The Effect of Massachusetts Health Reform on Access to Care for Medicaid Beneficiaries

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ABSTRACT

OBJECTIVES: To address concerns that expanding insurance coverage without expanding provider supply can lead to worse access for the previously insured, we examined whether previously insured Medicaid beneficiaries faced greater difficulties accessing primary care after statewide insurance expansion in Massachusetts.

STUDY DESIGN: We used the Medicaid Analytic eXtract databases for Massachusetts and 3 New England control states for 2006 and 2009. We calculated rates of overall, acute, and chronic preventable admissions (or Prevention Quality Indicators [PQIs]) and a composite of control conditions for adults aged 21 to 64 years.

METHODS: We used multivariate Poisson regression models, adjusting for age, race, gender, reason for Medicaid eligibility, and state-level physician supply, as well as a difference-in-differences (DID) approach to compare the change in the rate of PQIs and control admissions in Massachusetts versus control states before and after health reform.

RESULTS: Massachusetts and control states had increases in unadjusted rates of overall, acute, and chronic PQIs. When adjusting for age, race, gender, reason for eligibility, and physician supply, this increase persisted for overall and chronic PQIs in control states, with no significant difference in the relative increase between the 2 groups for any of the PQI measures. For the within-Massachusetts analysis, low-uptake counties had a significant increase in admission for chronic PQIs that was greater than that observed for high-uptake counties (+148.0 vs +36.0; $P = .045$ for DID). There was no significant DID for acute or overall PQIs between the 2 groups.

CONCLUSIONS: We found no evidence that insurance expansion in Massachusetts, compared with control states, reduced access to primary care for vulnerable Medicaid beneficiaries.

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The Affordable Care Act (ACA) remains controversial 6 years after its passage.[1] Although the law has increased the number of insured Americans,[2] its impact on the broader healthcare system remains unclear. One important concern regarding insurance expansions is how such efforts might impact those Americans who were already insured. The reason for concern is straightforward: as insurance expansion brings new individuals into the healthcare system, the existing supply of providers—physicians, physician assistants, and nurses—may not increase proportionately. Therefore, being able to access providers in a timely fashion can become a challenge,[3] not just for the newly insured, but also for the previously insured who are now competing for the same providers.

The predicted "crowd-out" phenomenon has been a key concern raised by the ACA's critics. Examining Massachusetts, which underwent similar healthcare reform a decade ago, may be instructive in helping us understand what is likely to happen in the rest of the nation. Although some early data suggested that in Massachusetts there were delays to see primary care physicians following health reform,[4,5] more careful analysis found that, at least for Medicare patients, there were no detrimental effects on access to quality outpatient care.[6-9] Critics have countered that examining the effects of health reform in Massachusetts on older Americans has limited applicability, however, because older Medicare beneficiaries likely receive care from a different set of providers than those sought out by newly insured patients. Therefore, understanding what happens to previously insured patients who live in the same communities as the newly insured, and are thus likely see the same providers, will be far more instructive.

We focused on a group of patients who are highly likely to experience a "crowd-out" effect: already-insured Medicaid beneficiaries. These patients generally have poor access to healthcare services at baseline.[10] Further, both Medicaid beneficiaries and the uninsured[11] tend to have low incomes, include a greater share of racial and ethnic minorities,[12,13] and are considered medically and financially vulnerable.[14] These vulnerable individuals tend to live in the same communities, underlying the important role of safety net providers, who care for

a disproportionate share of the uninsured and Medicaid beneficiaries. Safety net providers have seen an increase in demand for their services following Massachusetts health reform,[15] suggesting that concerns about a "crowd-out" effect for already-insured Medicaid beneficiaries are well founded.

Given these concerns and the ongoing debate about the potential impact of Medicaid expansion on states' existing healthcare services, we sought to answer 3 questions. First, did insurance expansion in Massachusetts, compared with control states, decrease access to effective primary care for Medicaid beneficiaries? Second, did communities in Massachusetts with the greatest uptake of insurance experience greater challenges with access to primary care than communities with a much smaller uptake? And finally, were the effects of "crowding out" particularly pronounced among previously insured African American Medicaid beneficiaries, who typically have had greater barriers to accessing care and higher rates of preventable hospitalizations?[16] With these 3 questions, we sought to more comprehensively examine the impact of insurance expansion on the ability of previously insured Medicaid beneficiaries to access high-quality primary care services.

