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RESEARCH ARTICLE

Impact of Massachusetts Health Reform on Enrollment Length and Health Care Utilization in the Unsubsidized Individual Market

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Objective. To evaluate the impact of the 2006 Massachusetts health reform, the model for the Affordable Care Act, on short-term enrollment and utilization in the unsubsidized individual health insurance market.

Data Source. Seven years of administrative and claims data from Harvard Pilgrim Health Care.

Research Design. We employed pre-post survival analysis and an interrupted time series design to examine changes in enrollment length, utilization patterns, and use of elective procedures (discretionary inpatient surgeries and infertility treatment) among nonelderly adult enrollees before (n = 6,912) and after (n = 29,207) the MA reform.

Principal Findings. The probability of short-term enrollment dropped immediately after the reform. Rates of inpatient encounters (HR = 0.83, 95 percent CI: 0.74, 0.93), emergency department encounters (HR = 0.85, 95 percent CI: 0.80, 0.91), and discretionary inpatient surgeries (HR = 0.66 95 percent CI: 0.45, 0.97) were lower in the postreform period, whereas the rate of ambulatory visits was somewhat higher (HR = 1.04, 95 percent CI: 1.00, 1.07). The rate of infertility treatment was higher after the reform (HR = 1.61, 95 percent CI: 1.33, 1.97), driven by women in individual (vs. family) plans. The reform was not associated with increased utilization among short-term enrollees.

Conclusions. MA health reform was associated with a decrease in short-term enrollment and changes in utilization patterns indicative of reduced adverse selection in the unsubsidized individual market. Adverse selection may be a problem for specific, high-cost treatments.

Key Words. Health reform, health insurance exchange, utilization, adverse selection

Key provisions of the 2010 Affordable Care Act (ACA)—the individual mandate and health insurance exchanges—were implemented in 2014 (Patient Protection and Affordable Care Act 2010). To ensure the sustainability of the new individual market health insurance exchanges, it is crucial for policy makers and insurers to understand how health care reform may impact enrollment trends and health care utilization. The ACA was modeled after the 2006 Massachusetts health care reform (McDonough et al. 2006; Lischko, Bachman, and Vangeli 2009). Therefore, the MA experience provides a unique opportunity to study the potential impact of the ACA.

The MA reform succeeded in reducing the number of uninsured (Long and Stockley 2010; Pande et al. 2011; Long, Stockley, and Dahlen 2012) and increasing the proportion of young and healthy residents in the individual market risk pool (Chandra, Gruber, and McKnight 2011; Hackmann, Kolstad, and Kowalski 2012, 2013). However, one report (Oliver Wyman 2010), which was cited widely in the national media (Lazar 2010a,b; Pear 2010; Turner 2011), claimed that the MA reform increased short-term enrollment and adverse selection in the individual market. Short-term, high-cost enrollees were purported to be generally healthy individuals who need expensive, elective procedures such as orthopedic surgery (i.e., hip or knee replacements) or infertility treatments (Lazar 2010a). A recent media report suggests that the same phenomenon is occurring in ACA exchange plans; the nation's largest insurer is threatening to drop out of the exchange market due to rising costs driven by "consumers coming in and out of the exchange system to use medical services" (Mathews and Armour 2015).

While some increases in short-term enrollment are expected as the exchange was designed to provide coverage for people in transition (e.g., between jobs), it is problematic for viability of the insurance market if short-term enrollees systematically incur higher than expected costs. Regardless of enrollment length, adverse selection, characterized by utilization of high-cost services that were predictable to a member before enrollment, could impact

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sustainability of the MA reform and the ACA (Akerlof 1970; Breyer, Bundorf, and Pauly 2011).

