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RESEARCH ARTICLE

Wage Growth for the Health Care Workforce: Projecting the Affordable Care Act Impact

Stephen T. Parente, Roger Feldman, Joanne Spetz, and Bryan Dowd

Objective. To predict changes in wage growth for health care workers based on projections of insurance enrollment from the Affordable Care Act (ACA).

Data Sources. Enrollment data came from three large employers and a sampling of premiums from ehealthinsurance.com. Information on state Medicaid eligibility rules and costs were from the Kaiser Family Foundation. National predictions were based on the MEPS and Medicare Current Beneficiary surveys. Bureau of Labor Statistics data were used to estimate employment.

Study Design. We projected health insurance enrollment by plan type using a health plan choice model. Using claims data, we measured the services demanded for each plan choice and year. Projections of labor demand were based on current output/input ratios. Changes in wages resulting from changes in labor demand from 2014 to 2021 were based on labor supply and demand elasticities.

Principal Findings. Expenditures required to retain and grow the health care workforce will increase substantially. Wages will increase most for professions with the greatest training requirements (physicians and registered nurses). The largest impact will be felt in 2015.

Conclusions. Projected wage increases for health care workers may drive substantial growth in insurance premiums and reduce the affordability of health insurance.

Key Words. Health reform, health care workforce, physician supply, registered nurse supply, microsimulation, insurance, uninsured

This study seeks to understand how the 2010 Affordable Care Act (ACA) will impact the demand for health care workers and their wages. Because the ACA will increase the population covered by health insurance, the demand for health care services, and thus providers, is expected to increase. What wage increases will be necessary to bring the supply of health care providers, including physicians, nurses, medical aides, technicians, and home health aides, in

line with the new level of demand? This study uses projections of insurance enrollment by plan type for the under-65 and Medicare populations, services demanded per enrollee in each plan type, and services supplied by each type of provider to predict the increase in demand for each provider category. The increase in demand is then coupled with supply projections and elasticity estimates to determine the change in demand and the input price impact from the ACA compared with the no-ACA baseline.

This analysis improves our understanding of how the ACA will impact the demand for health care services, and it predicts the magnitude to which health care professions will experience labor shortages and wage changes. The labor market for each health occupation is distinct due to differences in licensing regulations, educational requirements, and skill; thus, the ACA should impact each labor market differently. The short- and long-term effects of the ACA on labor markets also will differ. By anticipating gaps between demand and supply, and resulting wage inflation, we can better develop policies to address the need for health professionals and prepare for the impact of rising wages on health care costs and insurance premiums.

Background

The ACA impacts every part of the U.S. health care system: the employer-sponsored and individual insurance markets, Medicare, Medicaid, and health care providers. Key among the reforms is the expansion of insurance options for the uninsured and the individual mandate that requires most individuals to have a qualified insurance plan.

The expansion of health insurance is achieved through three major reforms that started in 2014: the expansion of Medicaid; the creation of state-based insurance marketplaces with subsidies for those with low income; and the guaranteed issue requirement for insurance companies. States have the option to use federal dollars to expand their Medicaid programs for all adults with household incomes below 133 percent of the federal poverty level. In

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addition, state-based insurance marketplaces were created to enable low- and middle-income Americans to purchase subsidized coverage. Plans in these marketplaces, often referred to as “exchanges,” are put in a “metal level” category according to their actuarial value, with consumers having options of Bronze, Silver, Gold, or Platinum plans with ascending levels of benefits.

It is important to note that there is mixed evidence about the long-term correlation between insurance coverage and health care utilization. Those who are uninsured still use the health care system; some pay for their medical needs out of pocket, some have access to free or reduced-fee medical care, and all individuals regardless of insurance status must be treated in emergency rooms under the Emergency Medical Treatment and Active Labor Act (EMTALA).

In addition, some predictions suggest that better access to primary care resulting from the insurance expansion may reduce emergency department visits and hospital admissions (Bodenheimer and Pham 2010). Having insurance to cover prescription drugs may limit the need for doctor visits in some patient populations. And, as seen in some patient populations, an insurance card does not guarantee access to necessary medical care; other barriers such as a high deductible or difficulty finding a provider that accepts Medicaid patients may deter the newly insured from treatment (Cheung et al. 2012; Decker 2013).

Past studies have looked at the linkages between insurance coverage and medical care utilization, but most of the literature regarding the impact of the ACA on health professional demand focuses on physician visits and potential shortages in the primary care workforce. Petterson et al. (2012) forecasted the demand for primary care physicians through 2025, considering population growth, aging, and the impact of the ACA. They estimated that 52,000 more primary physicians will be needed by 2025, with the ACA driving approximately 17 percent of the increase. Population growth will require 33,000 additional physicians, aging will increase demand by another 10,000, and insurance expansion will account for about 8,000 additional physicians, a 3 percent increase in the primary care physician workforce.