TAKEAWAY POINTS

We found no evidence that insurance expansion in Massachusetts, compared with control states, reduced access to primary care for vulnerable Medicaid beneficiaries. Our findings indicate that:

- Massachusetts saw no increase in preventable admissions relative to control states following health insurance expansion, and no greater increase in Prevention Quality Indicators (PQIs) within Massachusetts among those counties with high insurance uptake compared with counties with low insurance uptake.
- In looking at PQI rates for African American beneficiaries—who typically have had greater barriers to accessing care—we saw no differential change between Massachusetts and control states.
- The lack of a negative spillover effect in this study of vulnerable Medicaid beneficiaries should be reassuring to policy makers.

METHODS

We used the Medicaid Analytic eXtract (MAX) databases for Massachusetts and 3 New England control states (Vermont, New Hampshire, and Connecticut). MAX datasets, maintained by CMS, are extracted from the Medicaid Statistical Information System. Final-action claims are used to create beneficiary-level data on demographics and Medicaid eligibility, as well as on utilization and payment for medical services. We used the Small Area Health Insurance Estimates provided by the US Census Bureau to estimate insurance rates within counties for our within-Massachusetts analysis. We used the Area Resource File to obtain county-level physician supply. Consistent with prior research, we used 2006 as the pre-health reform period,[6,8] as this was when health reform legislation was passed. By 2007, key features of health reform had been implemented, and it was not until 2008 that the individual mandate penalty was implemented. We used 2009 as the post health reform period to allow for a "wash-out period" after health reform had been fully implemented.

We included nonelderly adults aged 21 to 64 years. Because claims information for Medicaid comprehensive managed care plans was unavailable in the Massachusetts MAX database for the study years,[17] we limited our sample to those beneficiaries with Medicaid fee-for-service or Primary Care Case Management (PCCM) plans. PCCM plans require beneficiaries to choose a primary care provider who receives a monthly payment to coordinate care in addition to fee-for-service payment for medical services rendered. To ensure we had complete claims for our sample, we excluded those who were not eligible for the entire year, as well as those with concomitant Medicare coverage or private insurance. Additionally, we excluded beneficiaries who had a claim related to childbirth that year. We felt that the barriers to accessing care for the general Medicaid population may not be generalizable to those who became Medicaid-eligible on the basis of pregnancy. Finally, we identified eligible beneficiaries in both 2006 and 2009, including only those beneficiaries who had continuous Medicaid coverage in both years, as we sought to determine the outcomes for beneficiaries who were already insured prior to Medicaid expansion. After identifying beneficiaries who were eligible in both years, we analyzed their claims. We also obtained beneficiaries' age, race, gender, and reason for Medicaid eligibility from the MAX database personal summary file. We collapsed the 26 subgroups of Medicaid-eligible populations in our sample into 3 main categories: disabled, adult, and other. To measure access to primary care, we used Prevention Quality Indicators (PQIs), developed by the Agency for Healthcare Research and Quality, to measure potentially avoidable hospitalizations.[18] We used PQIs that might be particularly sensitive to effective primary care access—including acute PQIs (urinary tract infection, bacterial pneumonia, and dehydration) and chronic PQIs (diabetes, chronic obstructive pulmonary disease, hypertension, heart failure, angina)—and overall PQIs, both before and after reform. We also looked at a composite marker for control conditions (acute myocardial infarction, stroke, hip fracture, and gastrointestinal bleeding) that have been used in prior research[6,19-22] to capture conditions that are less likely to be affected by changes in primary care access. Our predictor of interest was exposure to health insurance reform.

Analysis

We used multiple different strategies to isolate the impact of the reform program. Initially, we chose a control group of 3 New England states (Vermont, New Hampshire, and Connecticut) in which healthcare would be most similar to that of Massachusetts. Because Medicaid eligibility criteria vary substantially by state, we calculated the proportion of total beneficiaries in each state that met our inclusion criteria. Next, we conducted an analysis comparing rates of PQIs and control conditions

among counties in Massachusetts with high versus low insurance uptake after health reform. If health reform had a detrimental effect, then we expected to see a larger increase in PQIs in the high-uptake counties compared with the low-uptake counties. Finally, we repeated this analysis for the control condition composite (total number of admissions for control conditions per 100,000 beneficiaries) in order to see whether changes in Massachusetts for the control composite were comparable with changes in the control states.