No studies have assessed the MA reform's impact on enrollment length. Evidence is mixed about the reform's impact on overall health care utilization and on utilization patterns that may be indicative of adverse selection, and these issues have not been examined specifically in the unsubsidized individual market. Prior evaluations provide conflicting evidence regarding the impact of the MA reform on primary care (Long 2008; Long and Stockley 2010, 2011; Zhu, Brawarsky, and Lipsitz 2010; Pande et al. 2011; Long, Stockley, and Dahlen 2012; Miller 2012/2013; Chua and Sommers 2014; Joynt et al. 2014), emergency department (Long 2008; Long and Stockley 2010, 2011; Chen, Scheffler, and Chandra 2011; Smulowitz, Lipton, and Wharam 2011; Kolstad and Kowalski 2012; Long, Stockley, and Dahlen 2012; Miller 2012, 2012/2013; Mulcahy, Harris, and Finegold 2013; Chua and Sommers 2014; Joynt et al. 2014; Smulowitz, O'Malley, and Yang 2014; Lee, Ding, and Zeger 2015), and inpatient (Long and Stockley 2010, 2011; Long, Stockley, and Dahlen 2012; Chua and Sommers 2014) utilization. Evidence that enrollees' overall health care costs decreased following the reform suggests a reduction in adverse selection in the individual market (Hackmann, Kolstad, and Kowalski 2012, 2013). But there is also evidence of an increase in discretionary surgeries and a decrease in nondiscretionary surgeries following the reform (Ellimoottil, Miller, and Ayanian 2014).

We aimed to evaluate the impact of the MA reform on enrollment length and health care utilization in the unsubsidized individual market using robust longitudinal methods and 7 years of patient-level data from the second largest insurer in MA. Specifically, we evaluated the impact of the implementation of the individual mandate and health insurance exchange on enrollment length, four broad types of utilization (ambulatory visits, emergency department visits, inpatient hospitalizations, and same-day surgeries), discretionary surgeries (including hip and knee replacements), and infertility treatment.

METHODS

Design

Using pre-post survival analysis and interrupted time series (ITS) designs, we compared demographic and plan characteristics, short-term enrollment rates, and hazard ratios for disenrollment and health care utilization among members enrolled in Harvard Pilgrim Health Care (HPHC) individual market

health insurance plans in the 3.5 years before ("prereform") and 3.5 years after ("postreform") implementation of the MA health reform on July 1, 2007.

Data Sources

We used HPHC administrative and health care utilization claims data from 2004 to 2010, organized using the Health Maintenance Organization (HMO) Research Network Virtual Data Warehouse common data model (Hornbrook, Hart, and Ellis 2005). HPHC is the second largest insurer in MA, with about 20 percent of the commercial insurance market (Center for Studying Health System Change 2010). Data included enrollment start and stop dates, insurance plan characteristics (e.g., primary vs. dependent status; individual vs. family plan), demographic characteristics, and information on medical utilization (e.g., diagnoses, encounters, procedures), and outpatient prescription medicines dispensed. Data from the 2000 US census on neighborhood race, family income, and education were linked using member addresses geocoded at the block level.

Study Cohort

We included members in unsubsidized individual market plans with an enrollment start date between January 2004 and December 2010. Member identifiers remain consistent in all HPHC plans. We excluded members enrolled in Medicare or Medicaid, who were 65 years old or older during their enrollment, or who died on or before their enrollment end date. Children of age 0–17 were excluded as they did not make their own enrollment decisions. We were not able to link dependents with the primary subscriber, so we could not determine whether enrollment decisions of an entire family were driven by the health needs of one family member.

We assessed demographic and plan characteristics at the start of enrollment. We assigned members who enrolled before July 1, 2007, when the individual market plans became available on the exchange (the MA Connector), to the prereform cohort and members who enrolled on or after that date to the postreform cohort. Only the first eligible continuous enrollment period for each member was included in the main analysis.

Enrollment Length

Length of enrollment was calculated as days from initial enrollment to disenrollment. Membership periods with gaps of 62 days or less were bridged to

create continuous enrollment periods, which mimics Connector enrollment rules (MA Health Connector 2012). In sensitivity analyses, we shortened the allowed enrollment gap to 45 days.

Health Care Utilization

We examined four broad categories of utilization: ambulatory visits, emergency department (ED) encounters, inpatient stays, and same-day surgeries. We also examined a set of discretionary inpatient surgeries (Ellimoottil, Miller, and Ayanian 2014), 98 percent of which were knee/hip replacement or back surgery in our study population, and infertility treatment (see Table S1 in Electronic Appendix for specific codes). As a comparison, we also examined a set of nondiscretionary inpatient surgeries (Ellimoottil, Miller, and Ayanian 2014), 86 percent of which were appendectomies in our study population. Utilization categories and procedures were identified by Current Procedural Terminology, Healthcare Common Procedures Coding System, and International Classification of Disease (ICD-9) codes.