Other studies have estimated smaller increases in the demand for primary care providers. Hofer, Abraham, and Moscovice (2011) predicted the increase in primary care visits from the ACA. Adopting the Congressional Budget Office’s estimate of an additional 32 million insured, they found that the demand for primary care visits will increase by 15.07–24.26 million in 2019, and meeting that demand would necessitate 4,307 to 6,940 new physicians. A more recent analysis by the U.S. Department of Health and Human

Services estimates that up to 20,400 additional primary care physicians will be required by 2020, with 19 percent of this increase due to the ACA and the remainder to aging and population growth (U.S. Department of Health and Human Services, Health Resources and Services Administration 2013).

Other research has found that the ACA will impact the demand for medical specialists. Using a microsimulation model of health care demand, Dall et al. (2013) estimated that primary care demand would rise only about 2 percent by 2025 due to the ACA, but demand for specialist care would rise substantially more due to high rates of chronic conditions among the newly insured. Including both the impact of the ACA and demographic change, total growth by 2025 was projected to be 14 percent for primary care and over 30 percent for vascular surgery.

Research on the 2006 Massachusetts health insurance expansion finds evidence of higher health care utilization, longer wait times for physician appointments, and mixed evidence on emergency department use (Long and Stockley 2011; Smulowitz et al. 2011; Kolstad and Kowalski 2012; Miller 2012). One study found that total health care employment per capita in Massachusetts grew more rapidly after reform, compared with the rest of the country (Staiger, Auerbach, and Buerhaus 2011). Most of the difference in health care employment growth occurred in administrative positions, which grew by 18.4 percent per capita in Massachusetts from 2005–2006 to 2008–2009, compared with 8.0 percent national growth during that time.

It is difficult to extrapolate the Massachusetts experience to the entire nation because health workers can move across state lines to meet the increased demand for health care workers in one state. The health professional labor market may not function perfectly across state lines, however, due to medical licensure laws that often require licensure in the state of practice. These licensure laws generally confine the labor market to the United States because it is difficult for providers trained in other countries to enter the U.S. health care workforce.

Previous research has not studied the impact of a nationwide expansion of health insurance coverage on wages for physicians, nonphysician medical providers, and administrative professionals. One of the few studies that examined a national health insurance expansion found that expansion of the State Children's Health Insurance Program in 1997 had little impact on provider utilization (White 2012). This study was based on a comparatively limited population, and the aforementioned studies projecting the impact of the ACA focused largely on primary care and physician shortages rather than studying

the entire workforce and any wage adjustments that would occur from the increased coverage and demand for medical services.

In summary, the workforce literature—while robust—is not able to provide reliable estimates of the ACA impact on either labor force projections over time or wages.

METHODS

Health Insurance Enrollment by Plan Type

This analysis begins by looking at insurance plan enrollment for both the newly insured and already-insured U.S. populations under age 65 and Medicare. To project health insurance take-up in the under-65 population by plan type from 2013 to 2021, we used the Adjusted Risk Choice & Outcomes Legislative Assessment (ARCOLA) model (Feldman et al. 2005; Parente and Feldman 2013). The model includes employer and individually purchased insurance, Medicare and Medicaid. It can produce state-specific predictions of policy changes, such as predicting Medicaid enrollment in states that choose to expand their Medicaid programs under the ACA. Parente and Feldman (2013) estimated that 7.5 million more people would be insured through private insurance in 2014. This was within half a million of the actual estimate released by CMS at the end of 2014 (ASPE 2014).

The model uses a utility-maximization assumption with plan variables including the tax-adjusted premium, savings and reimbursement accounts, deductibles and coinsurance. The consumer's age, gender, income, and household size are accounted for by interacting them with plan characteristics. Then, using the Medical Expenditure Panel Survey (MEPS), the model assigns plan choice probabilities to the MEPS sample, which are scaled up to the U.S. population under age 65.

Plan enrollment from 2014 to 2021 was predicted under different ACA scenarios. A “likely” implementation schedule was ultimately used, in which it takes 3 years for the full enrollment adjustments to occur. The model was also estimated with “perfect” implementation, where all insurance take-up occurs immediately in 2014; details are provided in the online Technical Appendix. Even though the model was created prior to the ACA's exchange website and implementation issues, the “likely” scenario predicts a relatively slow take-up of exchange plans and thus far appears to accurately reflect enrollment in the first year of implementation.

Table 1 displays the plan enrollment predictions under current law. The number of uninsured under age 65 drops from 44,685,000 in 2013 to 22,089,000 in 2016 when everyone who is predicted by the model to sign up for coverage has done so. Thereafter, the number of uninsured begins to increase slowly again. This is due to further increases in health insurance premiums, which are only partly offset by the ACA subsidies.

The enrollment projections in Table 1 account for incentives in the ACA for employees to drop employer-sponsored coverage and enroll in exchanges. This is identified by plans labeled “ESI 2”: any ESI 2 label means that people turn down employer coverage to enroll in a plan of that type in the exchanges.

The Medicare population in Table 1 is divided into Fee-for-Service (FFS) Medicare without Part D, Fee-for-Service with Part D, and Medicare Advantage (MA). While the ACA will affect enrollment in each sector (e.g., by cutting payments to MA plans and FFS providers), we projected Medicare enrollment using demographic trends rather than ACA changes to the entitlement program.

