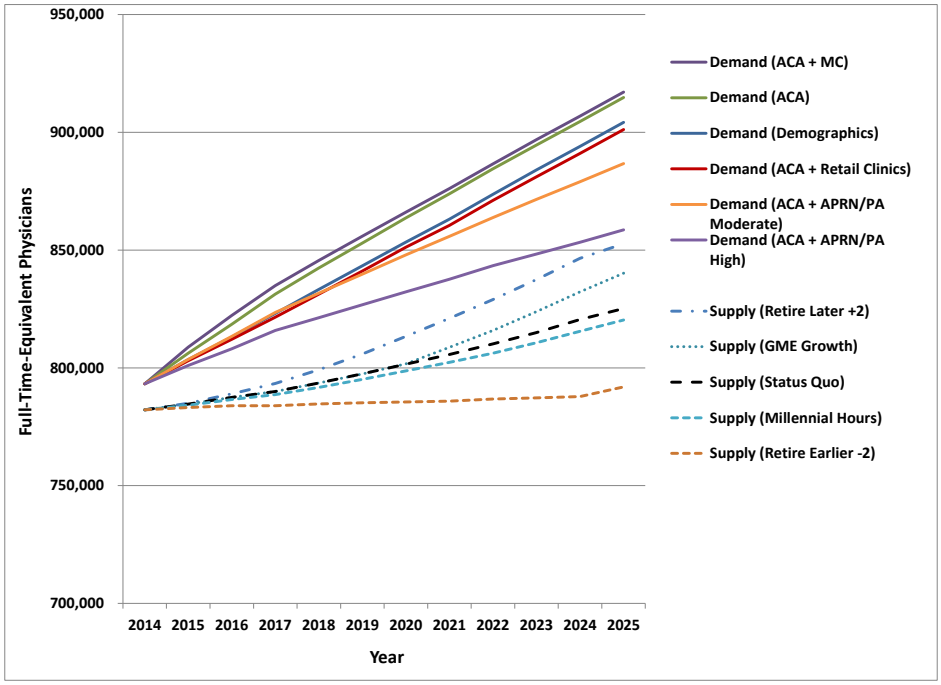


Exhibit ES-2: As was the case with the 2015 report, no combination of scenarios avoids a shortage.

Exhibit ES-3: Projected change in physician supply by specialty category, 2014 to 2025

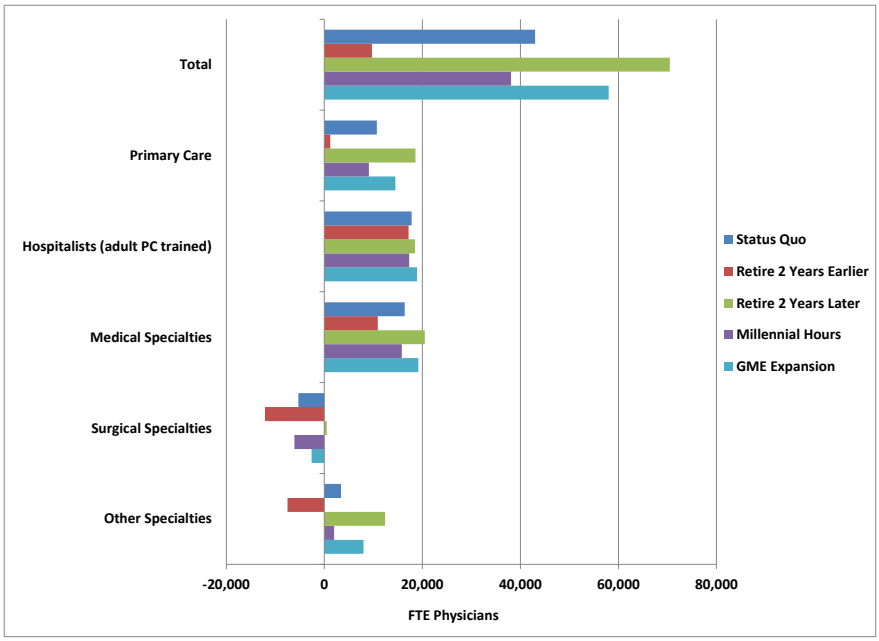


Exhibit ES-3: Under virtually all scenarios, the supply of surgical specialists is projected to decline by 2025.

New Research and Analyses

Differences in projections between the 2016 updated projections and the 2015 report reflect updates and improvements to supply and demand data and trends. The 2016 updated projections:

- Use the same microsimulation model and same multiple scenarios used to develop last year's projections;
- Incorporate updates to supply and demand data and trends;
- Integrate more fully the potential impact of a rapidly growing physician assistant workforce;
- Move adult primary care–trained hospitalists out of the primary care projections and into a separate specialty category, since including hospitalists in the primary care projections may overestimate the current and future supply of primary care physicians;
- Reflect refinements to the estimates of annual graduates (with an estimated 28,233 new physicians entering the workforce each year compared with the 29,032 estimate used in the 2015 report); and
- Extrapolate a "2014" level of care delivery compared with the 2015 report's "2013" level of care delivery.

The net effect of these refinements to model inputs and updates was to project a larger total physician shortage by 2025 than estimated by the 2015 report. Better integrating the growing physician assistant workforce into the projections reduced the growth in demand for physicians for some scenarios, but slower projected growth in physician supply is the primary cause for the higher shortfall projections.

Health Care Utilization Equity Estimates

This year's report also includes a special section on health care utilization equity. Current projections methods only partially account for possible underutilization by those with inadequate access. To further explore this limitation in current methodologies, the health care utilization equity scenarios model the implications for physician demand if currently underserved populations utilized care at a rate similar to that for populations facing fewer sociodemographic, economic, and geographic barriers to care. Therefore, to better gauge the degree of currently unmet need, this special section of the 2016 report includes estimates of the additional workforce needed if currently underserved populations utilized health care at the same rate as the rest of the population under two

If currently underserved populations utilized health care at the same rate as the rest of the population, an additional 40,100 to 96,200 physicians (5-12%) would be needed in 2014.

While many other factors would need to be addressed to achieve health care utilization equity—minimizing barriers related to insurance coverage, access, trust, etc.—these figures highlight the potential scale of currently unmet need.

different scenarios. These estimates are ***not included*** in the ranges of projections, as they are estimates for 2014 levels of care only. Moreover, the estimates we put forth are by no means deemed definitive; instead, they are intended to stimulate much-needed discussion and analysis about how best to address health care utilization inequity in future projections.

Future Directions in Research

Uncertainties abound regarding whether, how, and the speed with which emerging payment and care delivery models might affect physician supply and demand—though evidence to date has not shown a substantial effect on workforce needs. Similarly, a better understanding of how clinicians and care settings will respond to economic and other trends will better inform future projections. We also need to look more closely at specific specialties and conditions that may experience or portend future shortages, including both generalist disciplines (such as mental/behavioral health or primary care) and those focused in areas in which the illness burden is increasing (such as oncology, cardiology, and others). These deficits in the knowledge base present opportunities for ongoing research on the workforce implications of the evolving health care system and underscore the need for timely updates to projections.

I. INTRODUCTION

The AAMC published a study in 2008 (updated in 2010) that projected future physician supply and demand and summarized the implications of selected trends and policies likely to affect physician supply and demand. The study concluded that by 2025 demand would likely exceed supply by about 130,600 physicians. Since that report, the number of physicians trained annually has increased, the sizes of the advanced practice registered nurse (APRN) and physician assistant (PA) workforces have greatly increased, the nation has experienced turbulent economic conditions that have affected supply and demand for health care services, the Affordable Care Act (ACA) was enacted with ongoing implementation of new requirements, policies and care models continue to evolve, and new data have become available on the characteristics and projected changing demographics of the U.S. population and the health workforce.

Mindful of these changes, in 2015 the AAMC contracted with IHS Inc. to publish an update to its previous 2010 and 2008 reports. Titled *The Complexities of Physician Supply and Demand: Projections from 2013 to 2025*, that update incorporated the latest microsimulation modeling methods and available data on trends and factors affecting the physician workforce. Key trends likely to affect the supply and demand for health care services were identified under multiple supply and demand scenarios. Projections for individual specialties were aggregated into four broad categories for reporting consistent with American Medical Association–designated specialty groupings. These include primary care, medical specialties, surgical specialties, and "other" specialties.[3] Reflecting new research, a fifth category has been added to this 2016 update, with adult primary care–trained hospitalists moved out of primary care and into their own category.

Overall, the 2015 study found that demand for physicians was projected to increase by 11% to 17% between 2013 and 2025, with population growth and aging (and the accompanying rise in prevalence of chronic conditions such as diabetes and cardiovascular disease) responsible for most of that growth. Continued expansion of medical insurance coverage under the ACA accounted for a small portion of projected demand growth. Physician supply was projected to increase over the same period by only 4% to 12%, suggesting a growing shortage of physicians.

Study findings highlighted how the pace of change in health care delivery is too rapid for projections to be produced infrequently. Accordingly, this 2016 update report reflects the AAMC's commitment to

[3] **Primary care** consists of family medicine, general internal medicine, general pediatrics, and geriatric medicine. **Medical specialties** consist of allergy & immunology, cardiology, critical care, dermatology, endocrinology, gastroenterology, hematology & oncology, infectious diseases, neonatal & perinatal medicine, nephrology, pulmonology, and rheumatology. **Surgical specialties** consist of general surgery, colorectal surgery, neurological surgery, obstetrics & gynecology, ophthalmology, orthopedic surgery, otolaryngology, plastic surgery, thoracic surgery, urology, vascular surgery, and other surgical specialties. The **Other Specialties** category consists of anesthesiology, emergency medicine, neurology, pathology, physical medicine & rehabilitation, psychiatry, radiology, and all other specialties. For the 2016 report, **Hospitalists** trained in adult primary care are modeled as their own category and have been moved out of the Primary Care category. Hospitalists trained in non-primary care specialties are modeled within their trained specialty.

produce regularly updated projections focusing on developing and refining scenarios that reflect the best available evidence on trends in health care delivery.

The remainder of this update is organized to present the updated projections (Section II), supply scenarios (Section III), and demand scenarios (Section IV). Additional new research and analyses are addressed in Section V. Section VI features the special content on health care utilization equity. Conclusions are presented in Section VII, and Section VIII discusses possible future directions in the field of health workforce research. A Technical Appendix in Section IX provides additional detail on modeling data and methods. Detailed tables are presented in Section X.

II. UPDATED PROJECTIONS

Physician demand continues to grow faster than supply leading to a projected shortfall of between 61,700 and 94,700 physicians by 2025. Projected shortfalls in primary care range between 14,900 and 35,600 physicians by 2025. Projected shortfalls in non-primary care specialties range between 37,400 and 60,300 by 2025, with the shortfalls especially acute in select surgical and other specialties.

The ranges of supply and demand scenarios presented reflect the complexity and evolving nature of the environment within which physicians practice. One scenario alone is inadequate to convey the associated uncertainty. Therefore, this 2016 report examines five scenarios commonly expected to affect physician supply and six scenarios expected to affect the demand for physician services over the next decade. We compared each supply scenario with each demand scenario to estimate the likely range of paired supply and demand projections. The specific supply and demand scenarios modeled are described in detail in Sections III and IV.

The extreme high and low scenarios are least likely to occur—as multiple factors tend to mitigate highs and lows. For example, if physicians were to begin retiring earlier, the growing systemic stresses this could cause as a result of the growing shortfall of physicians would eventually lead some physicians to delay retirement. Given the propensity of such systems-level "checks and balances" to avoid extremes, we believe that the 25th to 75th percentile of the paired projections continues to reflect a likely range.

The updated projections reflect lower estimates of the number of new physicians entering the workforce each year (28,233 versus the estimate of 29,032 used in the 2015 report).[4] Other changes include demand projections that extrapolate a "2014" level of care delivery compared with a "2013" level of care delivery extrapolated for the 2015 report, additional modeling of the growth in PA supply, and other updates to the supply and demand models and data inputs (e.g., AMA Masterfile, American Community Survey, Medical Expenditure Panel Survey, and Behavioral Risk Factor Surveillance System).

Lastly, the model in this 2016 report assumes that current physician supply and demand are roughly in equilibrium at the national level (i.e., that supply and demand are about equal), with the exception of primary care (8,200 physician shortfall) and psychiatry (2,800 shortfall), based on federally designated Health Professional Shortage Areas.[5] However, this assumption may be conservative because the adequacy of other specialties' supply is not measured by any federal agencies. To the extent that current national shortages exist for other specialties, such as the surgical specialties, then the demand projections are underestimated from 2014 through 2025 by roughly the size of the current national shortage.

[4] The 2015 report's estimate of annual physicians graduating double counted graduates from several physician surgical and other specialties where a portion of physicians subspecialize.

[5] For information on HPSA designation, see www.hrsa.gov/shortage.

Total Physicians

Under all scenarios projected, the total projected demand for physicians exceeds total projected supply (Exhibit 1). Looking at the 25th to 75th percentile projections for total physicians, demand will continue to grow faster than supply leading to a projected shortfall of between 61,700 and 94,700 physicians by 2025 (Exhibit 2). This updated shortfall of 61,700 and 94,700 physicians projected for 2025 is on a scale similar to the 46,100 to 90,400 physician shortfall estimated by the 2015 study.