Statistical Analysis

We compared baseline demographic characteristics (age, sex, and neighborhood race, family income, and education) and insurance plan characteristics (primary vs. dependent status; individual vs. family plan; HMO, preferred provider organization [PPO], or high deductible health plan [HDHP]; prescription drug coverage; and mental health coverage) in the pre- vs. postreform groups. We used *t*-tests and chi-square tests to assess the statistical significance of observed differences.

We compared the probability of short-term enrollment (i.e., disenrollment at 45, 90, 180, and 365 days) and the probability of utilization, for all utilization types, within 45, 90, 180, and 365 days of enrollment in an HPHC unsubsidized individual market plan pre- versus postreform. To address censoring, we removed from the denominator in each calculation members who enrolled within 45, 90, 180, and 365 days, respectively, of the reform date (for the prereform cohort) or study end date (for the postreform cohort). For the postreform period only, we also assessed probability of disenrollment and probability of utilization by avenue of enrollment (i.e., enrolled via the Connector vs. directly via the insurer). We used chi-square tests to test for statistically significant differences.

To assess the effect of reform on the timing of enrollment and utilization decisions, we assessed time from enrollment to disenrollment and time from enrollment to the first clinical encounter for all of the utilization categories in the pre- versus postreform periods using Kaplan–Meier survival curves and Cox proportional hazard models that controlled for demographic and insurance plan characteristics. To assess whether short-term enrollees were more likely to have a clinical encounter, we also examined time from enrollment to first clinical encounter by enrollment length (using a cut-off of 90 or 180 days of enrollment as the definition for "short-term enrollee") in both the pre- and postreform periods. For all survival analyses, we censored prereform members at the reform date (July 1, 2007) and postreform members at the study end date (December 31, 2010). We stratified analyses by covariates that had significant interaction terms with the pre-postreform variable. We examined two follow-up periods: the entire study period (up to 3.5 years after enrollment) and 1 year after enrollment. For all survival models, we assessed the proportional hazards assumption and used the Wald chi-square statistic to test whether the hazard ratios changed significantly. We used the term "rate" when referring to hazard ratios in the Results and Discussion sections.

To control for trends in enrollment length and utilization, and to pinpoint whether changes happened at the time of the reform, we conducted ITS analyses to examine the probability of short-term enrollment by month of enrollment and probability of utilization within 90 and 180 days of enrollment by quarter of enrollment. We used segmented linear regression models for ITS to measure the prereform trend, the immediate level change following the reform, and the postreform change in trend (as compared to the prereform trend) (Wagner et al. 2002). We controlled for serial autocorrelation using an autoregressive error model and, in sensitivity analyses, allowed for nonlinear time trends. We were unable to do adjusted ITS analysis due to inadequate quarterly sample size. Therefore, the ITS results are more comparable to unadjusted survival analysis results. We were also unable to do ITS analysis on infertility treatment or discretionary and nondiscretionary surgeries due to the low incidence of these procedures in our data. We used SAS 9.2 for all analyses.

RESULTS

Demographic and Plan Characteristics

There were 6,912 and 29,207 adults in the prereform and postreform individual market cohorts, respectively. The demographic characteristics of the

MA individual market changed significantly after the health reform (Table 1). Postreform members were more likely to be male; young adults (18–26) or older adults (>40 years old); and to live in areas with a greater proportion of white, non-Hispanic residents and in areas with lower educational attainment and family income. In addition, postreform members were more likely to be in a family plan, in a PPO or HDHP, and have prescription drug coverage (as mandated by the reform). Most (60 percent) postreform individual market members enrolled through the Connector; the remainder enrolled directly with HPHC. Demographic and plan characteristics for the entire population, including children, are in Table S2 in Electronic Appendix.

Enrollment Length

The *probability of short-term enrollment* (i.e., disenrollment within 45, 90, 180, or 365 days of enrollment) in an HPHC unsubsidized individual market plan was significantly lower for postreform members (Table 2). In segmented regression analyses, the probability of short-term enrollment dropped significantly immediately following the reform (Figure 1, Table 2; Table S3 in Electronic Appendix). For example, the probability of being enrolled in a plan for less than or equal to 180 days dropped by 10.35 (SE: 2.96) percentage points immediately following the reform. For every enrollment length analyzed, the probability of short-term enrollment was significantly higher for members who enrolled via the Connector versus directly with the insurer (Table S4 in the Electronic Appendix).