The technical appendix’s Table T-1 shows “No ACA” as the alternative enrollment prediction. Here, the number of uninsured increases to 60,041,000 in 2021.

Medical Service Utilization by Plan Type

The model uses nationally representative claims data from multiple employers and private payers to estimate the use of medical services per person by type of private insurance plan.¹ Medicare and Medicaid claims data from 2011 were used to project utilization for the populations in Fee-for-Service Medicare, Medicare Advantage, and Medicaid.

Health care services are physician office visits (including visits to nurse practitioners and physician assistants), inpatient admissions to hospitals (including mental health and specialty hospitals), outpatient services provided at hospitals (emergency department visits, laboratory/radiology, ambulatory surgery, etc.), prescriptions, durable medical equipment, skilled nursing facility care, and home health visits.

The utilization estimates for new plans created by the ACA (Platinum, Gold, Silver, and Bronze plans) were based on health plan designs that closely match the “metallic” plans on medical loss ratio (MLR), provider panel “narrowness,” and coinsurance/copayment specifications. We assume that

Table 1: Insurance Enrollment by Plan Type under the ACA in Thousands, 2013–2021

Plan Choice	Predicted Enrollment ('000s) Under ACA										
	2013	2014	2015	2016	2017	2018	2019	2020	2021		
Under 65											
Platinum	2,898	3,115	3,337	3,316	1,994	1,400	980	684	449		
Gold	146	59	71	80	45	34	25	20	15		
Silver	4,969	7,726	6,981	6,855	7,695	7,799	7,892	7,972	8,050		
Bronze	13,096	19,268	22,561	27,542	24,888	25,214	25,443	25,596	25,663		
Catastrophic	6,759	971	982	1,100	1,227	1,242	1,254	1,264	1,274		
Choose Medicaid	34,587	41,815	45,427	46,312	47,515	48,389	49,244	50,082	50,912		
Uninsured	44,685	34,563	27,459	22,089	25,079	25,480	25,863	26,223	26,584		
HMO	6,678	6,430	6,268	6,217	6,743	6,712	6,638	6,553	6,485		
HRA	10,873	9,988	9,569	9,424	10,538	10,611	10,650	10,646	10,587		
HSA_E	5,274	5,378	5,858	6,497	7,898	8,873	9,966	11,180	12,517		
HSA_S	2,373	17,467	21,418	23,549	12,752	13,249	13,754	14,269	14,796		
ESI2 self-pay low PPO	6,971	9,196	11,869	13,256	10,711	10,771	10,836	10,902	10,962		
PPO high	28,563	26,078	24,497	23,252	23,916	22,833	21,659	20,411	19,097		
PPO low	1,344	1,354	1,415	1,502	1,770	1,897	2,018	2,137	2,265		
PPO medium	86,578	77,595	72,924	70,041	77,352	75,808	74,207	72,548	70,779		
ESI2 individual	1,098	1,402	1,857	2,507	4,219	5,450	6,765	8,088	9,393		
ESI2 uninsured	10,405	5,867	5,565	5,450	6,130	6,192	6,228	6,254	6,289		
ESI2 other ESI	79	101	134	181	305	394	489	585	679		
ESI2 Medicaid	1,938	2,127	2,425	2,742	3,107	3,479	3,891	4,365	4,925		
Total lives	269,315	270,502	270,619	271,912	273,885	275,826	277,802	279,776	281,722		
Over 65											
Fee-for-service	9,233	9,973	10,714	11,455	12,195	12,936	13,676	14,417	15,157		
Medicare advantage HMO	10,797	11,381	11,965	12,549	13,134	13,718	14,302	14,886	15,471		
Part D and fee-for-service	19,697	20,356	21,015	21,674	22,333	22,992	23,651	24,310	24,969		
Total lives	39,727	41,710	43,694	45,678	47,662	49,645	51,629	53,613	55,597		

enrollees in the exchanges will have the same average claims as those in comparable employer-sponsored plans.

Due to limitations in the claims data, the ARCOLA model does not estimate utilization of nonhospital outpatient services, such as physical therapy in freestanding centers, nonhospital radiology and laboratory tests, and ambulatory surgery in freestanding surgery centers. We assumed that the rate of growth in these services will be proportional to the rate of growth of office visits. Also due to limitations in the claims data, the ARCOLA model does not estimate long-term and residential care utilization. Because the Affordable Care Act does not have any substantial provisions affecting the demand for long-term care, the omission of these data should have a minimal impact on the results.

We generated per capita utilization of services by enrollees in each type of plan for the under-65 and Medicare populations. Medical care utilization varies substantially by type of insurance coverage (Table 2); for example, enrollees of Bronze-type plans are expected to use 2.16 physician visits per year, compared with Platinum plan enrollees, who use 2.97 visits per year. We calculated total services demanded by plan and year from 2014 to 2021 by multiplying the projected number of individuals in each plan type in each year by these average utilization projections. These are broken down by claim category: doctor's office visit, hospital admission, hospital outpatient, prescriptions, medical devices, skilled nursing facility admissions, and home health visits.