We calculated our primary outcome—the absolute number of acute, chronic and overall PQIs—for the pre- and post periods in Massachusetts and the control states. In our first analysis, we compared PQI rates among Medicaid patients in Massachusetts in 2006 (pre-reform) with PQI rates for the same population in 2009 (post reform). Since this simple comparison could be confounded by a time trend, our second and primary analysis used a difference-in-differences (DID) approach to compare the change in PQIs in Massachusetts with the change in PQIs in the control states. The analyses were carried out at the beneficiary-year level using longitudinal Poisson regression models, allowing for correlated pre-post measurements within each beneficiary. The outcome for each beneficiary was the number of PQIs in a given year, and the primary predictors were indicators for time (pre vs post), condition (Massachusetts vs control), and the interaction between time and condition. To try to further balance the comparison between Massachusetts and the control states, we allowed the 3 control states to have differing initial PQI rates and we adjusted for the following available patient characteristics: age, gender, race, reason for Medicaid eligibility, and county-level physician supply. The models were implemented using the Glimmix procedure in the SAS version 9.4 statistical package (SAS Institute Inc, Cary, North Carolina).

In our within-state analysis,[6] we identified counties with rates of baseline health insurance below the median for the state as high potential effect counties. We then calculated the change in insurance rate before (2005-2006) and after (2007-2009) health reform, and identified those counties with rates of insurance uptake that were above the median as "high-uptake" counties. We compared the change in rates of PQIs before and after health reform in high- versus low-uptake counties using the same longitudinal Poisson regression model as above. In order to address our specific interest in "crowding out" in the African American population, we repeated the analysis comparing Massachusetts with control states looking specifically at the potentially more vulnerable African Americans.

Sensitivity Analysis

In addition to the primary analysis using Poisson regression modeling, we also conducted all analyses using linear regression to investigate if our findings were sensitive to modeling choice. Results were considered significant at a 2-sided *P* value of less than .05. The Office of Human Research Administration at the Harvard T.H. Chan School of Public Health approved this study.

RESULTS

Sample Characteristics

Our analytic sample consisted of 127,532 beneficiaries in Massachusetts with 16,437 inpatient discharges in 2006 and 19,603 inpatient discharges in 2009. Control states had a total of 53,925 beneficiaries, with 9607 inpatient discharges in 2006 and 11,299 inpatient discharges in 2009. The proportion of beneficiaries who met each of the inclusion criteria in each state is presented in **eAppendix Table A** (eAppendices available at **www.ajmc.com**). The mean number of inpatient stays per beneficiary was similar across states, with the exception of New Hampshire, which had more than double the rate of admissions per beneficiary in both years in comparison with Massachusetts (0.35 admission per beneficiary in New Hampshire in 2009 vs 0.15 admission per beneficiary in Massachusetts). The demographic sample characteristics of our sample population of Medicaid beneficiaries in Massachusetts and control states are presented in **Table 1**.

Overall, Massachusetts had a higher percentage of white Medicaid beneficiaries relative to control states before health reform (53.8% vs 51.4%; $P < .0001$). The median age was slightly, but statistically, higher in Massachusetts than in control states (39.1 vs 38.2 years; $P < .0001$). The proportion of male beneficiaries was 30.3% in Massachusetts and 25.1% in control states ($P < .0001$). Massachusetts and control states differed with respect to the proportion of beneficiaries in each eligibility category. Massachusetts had a greater proportion of disabled beneficiaries (40.4% vs 35.2%; $P < .0001$) and of beneficiaries in the "other" category (41.0% vs 9.8%), which included primarily adults gaining coverage through Medicaid expansion waivers. Massachusetts had a lower proportion of beneficiaries (18.6% vs 55.0%) gaining coverage through the traditional "adult" eligibility categories (adult, adult poverty, unemployed adult). Mean total physician supply was 4.55 per 1000 population in Massachusetts and 3.36 per 1000 population in control states.