Exhibit 1: Projected Total Supply and Demand for Physicians, 2014-2025

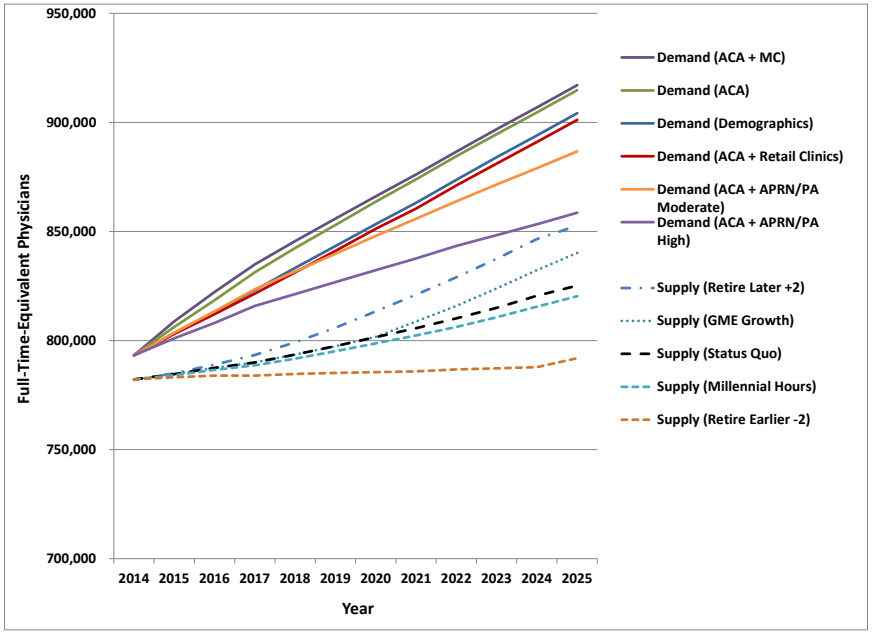
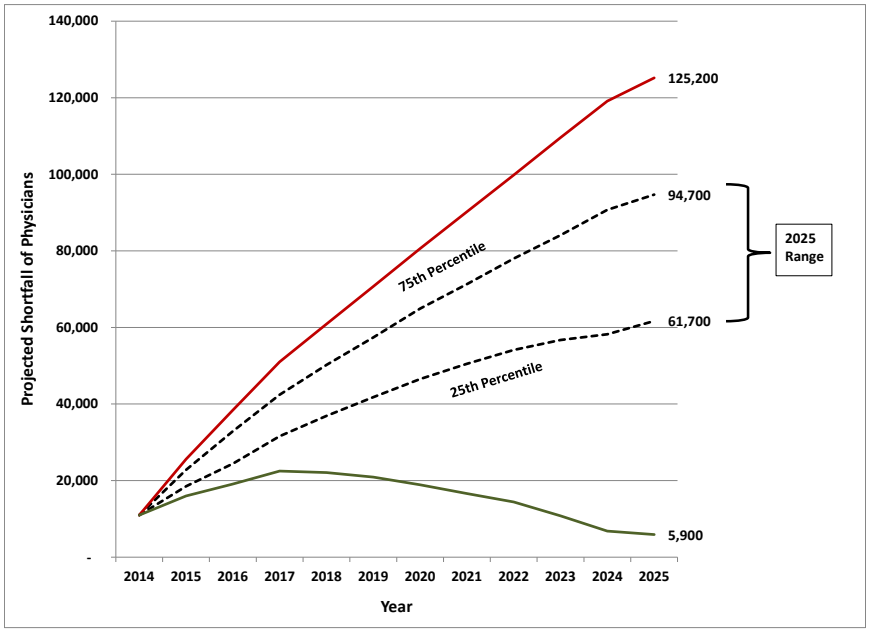


Exhibit 2: Total Projected Physician Shortfall Range, 2014-2025



Primary Care

Projected shortfalls in primary care range between 14,900 and 35,600 physicians by 2025. Exhibit 3 (projected supply and demand for primary care physicians by scenario); Exhibit 4 (primary care scenario shortfall range), and Exhibit 5 (primary care scenario shortfall range including hospitalists) summarize the projected supply, demand, and shortfall range for primary care physicians. The demand scenarios modeled project future demand for physicians, but scenarios can differ to the extent that future demand may be met by primary care or non-primary care physicians or other clinicians.

These updated primary care shortfall projections are slightly higher than the 12,500 to 31,100 primary care physician shortfall projected in the 2015 report. The higher shortfall estimates partially reflect moving adult primary care–trained hospitalists out of primary care and into their own category (as the supply of these hospitalists is growing at a faster rate than demand for inpatient services). Including hospitalists in primary care as was done in the 2015 report (Exhibit 5) reduces the projected 2025 shortfall range to between 1,900 and 22,600. These scenarios also reflect a fuller inclusion of impact of the nation's rapid growth in PA supply (as well as growth in primary care nurse practitioner supply).

Exhibit 3: Projected Supply and Demand for Primary Care Physicians, 2014-2025

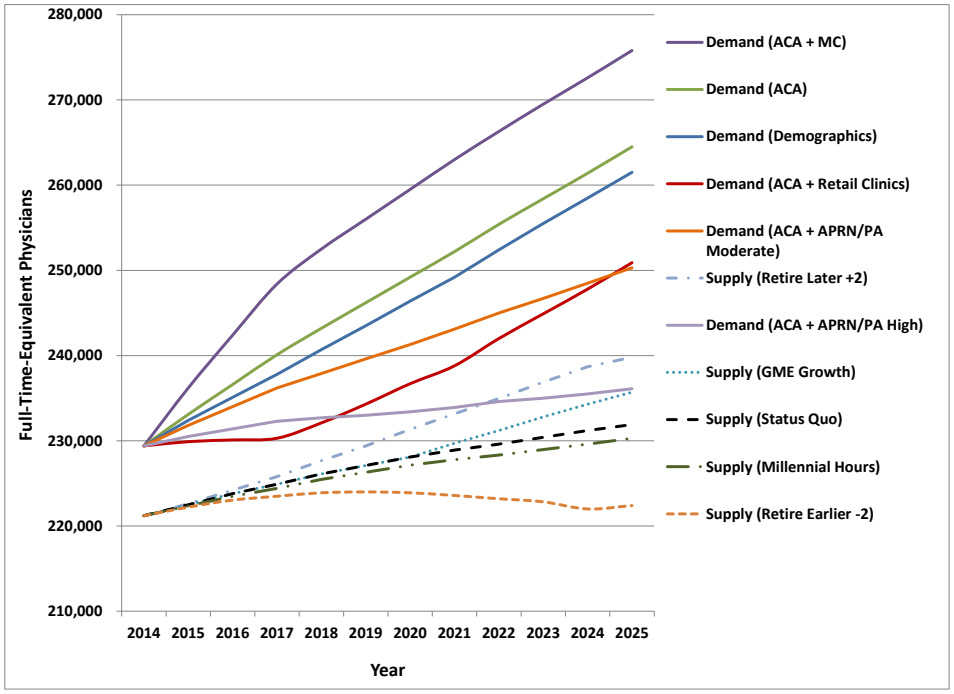


Exhibit 4: Projected Primary Care Physician Shortfall Range, 2014-2025

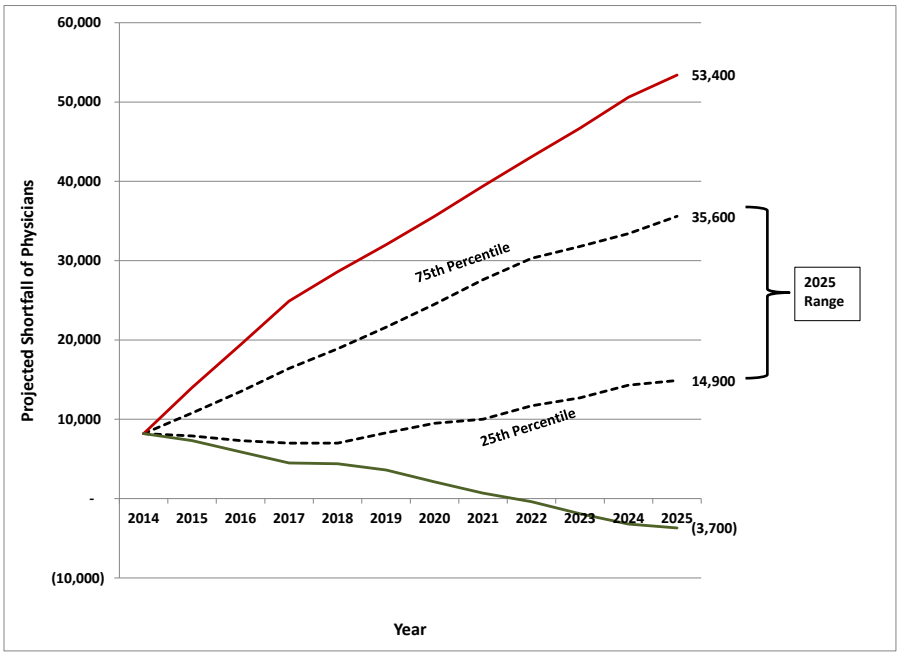


Exhibit 5: Projected Primary Care Physician Shortfall Range (PC + PC-trained hospitalists)

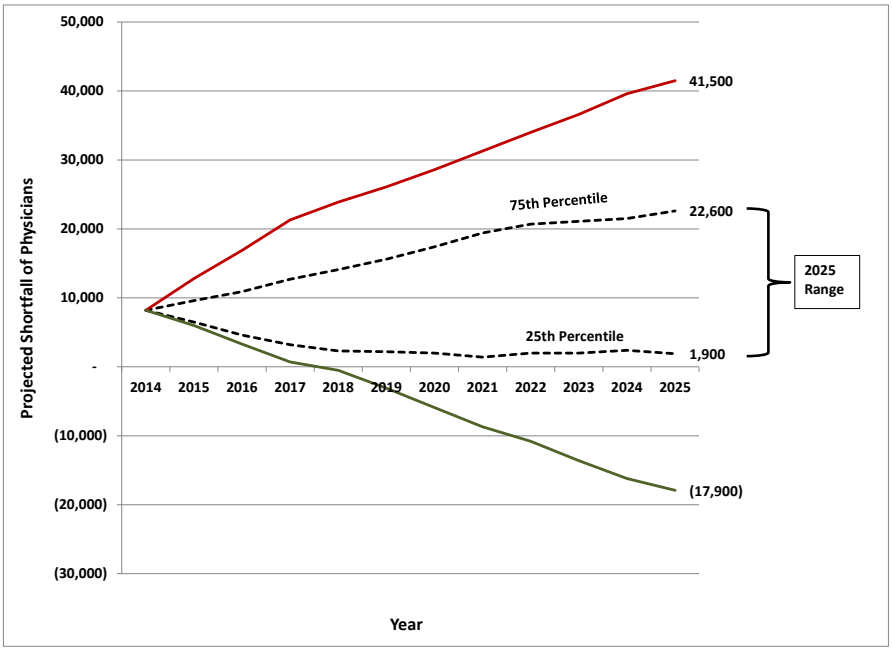


Exhibit 5: Including primary care–trained hospitalists in the updated 2016 projections, as was done in the 2015 report, results in a smaller projected shortage, likely reflecting the impact of the inclusion of the rapidly growing supply of PAs in the updated 2016 projections and an increase in the number of new graduates entering primary care.

Non-Primary Care

Exhibits 6 through 11 depict the overall range of supply and demand growth and projected shortfall ranges for non-primary care physicians by specialty category. Under the scenarios modeled, we project a shortfall of between 37,400 and 60,300 non-primary care physicians by 2025 (compared with a range of 28,200 to 63,700 in the 2015 report). Differences between the 2015 and 2016 projected ranges reflect lower estimates of physician supply growth in several specialties and the increasing supply of PAs. As mentioned, this 2016 report aggregates non-primary care specialties into three categories: medical specialties, surgical specialties, and other specialties.

Medical Specialties

The demand for physicians in medical specialties is growing rapidly, but many physicians are choosing internal medicine subspecialties and pediatric subspecialties so physician supply is also growing in the medical specialties (Exhibit 6). Under the scenarios modeled, this update projects a shortfall range of about 3,600 to 10,200 by 2025 (Exhibit 7), slightly lower than the projected range of 5,100 to 12,300 physicians in the 2015 report.

Exhibit 6: Projected Supply and Demand for Medical Specialist Physicians, 2014-2025

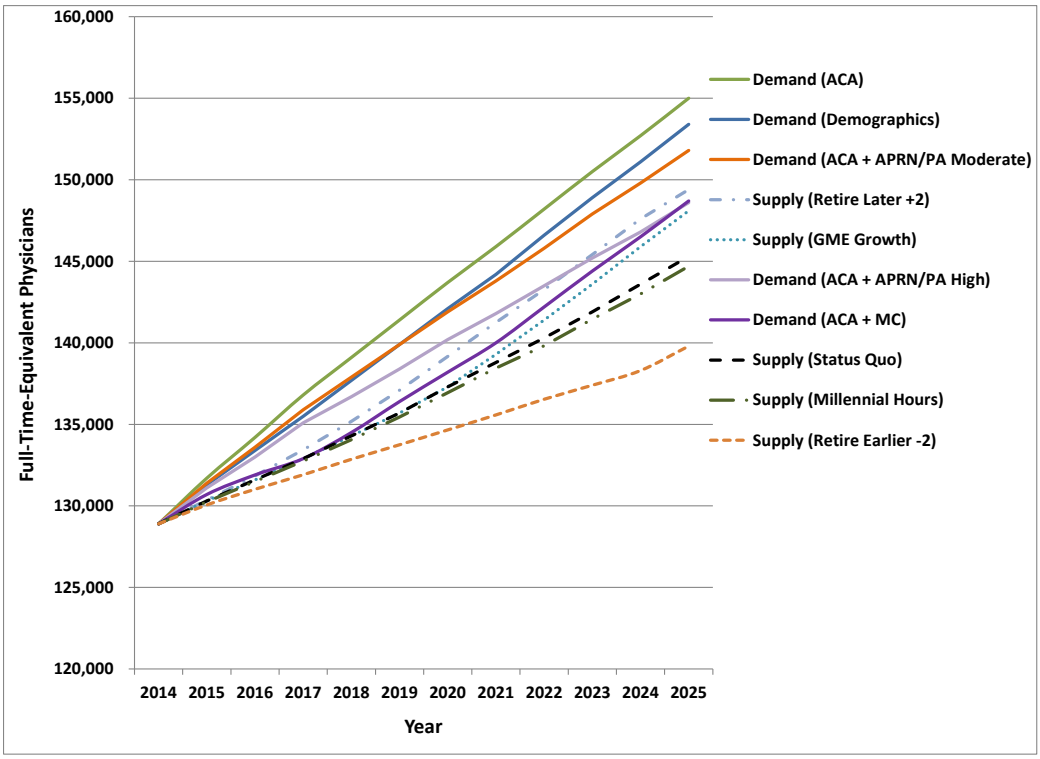
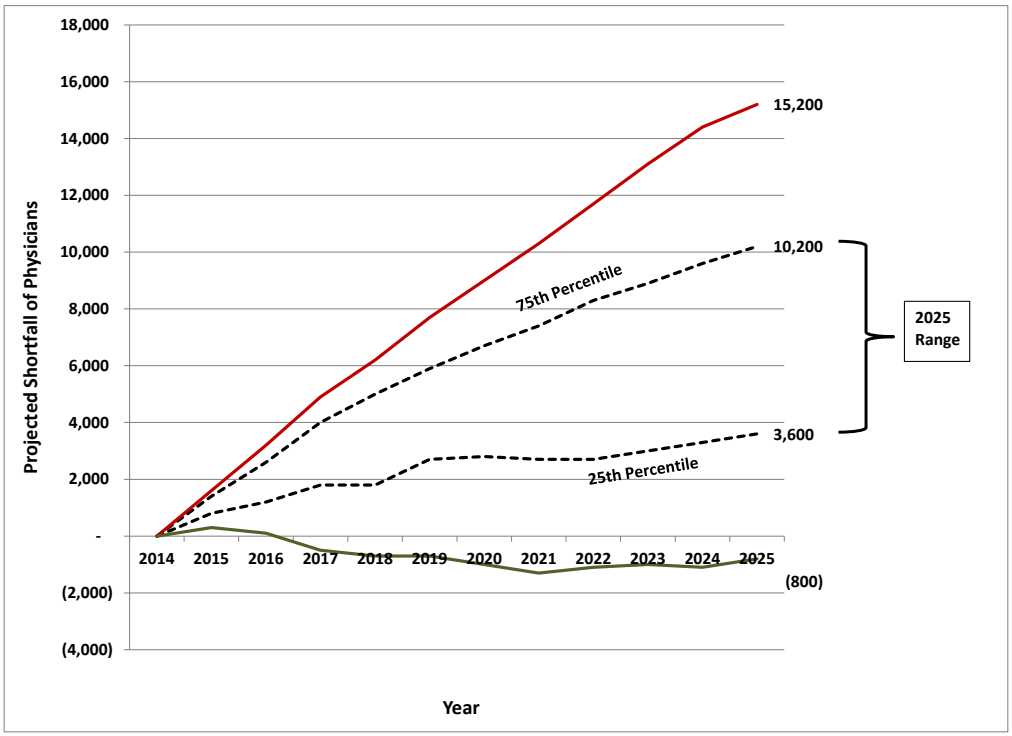


Exhibit 7: Projected Medical Specialist Physician Shortfall Range, 2014-2025



Surgical Specialties

Based on current trends, the supply of several larger surgical specialties (e.g., ophthalmology and urology) is not projected to grow as future attrition is likely to exceed the number of new entrants. Yet there continues to be strong projected growth in demand (Exhibit 8). Under the scenarios modeled, we project an updated shortfall of between 25,200 and 33,200 surgeons by 2025 (Exhibit 9), slightly higher than the shortfall of between 23,100 and 31,600 surgeons projected in the 2015 report. These projections represent an aggregation. Projections for individual surgical specialties might vary significantly.

