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Enrollment In A Health Plan With A Tiered Provider Network Decreased Medical Spending By 5 Percent

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ABSTRACT Employers and health plans are increasingly using tiered provider networks in their benefit designs to steer patients to higher quality and more efficient providers in an effort to increase value in the health care system. We evaluated the impact of a tiered-network health plan on total health care spending and on inpatient, outpatient, and outpatient radiology spending for nonelderly enrollees in a commercial health plan in 2008–12. The tiered network was associated with \$43.36 lower total adjusted medical spending per member per quarter (\$830.07 versus \$873.43), which represented about a 5 percent decrease in spending, relative to enrollees in similar plans without a tiered network. Similar levels of spending reductions were found for outpatient (4.6 percent) and outpatient radiology spending (6.5 percent). These findings suggest that health plans with tiered provider networks have the potential to reduce aggregate health care spending.

In response to wide variation in health care prices within geographic areas, often without meaningful differences in quality, there have been increasing calls to improve the value of US health care.^{1,2} Health insurance benefit design can steer patients to high-value providers—those who are both high-quality and efficient—by altering patient incentives. One such benefit design is tiered provider networks.

In a tiered provider network, a health plan sorts providers into tiers based on their cost and, often, quality relative to other similar providers who treat comparable patients. Providers with higher quality and lower cost are typically given the most preferred tier rankings. Providers with lower quality performance or higher cost are typically given nonpreferred rankings.

Not only does a tier ranking give patients information about a provider's value relative to other providers in the network (if methods of tiering accurately capture cost and quality), but tiered network designs also include financial

incentives to encourage patients to seek care from preferred providers. Specifically, patients pay lower cost sharing for ambulatory care or most hospital care if they choose a provider with a preferred tier ranking. Hospital care resulting from admission through the emergency department (ED) is exempt from tiered cost sharing, so patients pay the same amount if they choose an ED at a preferred or nonpreferred hospital.

The aim of tiered networks is thus to channel patients, through information about value, the financial incentive, or both, to providers in the preferred tier and ultimately to realize lower spending without sacrificing quality of care.

Tiered provider networks are also an alternative to “narrow network” plans. Whereas narrow network plans exclude some providers from the network, providing no coverage for services received from those providers, tiered networks allow patients to choose any provider in the widest network offered by the carrier but impose higher cost sharing for providers who are not preferred.

A few previous studies have examined whether

tiered networks affected patient choices. Dennis Scanlon and coauthors examined the experience of union workers enrolled in health plans with tiered hospital networks.³ The authors found that members of one union were more likely to select preferred hospitals for medical visits, but hospital tier ranking had no impact on the choices made by members of a second union or on the choices made by patients from either union admitted for a surgical diagnosis. In another study, state and municipal employees and families in Massachusetts who were enrolled in plans with a tiered physician network and were choosing a new doctor were less likely to choose one with the least preferred (or worst) tier ranking, for whom they would have had to pay a \$10–\$20 higher copayment for each office visit.⁴ However, tier ranking did not have an impact on whether patients decided to switch to a new physician from one they had seen previously.

Massachusetts is also the site of Blue Cross Blue Shield of Massachusetts's tiered-network health plans. A recent evaluation of the impact of the tiered hospital network, in which patients faced potential savings of \$900 in out-of-pocket spending if they chose a hospital in the preferred tier or \$690 if they chose a hospital in the middle tier (relative to hospitals in the nonpreferred tier), found increased use of hospitals in the preferred and middle tiers.⁵ Taken together, this evidence suggests that tiered networks are having an influence in certain contexts (for example, when patients are choosing new providers) and for care where differences in out-of-pocket spending are large. However, each of these studies focused on only one type of medical care (for example, hospitalizations or physician office visits) and did not examine the impact of tiered network designs on total spending.

One in five employers that offered health benefits to their employees in 2015 included a tiered network in their plan with the largest enrollment.⁶ Prevalence of the networks is particularly high in some markets. In the northeastern United States, 27 percent of employers offered a tiered-network health plan.⁷ In Massachusetts, the setting for this study, tiered-network-plan membership in 2014 was 16 percent of the commercially insured market (approximately 712,000 members), which was an increase from 11 percent in 2013.⁸

With the high prevalence of tiered-network plans in commercial health insurance, the impact of tiered networks on total spending remains an important policy question. In this article we seek to contribute to the literature in two ways. First, we evaluate the impact of tiered provider networks on total medical spending for nonelderly enrollees in commercial health plans

that tiered hospitals, physicians, and imaging providers. Second, we examine the impact on spending across these different types of care.