Our study does not permit an experimental or quasi-experimental design to adequately describe how the change in health insurance demand will affect the demand for medical care. However, we are able to compare our results to the RAND Health Insurance Experiment and the Oregon Medicaid Experiment. According to our claims data, there were 2.16 physician visits per member per year in the under-65 Bronze plan, increasing to 2.97 PMPY in the Platinum plan (37.5 percent increase). Hospital admissions increased from 0.06 to 0.08 PMPY (33.3 percent). The RAND Health Insurance Experiment found a 66 percent increase in face-to-face visits in the free plan versus a high-deductible plan with 5 percent coinsurance (Newhouse et al. 1993). The free plan was more generous than Platinum coverage (which has 90 percent actuarial value), so it is reasonable that changes in demand in the RAND experiment were larger than those in our claims data. RAND found that total admissions increased by 29 percent, which is slightly less than our estimate but within a reasonable range.

Table 2: Annual Service Utilization Per Capita by Plan Type, 2013

Plan Choice	Annual Claims Per Capita						Home Health Visits
	MD Visits	Admissions	Outpatient Visits	Prescriptions	Medical Devices	SNF Days	
Under 65							
Platinum	2.97	0.08	0.46	10.99	0.97	0.92	1.01
Gold	2.70	0.07	0.42	9.99	0.84	0.80	0.88
Silver	2.43	0.06	0.38	8.99	1.03	0.98	1.08
Bronze	2.16	0.06	0.34	7.99	0.87	0.83	0.91
Catastrophic	1.89	0.05	0.29	6.99	0.99	0.94	1.03
Choose Medicaid	1.62	0.04	0.25	6.00	0.94	0.89	0.98
Uninsured	0.75	0.04	0.21	5.00	0.98	0.93	1.02
HMO	2.30	0.06	0.36	8.49	1.03	0.98	1.08
HRA	2.65	0.05	0.35	7.81	0.95	0.90	0.99
HSA_E	1.89	0.05	0.29	6.99	1.04	0.99	1.09
HSA_S	1.89	0.05	0.29	6.99	0.86	0.82	0.90
ESI 2 self-pay low PPO	2.16	0.06	0.34	7.99	1.08	1.03	1.13
PPO high	2.97	0.08	0.46	10.99	1.03	0.98	1.08
PPO low	2.16	0.06	0.34	7.99	0.98	0.93	1.02
PPO medium	2.43	0.06	0.38	8.99	0.93	0.88	0.97
ESI 2 individual	1.89	0.05	0.29	6.99	0.99	0.94	1.03
ESI 2 uninsured	0.75	0.04	0.21	5.00	1.02	0.97	1.07
ESI 2 other ESI	2.43	0.06	0.38	8.99	0.97	0.92	1.01
ESI 2 Medicaid	1.62	0.04	0.25	6.00	1.03	0.98	1.08
Over 65							
Fee-for-service Medicare advantage HMO	4.54	0.12	0.71	13.59	2.27	2.15	2.37
Part D and fee-for-service	4.11	0.11	0.64	15.19	2.05	1.95	2.14
Part D and fee-for-service	6.06	0.16	0.94	20.78	3.02	2.87	3.16

In the first year of the Oregon experiment, Medicaid coverage raised the probability of using outpatient care by 35 percent, of using prescription drugs by 15 percent, and of hospital admission by 30 percent (Baicker and Finkelstein 2011; Finkelstein et al. 2012). Our claims-based estimates suggest increases of 116 percent, 20 percent, and zero percent, respectively, when an uninsured person gains Medicaid coverage. Because our estimates of a large increase for outpatient care and no increase for admissions differ from the Oregon findings, we adjusted the claims to match the Oregon data.

Determining Medical Productivity by Care Setting and Provider Category

The National Industry-Occupation Employment Matrix from the U.S. Bureau of Labor Statistics (BLS) provides estimates of employment by industry in 2012 (U.S. Bureau of Labor Statistics 2013). We used the North American Industry Classification System categories in the Matrix to estimate employment in hospitals (NAICS 622000), physician offices (NAICS 62110), pharmacies and drug stores (NAICS 446110), medical equipment supplies and manufacturing (NAICS 339100), outpatient care centers (NAICS 621400, 621500, and 621900), skilled nursing facilities (NAICS 623000), and home health visits (NAICS 621600). For these industry categories, we extracted employment data for health care occupations identified by the 2010 Standard Occupational System: health care practitioners and technical occupations (SOC 29-0000) and health care support occupations (SOC 31-0000). We focused on a subset of these occupations: physicians, health care diagnostic and treatment technicians, registered nurses, licensed practical/vocational nurses, nursing assistants and aides, and nonmedical administrative positions.

Growth rates in health service demand estimated from the insurance enrollment projections and claims data were translated into estimates of growth rates in the demand for health care occupations using the Industry-Occupation Matrix employment estimates. We calculated the productivity of each workforce category, for example, the number of doctors required to produce physician visits, using 2012 employment data and our 2013 demand estimates. The application of this matrix for simulation purposes was first published by Frogner et al. (2015). Productivity was calculated for each service category (physician visit, hospital admission, hospital outpatient, prescription, medical device, skilled nursing facility, and home health) and each type of provider (physicians, non-MD technicians, registered nurses, licensed practical nurses, nurses' aides, and nonmedical administrative positions). These estimates are presented in the online Technical Appendix as Table T-2.