Exhibit 8: Projected Supply and Demand for Surgeons, 2014-2025

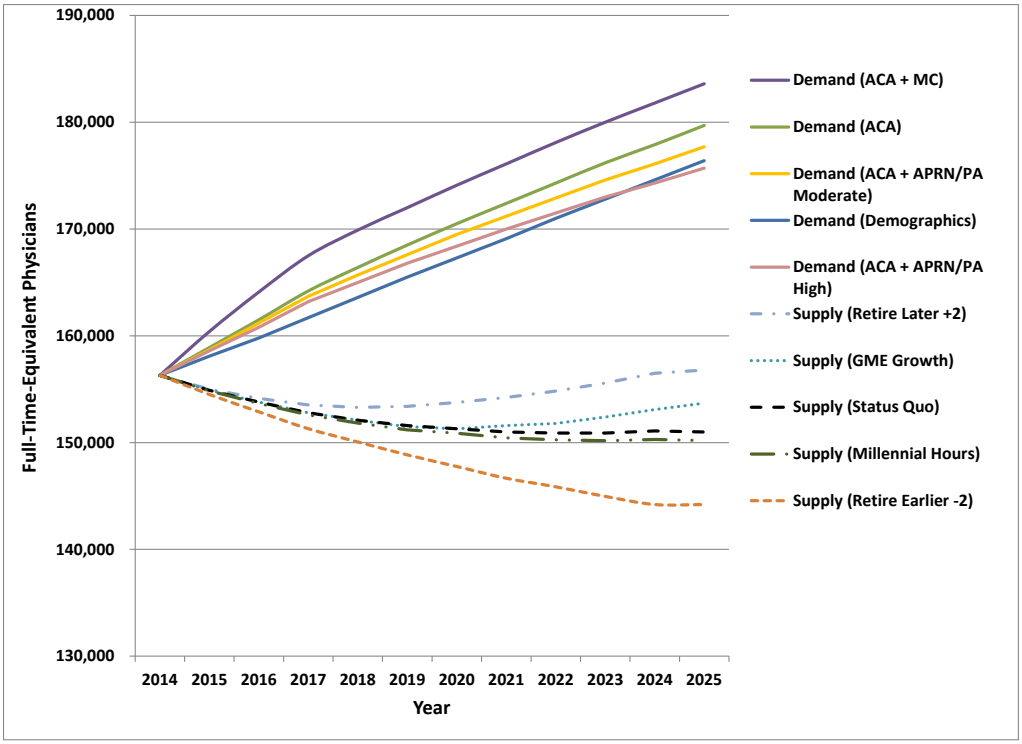
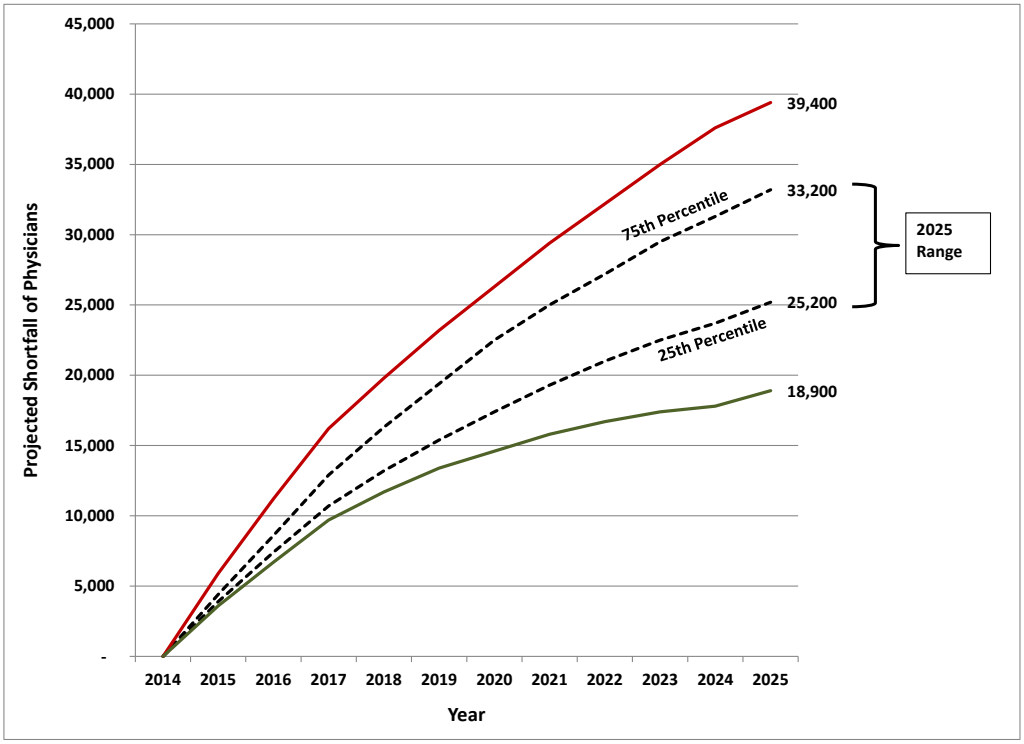


Exhibit 9: Projected Surgical Physician Shortfall Range, 2014-2025



Other Specialties

For the Other Specialties category, while the demand projections across scenarios modeled are mostly similar, the supply projections vary substantially and are sensitive to retirement assumptions (Exhibit 10). The projected shortfall range of between 22,200 and 32,600 for physicians in this specialty category exceeds the 2015 report projected shortfall range of between 2,400 and 20,200 (Exhibit 11). The main reason for the higher shortfall projections is slower projected supply growth (as graduates for some individual specialties in this category were overcounted for the 2015 report). Specialties with the highest attrition rates fall into this specialty category, including emergency medicine, anesthesiology, and radiology.

Exhibit 10: Projected Supply and Demand for Other Specialties, 2014-2025

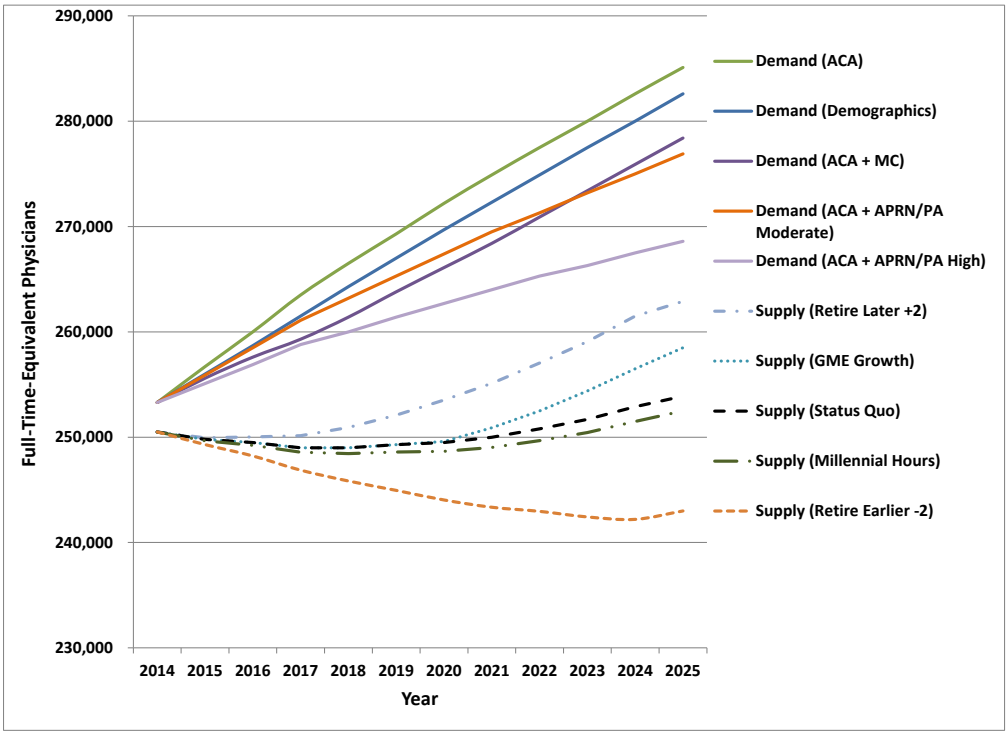
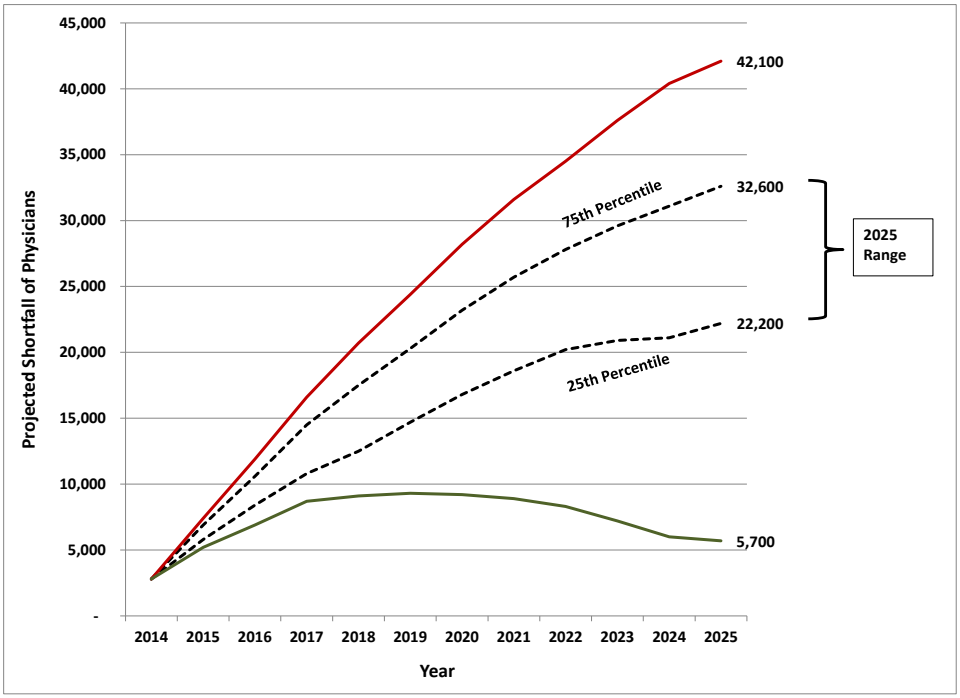


Exhibit 11: Projected Other Specialist Physician Shortfall Range, 2014-2025



III. SUPPLY SCENARIOS

The supply model used a microsimulation approach to project the future supply of physicians based on the number and characteristics of the current supply, the number and characteristics of new entrants to the physician workforce, hours worked patterns, and retirement patterns at the national, state, and sub-state levels. The model has been extensively documented elsewhere and a brief description of modeling methods may be found in the technical appendix.[6] Below we summarize supply scenarios modeled for this update.

Supply Scenarios Modeled

To be consistent with the organization of the 2015 report, the status quo, retirement, and hours worked scenarios described below were included in the gap analysis comparing supply and demand to project a range for future adequacy of physician supply. GME expansion was modeled separately as a policy-oriented scenario but was not included in the final shortage projections.

- **Status Quo**: This scenario assumes continuation of the status quo in terms of number and characteristics of physicians newly entering the workforce, hours worked, and retirement patterns.
- **Early Retirement and Delayed Retirement**: Reflecting uncertainty about when physicians might retire in the future, we model scenarios assuming physicians retire two years earlier or two years later, on average, relative to current patterns. Scenario assumptions reflect that physicians might decide to delay or speed retirement for financial, health, and other reasons. The Physician Foundation's 2014 survey reports that "39% of physicians indicate they will accelerate their retirement due to changes in the healthcare system."[7] However, the U.S. Bureau of Labor Statistics reports that, on average, workers are delaying retirement and this trend is likely to continue.[8]
- **Millennial Hours Worked**: As modeled for the 2015 report, this scenario assumes that physicians currently under age 35 will continue to work approximately 13% fewer hours per week relative to earlier cohorts. The 13% reduction assumption is based on analysis by the AAMC's Center for Workforce Studies comparing self-reported weekly hours worked from the 1980 Census to those reported in the 2012-2014 American Community Survey.

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[6] U.S. Department of Health and Human Services, Health Resources and Services Administration, National Center for Health Workforce Analysis. 2014. Technical Documentation for HRSA's Health Workforce Simulation Model. Rockville, Maryland: U.S. Department of Health and Human Services. http://bhpr.hrsa.gov/healthworkforce/supplydemand/simulationmodeldocumentation.pdf.

Dall TM, Storm MV, Chakrabarti R. Supply and demand analysis of the current and future US neurology workforce. *Neurology*. 2013; 81(5): 470-478. http://www.neurology.org/content/early/2013/04/17/WNL.0b013e318294b1cf.short.

[7] Accessed at http://www.physiciansfoundation.org/uploads/default/2014_Physicians_Foundation_Biennial_Physician_Survey_Report.pdf.

[8] Closing the deficit: How Much Can Later Retirement Help? Edited by Burtless H and Aaron HJ. Washington DC, Brookings Institute Press, 2013.

Leonesio MV, Bridges B, Gesumaria R, Del Bene L. The Increasing Labor Force Participation of Older Workers and Its Effect on the Income of the Aged. *Social Security Bulletin*. 2012; 72(1). https://www.ssa.gov/policy/docs/ssb/v72n1/v72n1p59.html.

- **GME Expansion**: This scenario assumes a possible expansion of federally funded GME slots. The GME expansion scenario is based on the proposed Resident Physician Shortage Reduction Act of 2015 and assumes increasing approved GME slots by 3,000 annually between 2017 and 2021. Since it is unknown which specialties might gain residency slots, for modeling purposes we assume that all specialties will gain the same proportion of residency slots.