The reform was a significant negative predictor of *time to disenrollment* in unadjusted and adjusted survival analyses (Table 3). The rate of disenrollment was significantly lower in the postreform period (HR = 0.81, 95 percent CI: 0.78, 0.84) when controlling for demographic and plan characteristics (Table 3). Interactions with age, plan type (individual/family plan), and neighborhood education and race were significant, so we stratified by these variables. While all strata had lower rates of disenrollment in the postreform period, members who were older, in family plans, and who lived in areas with higher college attainment and higher percentage of white, non-Hispanic residents had greater reductions in the rate of disenrollment following the reform (Table S5 in the Electronic Appendix). These results did not change in sensitivity analyses with a 1-year follow-up period or with a 45-day gap between enrollment periods.

Table 1: Demographic and Plan Characteristics, Pre- versus Postreform (Adults of Age 18–64)

	MA Individual Health Insurance Market (HPHC Enrollees)	
Enrollee Characteristics	*Prereform (n = 6,912)*	*Postreform (n = 29,207)*
Gender (percent male)	40.9	45.9**
Age (mean, SD)	37.6 (13.7)	37.9 (14.0)
Age (distribution)		
18–26 years old ("young adults")	29.8	31.6*
27–40 years old	32.5	27.2**
41–50 years old	14.9	17.2**
51–64 years old	22.9	24.0*
Neighborhood race (mean % white, non-Hispanic, SD)†	87.4 (15.8)	88.7 (15.8)**
Neighborhood education level (mean % with an associate, college, or graduate/professional degree, SD)†	53.5 (19.7)	50.9 (19.1)**
Neighborhood education level categories (mean %, SD)†		
High school or less	31.0 (16.6)	32.7 (16.4)**
Some or completed college	47.5 (9.0)	48.1 (9.5)**
Graduate or professional degree	21.5 (14.4)	19.2 (13.3)**
Neighborhood family income†		
Mean % family income <$50,000 (SD)	30.2 (16.8)	31.4 (17.0)**
Mean % family income $50,000–$99,000 (SD)	37.2 (12.2)	38.3 (12.2)**
Mean % family income >$100,000 (SD)	33.6 (20.0)	30.2 (19.5)**
Primary member (% who were subscriber)	90.2	77.6**
Dependent member		
Spouse (% who are married to subscriber)	8.5	16.9**
Child (% who are adult child of subscriber)	1.3	5.6**
Contract type		
Individual (% of members in individual plan)	79.8	56.8**
Family (% of members in plan with ≥1 other member)	20.2	43.2**
Connector (% in Connector plan, postreform only)	NA	60.9
Plan characteristics		
HMO (% in HMO plan)	100	88.2**
PPO (% in PPO plan)	0.1	12.0**
HDHP (% in HDHP)	0	7.1**
Prescription drug coverage (% with Rx benefit)	43.4	83.5**
Mental health coverage (% with MH coverage)	100	100

†% in census block of residence (education is % of population age 25+ in that level).
*Post significantly different from pre, $p < .05$; **$p < .0001$.

Health Services Utilization

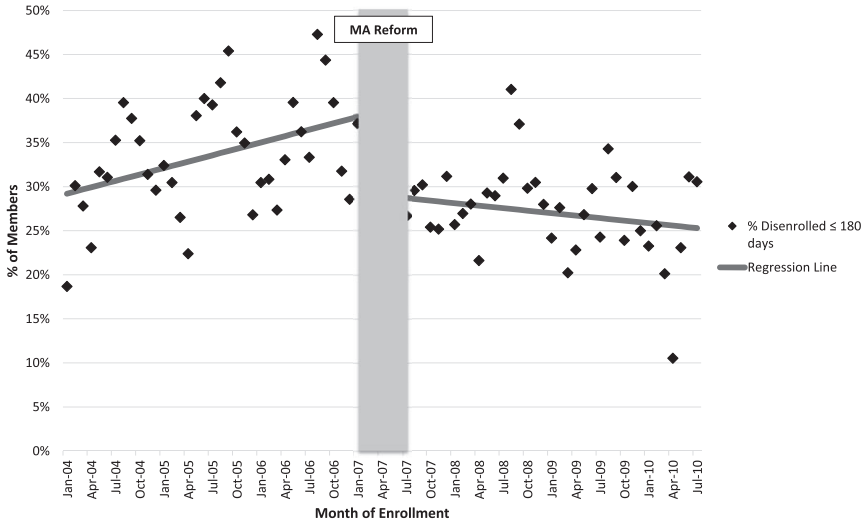
In the *time to utilization* analyses, the rates of inpatient (HR = 0.83, 95 percent CI: 0.74, 0.93) and emergency department (HR = 0.85, 95 percent CI: 0.80,