Baseline and Future Supply Projections

The ARCOLA model projected the number of additional health care workers that will be demanded in a no-ACA scenario and the ACA scenario. The difference between the demand for providers in 2013 (pre-ACA) and demand in subsequent years was calculated to obtain the number of additional providers needed per year. We allocated incoming professionals into care settings based on their employment settings in 2013. The projections of the difference

between the 2013 baseline and future years, less anticipated graduations of students who enrolled prior to 2013, were calculated for each labor category.

These results are presented in Table 3 as percentage changes in demand, by labor category and year from 2014 to 2021. The annual growth in demand for physicians due to the ACA ranges from a low of 0.47 percent (2021) to a high of 2.12 percent (2014). The cumulative growth in demand for doctors is 10.3 percent from 2014 to 2021, compared with the no-ACA baseline. Note that this 10.3 percent cumulative growth represents the total effect of 8 years of small increases in demand ranging from 0.47 to 2.12 percent per year. One may only need 1 percent more physicians to meet the increase in demand from a given year, but that population will remain insured and new growth in demand above the baseline will add another 1 percent in a subsequent year. Given that supply and demand for doctors are inelastic, a shift in demand of this size will push up wages by a substantial amount. Of six labor categories presented in Table 3, physicians, medical aides, and LPNs are projected to have the greatest increases in demand due to the ACA. Less affected are home health aides, registered nurses, and technical positions.

We also estimated the number of newly licensed providers expected to enter the labor market, based on current enrollments and graduation trends. This exogenous supply change existed only for physicians and nurses because those professionals have a “pipeline” of students in medical and nursing schools.²

The Wage Adjustment Process

To predict how changes in demand and supply will affect wages, we needed to link the change in demand and supply for labor inputs with the elasticities of

Table 3: Percentage Changes in Demand, by Labor Category and Year

<i>Labor Category</i>	<i>2014</i>	<i>2015</i>	<i>2016</i>	<i>2017</i>	<i>2018</i>	<i>2019</i>	<i>2020</i>	<i>2021</i>	<i>2014–2021</i>
Physician	2.12	1.53	1.85	1.35	1.00	0.87	0.69	0.47	10.32
Technician	1.42	1.00	1.30	1.04	0.69	0.60	0.46	0.05	6.74
Registered nurse	1.31	0.90	1.22	0.96	0.60	0.50	0.37	−0.02	5.99
Licensed practical nurse	2.12	1.55	1.86	1.41	1.11	1.00	0.82	0.48	10.81
Medical aide	2.55	1.90	2.19	1.64	1.36	1.24	1.05	0.62	13.24
Home health aide	0.76	0.47	0.79	0.73	0.38	0.31	0.21	−0.18	3.54

demand and supply for the inputs. To do so, we started with the demand and supply functions for an input:

$$\begin{aligned} Q_D &= \alpha_1 - \alpha_2 P + X_D \\ Q_S &= \beta_1 + \beta_2 P + X_S \end{aligned} \quad (1)$$

All variables in equation (1) are measured in natural logarithms where: Q = quantity; P = price; X_D = shift in demand for the input due to the ACA; X_S = exogenous shift in supply of the input; α_1, β_1 = intercepts; $-\alpha_2$ = price elasticity of demand for input; β_2 = long-run price elasticity of supply for input.

We can solve for the equilibrium input price:

$$P = \frac{\alpha_1 - \beta_1 + (X_D - X_S)}{\alpha_2 + \beta_2} \quad (2)$$

We estimate X_D but treat X_S as exogenous because it represents doctors or nurses in the training pipeline. It follows that the input price elasticity with respect to the *net shift* in demand is:

$$dP/dX = \frac{1}{\alpha_2 + \beta_2} \quad (3)$$

where $X = X_D - X_S$. The input price elasticity depends on the price elasticities of demand and supply for the input (α_2 and β_2). As these increase, the input price elasticity decreases.

Let the net percentage change in demand be ΔX . Then, the percentage change in the input price with respect to that shift is:

$$\Delta P = (dP/dX)\Delta X = \frac{\Delta X}{\alpha_2 + \beta_2} \quad (4)$$

We used equation (4) to predict how the ACA affects input prices in the long run. The calculations required that we make assumptions about the most likely supply and demand elasticities for each type of labor. We surveyed the literature on the supply and demand for health workers to identify elasticities, described in more detail in the technical appendix with specific estimates we used presented in Table T-4. Several different elasticity estimates were used to test the sensitivity of the results to the elasticities.

While the elasticity of demand stayed constant from 2014 to 2021, we used different short- and long-run supply elasticity estimates depending on the labor category. The elasticity of supply of some inputs may be lower (less responsive to price) in the short run due to the length of the training period or supply bottlenecks. We assumed $\beta_2 = 0.20$ for doctors over the entire projection period because this profession has the most restricted supply. For

the other professions, labor supply is assumed to become increasingly elastic over time, based on a linear transition between short- and long-run elasticities.