Supply Projections

Updated annual projections for total physician supply are summarized in Exhibit 12. Under the status quo scenario, total physician supply increases from 782,200 in 2014 to 825,200 physicians in 2025, a 43,000 (5%) increase (Exhibit 13). This is less than both the 8% growth in physician supply expected in the 2015 report and less than the approximately 8.6% projected growth in the U.S. population over this period. The slower growth in supply is primarily due to refined (and lower) estimates of the number of physicians entering the workforce each year (28,233 vs the estimate of 29,032 used in the 2015 report).[9] Growth in total physician supply by specialty category between 2014 and 2025 ranges from a high of 20,500 physicians among medical specialties under a delayed retirement scenario to projected negative growth among surgical specialties of -12,100 physicians under an early retirement scenario (Exhibit 14). Under almost all scenarios, the supply of surgical specialists is projected to decline, whereas primary care and medical specialist supply are projected to grow under all scenarios. The supply of physicians in the Other Specialties category is projected to grow under most scenarios, but this may be somewhat conservative. As it represents a mix of sometime dissimilar specialties, it may mask the effects of high attrition rates within specific specialties, such as emergency medicine, anesthesiology, and radiology.

[9] The 2015 report's estimate of annual physicians graduating double counted graduates from several physician surgical and other specialties where a portion of physicians subspecialize.

Exhibit 12: Projected Supply of Physicians, 2014-2025

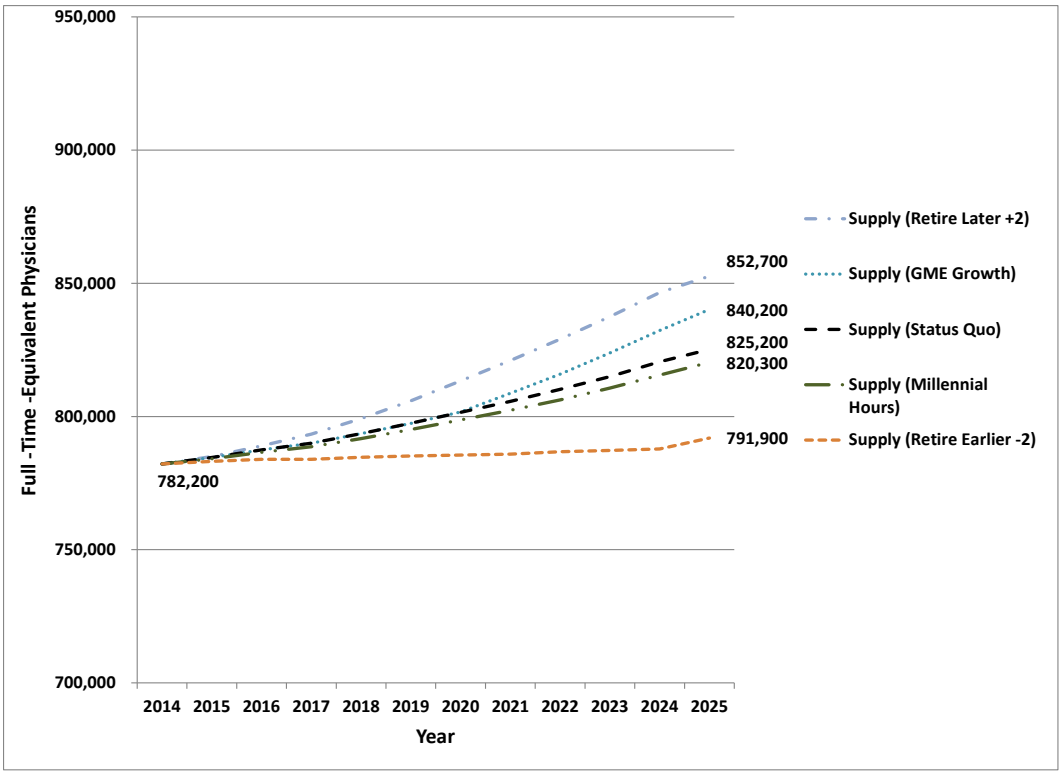


Exhibit 13: Growth in Physician Supply 2014-2025: 2015 Report vs 2016 Report Scenario Projections

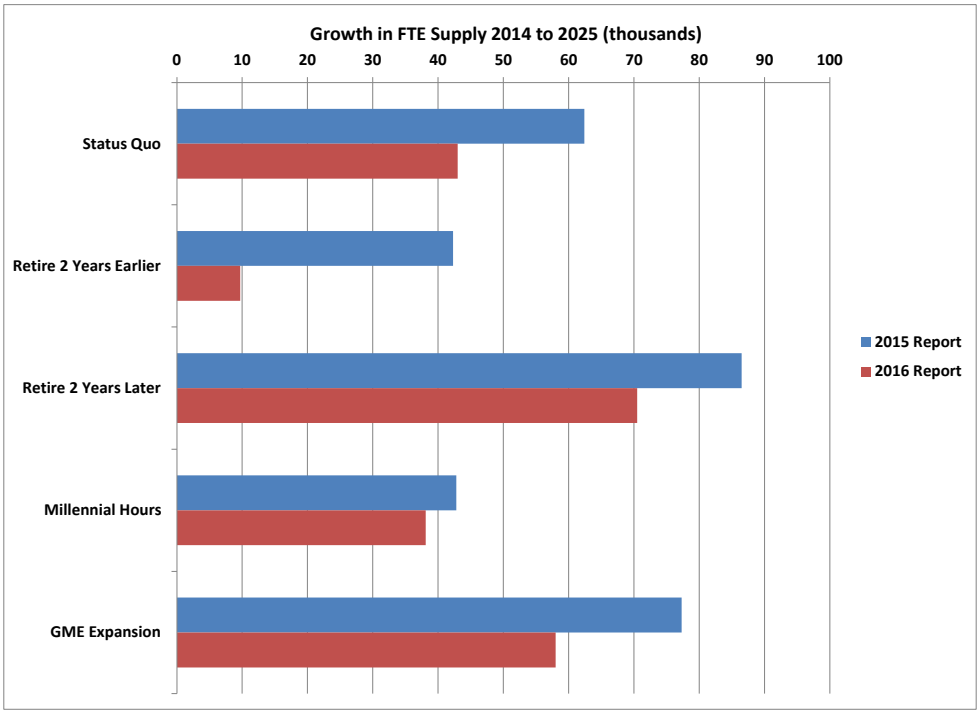
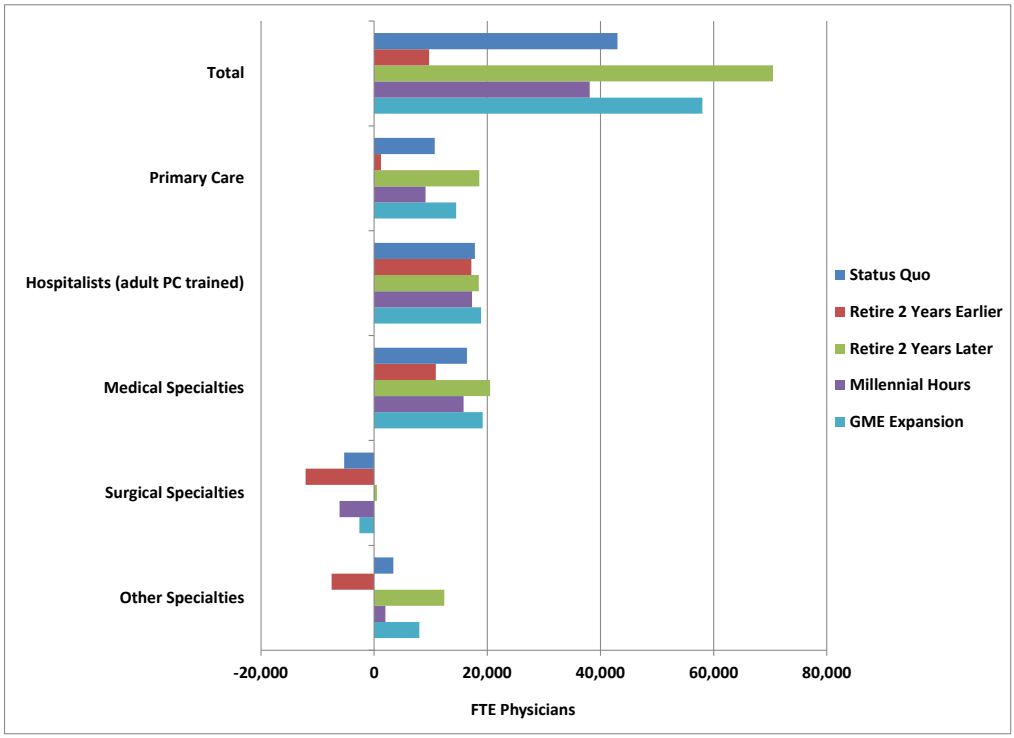


Exhibit 14: Projected Change in Physician Supply by Specialty Category, 2014-2025



IV. DEMAND SCENARIOS

This section presents an overview of demand scenarios modeled, updated projections, and comparisons to 2015 study findings. Detailed information about the demand microsimulation model and model validation activities has been published elsewhere, and a brief summary can be found in the Technical Appendix.[10]

Demand Scenarios Modeled

We projected demand under scenarios that reflect different assumptions regarding use of health care services and care delivery. All scenarios modeled reflect changing demographics from 2014 to 2025. With the exception of the scenario that reflects only changing demographics, all other scenarios modeled include the projected impact of continued expansion of medical insurance coverage under ACA. Similar to the projections in the 2015 report, we modeled the implications of greater use of managed care, retail clinics, and the contribution of PAs and APRNs.

Refinements to the projections include separately modeling demand for adult primary care–trained hospitalists (included with the demand for primary care services in the 2015 report) and the physician workforce implications of the rapidly growing supply of PAs. A set of primary care projections was developed without primary care–trained hospitalists because including them may result in overestimating primary care physician supply. The impact of the current PA workforce was included in the supply projections in the 2015 report, but due to limited data on supply growth by specialty, the implications of PA supply growth beyond the growth required to maintain current staffing levels were not captured in the physician demand projections in the 2015 report. Those limitations were resolved by incorporating PA specialty-specific data from the Health Resources and Services Administration.

- **Changing Demographics**: This scenario extrapolates current health care use and delivery patterns to future populations, taking into account projected future demographics (e.g., age, gender, and race/ethnicity) through 2025. During this period the U.S. population is projected to grow by close to 8.6%, from about 319 million to 346 million. The population under age 18 is projected to grow by only 5%, while the population aged 65 and over is projected to grow by 41%. Percentage growth in demand for services used by seniors, therefore, is projected to be much higher than percentage growth in demand for pediatric services.

[10] U.S. Department of Health and Human Services, Health Resources and Services Administration, National Center for Health Workforce Analysis. 2014. Technical Documentation for HRSA's Health Workforce Simulation Model. Rockville, Maryland: U.S. Department of Health and Human Services. http://bhpr.hrsa.gov/healthworkforce/supplydemand/simulationmodeldocumentation.pdf.

Dall TM, Gallo PD, Chakrabarti R, West T, Semilla AP, Storm MV. An Aging Population and Growing Disease Burden Will Require A Large and Specialized Health Care Workforce By 2025. *Health Affairs*. 2013; 32:2013-2020. http://content.healthaffairs.org/content/32/11/2013.abstract.

Dall TM, Chakrabarti R, Storm MV, Elwell EC, and Rayburn WF. Estimated Demand for Women's Health Services by 2020. *Journal of Women's Health*. 2013; 22(7): 643-648. http://www.ncbi.nlm.nih.gov/pubmed/23829185.

- **Growth in Demand Due to ACA Expanded Medical Insurance Coverage**: This scenario models anticipated change in health care use patterns as more people gain medical insurance under the Affordable Care Act. The 2015 report describes the assumptions and methods under which the demand implications of gaining medical coverage under ACA were simulated. By 2014, some parts of ACA had already been implemented and hence are reflected in the starting year demand estimates. The remaining demand scenarios summarized below all build on this scenario and reflect both changing demographics and expanded medical insurance coverage under ACA.

- **Managed Care**: A variety of integrated care delivery models promoted by provisions in the ACA are being implemented for use with both publicly and privately insured populations. Goals include improving the coordination and quality of patient care, reducing inefficiencies, shifting care to lower cost settings and providers as appropriate, improving preventive care efforts, and better controlling medical expenditures. An estimated 23.5 million Americans are currently part of an Accountable Care Organization (ACO), and this number is projected to continue growing.[11] Many of the goals of ACOs are similar to those of other risk-bearing organizations such as Health Maintenance Organizations (HMOs), including incorporating financial incentives for patients and physicians to better manage utilization. Looking historically at the effect of these delivery models on use of services provides insights on what might happen if ACOs and other integrated care models gain greater prominence. Consistent with assumptions guiding the projections in the 2015 report, this scenario models the physician demand implications if 100% of the population were enrolled in risk-based entities as a proxy for the possible implications of increased enrollment in ACOs.

  Well-managed ACOs are often capable of accepting the associated risk and managing care under bundled payment systems in part because they may be well suited to manage patient flows and reengineer care delivery systems to improve efficiency. Yet a more fully developed bundled payment system will take time to develop and diffuse. How that occurs will have implications for care and for the delivery system workforce more broadly, so continued work to assess the impact of ACOs is crucial.

- **Expanded Use of Retail Clinics**: Between 2009 and 2015, the number of retail clinics in operation increased from approximately 1,100 to 2,000.[12] Chief drivers of retail clinic utilization include convenience, after hours accessibility, cost-effectiveness, and coverage by insurance plans. As a result, retail clinics may be an alternative to traditional primary care for many consumers. Described in greater detail in the 2015 report, this scenario explores the demand implications of shifting care from primary care physician offices to retail clinics for 10 conditions typically treated at retail clinics.[13] This scenario assumes the following:

[11] Accessed at http://www.brookings.edu/~/media/research/files/papers/2015/05/12-aco-paper/impact-of-accountable-careorigins-052015.pdf

[12] Accessed at http://www.ncsl.org/research/health/retail-health-clinics-state-legislation-and-laws.aspx

[13] Mehrotra A, Wang MC, Lave JR, Adams JL, and McGlynn EA. Retail Clinics, Primary Care Physicians, and Emergency Departments: A Comparison Of Patients' Visits. *Health Affairs.* 2008; 27(5):1272-1282.

- Patients with chronic conditions will be seen by their regular primary care provider to ensure continuity of care;
- Care in retail clinics will primarily be provided by nurse practitioners and PAs;
- For care provided in primary care physician offices, 77% of visits to a pediatrician's office are handled primarily by a physician (reflecting that between nurse practitioners and physicians, 77% of the pediatric workforce are physicians) and 70% of adult primary care office visits will be handled primarily by a physician; and
- To reflect that the categories of visits modeled tend to be less complex than the average office visit, we used the Management Group Medical Association's estimates for the 75th percentile of annual ambulatory patient encounters to translate the reduction in office visits to reduced demand for physicians.

These assumptions suggest that 7,970 visits by children to a retail clinic rather than a pediatrician's office reduce demand for pediatricians by 1 physician, with 7,855 retail clinic visits by an adult reducing demand for an adult primary care physician by 1 physician.

- **Increased Use of Advanced Practice Registered Nurses and Physician Assistants under "Moderate Use" and "High Use" Assumptions:** These scenarios use the same supply projections used for the 2015 report for certified registered nurse anesthetists (CRNAs), certified nurse midwives (CNMs), and nurse practitioners (NPs). The 2015 report contains a more detailed description of modeling inputs and assumptions. In this 2016 report, these scenarios also model the growth in PA supply, building on work by the Health Resources and Services Administration.