Preventable Hospitalization Rates in Massachusetts and Control States

We report unadjusted rates of PQIs by state in the pre- and postreform periods (**eAppendix Table B**). Massachusetts had a lower unadjusted rate of PQIs relative to control states in both years. Both Massachusetts and control states had increases in unadjusted rates of overall, acute, and chronic PQIs during the study period (**Figure** and eAppendix Table B). When we adjusted for age, race, gender, reason for eligibility, and physician supply, this increase persisted for overall and chronic PQIs in both Massachusetts and the control group of states, with no significant difference in the relative increase between the 2 groups for any of the PQI measures (**Table 2**). For example, among overall PQIs, Massachusetts had an increase of 73.6 admissions per 100,000 beneficiaries (from 557.4 to 631.0; $P = .0049$) whereas control states had an increase of 182.1

admissions per 100,000 beneficiaries (from 812.6 to 994.7; $P = .0003$). For chronic PQIs, the increases in Massachusetts and control states were 50.9 (from 314.6 to 365.6; $P = .01$) and 147.2 (from 501.7 to 649.0; $P = .0002$) admissions per 100,000 beneficiaries, respectively. There were no significant changes after health reform in the rate of acute PQIs in either Massachusetts or control states. There were no significant differences between Massachusetts and control states in the relative change between the 2 groups on any of the PQI measures using Poisson regression analysis (Table 2).

For control conditions, control states saw a trend toward an increase (59.3 admissions, from 359.7 to 419.1; $P = .06$) whereas Massachusetts saw a decrease (–19.1 admissions, from 305.2 to 286.1; $P = .25$), but it was not significant. The DID (–78.4; 95% CI, –148.1 to –8.8) was significant at $P = .02$. When we repeated the analyses using linear regression, the relative increase in PQIs was greater in control states than in Massachusetts for overall and chronic PQIs. For control conditions, Massachusetts saw a significant decrease, whereas control states saw a significant increase, with a significant DID between the two (**eAppendix Table C**).

TABLE 1. Demographic Characteristics of Sample Beneficiaries in Massachusetts and Control States

		Massachusetts	Control States	*P*
Total population (2006)		6,410,100	5,449,792	
Total number of Medicaid beneficiaries (2006)		1,315,272	847,936	
Percent of total population with Medicaid (2006)		20.5	15.6	<.0001
Total beneficiaries in sample		127,532	53,925	
Median age, years		39.1	38.2	
Race (percentage of total sample)	White	53.8	51.4	<.0001
	Black	10.7	16.3	
	Hispanic	13.9	25.7	
	Other	21.6	6.7	
Gender (percentage of total sample)	Male	30.3	25.1	<.0001
	Female	69.7	74.9	
Basis of eligibility (percentage of total sample)	Disability	40.4%	35.2%	<.0001
	Adult	18.6%	55.0%	
	Other	41.0%	9.8%	
Physician supply per 1000 population	MDs, total patient care	4.55	3.36	<.0001

Preventable Hospitalization Rates Within Massachusetts

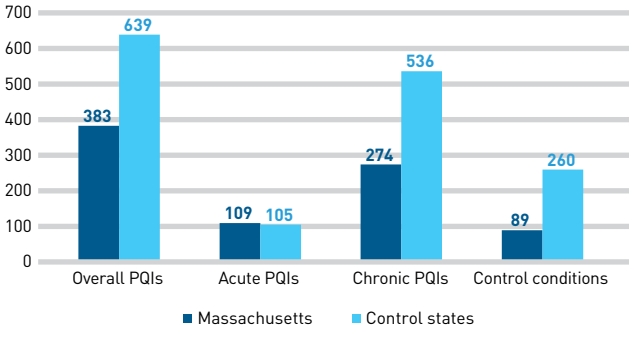
We performed an analysis comparing PQI rates before and after health reform among counties in Massachusetts with a baseline insurance rate that was below the median (high-uptake counties) with those with a pre-reform insurance rate above the median (low-uptake counties) (**Table 3**). Prior studies have found that counties with the lowest rates of health insurance at baseline had, unsurprisingly, the greatest new uptake of health insurance; therefore, we hypothesized, they would have the largest crowding-out effect. We found that both high- and low-uptake Massachusetts counties experienced an increase in overall PQIs with no significant differences in the rate of change between the 2 groups (+97.3 vs +157.0 admissions per 100,000 beneficiaries, respectively; $P = .42$ for DID). Only high-uptake counties saw a significant increase in acute PQIs (+62.8 admissions per 100,000 beneficiaries; $P = .03$), but there was again no significant difference in the trend observed between the 2 groups ($P = .16$ for DID). For chronic PQIs, low-uptake counties had a significant increase that was greater than that observed for high-uptake counties (+148.0 vs +36.0; $P = .045$ for DID).

When we examined admissions for control conditions in high- and low-uptake counties (Table 3), overall admissions for control conditions decreased only in high-uptake counties (–56.4 admissions per 100,000 beneficiaries), but there was no significant differential change between the 2 groups ($P = .16$ for DID). A linear regression model produced similar findings (**eAppendix Table D**).