Study Context

Blue Cross Blue Shield of Massachusetts, the commercial health insurer with the largest market share in Massachusetts, began offering tiered-network health plans in 2008. Included in the tiered networks were hospitals, imaging centers, clinical and diagnostic labs, and primary care providers, all of which were categorized into three tiers called enhanced, standard, and basic according to their performance on quality and cost benchmarks. The enhanced tier included top-performing providers in terms of those benchmarks, the standard tier included moderate-performing providers or those with insufficient performance data, and the basic tier included the lowest performing providers. Primary care providers were tiered at the level of the group, not the individual clinician.

Enrollees in these tiered-network plans paid different cost-sharing levels depending on the tier ranking of their provider for inpatient admissions (excluding those through the ED), outpatient surgery, high-tech radiology (such as magnetic resonance imaging, computed tomography, positron emission tomography scans, and nuclear cardiac imaging tests), and primary care visits. The majority of tiered-network plans included all of these medical services, but approximately 25 percent of enrollees were in tiered plans that tiered only hospital admissions. Some plans also tiered the deductible, which meant that patients had higher out-of-pocket spending before they satisfied their deductible when they saw providers in nonpreferred tiers. The range of patient cost sharing varied across specific plans; general differences in copayments are shown in Exhibit 1.

Study Data And Methods

SAMPLE The study population consisted of 184,385 nonelderly enrollees (younger than age sixty-five) who were enrolled in a Blue Cross Blue Shield of Massachusetts small- or large-group tiered-network plan for at least one quarter in 2008–12 (intervention group) and 927,491 nonelderly enrollees in health plans with matched benefit designs except no tiered network in the same period (control group). For details on the construction of study sample, analytic methods, and results of sensitivity analyses, see the online Appendix.⁹ We obtained enrollment and medical claims data from the insurer on all of these enrollees for 2008–12.

EXHIBIT 1

Cost sharing for selected services for nonelderly enrollees in commercial health plans in Massachusetts with tiered networks, 2008–12

| Tier | PCP visit | Inpatient admission ^a | Outpatient surgery | High-tech radiology | Individual medical deductible |
|----------|-----------|----------------------------------|--------------------|---------------------|-------------------------------|
| Enhanced | \$15 | \$250 | \$150 | \$75 | \$0 |
| Standard | \$25 | \$500 ^b | \$250 | \$150 | \$500 |
| Basic | \$45 | \$1,000 | \$500 | \$250 | \$2,000 |

SOURCE Authors' analysis of plan enrollment data from Blue Cross Blue Shield of Massachusetts.
NOTES Tiers are defined in the text. PCP is primary care physician. ^aExcluding admissions through the emergency department. ^bCost sharing for inpatient admissions is \$300 at selected hospitals.

STUDY DESIGN We used a difference-in-differences analysis to evaluate the impact of a tiered network on health care spending. Our main unit of analysis was the enrollee quarter. We excluded any of an enrollee's quarters in which he or she was not continuously enrolled (9 percent of all member quarters) and defined an individual as being in a tiered plan if he or she was enrolled in a tiered plan for at least two months of the quarter. Tiered-network health plans became available in 2008, and an employer could choose to switch its employees to a tiered-network plan at any time after that. Therefore, within the intervention group, all quarters after the one in which employers switched to a tiered-network plan were the post period.

Because tiered-network plans aim to channel patients to providers in preferred tiers, and because previous research suggested that the plans had an impact on hospitalization,⁵ we hypothesized that total health care spending for people in plans with a tiered network would be lower than that for people in plans without such a network. We also hypothesized that the effect would be observed on types of spending that are subject to tiered copayments, including inpatient care, outpatient care, and radiology.

We analyzed this effect in two ways. First, we analyzed total medical spending, excluding pharmacy. Second, we replicated the analysis disaggregated by inpatient versus outpatient spending, and then separately for the subset of spending on outpatient radiology services.

VARIABLES The primary dependent variable was total medical spending per member per quarter, which combined plan spending and any enrollee cost sharing. We calculated spending by site or by combination of site and service (inpatient, outpatient, and outpatient radiology) as the sum of total medical spending on claims determined by the insurer to be from the site and, for outpatient radiology, the combination of site and service.

Control variables included age, sex, interactions between those two, risk score, and geo-

graphic region. Risk scores were estimated using age, sex, and diagnoses appearing in medical claims data in the same year (that is, concurrent) using diagnostic cost group (DxCg) software specified for the commercially insured population by Verisk Health. Members were assigned to one of seven geographic regions within Massachusetts using three-digit ZIP codes.¹⁰

STATISTICAL METHODS We estimated linear regression models of the effect of enrollment in a tiered-network health plan on total medical spending, controlling for the independent variables described above and secular trends (quarter-year fixed effects). We included employer-group fixed effects in the models to control for unobservable characteristics of the groups that might be correlated both with the decision to enroll in a tiered-network plan and medical spending by the group. Our base specification was not logarithmic-transformed for ease of interpretation and because linear models have been shown to adequately predict medical spending, compared to more complex functional forms.¹¹ We corrected for correlation between multiple observations from within 18,496 employer groups using clustered standard errors.