  These scenarios include modeling the growth in demand for APRNs and PAs to maintain a 2014 level of care (based on current staffing patterns), and the supply of APRNs and PAs beyond that required to maintain the status quo. Analysis of the American Community Survey, National Plan and Provider Enumeration System, the 2012 National Sample Survey of Nurse Practitioners, and new graduates data from the American Association of Colleges of Nursing suggest that in 2014 there were an estimated 143,300 NPs; 46,400 CRNAs; and 11,300 CNMs. By 2025, taking into account the projected growth in demand for health care services across the settings and specialty areas served by these APRNs, the supply of APRNs could exceed the number required to maintain current staffing levels by approximately 90,100 APRNs. In 2014, there were an estimated 101,200 active PAs.[14] Taking into account the projected rapid growth in PA supply[15] plus the addition of new PA programs[16], by 2025, supply could grow to be approximately 53,500 more PAs than required to maintain current staffing levels. For physician modeling purposes, the uncertainties are to what extent these additional 90,100 APRNs and 53,500 PAs will reduce demand for physicians and which

[14] National Commission on Certification of Physician Assistants. 2015. 2014 Statistical Profile of Certified Physician Assistants. http://www.nccpa.net/Uploads/docs/2014StatisticalProfileofCertifiedPAsPhysicianAssistants-AnAnnualReportoftheNCCPA.pdf.

[15] Hooker RS, Muchow AN. Supply of Physician Assistants: 2013-2026. *Journal of the American Academy of Physician Assistants*. 2014; 27(3):39-45.

[16] Accreditation Review Commission on Education for the Physician Assistant, Inc. Projected growth in accredited programs. http://www.arc-pa.org/documents/current%20and%20project%20growth%204.17.15.pdf.

specialties will likely be most affected. Adding to the uncertainty is that these providers might take on new roles or address currently unmet needs, rather than taking on workload historically provided by physicians.[17]

For modeling purposes, the "high use" scenario assumes that each additional APRN or PA beyond the supply needed to maintain current staffing patterns will ease demand for physicians in their specialty as follows: anesthesiology (60%), women's health (40%), primary care (50%), medical specialties (30%), surgery (20%), and other medical specialties (30%). The "moderate use" scenario assumes the adjustment in physician demand is half of the above amounts. The above percentages make no implications about the value of services provided by APRNs and PAs relative to physicians, but rather about the role these providers will play in the health care system and whether the role fills a currently unmet need versus reducing demand for physicians.

- **Expanded Use of Telemedicine:** Some stakeholders have pointed to telemedicine as one possible strategy for mitigating demand for physician services, a topic we did not address in the 2015 report. We explored the extent to which telemedicine may change the health care use and delivery patterns of patients with diseases for which there is published information on how telehealth has been implemented. Identified extant research questions focused on three areas of potential telemedicine impact:
    - Impacts on demand of transferring care for specific conditions to telemedicine,
    - Impacts on new demand of expanded geographic access/less constrained supply, and
    - Impacts of telemedicine on provider productivity/efficiency.

  However, based on literature provided by the AAMC Center for Workforce Studies as part of its systematic review of the literature on telehealth and its impact on service utilization, we concluded that the empirical evidence currently is insufficient for modeling purposes. More research is needed to explore the impact of telemedicine technologies on current and new service and health workforce demand.

Demand Projections

As noted in the 2015 report, rapidly changing population demographics are the single factor most affecting future service and physician demand growth. High rates of projected population growth, especially among the "Baby Boomer" population, portend rapidly growing demand for health care services, with highest growth expected for those specialties that disproportionately serve seniors. Because these demographic trends are inevitable, they are incorporated into all the demand scenarios. Between 2014 and 2025, changing demographics alone are projected to increase national demand for physicians by about 111,000 physicians (+14%), with demand for primary care physicians projected to grow 32,100 physicians (+14%), faster growth rates expected among hospitalists (+20%) and medical

[17] Auerbach DI, Chen PG, et al. Nurse Managed Health Centers and Patient-Centered Medical Homes Could Mitigate Expected Primary Care Physician Shortage. *Health Affairs*. November 2013; 32(11):1933-1941.

specialists (+19%), and lower growth rates expected among the other specialties (+12%) and surgical specialties (+13%) (Exhibit 15).

The effect of ACA-related expansion in medical insurance coverage had already started by 2014, but between 2014 and 2025, the projected effect is additional demand of about 10,600 physicians, of which 7,600 is specific to non-primary care specialties. The effects of ACA-related medical insurance expansion are incorporated into all but the changing demographics scenario.

The managed care scenario continues to have little impact on overall physician demand but does shift the specialty mix. National demand rises by an estimated 2,300 physicians. However, simulation results suggest that by 2025 demand for primary care physicians would rise by an additional 11,300 physicians; demand for medical specialties would decline by 6,300 physicians; demand for surgical specialties would rise by 3,900 physicians (with growth in obstetrician and gynecology care, general surgery, and ophthalmology accounting for most of the increase); and demand for other specialties would decline by 6,700 physicians (much of this from an observed decline in utilization of radiology and psychiatry[18] services among patients currently enrolled in managed care plans).

Simulated increased use of retail clinics only affected demand for primary care, with demand for primary care physicians declining by 13,600 physicians in 2025 relative to the scenario with ACA plus changing demographics. The impact was larger for general pediatrics (-10,800 physicians) than for adult primary care (-2,800 physicians), reflecting the patient population without chronic conditions and the mix of services likely to be provided in retail clinic settings. This scenario used conservative assumptions on which primary care visits could be provided in a retail clinic, so the impact could be larger than reported here.

The impacts of increased use of APRNs and PAs are potentially significant and will vary depending on physician specialty and assumptions regarding the future level and scope of care delivery provided by these professions. Relative to the scenario with ACA plus changing demographics, the projected physician demand declines by 28,100 physicians between 2014 and 2025 with increased use of APRNs and PAs under the “moderate use” scenario. Alternatively, growth in physician demand between 2014 and 2025 declines by 56,200 physicians under the “high use” scenario.

Exhibit 16 compares projected physician demand growth by scenario between the 2015 report and this 2016 update. The 2016 update projects slightly higher demand growth between 2014 and 2025 under most scenarios modeled. The higher demand growth projections are partially the result of recalibrating the model to a 2014 level of care. For the two scenarios modeling possible effects of APRNs and PAs, the demand projections are now lower for 2025 reflecting that growth in PA supply beyond that needed for current levels of care was added to this scenario.

[18] The decline in use of psychiatry services observed among patients in managed care plans is a topic requiring additional research but might partially be explained by greater use of primary care services (where some behavioral health counseling might occur) or perhaps greater controls on access to care.

Exhibit 15: Projected Demand for Physicians, 2014-2025

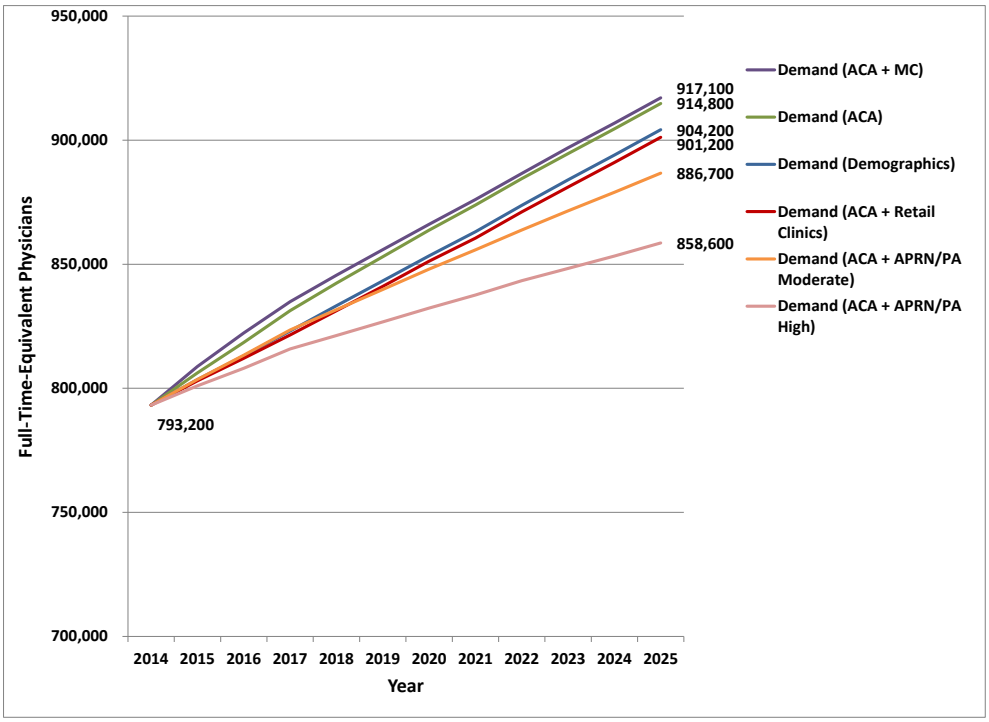
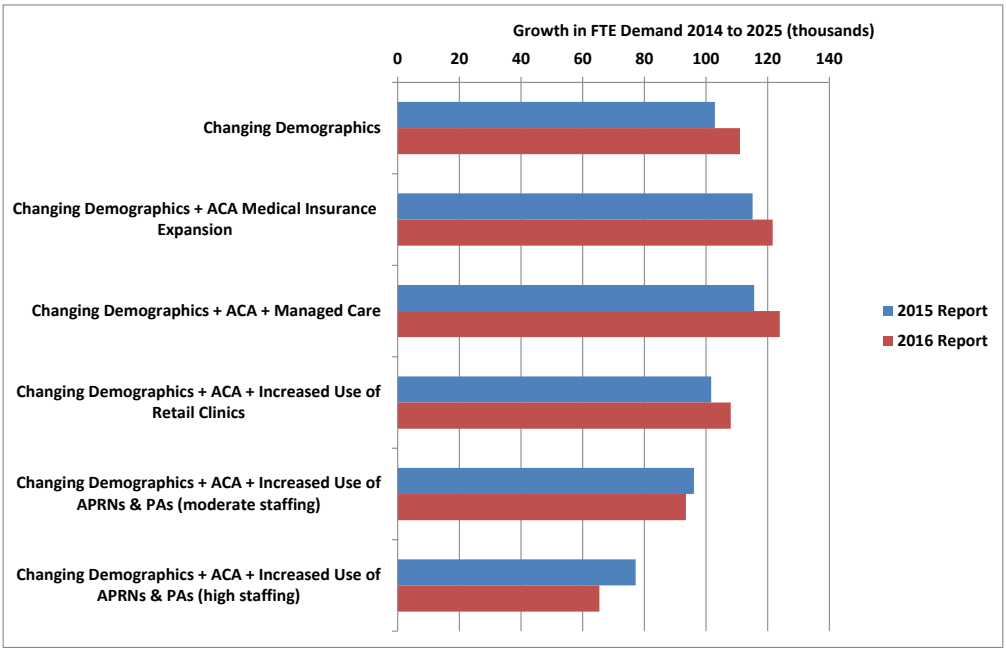


Exhibit 16: Growth in Physician Demand 2014-2025: 2015 Report vs 2016 Report Scenario Projections



V. NEW RESEARCH AND ANALYSES

New topics analyzed for this update include identifying and moving adult primary care–trained hospitalist physicians into their own category (separate from primary care) and the rapidly growing supply of PAs.

Growth in Supply and Demand for Primary Care–Trained Hospitalists

Hospital medicine is concerned with the care of acutely ill hospitalized patients, and physicians whose primary professional focus is hospital medicine are called hospitalists. The use of hospitalists allows primary care and specialty physicians to spend more of their time providing office-based care with less time required for hospital rounds. The projections presented here rely on work by the AAMC Center for Workforce Studies to identify hospitalists using Medicare fee-for-service billing records (for those physicians where close to 100% of their Evaluation and Management billing was hospital based) and to link identified hospitalists with the AMA Masterfile. The large majority of hospitalists in the AMA Masterfile are not identified as hospitalists based on self-reported specialty, but rather are listed under the specialty in which they received their training. The AAMC work identified 25,320 hospitalist physicians who were listed in the AMA Masterfile as general internists, family physicians, or geriatricians. Hospitalists trained in pediatrics cannot easily be identified using Medicare billing records. Hospitalists with specialized training in an internal medicine subspecialty or other specialty were categorized under their specialty rather than as a hospitalist for purposes of our modeling (e.g., a neurologist practicing as a hospitalist was categorized as a neurologist). In the remainder of this section, references to hospitalists focus on those whose final GME training was in general internal medicine, family medicine, or geriatric medicine.

The hospitalist workforce tends to be young, so over the next decade, relatively few hospitalists are projected to retire. Analysis by the AAMC Center for Workforce Studies of active physicians who transitioned between hospitalist and non-hospitalist between 2013 and 2014 suggests that the number of hospitalists leaving the hospitalist workforce mid-career is offset by the number of people entering the hospitalist workforce mid-career. Furthermore, comparing exits from the hospitalist workforce for physicians age 55 and older suggests retirement patterns similar to those of general internists. Therefore, we used retirement patterns for general internists because they are based on a larger sample size (especially because the number of hospitalists nearing retirement age is small). Between 2011 and 2013, approximately 1,927 physicians trained in adult primary care entered the hospitalist workforce each year. We modeled future hospitalist supply under a scenario where this annual number of new entrants continues.

As noted previously in the discussion of demand projections, rapidly changing population demographics affect future service and physician demand growth the most. Between 2014 and 2025, changing demographics are projected to increase national demand for hospitalists by about 5,000 physicians (+20%). Although hospitalization rates have fallen over the past decade, rates have remained relatively constant over the past several years, and we project that the rapidly aging population will drive national

rates higher over the next decade. We project virtually no change in demand for hospitalists associated with ACA-related expansion in medical insurance coverage, increased use of managed care or retail clinics. To the extent that there is current unmet need for hospitalists, the health care system might absorb more hospitalists into the system beyond that needed to maintain current staffing levels. This, in turn, could free up primary care physician time that might otherwise be spent in hospital rounds. On the other hand, increased use of APRNs and PAs as hospitalists may affect the demand for hospitalist physicians, or excess future supply of hospitalists could result in physicians choosing other specialties. Further research is needed to better to understand the dynamics of the hospitalist labor market.

Rapid Growth in Physician Assistant Supply

The National Commission on Certification of Physician Assistants reports that at the end of 2014, the U.S. had an estimated 102,000 certified PAs (up from 95,600 certified PAs at the end of 2013).[19,20] Approximately 27% worked in primary care; 24% worked in surgical specialties; 20% worked in internal medicine subspecialties; and the remainder worked in other practice areas. (This specialty distribution is based solely on those PAs who chose only one practice area in the PA Professional Profile database and excludes responses from PAs who indicate practicing in multiple specialty areas).

The physician demand projections in this 2016 report incorporate the potential implications of a supply of PAs that is growing faster than the rate of growth in demand for health care services.

Projected ranges of shortages are still higher mainly because downward adjustments were made to the new numbers of physician graduates relative to the 2015 report.