Preventable Hospitalization Rates by Race

Finally, because PQI rates differ by race, we looked specifically at rates of PQIs for African American beneficiaries in Massachusetts and in control states (**Table 4**). For overall and chronic PQIs, Massachusetts and control states saw a significant increase. For overall PQIs, Massachusetts had an increase of 156.1 PQI admissions per 100,000

FIGURE. Unadjusted Changes in Preventable Admissions (PQIs) and Control Conditions per 100,000 Medicaid Beneficiaries in Massachusetts and Control States Following Massachusetts Health Reform[a]



PQI indicates Prevention Quality Indicator.

[a]Change scores represent the unadjusted difference between post Massachusetts health reform minus pre–health reform per 100,000 Medicaid beneficiaries

TABLE 2. Changes in Preventable Admissions (PQIs) and Control Conditions (per 100,000 beneficiaries) in Massachusetts Versus Control States[a]

Outcome	States	Pre-Period	*P*	Post Period	*P*	*P* Value for Pre vs Post	Change	DID (95% CI)	*P* Value for DID
Overall PQIs	Massachusetts	557.4	<.0001	631.0	<.0001	.0049	73.6	−108.6 (−299.7 to 82.6)	.27
	Control states	812.6		994.7		.0003	182.1	–	
Acute PQIs	Massachusetts	243.4	.01	264.7	.013	.18	21.3	1.7 (−15.3 to 18.7)	.85
	Control states	302.0		321.6		.48	19.7	–	
Chronic PQIs	Massachusetts	314.6	<.0001	365.6	<.0001	.01	50.9	−96.3 (−255.3 to 62.7)	.24
	Control states	501.7		649.0		.0002	147.2	–	
Control conditions	Massachusetts	305.2	<.0001	286.1	.04	.25	-19.1	−78.4 (−148.1 to −8.8)	.02
	Control states	359.7		419.1		.06	59.3	–	

CI indicates confidence interval; DID, difference-in-differences; PQI, Prevention Quality Indicator.
[a]Adjusting for beneficiary age, race, gender, reason for Medicaid eligibility, and annual physician supply per capita.

TABLE 3. Adjusted Changes in Preventable Admissions (PQIs) and Marker Conditions (per 100,000 beneficiaries) in High- and Low-Insurance-Uptake Counties in Massachusetts[a]

Outcome	States	Pre-Period	*P*	Post Period	*P*	*P* Value for Pre vs Post	Change	DID (95% CI)	*P* Value for DID
Overall PQIs	High uptake	835.2	.80	932.5	.47	.05	97.3	59.7 (−84.1 to 203.6)	.42
	Low uptake	790.9		947.9		.01	157.0	–	
Acute PQIs	High uptake	323.9	.59	386.7	.20	.03	62.8	−61.2 (−147.4 to 25.0)	.160
	Low uptake	366.6		368.1		.96	1.5	–	
Chronic PQIs	High uptake	502.1	.53	538.1	.08	.33	36.0	112.0 (2.7-221.4)	.045
	Low uptake	420.6		568.7		.00	148.0	–	
Control conditions	High uptake	393.1	.02	336.8	.79	.03	−56.4	57.3 (−414.6 to 529.1)	.16
	Low uptake	401.8		402.7		.98	0.9	–	

CI indicates confidence interval; DID, difference-in-differences; PQI, Prevention Quality Indicator.
[a]Adjusting for beneficiary age, race, and gender.

TABLE 4. Rates of Preventable Hospitalizations (PQIs) for African Americans per 100,000 for Medicaid Beneficiaries in Massachusetts and Control New England States Stratified by High- and Low-Insurance-Uptake Counties[a]

Outcome	States	Pre-Period	*P*	Post Period	*P*	*P* Value for Pre vs Post	Change	DID (95% CI)	*P* Value for DID
Overall PQIs	Massachusetts	575.2	<.0001	731.3	.002	.02	156.1	−289.4 (−945.0 to 366.1)	.39
	Control states	963.5		1409.0		.002	445.5	–	
Acute PQIs	Massachusetts	225.0	.20	257.7	.66	.45	32.7	−52.6 (−243.3 to 138.2)	.59
	Control states	251.3		336.5		.20	85.3	–	
Chronic PQIs	Massachusetts	355.8	<.0001	473.2	.0007	.025	117.4	−221.7 (−943.4 to 500.0)	.55
	Control states	689.9		1029.1		.004	339.1	–	
Control conditions	Massachusetts	323.0	.31	249.7	.88	.10	−73.3	−45.3 (−173.3 to 82.8)	.49
	Control states	333.7		305.6		.64	−28.1	–	