Table 2: Probability of Short-Term Enrollment

Enrollment Length	*Prereform Probability*†	*Postreform Probability*†	*Immediate Postreform Percentage Point Change in Probability (SE)*‡
≤45 days	9.04%	6.59%**	−4.54 (1.15)*
≤90 days	18.07%	14.78%**	−5.26 (1.83)*
≤180 days	32.35%	25.98%**	−10.35 (2.96)*
≤1 year	53.52%	50.25%**	−7.50 (2.99)*

†Percent of members that disenrolled within X days after enrollment (i.e., short-term enrollment) in the pre- and postreform periods, respectively.
‡Level change from segmented regression models, which examined the probability of short-term enrollment by quarter of enrollment. Full models in Table S3 of Electronic Appendix.
*Post significantly different from pre, $p < .05$; **Post significantly different from pre, $p < .001$.

Figure 1: Probability of Enrollment Length ≤180 days by Month of Enrollment



0.91) encounters were significantly lower in the postreform period in both the unadjusted and adjusted models (Table 3); conversely, postreform members had a slightly higher rate of ambulatory encounters (HR = 1.04, 95 percent CI: 1.00, 1.07). The reform was not a significant predictor of the rate of same-day surgery encounters. Age and/or neighborhood income interactions with the reform were significant in the ambulatory, emergency department, and inpatient encounter models, so we stratified analyses by these variables. The

Table 3: Time to Disenrollment and First Medical Encounter, Pre- versus Post-MA Reform from Cox Proportional Hazard Models[†]

Outcome	*Post (vs. Pre) Reform Unadjusted Hazard Ratio (95% CI)*	*Post (vs. Pre) Reform Adjusted Hazard Ratio (95% CI)*[†]
Disenrollment	0.79 (0.76, 0.82)*	0.81 (0.78, 0.84)*
Encounter type		
Ambulatory	0.99 (0.96, 1.02)	1.04 (1.00, 1.07)*
Emergency department	0.85 (0.79, 0.90)*	0.85 (0.80, 0.91)*
Inpatient	0.79 (0.71, 0.88)*	0.83 (0.74, 0.93)*
Same-day surgery	0.91 (0.81, 1.02)	0.95 (0.84, 1.07)
Infertility treatment[‡]	0.89 (0.74, 1.08)	1.61 (1.33, 1.97)*
Discretionary inpatient surgeries[§]	0.62 (0.43, 0.90)*	0.66 (0.45, 0.97)*
Nondiscretionary inpatient surgeries[§]	0.66 (0.37, 1.18)	0.59 (0.33, 1.08)

Notes. [†]Models control for: sex, age, education, race, family income, and individual/family plan. Follow-up time = 3.5 years max in pre and post. All models, except for ambulatory care, met the proportional hazards assumption.
[‡]Infertility treatment analysis limited to females of ages 27–50 years.
[§]See Table S1 in Electronic Appendix for list of discretionary and nondiscretionary procedures.
*Wald $p < .05$.

higher rate of ambulatory encounters following the reform was driven by members of ages 27–50 and members from higher income areas; lower emergency department visit rates were driven by members from higher income areas; and lower inpatient encounter rates were driven by younger (i.e., ages 18–40) members and members from higher income areas (Table S6 in Electronic Appendix).

The reform was associated with a significant decrease in rate of discretionary surgeries (HR = 0.66, 95 percent CI: 0.45, 0.97) and no significant change in rate of nondiscretionary surgeries (Table 3). The reform was a significant predictor of infertility treatment (HR = 1.61, 95 percent CI: 1.33, 1.97) in the adjusted analysis, but not in the unadjusted model (Table 3). Interactions with plan type and age were significant. Postreform increases in infertility treatment were driven by women in individual, and not family, plans and by women older than 40 (Table S6 in Electronic Appendix). While women in individual plans were significantly more likely than women in family plans to get infertility treatment both before and after the reform, the rate of infertility treatment in women in individual versus family plans quadrupled after the reform (HR = 2.85 in pre vs. HR = 11.64 in post, data not shown). However, the proportion of women of ages 27–50 in individual (vs. family) plans dropped significantly after the reform (73.7 percent in pre vs. 41.0 percent in

post), which explains why the unadjusted model found no effect for this outcome.