The projections for physician demand—both from the 2015 report and the updated projections presented here—reflect that a significant portion of patient care is currently being provided by PAs. The physician demand projections in this 2016 report also incorporate the potential implications of a supply of PAs that is growing faster than the rate of growth in demand for health care services. The projected ranges of shortages are still higher, however, because the change in the impact of growing PA supply only reflects that created by growth above and beyond what would be needed to maintain current levels of care, and downward adjustments were made to the new numbers of physician graduates relative to the 2015 report.

[19] National Commission on Certification of Physician Assistants. 2015. 2014 Statistical Profile of Certified Physician Assistants. http://www.nccpa.net/Uploads/docs/2014StatisticalProfileofCertifiedPAsPhysicianAssistants-AnAnnualReportoftheNCCPA.pdf.

[20] The number of certified PAs can differ from the number of licensed and active PAs. Using a database of active clinicians based on state licensure data, Hooker and Muchow report that in 2013 an estimated 84,064 PAs had an active license to treat patients. Hooker RS and Muchow AN. The 2013 Census of Licensed Physician Assistants. *Journal of the American Academy of Physician Assistants*. 2014; 27(7):35-39.

Hooker and Muchow (2014) estimated that between 2013 and 2026, PA supply would grow by about 41,800 PAs (50%), and this estimate is likely conservative: since this study was completed, additional colleges and universities have announced plans to open new PA programs.[21] Analysis of the practice areas where PAs work suggests that between 2014 and 2025, overall demand will rise by 15%, equivalent to the need for 15,700 additional PAs, to maintain current staffing levels. Taking into account the rapidly growing supply and new PA programs opening, supply projections for PAs suggest that by 2025 there may be 53,500 more PAs than what will be needed to maintain current staffing levels. Future updates will need to account for continued growth in the PA pipeline, and additional research is also needed to better understand how PAs are integrated into the health care system. In the interim, the physician demand projections presented in this 2016 report make the same assumptions for PAs as for APRNs regarding the degree to which additional clinicians in each practice area might influence demand for physicians under "high use" and "moderate use" staffing scenarios.

[21] Hooker RS, Muchow AN. Supply of Physician Assistants: 2013-2026. *Journal of the American Academy of Physician Assistants*. 2014; 27(3):39-45.

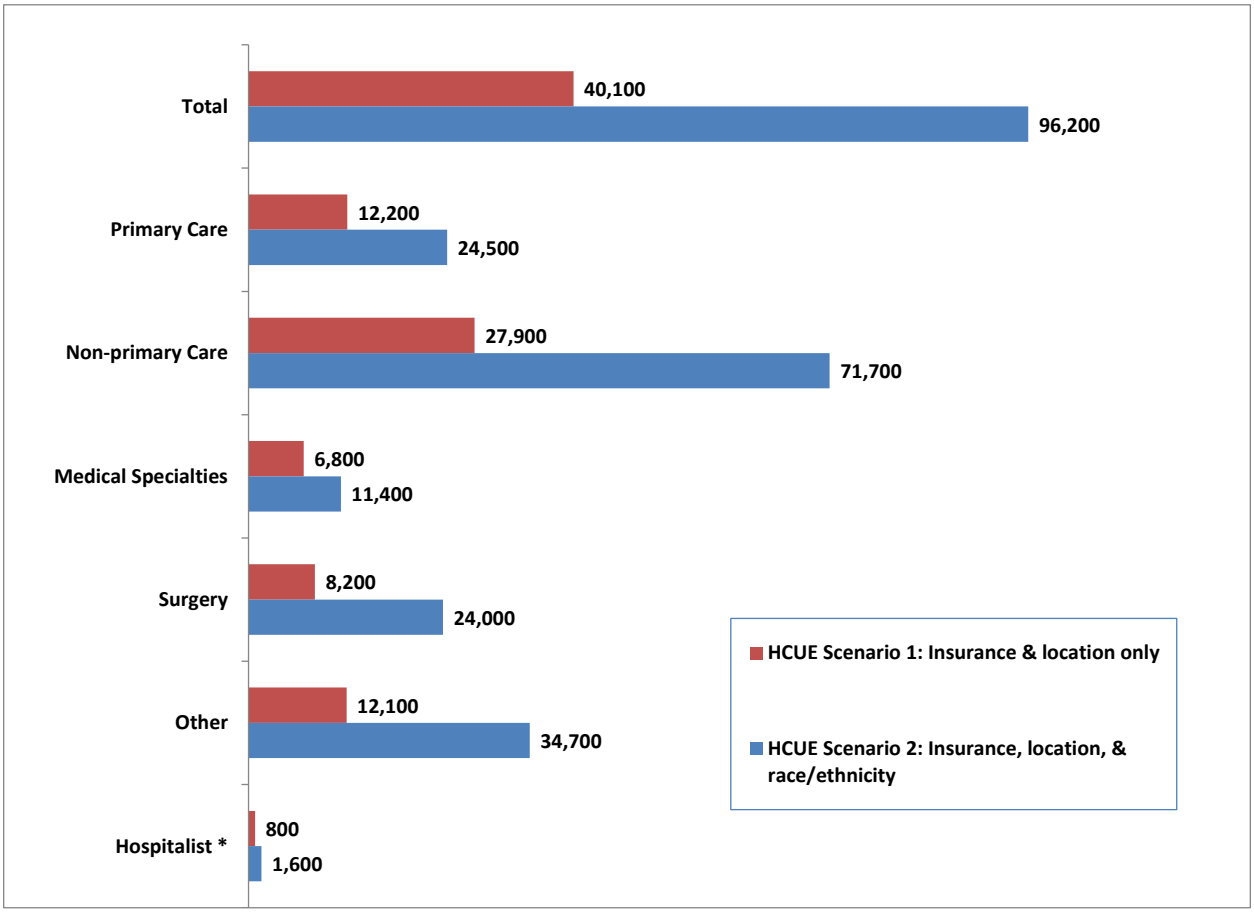
VI. PROVIDERS REQUIRED IF U.S. ACHIEVED EQUITY IN HEALTH CARE UTILIZATION

The health care utilization equity (HCUE) scenario models the implications for physician demand if currently underserved populations utilized care at a rate similar to that for populations facing fewer barriers to care. ***It is not included in the ranges of scenarios compared above*** that summarize projected gaps between supply and demand across physician specialty categories at the 25th and 75th percentile of projected shortages, but rather is intended as an additional point of consideration when gauging workforce adequacy. This stand-alone scenario illustrates that sociodemographic, economic, and geographic imbalances in the supply of physicians and other barriers to accessing care result in lower levels of care received by historically underserved populations beyond utilization differences that can be explained by differences in disease prevalence and other health risk factors. The estimates we put forth are by no means deemed definitive; instead, they are intended to stimulate much-needed discussion and analysis about how best to address health care utilization inequity in future projections

Two scenarios were modeled to estimate the increase in use of health care services anticipated if underserved populations had similar use patterns as the rest of the population (Exhibit 17, see also Exhibit 27 and Exhibit 28). The first of these (HCUE Scenario 1) estimated 2014 physician shortfalls by specialty category under a hypothetical scenario if people without medical insurance and people living in non-metropolitan areas had equivalent care utilization patterns as their insured peers living in metropolitan areas with similar demographics and health risk factors. (For example, an uninsured person with heart disease living in a rural area was modeled as having the utilization rate of an insured person with heart disease living in a metropolitan area.) Under these assumptions, we estimate a 5% gap in total physician supply in 2014 compared with the number required under this health care utilization equity scenario. Compared with the supply in 2014, an additional 40,100 physicians would be required to enable uninsured, non-metropolitan patients to utilize care in the same manner as other patients. (This estimate for physicians is in addition to the additional PAs and APRNs that would be needed based on current national delivery patterns.)

The second health care utilization equity scenario (HCUE Scenario 2) estimated 2014 physician shortfall by specialty category under a hypothetical scenario wherein we modeled everyone utilizing care as if they had equivalent utilization patterns to white insured populations residing in metropolitan areas. (For example, an uninsured black person with heart disease living in a rural area was modeled as having the utilization rate of an insured white person with heart disease living in a metropolitan area.) Under these assumptions, we estimate a 12% gap between total physician supply in 2014 and the number of physicians required. Compared with the supply in 2014, an additional 96,200 physicians would be needed to provide services at the same level of health care utilization across all populations.

Exhibit 17: Estimated Additional Physicians Needed if U.S. Had Achieved Health Care Utilization Equity in 2014



VII. KEY FINDINGS AND CONCLUSIONS

The need to assess the capacity of the nation's future health care workforce overall—and physician workforce in particular—is more important now than ever for both public and private sectors to act and make the investments needed for a health care system that provides high-quality, cost-efficient health care, while also developing the physicians needed to transform the current system and to maximize population health. The pace of change in the world of health care delivery and finance necessitates an almost constant updating and improvement of workforce projections and projections models. That is why the AAMC made a commitment to commission updated national physician workforce projections annually. The purpose is threefold:

- **Update Projections** - Support the ongoing development of up-to-date projections of the physician workforce based on the most recent and best quality data and respond to questions raised by previous reports;
- **Present New Analyses** - Produce research and data on specific topics to further develop the physician workforce projections; and
- **Identify Future Directions for Research** - Identify specific areas for future research, data collection, and analysis that will also strengthen future projections work and support the decision making that guides alignment of the nation's health workforce with its health needs.

Through these efforts, the AAMC intends to invite discussion to continue to develop better projections. In other words, we seek to advance our collective capacity for developing continually improved health workforce projections with data-based analysis. This annual (2016) workforce projections update combined data on the national physician workforce; data on the demographics, socioeconomics, and health risk factors of the population; data from national sources on patient care use and delivery patterns; and health workforce microsimulation supply and demand models to estimate the current and future demand and supply of physicians through 2025. The projections in this analysis are based on available data to date. Further, recognizing the uncertainty inherent to modeling the future workforce, this study presents projections across a variety of scenarios, resulting in a projected range.

Key study findings and conclusions include:

- **Physician demand continues to grow faster than supply leading to a projected total physician shortfall of between 61,700 and 94,700 physicians by 2025. As with the 2015 projections, under every combination of scenarios modeled, an overall physician shortage is projected.** Though this total projected shortfall exceeds the 46,100 to 90,400 physician shortfall estimated by the 2015 study, the 2016 updated projections of a physician shortfall in 2025 are of a similar magnitude to the 2015 projections. Differences between the 2016 update and the 2015 projections largely reflect the use of more recent data and improvements to methods.
    - **Projected shortfalls in primary care range between 14,900 and 35,600 physicians by 2025.** This is directionally consistent with the 12,500 to 31,100 primary care physician shortfall

projected in the 2015 report.[22] As part of the ongoing effort to improve our projections, primary care–trained hospitalists were excluded from primary care projections for the 2016 update. If they had been included (as was done in the 2015 report), the updated estimated primary care shortfall would be in the 5,600 to 28,300 range.

  - **Projected shortfalls in non-primary care specialties range between 37,400 and 60,300 by 2025.** This range is directionally consistent with the shortfall projections in the 2015 report (28,200 to 63,700 physicians).

- **Under almost all scenarios, the supply of surgical specialists is projected to decline.** Based on current trends, the supply of several larger surgical specialties (e.g., ophthalmology and urology) is not projected to grow as future attrition is likely to exceed the number of new entrants. Yet there continues to be strong projected growth in demand. Although projections for individual surgical specialties will likely vary, in the aggregate we project an updated shortfall of between 25,200 and 33,200 surgeons by 2025, slightly higher than the 2015 report shortfall of between 23,100 and 31,600 surgeons.
- **For all specialty categories, physician retirement decisions are projected to have the greatest impact on supply, and over one-third of all currently active physicians will be 65 or older within the next decade.** Physicians between ages 65 and 75 account for 11% of the active workforce, and those between ages 55 and 64 make up nearly 26% of the active workforce. Projected shortfalls for the Other Specialties category (which includes emergency medicine, neurology, pathology, and psychiatry) are particularly sensitive to retirement assumptions.
- **Demographics—specifically, population growth and aging—continue to be the primary driver of increasing demand, with the older population expected to experience the greatest growth in demand from 2014 to 2025.** During this period the U.S. population is projected to grow by close to 8.6%, from about 319 million to 346 million. The population under age 18 is projected to grow by only 5%, while the population aged 65 and over is projected to grow by 41%. Because seniors have much higher per capita consumption of health care than younger populations, the percentage growth in demand for services used by seniors is projected to be much higher than the percentage growth in demand for pediatric services.
- **Expansions in medical insurance coverage due to the Patient Protection and Affordable Care Act (ACA) and the economic recovery have reduced the number of uninsured. However, demand is projected to increase by another 10,000 to 11,000 physicians (1.2%) to reflect ACA-related expanded coverage effects still to be realized.** The 2015 projections estimated that expanded medical coverage achieved under ACA once fully implemented would likely increase demand by about 16,000 to 17,000 physicians (2.0%).

These updated projections also integrate more fully the potential impact of a rapidly growing physician assistant workforce, move adult primary care–trained hospitalists out of the primary care projections and into a separate specialty category, and reflect refinements to the estimates of annual graduates. The net effect of these refinements to model inputs and updates was to project a larger total physician

[22] One update to the 2016 projections update was to identify and move primary care–trained hospitalists out of primary care and into their own specialty category. If primary care–trained hospitalists were included with primary care physicians (as was done in the 2015 report), the estimated primary care shortfall would be in the 5,600 to 28,300 range.

shortage by 2025 than estimated by the 2015 report. Better integrating the growing physician assistant workforce into the projections reduced the growth in demand for physicians for some scenarios, but ***slower projected growth in physician supply is the primary cause for the higher shortfall projections***.

- **If currently underserved populations utilized health care at the same rate as the rest of the population, an additional 53,000 to 96,000 physicians (7-12%) would be needed in 2014.** While many other factors would need to be addressed to achieve health care utilization equity—minimizing barriers related to insurance coverage, access, trust, etc.—these figures highlight the potential scale of currently unmet need.

This year's report also includes a special section on health care utilization equity. Current projections methods only partially account for possible underutilization by those with inadequate access. Therefore, to better gauge the degree of currently unmet need, the health care utilization equity scenario models the implications for physician demand if currently underserved populations utilized health care at the same rate as the rest of the population. These estimates are ***not included*** in the ranges of projections, as they are estimates for 2014 levels of care only. Moreover, the estimates we put forth are by no means deemed definitive; instead, they are intended to stimulate much-needed discussion and analysis about how best to address health care utilization inequity in future projections.

Finally, projections are constantly challenged by the reality that health care is changing at a tremendous pace and in often unpredictable ways. The projected ranges reflect uncertainties regarding how emerging care delivery and financing models might change health care use and delivery patterns, as well as uncertainties regarding physician labor force participation patterns (i.e., retirement and work-life balance decisions) and employment versus independent practice decisions. This high level of uncertainty, combined with the need to incorporate new research and updated data on physician supply and demand, underscores the importance of the AAMC's decision to produce, on an annual basis, ever more sophisticated projections of the nation's physician workforce, address issues that need to be explored, and identify areas of analysis and research that still need to be explored.