CI indicates confidence interval; DID, difference-in-differences; PQI, Prevention Quality Indicator.
[a]Adjusting for beneficiary age, race, gender, reason for Medicaid eligibility, and annual physician supply per capita.

beneficiaries (from 575.2 to 731.3; $P = .002$), and control states had an increase of 445.5 PQI admissions per 100,000 beneficiaries (from 963.5 to 1409.0; $P = .002$). For chronic PQIs, Massachusetts saw a significant increase of 117.4 PQIs per 100,000 beneficiaries (from 355.8 to 473.2; $P = .025$), and control states saw an increase of 339.1 PQIs per 100,000 beneficiaries (from 689.9 to 1029.1; $P = .004$). For acute PQIs, neither Massachusetts nor control states had a significant increase in PQIs for African American beneficiaries. We found no significant DID between Massachusetts and control states in any admission rates (PQI or control conditions) for African American beneficiaries following Massachusetts health reform, using either Poisson regression (Table 4) or linear regression.

DISCUSSION

In our study of Medicaid beneficiaries, Massachusetts, relative to control states, saw no increase in preventable admissions following health insurance expansion. When we stratified counties within Massachusetts by their rates of insurance uptake, high-uptake counties saw no greater increase in PQIs relative to low-uptake counties. Finally, when we looked at PQI rates for African Americans, we saw no differential change between Massachusetts and control New England states. Taken together, our findings suggest that there was no evidence of crowd-out in access to primary care for Medicaid beneficiaries as a result of Medicaid expansion from Massachusetts health reform.

Massachusetts health reform is a model for national health insurance expansion, a key component of which is Medicaid expansion in many states. Although insurance expansion has clear benefits for the newly insured, one persistent concern has been that reform efforts could jeopardize the care of individuals with existing health insurance and provider relationships via a crowd-out effect. Yet, we found no evidence of impaired primary care access among Medicaid beneficiaries who traditionally have had the greatest barriers to obtaining care. Our sample of beneficiaries in Massachusetts did have an increase in PQIs, but this trend was also seen in control states that did not undergo health reform during this time period.

We hypothesized that those counties with the lowest baseline rates of health insurance (ie, those with the greatest new uptake) would experience the largest impact of health insurance expansion and would be most likely to experience any negative spillover effect. Although these high-uptake counties did have increases in preventable admissions overall and for acute conditions, they did not experience a differential increase relative to low-uptake counties. In fact, for chronic PQIs, high-uptake counties saw less of an increase than low-uptake counties. These results suggest that the healthcare infrastructure in these communities was able to accommodate the increased demand for services associated with insurance expansion.

Our study complements the findings of previous work indicating that Massachusetts health reform had no adverse effects on preventable admissions among the Medicare population.[6,7] This lack of observable deleterious effects among the elderly served as initial evidence that fears of a negative spillover effect of insurance expansion may be unfounded. However, Medicaid beneficiaries are thought to have even greater barriers to care because of historically low reimbursement rates. Now, the lack of an observable negative spillover effect in 2 separate vulnerable populations, Medicare and Medicaid beneficiaries, suggests that Massachusetts health reform did not result in clinically significant decrements in access to high-quality care for the previously insured. This should be reassuring for policy makers.

Although there may not have been a large, overall negative impact of health reform on access for those previously insured, one worries that certain particularly vulnerable populations, such as racial minorities, might have been affected. We found that Massachusetts—relative to other New England control states—did not have a differential change in preventable admissions for African Americans. However, African Americans continued to have higher PQIs than the overall population across both Massachusetts and control states, suggesting that we need to continue to focus on reducing disparities.

There are several possible explanations for our findings, which suggest that Massachusetts health reform did not impair access to care for already-insured Medicaid beneficiaries. First, Massachusetts was unique relative to other states in that it already had a relatively low number of uninsured, compared with the national average. Despite reports of physician shortages in Massachusetts, the per capita supply of physicians was higher in Massachusetts compared with control states, as well. These factors may have made the state optimally suited to implement near-universal coverage without significantly overburdening the existing system. Although there were anecdotal reports of increased wait times to see a physician,[4,5] there have been no peer-reviewed studies, to our knowledge, investigating wait times directly. It is also conceivable that healthcare providers and practices were able to appropriately triage the needs of new and existing patients so that any delays in care did not have any observable adverse outcomes.