The model also includes a lag in wage adjustment because some health care workers are employed in multiyear contracts that are renegotiated at fixed intervals. Full wage adjustment takes 3 years. The National Sample Survey of Registered Nurses in 2008 found unionization rates of 6 percent of nurses in ambulatory care, 18.6 percent of nurses employed in hospitals, and 40.4 percent of nurses working in school health. Unionized workers are likely to be covered by multiyear labor contracts that will adjust over time to the new demand conditions of the ACA.

RESULTS

Figures 1 and 2 display the annual and cumulative wage increases for physicians and registered nurses. Table 4 shows these trends for technicians, registered nurses, licensed practical nurses, medical aides, and home health aides.

Figure 1: Physician Wage Growth, 2014–2021

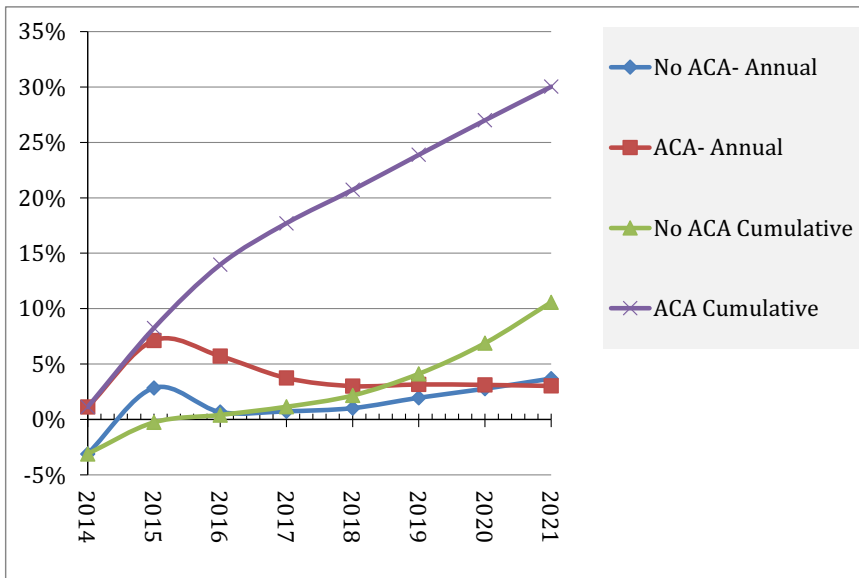
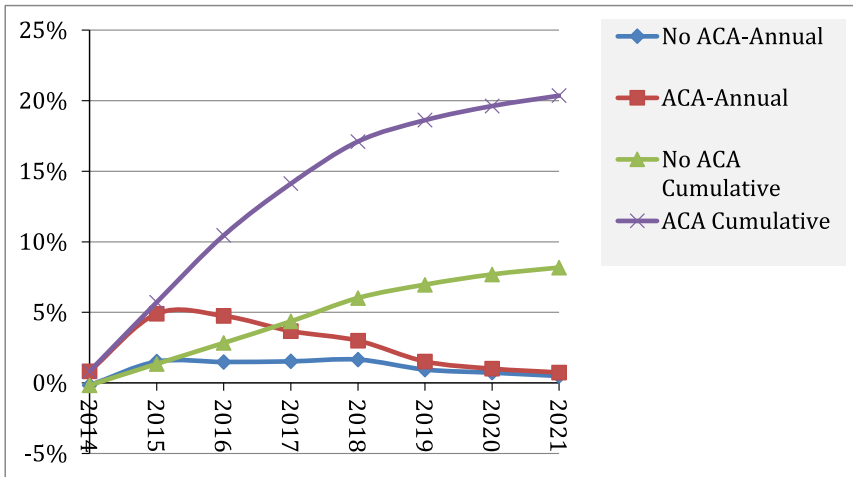


Figure 2: Registered Nurse Wage Growth, 2014–2021



Two scenarios are displayed: the baseline with no ACA; and the current law scenario with the most likely implementation of the ACA.

We project significant wage increases for all workforce categories in the ACA scenario compared with the baseline. The effects for all workforce categories are most pronounced in 2015 and 2016, and then stabilize to near-baseline wage growth. However, the increased wage growth rates in the initial implementation years create a cumulative growth rate over 2014–2021 that outpaces the non-ACA wage growth.

At the high end, physician wages grow 30 percent from 2014 to 2021 in the ACA scenario, compared with baseline growth of 10.6 percent—a remarkable increase for the highest-paid providers in the health care system. In contrast, home health aides are projected to see 6 percent wage growth from 2014 to 2021 compared with 3.9 percent in the absence of the ACA. As the graphs below show, the key years for wage growth are 2015 and 2016, after which growth rates stabilize.