VIII. FUTURE DIRECTIONS IN HEALTH WORKFORCE RESEARCH

Given the ongoing changes in how health care services are offered and financed, the nation may never arrive at a definitively appropriate mix of providers.[23] Uncertainties regarding how emerging payment and care delivery models might affect clinician supply and demand, uncertainties about how clinicians and care settings will respond to economic and other trends, and improvements in medical and information technology all underscore the importance of future research on the potential implications of the evolving health care system for the nation's supply of physicians.

For example, given that growth in demand for health care services is projected to continue to exceed the growth of physician supply, we need to better understand how this may exacerbate geographic imbalances in supply, thus aggravating extant disparities in geographic distribution. Similarly, although this update has explored the issues to some extent, the implications of future growth in APRN, PA, and hospitalist supply need to be better understood, including how the rapidly growing supply will be integrated into the health care workforce.

Other examples of directions for future research to improve analytic capabilities and advance the field of health workforce modeling, as better data become available, include:

- Continuing to evaluate data from new care delivery and financing models, including the effect on capacity and staffing, though existing research has not demonstrated a mitigation effect on workforce needs;
- Physician workforce retention, productivity, and attrition (due to retirement, lifestyle preferences, and issues related to well-being), including tracking trends in retirement and understanding the drivers of and shifts in physician well-being and their implications for the future physician workforce;
- Telemedicine and digital technology, including their effect on access and capacity;
- Further development of the health care utilization equity scenario and a closer look at its implications for physician workforce needs; and
- Population health initiatives, including their impact on access, workforce demand, and utilization.

We also need to look more closely at specific specialties and conditions that may experience or portend future shortages (and often current crises)—behavioral and mental health, including psychiatry, addiction medicine, and related disciplines; disciplines focused in areas in which the illness burden is increasing, such as oncology, cardiology, and endocrinology; obstetrics and gynecology; and the surgical specialties—to better plan for meeting those more specific physician supply needs. Finally, given the enormity of research and analysis, we need to understand the role that local studies and qualitative analysis can play in helping analysts develop more sophisticated assumptions on which to build projections.

[23] Daschle T. Creating a Workforce for the New Health Care World. Health Affairs Blog, March 7, 2013. Available online at http://healthaffairs.org/blog/2013/03/07/creating-a-workforce-for-the-new-health-care-world/.

IX. TECHNICAL APPENDIX

This appendix provides a brief overview of the workforce microsimulation models used, the data and assumptions, and information on select model inputs. Extensive technical documentation of the supply and demand models is available elsewhere.[24]

Synopsis of Study Methods

Consistent with the 2015 physician workforce projections, this 2016 update used a microsimulation approach to project the supply of and demand for health care services and physicians. The supply and demand projection models have been used for health workforce modeling for federal and state governments and for trade and professional associations for physicians and other health occupations.

The supply model, under a status quo scenario, simulated the likely career decisions of physicians, given the current numbers, specialty mix and demographics of new entrants to the physician workforce, retirement and mortality patterns, and patterns of patient care hours worked. The supply model begins with the 2014 American Medical Association (AMA) Physician Masterfile, adds new physicians based on reported numbers of physicians completing their graduate medical education, subtracts estimates of physicians retiring, and accounts for projected differences in average patient care hours worked as the demographics of the physician workforce change. Additional supply scenarios modeled were the implications if physician retirement patterns changed (including delaying retirement or retiring earlier by ± two years); younger physicians (those currently age<35 and new graduates) working fewer patient care hours compared with older cohorts; and a modest expansion of graduate medical education (GME) programs.

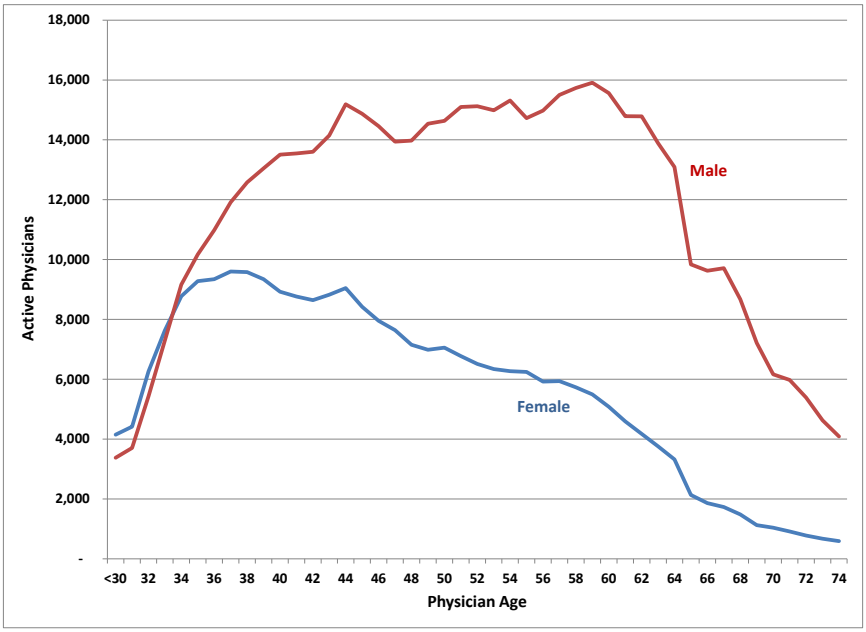
The demand projections start by extrapolating current levels of care into the future as the population grows and ages, taking into consideration projected changes in disease prevalence and other health risk factors among the population if health care use and delivery patterns remained unchanged. Then, the implications of continued expansion of medical insurance coverage associated with the Affordable Care Act (ACA) were modeled. To reflect likely changes over the next decade in care use and delivery patterns, we updated scenarios reflecting possibly greater reliance on managed care and retail clinics and rapid growth in supply of advanced practice registered nurses (APRNs). These updated projections also take into account the rapidly growing supplies of PAs and hospitalists.

[24] U.S. Department of Health and Human Services, Health Resources and Services Administration, National Center for Health Workforce Analysis. 2014. Technical Documentation for HRSA's Health Workforce Simulation Model. Rockville, Maryland: U.S. Department of Health and Human Services. http://bhpr.hrsa.gov/healthworkforce/supplydemand/simulationmodeldocumentation.pdf.

Supply Model Overview and Updates

Current Physician Workforce: Supply modeling starts with the 2014 AMA Physician Masterfile to identify the size and characteristics of the current workforce. In 2014 there were approximately 782,210 physicians under age 75 in active practice who had completed their graduate medical education, compared with about 767,100 in 2013—an increase of about 2 %.[25] Women constituted a third (33%) of the workforce. Physicians within the traditional retirement age between 65 and 75 were 11% of the active workforce, and those between age 55 and 64 made up nearly 26% of the active workforce (Exhibit 18). Therefore, it is possible that a third of all currently active physicians could retire within the next decade.

Exhibit 18: Age Distribution of Active Physicians, 2014



The approximately 221,200 active primary care physicians were 28% of the workforce, with another 128,900 (16%) in medical specialties; 156,300 (20%) in surgical specialties; 25,300 (3%) adult primary care–trained hospitalists; and 250,500 (32%) in the remaining specialties. Separation of adult primary care–trained hospitalists into their own category is a change over the projections in the 2015 report where these physicians were categorized as primary care.

New Entrants: Under the status quo supply scenario, estimates of the number of physicians completing their GME in individual specialties came from published information on programs accredited by the Accreditation Council for Graduate Medical Education (ACGME) and the American Osteopathic

[25] Both the supply and demand models measure full-time equivalents based on number of physicians who have completed GME. To the extent that some physicians-in-training also provide direct patient care, both demand and supply would be adjusted upward by the same amount so any gap between supply and demand would be unchanged.

Association (AOA), taking into account that some programs are dually accredited.[26] The age and sex distribution of new physicians was derived from analysis of the 2014 AMA Physician Masterfile. We estimate approximately 28,233 physicians completed GME between 2014 and 2015. This includes approximately 26,707 physicians completing GME from ACGME-accredited programs;1,981 physicians from AOA-accredited programs; and subtracting out approximately 455 physicians who completed GME in dually accredited programs. In total, approximately 7,259 physicians (26% of new graduates) entered the workforce as primary care providers; 1,930 (7%) entered as adult primary care–trained new hospitalists; 5,422 (19%) entered in internal medicine and pediatric subspecialties; 4,887 (17%) entered in surgical specialties; and 8,735 (31%) entered in other specialties.

Hours Worked Patterns: Supply projections take into consideration differences in average hours per week spent in patient care by physician age, sex, and specialty. This component of the model is unchanged since the 2015 report and is based on analysis of bi-annual 2012-2013 survey data (n=18,016) of physicians in Florida who renewed their license and who work at least 8 hours per week in professional activities. The analysis found that, controlling for specialty, hours worked per week were relatively constant through age 59 for men but decreased beyond age 60. Female physicians worked about 5 hours fewer per week than their male counterparts through age 54 but among those age 55 and older, worked only about 1-2 fewer hours per week than males of similar age and specialty. For modeling purposes, we used the Florida survey data because it is a robust sample size, includes current data on physician characteristics, and is reviewed annually by the Florida Department of Health to ensure quality. Analysis of survey data for physicians in Maryland showed similar patterns by age, sex, and specialty.

Analysis by the AAMC's Center for Workforce Studies comparing self-reported hours worked per week from the 1980 U.S. Census to hours reported in the 2012-2014 files of the American Community Survey suggested that male physicians age 26 to 35 worked 5.8 fewer hours per week in 2013 relative to 1980. A decline of 3.9 hours worked per week was observed among women physicians age 26 to 35 when comparing 1980 with 2013 hours worked patterns. The supply scenarios modeled all use current patterns of hours worked to model the implications of changing demographics among the physician workforce, with the exception of the millennial hours scenario described previously.

Retirement Patterns: For both the 2015 study and this update, the supply model used age-sex-specialty dependent annual attrition probabilities to simulate providers leaving the workforce. Publicly available sources of data for modeling specialty-specific retirement patterns are unavailable. These supply projections use retirement patterns estimated from data collected through Florida's mandated bi-annual physician licensure survey (2012-2013 data), which asks about intention to retire in the

[26] Estimates for graduates from ACGME-accredited programs came from Brotherton SE, Etzel SI. Graduate Medical Education, 2014-2015. *JAMA*. 2015; 314(22):2436-2454. http://jama.jamanetwork.com/article.aspx?articleid=2474404.

Estimates for graduates from AOA-accredited programs were unavailable, so information on new entrants to these programs were used. https://natmatch.com/aoairp/stats/2015prgstats.html.

upcoming five years. The Florida physician survey is currently among the timeliest and most accurate sources of information available regarding physician retirement patterns and hours worked.

Calculated retirement rates from the Florida survey are generally consistent with estimates derived from analysis of the AAMC's 2006 Survey of Physicians over Age 50 (which collected information on age at retirement or age expecting to retire). The 2006 AAMC survey data were collected before the economic downturn (which occurred from approximately 2008 to 2010), while the Florida survey data were collected during a period of economic recovery. Mortality rates from the Centers for Disease Control and Prevention (CDC), which are specific to each age-gender combination, were combined with rates of intention to retire to calculate overall attrition rates.[27] Johnson et al. found that age-adjusted mortality rates for occupational and technical specialties are approximately 25% lower than national rates for men and 15% lower for women through age 65, so mortality rates for physicians under age 65 were adjusted downward accordingly.[28]

Attrition rates are similar for male and female physicians, but differ by specialty. For example, attrition patterns for male physicians suggest that by age 65, approximately 65% of allergists and immunologists are still active, while only 50% of emergency physicians are still active (Exhibit 19).

From these patterns we estimate the median age of retirement is approximately 67 years old (i.e., about half retire before that age, and half retire after). This estimate of median retirement age is similar to the estimates of the mean age of retiring physicians over age 50 calculated by the AAMC's Center for Workforce Studies using data from the American Community Survey (Exhibit 20). Due to uncertainty, for modeling purposes we simulate future physician supply under scenarios where physicians retire two years earlier or two years later, on average.

[27] Arias E. United States Life Tables, 2008. *National Vital Statistics Reports*. 2012; 61(3).

[28] Johnson NJ, Sorlie PD, Backlund E. The Impact of Specific Occupation on Mortality in the US National Longitudinal Mortality Study. *Demography*. 1999; 36:355-367.

Exhibit 19: Probability Male Physician is Still Active by Specialty and Age

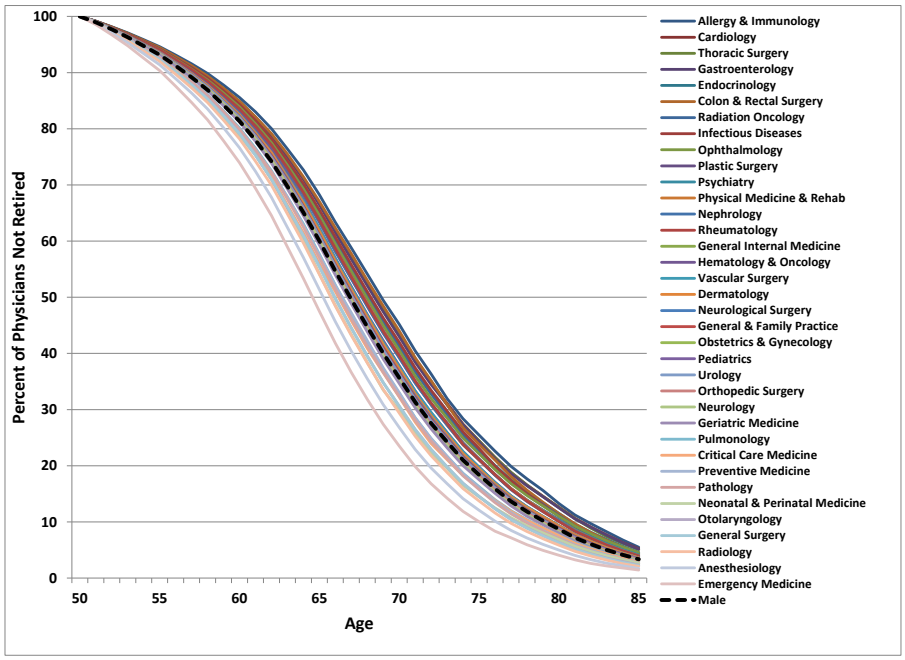
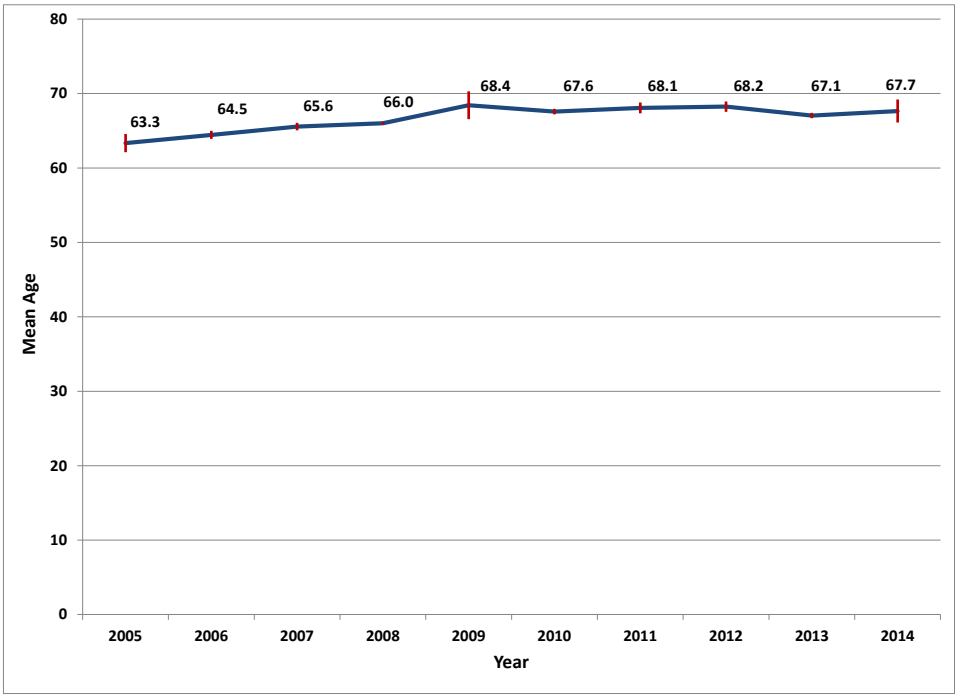


Exhibit 20: Mean Age of Retiring Physicians (age 50+)



Source: AAMC analysis of the American Community Survey (2005-2014 data). Note: vertical bars reflect the standard errors for the estimated means.