Limitations

Our study has a number of limitations. It did not include claims for enrollees in Medicaid Managed Care, as their claims were not available in the MAX database for Massachusetts nor for 2 out of 3 control states during our study period. Our study sample was limited to fee-for-service beneficiaries and those in PCCM plans; in Massachusetts, managed care plans tend to reimburse at higher rates than fee-for-service plans.[23] Also, Medicaid managed care beneficiaries tend to have lower medical complexity than those enrolled in PCCM plans.[24] Given that higher reimbursement rates for Medicaid are associated with improved care access,[25] the de facto exclusion of this group from our study leaves us with an even more vulnerable population for which a negative spillover effect would be even more likely. Yet, despite studying the most vulnerable and medically complex Medicaid beneficiaries, we saw no negative

spillover effect in access to outpatient care in Massachusetts, and we actually saw improvement in several of these measures.

Second, after applying our exclusion criteria, our sample consisted of less than 10% of the total beneficiaries in a given year. Given that Medicaid beneficiaries are a heterogeneous group with significant turnover,[26] we felt that these exclusion criteria were necessary to have complete claims for nonelderly, nonpregnant adults. Medicaid programs also vary substantially across states in terms of eligibility criteria. For example, New Hampshire had significantly less generous income eligibility criteria for parents of dependent children (51%-56% of the federal poverty level) relative to the remaining 4 states (133%-191% of the federal poverty level) in both study years.[27] Our finding that New Hampshire Medicaid beneficiaries had more than double the rate of inpatient hospitalizations relative to other New England states likely reflects a more impoverished beneficiary pool with greater medical and social needs.

Additionally, although PQIs are a well-validated set of metrics used as indicators of adequate primary care access, they are still an indirect measure of access to outpatient care. We did not look specifically at changes in outpatient utilization or wait times to see a physician that would mediate any observed increases in preventable admissions. Finally, another limitation noted by previous investigators is that Massachusetts had a high baseline rate of insurance relative to many other states even before insurance expansion. Thus, the experience in Massachusetts may not be generalizable to other states with lower rates of health insurance and/or physician supply. Yet, the consistent lack of negative spillover effects in several studies should be reassuring to policy makers implementing health reform in their jurisdictions.

CONCLUSIONS

We examined the effect of the first statewide health insurance expansion on access to care for Medicaid beneficiaries. Despite fears that an increase in the number of insured could lead to delays in primary care access, we found no evidence of a negative spillover effect in this particularly vulnerable population. ■

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eAppendix Table A. Final Analytic Sample by State of Beneficiaries Who Met Inclusion Criteria

		MA		CT		NH		VT	
		2006	**2009**	**2006**	**2009**	**2006**	**2009**	**2006**	**2009**
Total		1,315,272	1,743,293	534,495	598,844	148,759	168,549	164,682	190,276
Exclusions	Age not between 21-65 years	736,376 (56%)	849,478 (49%)	347,521 (65%)	376,597 (63%)	108,146 (73%)	119,562 (71%)	96,901 (59%)	98,319 (52%)
	Not eligible for the entire year	212,325 (16%)	336,194 (19%)	71,051 (13%)	74,124 (12%)	19,886 (13%)	23,605 (14%)	35,845 (22%)	46,902 (25%)
	Concomitant private insurance	32,809 (2%)	166,669 (10%)	4805 (1%)	12,690 (2%)	924 (1%)	1211 (1%)	8976 (5%)	8469 (4%)
	Dual eligible[a]	90,652 (7%)	101,065 (6%)	30,128 (6%)	32,726 (5%)	9269 (3%)	11,547 (7%)	475 (0.3%)	7867 (4%)
	Inpatient claims	25,687 (10%)	37,100 (11%)	7398 (9%)	73,208 (49%)	2828 (25%)	3526 (9%)	3543 (2.1%)	4703 (2.5%)
	Delivery and newborn claim[b]	4083 (0.31%)	3736 (0.21%)	302 (0.06%)	5632 (0.94%)	783 (0.53%)	760 (0.45%)	1505 (0.91%)	2115 (1.11%)
	Not eligible in either 2006 or 2009[b]	111,277 (8.5%)	156,309 (9.0%)	41,626 (7.8%)	40,687 (6.8%)	5226 (3.5%)	7101 (4.2%)	10,853 (6.6%)	16,924 (8.9%)
					59,659 (10.0%)[c]				
Final Sample		127,532 (9.7%)	127,532 (7.3%)	39,000 (7.3%)	39,000 (6.5%)	4545 (3.1%)	4545 (2.7%)	10,380 (6.3%)	10,380 (5.5%)
Final inpatient stays		16,437	19,603	6571	7974	1597	1727	1439	1598
Mean inpatient stays per beneficiary		0.13	0.15	0.17	0.20	0.35	0.38	0.14	0.15