Registered nurses will see the second-highest wage growth of 20.4 percent from 2014 to 2021. Like physicians, registered nurses go through multiple years of training to enter the profession and thus the labor supply is less elastic. Without the ACA, wage growth is projected to be 8.4 percent, reflecting the growing demand for nursing care due to changing population demographics. As with other professions, the highest wage growth occurs in 2015 and 2016.

Table 4: Wage Growth of Technicians, Licensed Practice Nurses, Assistants and Aides, and Home Health Aides, 2014–2021

	<i>No ACA</i>	<i>ACA Likely</i>	<i>No ACA Summed</i>	<i>ACA Summed</i>
Technicians (%)				
2014	0.5	0.4	0.5	0.4
2015	0.4	1.7	0.9	2.1
2016	0.4	1.5	1.2	3.7
2017	0.3	0.9	1.6	4.6
2018	0.3	0.7	1.9	5.2
2019	0.3	0.6	2.2	5.8
2020	0.3	0.5	2.6	6.3
2021	0.5	0.5	3.1	6.8
Licensed practical nurses (%)				
2014	0.1	0.5	0.1	0.5
2015	0.0	2.1	0.1	2.6
2016	0.0	1.7	0.0	4.3
2017	0.0	0.9	0.0	5.2
2018	0.0	0.6	0.0	5.8
2019	0.0	0.6	0.0	6.4
2020	0.1	0.5	0.1	6.9
2021	0.2	0.5	0.3	7.4
Assistants and aides (%)				
2014	0.1	0.5	0.1	0.5
2015	0.0	2.1	0.1	2.6
2016	0.0	1.7	0.0	4.3
2017	0.0	0.9	0.0	5.2
2018	0.0	0.6	0.0	5.8
2019	0.0	0.6	0.0	6.4
2020	0.1	0.5	0.1	6.9
2021	0.2	0.5	0.3	7.4
Home health aides (%)				
2014	0.6	0.3	0.6	0.3
2015	0.6	1.4	1.2	1.7
2016	0.5	1.3	1.7	3.0
2017	0.5	0.9	2.2	3.9
2018	0.4	0.6	2.6	4.5
2019	0.4	0.5	3.0	5.0
2020	0.4	0.5	3.4	5.5
2021	0.5	0.5	3.9	6.0

Medical technicians are projected to have moderate wage growth of 6.8 percent from 2014 to 2021, but this is a little over twice their projected baseline wage growth of 3 percent. Annual growth rates for this group are relatively low, exceeding 1 percent only in 2015 and 2016. Licensed practical nurses also are projected to see moderate wage growth of 7.4 percent from 2014 to 2021

compared with a baseline estimate of only 0.3 percent over that period. Both of these occupations have lower training requirements than RNs and physicians, so their labor supply is more elastic and can more readily grow to meet the new levels of demand.

Assistants and aides are projected to see the same wage growth rate as licensed practical nurses, 7.4 percent over 2014–2021 compared with a baseline rate of 0.3 percent. Unlike the other professions, higher growth rates for medical aides persist throughout our forecasting period as the wage growth curves for the other occupations return to baseline levels after 2017.

Home health aides are projected to have the lowest wage growth of the professions studied: only 6 percent from 2014 to 2021. However, this is double the 3 cumulative percent wage growth in the baseline projection. As with other workforce categories, home health aides see wage growth increasing relative to the baseline in 2015 and 2016, and then growth rates return to the baseline once they have adjusted to meet the rising demand.

Limitations

This analysis has several limitations. The first is that we made numerous assumptions to complete the complex analyses both in the ARCOLA model and in the wage elasticity estimates. Our assumptions regarding the elasticity of supply and demand were drawn from an assessment of the best estimates in the literature, but the labor markets may prove to be more or less elastic than our predictions. If health care labor markets are more elastic than our assumptions, wage adjustments will be less dramatic than our projections. In addition, expansions in undergraduate medical education programs, medical residencies, and nursing schools (including nurse practitioner programs) could dampen the wage growth we predict.

Another key assumption is that rates of medical claims and provider productivity will be constant. New treatments, new models of care (e.g., patient-centered medical homes), new technology (e.g., health information technology [HIT]), or a healthier population may lead to fewer visits per patient or fewer health workers needed to provide the services demanded. Although HIT is often identified as a key source of potential efficiency improvements, recent evidence (Lee, McCullough, and Town 2013) indicates that HIT may have limited potential to reduce costs, at least in the near future. Organizational innovations and changes, such as patient-centered medical homes, also could improve the efficiency of health care delivery, thus reducing the demand for providers (Auerbach et al. 2013; Bodenheimer and Smith

2013; Green, Savin, and Lu 2013; Shipman and Sinsky 2013). Finally, there may be regional differences in labor markets, as well as differences across sub-groups within professions such as physician specialists versus primary care physicians.