As a secondary analysis, we conducted unadjusted ITS on the utilization categories to determine whether the changes in utilization occurred at the same time as the reform. The unadjusted ITS results concurred with the unadjusted survival analyses results for all utilization outcomes. The probability of utilization within 180 days after enrollment dropped significantly immediately following the reform for ED and inpatient encounters and did not change for ambulatory and same-day surgery encounters (Table S7 in Electronic Appendix). For infertility treatment, the directions of the unadjusted ITS and unadjusted survival analysis were the same.

The reform was not associated with increased utilization among short-term enrollees (i.e., members enrolled for less than 90 or 180 days). Rates of inpatient, ED, and same-day surgery utilization and infertility treatment were not significantly different for short-term versus long-term enrollees in the pre- and postreform periods (Table S8 in Electronic Appendix). However, short-term enrollees had a lower rate of ambulatory visits after the reform.

In the postreform period, the probability of an encounter within 180 days for all four utilization categories (i.e., inpatient, ED, same-day surgery, and ambulatory) and infertility treatment was significantly lower for members who enrolled via the Connector versus directly with the insurer (Table S9 in Electronic Appendix).

DISCUSSION

This study provides important new evidence regarding the sustainability of the unsubsidized individual market health insurance exchanges created by the ACA. Despite initial concerns, the 2006 MA health care reform was not associated with an increase in short-term enrollment in the unsubsidized individual insurance market; in fact, we identified a decrease in short-term enrollment. The reform was also associated with lower rates of hospitalization and emergency department visits, and slightly higher rates of ambulatory care. We found no evidence of increased utilization among short-term enrollees, a proxy for adverse selection. Results for the elective procedures were mixed; the rate of infertility treatment increased in the postreform period, but the rate of discretionary surgeries decreased.

The decreased rate of inpatient or emergency department encounters and discretionary surgeries after the reform suggests that, as intended, the

reform attracted a relatively healthy population into the unsubsidized individual market risk pool and reduced adverse selection. However, we found evidence that adverse selection may occur for specific treatments. A potentially important unintended consequence of reform is the increased use of infertility treatments. The Connector plan premiums are considerably lower than the estimated cost of *in vitro* fertilization, which has an average cost of $12,400 per treatment cycle (American Society for Reproductive Medicine 2013). Some speculate (personal communication HPHC December 11, 2012) that women employed by self-insured companies not subject to state laws mandating insurance coverage of infertility treatment (Massachusetts General Laws 175 § 47H) may have dropped employer coverage, joined Connector plans (paying out of pocket) to obtain coverage for these services, and then dropped individual market coverage and returned to their prior employer-sponsored insurance after treatment. Our results corroborate this theory. We observed a postreform increase in infertility treatment only among women who were the sole enrollee in their insurance plan (i.e., in an individual vs. family plan). While infertility treatment is not included in the ACA essential benefit package, five other states—Connecticut, Hawaii, Illinois, New Jersey, and Rhode Island—include infertility treatment in their exchange benefit package (CMS 2015) and could see similar enrollment patterns.

Although the reform reduced short-term enrollment, the high rates of short-term enrollment in the unsubsidized individual market may be problematic—even after the reform, a quarter of members disenrolled within 6 months (i.e., 180 days) and half disenrolled within a year (Table 2). The high rate of churning (i.e., enrolling and then terminating coverage) could reflect behavior such as obtaining coverage during a short spell of uninsurance (i.e., between jobs) or switching between plans due to cost or preference. We did not find increased utilization among short-term enrollees, making it unlikely that adverse selection is occurring in this population. However, there is an administrative burden associated with each enrollment period that may eventually precipitate increases in premium costs. Interestingly, we found that members who enrolled in individual market plans via the state health exchange (Connector) versus directly with the insurer had significantly higher rates of short-term enrollment, and also significantly lower rates of utilization. Differences in demographics and plan choices may explain these findings. Connector members were significantly more likely to be younger, male, nonwhite race, and have lower educational attainment—a demographic that is more likely to be in transition regarding insurance coverage. Members who signed up directly via the insurer were more likely to be in a PPO (24.14

percent vs. 4.17 percent via Connector) as opposed to an HMO plan, which covers a more limited network of providers. Presumably, members who sign up for the more comprehensive PPO plans anticipate greater medical use.