[a]Beneficiaries with concomitant Medicare coverage were excluded.
[b]Beneficiaries with delivery and newborn claims were excluded.
[c]Beneficiaries who were not covered during either year were excluded.
[d]Encounter claims for patients with Medicaid managed care plans were only available for Connecticut in 2009 and were thus excluded.

eAppendix Table B. Unadjusted PQIs Rate (per 100,000 beneficiaries) by State and Year

	MA			CT			NH			VT			Interaction of Year and States
	2006	**2009**	***P***	**2006**	**2009**	***P***	**2006**	**2009**	***P***	**2006**	**2009**	***P***	
Overall PQIs	1090	1473	<.0001	1494	2167	<.0001	2768	3615	.0004	785	1195	.01	0.002
Acute PQIs	426	535	<.0001	468	550	.095	855	1010	.27	331	499	.08	0.63
Chronic PQIs	664	938	<.0001	1025	1617	<.0001	1913	2605	.0004	454	697	.07	<0.0001
Control conditions	575	664	.005	443	667	<.0001	1404	2019	.0001	785	1026	.03	0.04

eAppendix Table C. Changes in Preventable Admissions (PQIs) and Marker Conditions (per 100,000 beneficiaries) in Massachusetts Versus Control States, Adjusting for Age, Race, Gender, Reason for Medicaid Eligibility, and Annual Physician Supply per Capita, Using Linear Regression

Outcome	States	Pre-Period	*P*	Post Period	*P*	*P* Value for Pre vs Post	Change	DID (95% CI)	*P* Value for DID
Overall PQIs	Massachusetts	1134.0	<.0001	1273.1	<.0001	.41	139.1	–264.8 (–490.4 to –39.3)	.02
	Control states	1754.3		2158.1		<.0001	403.8	–	
Acute PQIs	Massachusetts	441.6	.02	479.1	.013	.61	37.6	2.2 (–107.0 to 111.4)	.97
	Control states	552.7		588.1		.45	35.4	–	
Chronic PQIs	Massachusetts	692.4	<.0001	793.9	<.0001	.20	101.5	–266.9 (–463.6 to –70.3)	.008
	Control states	1201.6		1570.0		<.0001	368.4	–	
Control conditions	Massachusetts	606.2	<.0001	573.4	.03	.03	–32.9	–164.8 (–298.7 to –30.9)	.02
	Control states	718.9		850.8		.02	131.9	–	

CI indicates confidence interval; DID, difference-in-differences; PQI, Prevention Quality Indicator.

eAppendix Table D. Changes in Preventable Admissions (PQIs) and Marker Conditions (per 100,000 beneficiaries) in High- and Low-Insurance-Uptake Counties in Massachusetts, Adjusting for Age, Race, and Gender Using Linear Regression

Outcome	Counties	Pre-Period	*P*	Post Period	*P*	*P* Value for Pre vs Post	Change	DID (95% CI)	*P* Value for DID
Overall PQIs	High uptake	1192.42	.998	1388.3	.48	.01	195.9	58.1 (–162.0 to 278.1)	.61
	Low uptake	1134.0		1388.0		.0003	254.0	–	
Acute PQIs	High uptake	427.8	.52	525.3	.23	.02	97.4	–83.9 (–203.1 to 35.4)	.17
	Low uptake	480.3		493.9		.77	13.6	–	
Chronic PQIs	High uptake	764.6	.70	863.0	.10	.11	98.4	141.9 (–39.4 to 323.3)	.13
	Low uptake	653.7		894.1		.0007	240.4	–	
Control conditions	High uptake	627.0	.0496	561.2	.86	.16	–65.8	97.2 (–41.9 to 236.3)	.17
	Low uptake	635.3		666.7		.59	31.4	–	

CI indicates confidence interval; DID, difference-in-differences; PQI, Prevention Quality Indicator.