Demand Model Overview and Updates

Demand for physicians is calculated based on demand for health care services and staffing patterns for care delivery. For modeling purposes, at the national level we quantify current demand for health care services (and physicians) as equivalent to the level of health care services actually utilized (and current physician supply). Demand projections are thus extrapolating a "2014 level of care," with any imbalances between supply and demand (whether shortfalls or excesses) extrapolated into the future. An exception pertains to federal government estimates that the nation requires approximately 8,200 additional primary care physicians and 2,800 psychiatrists to de-designate the federally designated primary care and mental health professional shortage areas (HPSAs), and for modeling purposes, we assume these 11,000 physicians reflect national shortfalls.[29] To the extent that other shortages already exist in specialties other than primary care and psychiatry, our starting point assumption may be a moderate one.

The demand model used a microsimulation approach that simulates the demand for health care services for a nationally representative sample of the current U.S. population projected to 2025. Then, demand for physicians, APRNs, and PAs are modeled to meet the projected demand for services. A more detailed description of demand modeling methods and data inputs is provided in the 2015 report. Exhibit 21 summarizes, by demand model component, the data sources incorporated in 2015 and this 2016 workforce projections update.

Exhibit 21: Summary of 2015 and 2016 Demand Modeling Data Sources

Model Component	2016 Projections	2015 Projections
National/state population files	2014 ACS 2013 & 2014 BRFSS 2004 NNHS	2013 ACS 2011 & 2013 BRFSS 2004 NNHS
Weights for population projections	2014 U.S. Census Bureau population projections	2014 U.S. Census Bureau population projections
Health care use equations	2009-2013 Pooled MEPS	2008-2012 Pooled MEPS
Hospital inpatient day equations	2013 NIS	2012 NIS
Health care use calibration/validation	2013 NIS 2012 NHAMCS 2011 NHAMCS	2012 NIS 2010 NHAMCS 2010 NHAMCS
Physician staffing ratios	2014 AMA Masterfile	2013 AMA Masterfile

Notes: ACS=American Community Survey; BRFSS=Behavioral Risk Factor Surveillance System; NNHS=National Nursing Home Survey; MEPS=Medical Expenditure Panel Survey; NIS=Nationwide Inpatient Sample; NHANCS=National Hospital Ambulatory Medical Care Survey; AMA=American Medical Association.

[29] For information on HPSA designation, see www.hrsa.gov/shortage.

X. DETAILED TABLES

The following tables provide more detailed projections of supply, demand, and imbalances between supply and demand across years, scenarios, and specialty categories.

Exhibit 22: Summary of Projected Gap between Physician Supply and Demand

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Total Physicians												
75th Percentile	11,000	22,800	32,900	42,400	50,200	57,400	64,900	71,300	78,000	84,100	90,700	94,700
25th Percentile	11,000	18,500	24,400	31,600	36,900	41,800	46,500	50,500	54,100	56,700	58,200	61,700
Primary Care												
75th Percentile	8,200	10,800	13,500	16,400	18,900	21,600	24,500	27,600	30,300	31,800	33,400	35,600
25th Percentile	8,200	7,900	7,300	7,000	7,000	8,300	9,500	10,000	11,700	12,700	14,300	14,900
Non-Primary Care												
75th Percentile	2,800	11,200	18,700	26,700	32,800	38,000	42,900	47,100	51,200	54,500	57,300	60,300
25th Percentile	2,800	9,800	15,700	21,600	25,800	29,600	32,500	33,800	35,100	35,600	35,400	37,400
Medical Specialties												
75th Percentile	-	1,400	2,600	4,000	5,000	5,900	6,700	7,400	8,300	8,900	9,600	10,300
25th Percentile	-	800	1,200	1,800	1,800	2,700	2,800	2,700	2,700	3,000	3,300	3,700
Surgical Specialties												
75th Percentile	-	4,400	8,600	12,900	16,300	19,400	22,500	25,000	27,200	29,500	31,300	33,200
25th Percentile	-	3,900	7,400	10,700	13,200	15,400	17,400	19,300	21,000	22,500	23,700	25,200
Other Specialties												
75th Percentile	2,800	6,900	10,600	14,500	17,500	20,300	23,200	25,700	27,800	29,600	31,100	32,600
25th Percentile	2,800	5,800	8,400	10,800	12,500	14,700	16,800	18,600	20,200	20,900	21,100	22,200
Hospitalists (adult, primary care–trained)												
75th Percentile	-	(1,200)	(2,500)	(3,600)	(4,800)	(6,000)	(7,000)	(8,200)	(9,100)	(10,200)	(11,100)	(12,000)
25th Percentile	-	(1,300)	(2,700)	(3,800)	(5,000)	(6,300)	(7,500)	(8,800)	(9,800)	(11,000)	(12,100)	(13,200)

Note: The shortage range for total physicians is smaller than the sum of the ranges for the specialty categories. The demand scenarios modeled project future demand for physician services, but scenarios can differ in terms of whether future demand will be provided by primary care or non-primary care physicians. Likewise, the range for total non-primary care is smaller than the sum of the ranges for the specialty categories. Numbers in parentheses reflect projected excess supply, with numbers not in parentheses reflecting projected shortfalls.

Exhibit 23: Total Projected Physician Supply, 2014-2025

	Workforce Participation Scenarios				Policy Scenario
Year	Status Quo	Retire 2 Years Earlier	Retire 2 Years Later	Millennial Hours	GME Expansion
2014	782,200	782,200	782,200	782,200	782,200
2015	784,600	783,200	785,000	784,200	784,600
2016	787,500	783,900	789,000	786,600	787,500
2017	790,000	783,900	793,400	788,600	790,000
2018	793,600	784,700	799,200	791,700	793,600
2019	797,500	785,200	805,900	795,100	797,500
2020	801,600	785,500	813,400	798,700	801,600
2021	805,700	785,900	821,000	802,300	808,700
2022	810,200	786,800	829,000	806,200	815,900
2023	815,000	787,300	837,500	810,700	823,900
2024	820,500	787,800	846,500	815,500	832,300
2025	825,200	791,900	852,700	820,300	840,200
% growth 2014-2025	5%	1%	9%	5%	8%

Exhibit 24: Physician Supply Projection Summary by Specialty Category, 2014-2025

	Workforce Participation Scenarios				Policy Scenario
Year	Status Quo	Retire 2 Years Earlier	Retire 2 Years Later	Millennial Hours	GME Expansion
2014					
Total	782,200				
Primary Care	221,200				
Non-primary Care	561,000				
Medical Specialties	128,900				
Surgical Specialties	156,300				
Other Specialties	250,500				
Hospitalists *	25,300				
2025					
Total	825,200	791,900	852,700	820,300	840,200
Primary Care	231,900	222,400	239,800	230,300	235,700
Non-primary Care	593,300	569,500	612,900	590,000	604,500
Medical Specialties	145,300	139,800	149,400	144,700	148,100
Surgical Specialties	151,000	144,200	156,800	150,200	153,700
Other Specialties	253,900	243,000	262,900	252,500	258,500
Hospitalists *	43,100	42,500	43,800	42,600	44,200
Growth 2014 to 2025					
Total	43,000	9,700	70,500	38,100	58,000
Primary Care	10,700	1,200	18,600	9,100	14,500
Non-primary Care	32,300	8,500	51,900	29,000	43,500
Medical Specialties	16,400	10,900	20,500	15,800	19,200
Surgical Specialties	-5,300	-12,100	500	-6,100	-2,600
Other Specialties	3,400	-7,500	12,400	2,000	8,000
Hospitalists *	17,800	17,200	18,500	17,300	18,900

* Adult primary care–trained hospitalists identified through analysis of Medicare billing records.

Exhibit 25: Projected Physician Demand Summary by Scenarios Modeled, 2014-2025

	2014	2025	Growth 2014 to 2025	% Growth 2014 to 2025
Scenario 1: Changing Demographics				
Total	**793,200**	**904,200**	**111,000**	**14%**
Primary Care	229,400	261,500	32,100	14%
Non-primary Care	563,800	642,700	78,900	14%
Medical Specialties	128,900	153,400	24,500	19%
Surgery	156,300	176,400	20,100	13%
Other Specialties	253,300	282,600	29,300	12%
Hospitalists*	25,300	30,300	5,000	20%
Scenario 2: Changing Demographics + ACA Medical Insurance Expansion				
Total	**793,200**	**914,800**	**121,600**	**15%**
Primary Care	229,400	264,500	35,100	15%
Non-primary Care	563,800	650,300	86,500	15%
Medical Specialties	128,900	155,000	26,100	20%
Surgery	156,300	179,700	23,400	15%
Other Specialties	253,300	285,100	31,800	13%
Hospitalists*	25,300	30,500	5,200	21%
Scenario 3: Changing Demographics + ACA + Managed Care				
Total	**793,200**	**917,100**	**123,900**	**16%**
Primary Care	229,400	275,800	46,400	20%
Non-primary Care	563,800	641,300	77,500	14%
Medical Specialties	128,900	148,700	19,800	15%
Surgery	156,300	183,600	27,300	17%
Other Specialties	253,300	278,400	25,100	10%
Hospitalists*	25,300	30,600	5,300	21%
Scenario 4: Changing Demographics + ACA + Increased Use of Retail Clinics				
Total	**793,200**	**901,200**	**108,000**	**14%**
Primary Care	229,400	250,900	21,500	9%
Non-primary Care	563,800	650,300	86,500	15%
Medical Specialties	128,900	155,000	26,100	20%
Surgery	156,300	179,700	23,400	15%
Other Specialties	253,300	285,100	31,800	13%
Hospitalists*	25,300	30,500	5,200	21%
Scenario 5: Changing Demographics + ACA + Increased Use of Advanced Practice Nurses and PAs ("moderate use" level)				
Total	**793,200**	**886,700**	**93,500**	**12%**
Primary Care	229,400	250,300	20,900	9%
Non-primary Care	563,800	636,400	72,600	13%
Medical Specialties	128,900	151,800	22,900	18%
Surgery	156,300	177,700	21,400	14%
Other Specialties	253,300	276,900	23,600	9%
Hospitalists*	25,300	30,000	4,700	19%
Scenario 6: Changing Demographics + ACA + Increased Use of Advanced Practice Nurses and PAs ("high use" level)				
Total	**793,200**	**858,600**	**65,400**	**8%**
Primary Care	229,400	236,100	6,700	3%
Non-primary Care	563,800	622,500	58,700	10%
Medical Specialties	128,900	148,600	19,700	15%
Surgery	156,300	175,700	19,400	12%
Other Specialties	253,300	268,600	15,300	6%
Hospitalists*	25,300	29,600	4,300	17%

Note: * Includes only hospitalists trained in adult primary care. Hospitalists in non-primary care specialties are included with their individual specialty. The use of Medicare payment data for identifying hospitalists precludes identifying pediatric hospitalists.

Exhibit 26: PC-Trained Hospitalist Physician Supply and Demand Projections by Scenario, 2025

Scenario	2025	Growth (from 25,300 in 2014)	% Growth
Supply			
Status Quo	43,100	17,800	70%
Retire 2 Years Earlier	42,500	17,200	70%
Retire 2 Years Later	43,800	18,500	73%
Millennial Hours	42,600	17,300	68%
GME Expansion	44,600	18,900	75%
Demand			
Changing Demographics	30,300	5,000	20%
ACA Medical Insurance Expansion	30,500	5,200	21%
ACA Insurance Expansion + Managed Care	30,600	5,300	21%
ACA Insurance Expansion + Increased Use of Retail Clinics	30,500	5,200	21%
ACA Insurance Expansion + Increased Use of Advanced Practice Nurses and PAs ("moderate use" practice level)	30,000	4,700	19%
ACA Insurance Expansion + Increased Use of Advanced Practice Nurses and PAs ("high use" practice level)	29,600	4,300	17%

Exhibit 27: Health Care Utilization Equity Scenario 1, 2014

	Physicians				Additional Providers Required	
	Current Supply	Requirements under Equity Scenario	Current Gap	% Gap	Advanced Practice Nurses	Physician Assistants
Total	785,000	825,000	40,100	5%	10,300	5,100
Primary Care	221,200	233,300	12,200	5%	3,200	1,900
Non-primary Care	563,800	591,700	27,900	5%	7,100	3,200
Medical Specialties	128,900	135,700	6,800	5%	1,900	800
Surgery	156,300	164,500	8,200	5%	2,300	1,200
Other Specialties	253,300	265,800	12,100	5%	2,800	1,100
Hospitalists*	25,300	26,100	800	3%	100	100

Note: * Includes only hospitalists trained in adult primary care. Hospitalists in non-primary care specialties are included with their individual specialty. The use of Medicare payments to identify hospitalists precludes identifying pediatric hospitalists.

Exhibit 28: Health Care Utilization Equity Scenario 2, 2014

	Physicians				Additional Providers Required	
	Current Supply	Requirements under Equity Scenario	Current Gap	% Gap	Advanced Practice Nurses	Physician Assistants
Total	785,000	881,200	96,200	12%	25,800	12,200
Primary Care	221,200	245,700	24,500	11%	6,600	3,800
Non-primary Care	563,800	635,500	71,700	13%	19,200	8,400
Medical Specialties	128,900	140,300	11,400	9%	3,100	1,400
Surgery	156,300	180,300	24,000	15%	5,500	3,600
Other Specialties	253,300	288,000	34,700	14%	10,400	3,200
Hospitalists*	25,300	26,900	1,600	6%	200	200

Note: * Includes only hospitalists trained in adult primary care. Hospitalists in non-primary care specialties are included with their individual specialty. The use of Medicare payments to identify hospitalists precludes identifying pediatric hospitalists.