Responding to concerns about short-term enrollment and adverse selection, MA made two policy changes in 2010—the MA legislature restricted open enrollment in the individual market to two times a year in 2011 and once a year thereafter, and it restricted individual market enrollment to those who were ineligible for group coverage (Massachusetts Session Laws Acts of 2010 Chap 288). Future research to assess the impact of these MA policies, which occurred after our study period, will inform the implementation of the ACA. Given that we found no evidence of increased short-term enrollment or widespread adverse selection, it will be important to assess potential unintended consequences of the open enrollment rules on accessibility of insurance in MA, especially as the ACA includes similar open enrollment restrictions. Similarly, it will be important to assess the impact of restricting individual market enrollment to those ineligible for group coverage. The ACA does not include this restriction, which may be important for reducing adverse selection into exchanges in states where health exchange plans are more generous than employer-sponsored insurance.

Our findings are consistent with existing evidence, presented in the introduction, that the MA reform increased primary care visits (Long 2008; Pande et al. 2011; Long, Stockley, and Dahlen 2012; Miller 2012/2013; Joynt et al. 2014), reduced ED (Smulowitz, Lipton, and Wharam 2011; Kolstad and Kowalski 2012; Long, Stockley, and Dahlen 2012; Miller 2012, 2012/2013; Lee, Ding, and Zeger 2015) and inpatient (Long, Stockley, and Dahlen 2012) visits, and reduced overall adverse selection in the individual market (Hackmann, Kolstad, and Kowalski 2012, 2013).

Our findings differ from a 2010 state-commissioned report (Oliver Wyman 2010) that found an increase in short-term enrollment and utilization among short-term enrollees in the MA unsubsidized individual market following the 2006 reform. There are several explanations for our different findings. First, our sample included members enrolled over a 7-year period (3.5 years before and 3.5 years after the reform), which allowed us to control for trends in enrollment length, whereas the earlier report only looked at enrollment at two points in time—2006 and 2008. Second, we used more robust, longitudinal analytic methods (i.e., interrupted time series and survival analysis). Third, we had access to granular enrollment data that allowed us to collapse multiple enrollment spans per member into a period of continuous enrollment,

allowing for plan changes and short enrollment gaps consistent with state insurance rules. During our study period, postreform members had more enrollment spans per person than prereform members and the average length of the first enrollment span was shorter (data not shown). Finally, consistent with our findings that the rates of hospital and emergency department utilization were lower in the postreform period, the earlier report found that per member per month claims costs in the individual market declined from 2006 to 2008 for all durations of coverage, even for short-term enrollees (Oliver Wyman 2010).

Our findings also differ from a study that found a significant increase in discretionary surgeries following the MA reform (Ellimoottil, Miller, and Ayanian 2014). This is likely due to differences in the study population. Ellimoottil and colleagues included all MA residents who presented for inpatient surgeries, regardless of payer or insurance status, while we included only patients who were insured in the unsubsidized individual market. Therefore, our study population was much younger (i.e., in the postreform period, 80 percent of the population in Ellimoottil, Miller, and Ayanian 2014 was 41–64 years old vs. 41 percent of our study population) and presumably healthier.

This paper provides important new information for policy makers and insurers who look to the MA experience to gauge the potential impact and sustainability of the ACA; it is the first peer-reviewed study that examines short-term enrollment in the individual market, attempts to identify potential adverse selection by assessing the time from enrollment to utilization, uses an interrupted time series approach to pinpoint whether changes in enrollment and utilization occurred at the time of the policy change, examines differences in utilization by avenue of enrollment into the individual market, and examines infertility treatment (a category of elective utilization that MA insurers claimed was particularly susceptible to adverse selection). Unlike previous studies that largely relied on cross-sectional and/or annual surveys or claims data for specific health care events (e.g., ED visits or hospitalizations), we were able to follow enrollees over time, identify enrollment windows shorter than 1 year, link member demographic and plan characteristics to enrollment and utilization patterns, and assess the timing of enrollment decisions and utilization. To our knowledge, only three other studies—two of which focus on the subsidized individual market (i.e., Commonwealth Care) (Chandra, Gruber, and McKnight 2011; Lee, Ding, and Zeger 2015) and one of which focuses on the Medicare population (Joynt et al. 2014)—have used longitudinal patient-level data to measure the impact of the reform on health care utilization. This is the first study to use longitudinal, patient-level data to evaluate the impacts

of the MA reform in the unsubsidized individual insurance market and to examine effects on elective care that may be particularly susceptible to adverse selection. Our study also provides the unique perspective of one insurer in a health insurance exchange. This is an important perspective to consider as the ACA will only succeed if an adequate number of insurers continue to offer affordable plans and participate in the individual market health exchanges.