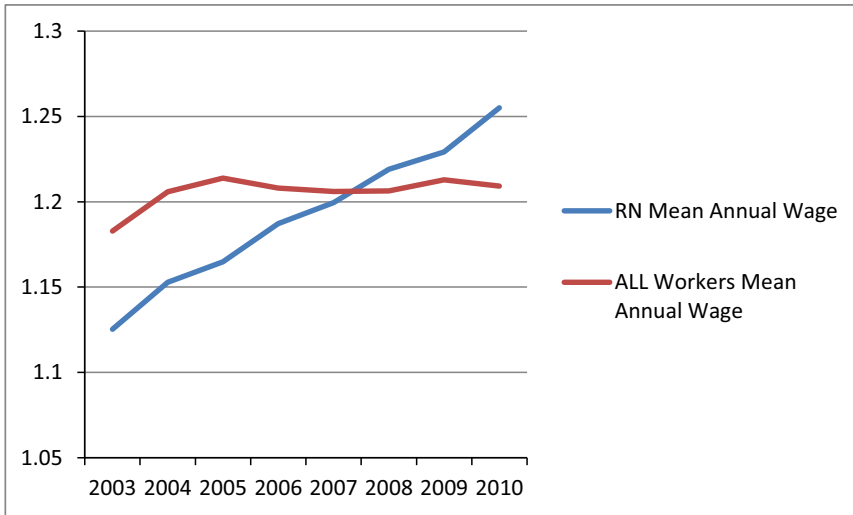
Policy Implications

The ACA-fueled increase in the demand for health care workers is projected to increase wages across the health care workforce, with the largest impacts for physicians and registered nurses. With physicians already accounting for 24 percent of personal health care spending,³ thirty percent wage growth from 2014 to 2021 would put tremendous strain on patients' resources and the federal budget. Registered nurses are the largest health care occupation, and the largest expense in hospitals, so the projected wage growth of 20.4 percent from 2014 to 2021 could also have a large impact on overall health care costs.

The only point of reference for the effect of the ACA insurance expansion on wages is the Massachusetts expansion in 2006. We compared trends in RN wages in Massachusetts before and after 2006 to national trends. We expected to see a break after 2006, with nurses in Massachusetts gaining relative to the national average after health reform. However, as seen in Figure 3, nurses' wages in Massachusetts were trending upward every year from 2003 through 2010. Perhaps Massachusetts had permanent excess demand for nurses, before and after health reform. Staiger, Auerbach, and Buerhaus (2011) found that Massachusetts reform increased the demand for health care occupations, but most of the increase was in administrative occupations. If these administrative occupations required clinical training, such as care management positions, that may explain some of the labor market impact among nurses.

We considered the effect of uncertain provider pricing from the new Medicaid expansions on physicians' wages. Our analysis captures differences due to demographic factors (e.g., a younger population in Medicaid) and benefit designs, but Medicaid and exchange plans may simply pay less to doctors than other plans, thereby putting downward pressure on physicians' wages. However, the Affordable Care Act required that states increase Medicaid primary care fees to at least the Medicare levels in 2013 and 2014. The federal government funded 100 percent of the increase until December 31, 2014. Fifteen states indicated that they would continue the primary care fee increase at least in part in 2015. While Medicaid fees continue to lag those for private

Figure 3: Ratio of RN Annual Wage and All Workers Annual Wage in MA to National Levels



Source: U.S. Bureau of Labor Statistics, Occupational Employment Statistics, available at <http://www.bls.gov/oes/>

patients, the discrepancy going forward will be smaller than in the past (Kaiser Commission on Medicaid and the Uninsured, 2014).

One goal of the ACA is to rein in health care costs, with “costs” widely defined to include insurance premiums, the price of medical services, and spending on federal health care programs. The Congressional Budget Office scored the legislation as saving money relative to the baseline federal budget. However, the analysis presented here suggests that the market will have to pay substantially higher wages to the health care workforce. If this occurs, it will be difficult to keep insurance premiums, the cost of services, and the amount spent on Medicare and Medicaid from rising in turn.

CONCLUSION

We project an increase in labor costs for the health care professions studied from 2014 to 2021, with the ACA leading to a large increase relative to baseline wage growth. This suggests that the ACA will lead to short-term provider shortages, which then will lead to rising wages and, as a result, rising

reimbursements and insurance premiums. Additional research is needed to understand the factors that affect the elasticity of supply and demand for different health care professions. Research also is needed to understand which potential policy and health care delivery changes could limit the wage increases that will occur from the increase in demand for medical care. Increasing the pipeline of health care providers coming through schools, and educational opportunities for medical aides and technicians to transfer into nursing roles and for nurses to transition into advance practice nursing are among the strategies that can be explored. Innovative care delivery models show promise to improve the efficiency of care delivery, but payment reforms will be needed to support these changes. The potential for reimbursement systems that reward value over the volume of care needs to be assessed and, if payment reforms could support such changes, implemented rapidly to prevent escalation in health care costs.

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Disclaimers: None.

NOTES

1. The claims data were provided by HSI Network LLC.
2. The exogenous increase in the supply of physicians varied by year, but it was typically 4,000–5,000 per year from 2014 to 2021. The exogenous increase in the supply of nurses was 27,500 per year from 2014 to 2021.
3. National Health Care Expenditure Tables, Centers for Medicare and Medicaid Services, available at <http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/index.html>.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

- Appendix SA1: Author Matrix.
- Data S1. Technical Appendix.