As with all observational studies, there are important limitations and areas for future research. First, we could not follow members once they left the HPHC system. Future research should examine initial plan choice and plan switching between different insurers and between the group and individual markets. Second, the characteristics of individual market members changed dramatically after the reform. While we controlled for observed changes in our survival models, we were unable to control for unobserved differences that may affect disenrollment decisions and utilization, most important, prior health status. However, this is not important from a policy perspective for two reasons: one, our analysis mimics reality—due to informational asymmetries, insurers must rely only on demographic and plan characteristics to predict disenrollment and utilization; and, two, controlling for prior health status would lead us to underestimate adverse selection, which was one of our main study outcomes. Third, our analyses would have benefited from having an external comparator group, such as other states, but HPHC did not serve the individual market in other states during our study period. Thus, we were unable to control for potential secular events, such as the 2008 economic recession, which started shortly after the MA reform. However, our interrupted time series results suggest that short-term enrollment decreased immediately following the reform in July 2007 (Figure 1) and prior to the recession (Figure S1 in Electronic Appendix). Postreform trend changes, which may have been impacted by the recession, were small or nonsignificant.

Finally, results from Massachusetts may not be generalizable to other states as the state's prereform economic and health insurance situation were unique (Joyce, Holtz-Eakin, and Gruber 2010). Massachusetts had a relatively low rate of uninsurance and higher premiums for individual coverage prior to the reform (Joyce, Holtz-Eakin, and Gruber 2010), due to previously implemented laws on community rating and guaranteed issue (McDonough et al. 2006; Doonan and Tull 2010). Under the ACA, individual market insurance rates have increased in other states, in part due to rules that require insurers to offer a more generous benefit package as well as insurers' anticipation of more high-cost members (Mathews and Radnofsky 2013; Pauly, Harrington, and

Lieve 2014). It is unclear if the individual mandate, and relatively small financial penalties for not obtaining coverage, will be effective if premiums increase under the ACA. We demonstrate that the increasing prereform trend in short-term enrollment (Figure 1) in MA is consistent with the increasing trend in individual market premiums (Hackmann, Kolstad, and Kowalski 2013). Nevertheless, evaluations of the MA reform provide the best evidence of how the unsubsidized individual market will fare under the ACA and may shed light on issues to consider when evaluating the potential impact of national reform. National estimates of short-term enrollment in the individual market prior to the ACA (Kaiser Family Foundation 2014) were similar to the rates we found in MA prior to the 2006 reform.

CONCLUSIONS

The MA experience provides insight into the sustainability of the unsubsidized individual market in other states under the ACA. The MA individual mandate and health insurance exchange, which provided access to more affordable nongroup plans, encouraged enrollees to stay insured for longer periods of time, and reduced widespread adverse selection in the unsubsidized individual market.

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SUPPORTING INFORMATION

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

Appendix SA1: Author Matrix.

Table S1: Discretionary and Non-Discretionary Surgery Diagnostic and Procedure Codes (from Ellimoottil et al., 2014; eTable 1).

Table S2: Demographic and Plan Characteristics, Pre vs. Post Reform (All Ages).

Table S3: Probability of Disenrollment by Month of Enrollment from Segmented Regression Models.

Table S4: Probability of Disenrollment within 45, 90, 180 and 365 Days of Enrollment by Avenue of Enrollment (Post-Only).

Table S5: Cox Proportional Hazard Models: Time to Disenrollment, Pre vs. Post Reform (Stratified Analyses).

Table S6: Cox Proportional Hazard Models: Time to First Medical Encounter by Encounter Type, Pre vs. Post Reform (Stratified Analyses).

Table S7: Probability of Utilization within 180 Days of Enrollment.

Table S8: Cox Proportional Hazard Models: Time to First Medical Encounter by Encounter Type, Short-Term Enrollee (STE) vs. Longer-Term Enrollee (Non-STE), Pre vs. Post Reform (Adjusted).

Table S9: Probability of an Encounter within 180 Days of Enrollment by Avenue of Enrollment (Post-Only).

Figure S1: MA Unemployment Rate by Month (Source: Bureau of Labor Statistics).