We tested for differences in trends in spending between the intervention and control groups during the pre-intervention period, which we defined as all quarters before the employer shifted to a tiered-network plan (for the intervention group) and all quarters for the control group, using an F-test.

SENSITIVITY ANALYSES There is some concern that at the firms whose employees had a choice between health plans with and without a tiered network, self-selection by these employees could bias our results. For example, if employees who were more likely to go to preferred providers were also more likely to enroll in a tiered plan, then our findings would be biased toward finding a greater impact of the tiered plans on spending. Overwhelmingly, firms in our sample offered health plans with a tiered provider network as the only option to their employees: Fewer than 4 percent of the firms had employees enrolled in plans with tiered networks and plans without tiered networks during the same month. However, as a sensitivity analysis, we excluded all firms that ever offered a choice among health plans from the study sample and estimated results for firms that offered only tiered plans.

It is also possible that firms offered a choice of plans across health insurance carriers, which we could not observe in our data. Very few of the smallest firms (those with fewer than fifty employees) offered a choice among health insurance carriers, so we present results for the sample stratified by employer group size (5–49

employees and 50 or more employees) to assess whether the effect of tiered networks on spending is different at employers of different sizes.

Finally, the intervention we studied affects cost sharing, which is known to affect patients' use of care. Thus, health risk scores based on current-year claims might be biased. We tested whether our findings were sensitive to our measure of members' health risk by estimating models that omitted a measure of health risk and by estimating models that included a prospectively defined (that is, based on prior-year claims) risk score. Models including prospectively defined risk scores included data from the period 2009–12 and only member-quarters for which we had a previous year of claims data (which was necessary to calculate the risk score).

LIMITATIONS Our study had several limitations. First, this analysis, like many other evaluations of health system reforms, is based on members enrolled at one commercial insurer in one state. It is also conditional on the way in which Blue Cross Blue Shield of Massachusetts defined tiers.

Second, the prevalence of tiered-network health plans is high in Massachusetts, and—for most of the state—patients can choose from among a large number of physicians, hospitals, and health systems, which could affect our results. We expect that the impact of any tiered network will depend on its environment and details, and thus all work on such networks will have to trade off generalizability with concerns about heterogeneous effects across different markets. Evidence about tiered networks (and many other reforms) will need to be built up over a number of studies, of which this is just a start.

A third limitation is that the results are subject to potential bias resulting from employers' decisions to switch to tiered-network health plans, which may be in part affected by the health of their employees. Although we address this concern by including employer-group fixed effects, testing for differences in pre-intervention spending trends, and estimating models that excluded large firms from the analyses, this concern could not be entirely addressed in our data. Thus, the estimates reported here should be considered suggestive and not definitive.

Study Results

Enrollment in health plans with tiered networks within our sample increased steadily over the study period, from 2.5 percent in 2008, the first year the plans were available, to almost 30 percent in 2012. The characteristics of members enrolled in tiered plans in one year—2012, which is the last year of our study period and the year of

greatest penetration—are presented in Exhibit 2. Tiered-network enrollees were slightly older, had higher mean health risk, were more likely to work at the largest firms, and lived in different regions of the state, compared to enrollees in plans without a tiered network.

The key assumption of our analysis is that spending trends were similar in the intervention (ever tiered) and control (never tiered) groups before adoption of tiered networks. Our analysis of pre-intervention spending trends found that the difference in trends between the ever-tiered and never-tiered enrollees was $-\$3.78$ per quarter ($p = 0.01$) (see the Appendix),⁹ which suggests that spending growth among tiered-network enrollees grew at a rate of about \$4 less per quarter in the period before entering a tiered-network plan, compared to the rate among the control group. While this difference is significant, it is quite small—representing only 0.5 percent of adjusted spending in a quarter.

In our difference-in-differences analysis, the tiered network was associated with \$43.36 lower total adjusted medical spending per member per quarter (\$830.07 versus \$873.43) (Exhibit 3), which represents a 5 percent decrease in spending. If the differential pre-intervention trend had continued in the absence of the intervention, our estimates of the association between tiered-provider-network plans and spending would be slightly overstated. If spending in the tiered-network groups had reverted to the mean, we would be slightly underestimating the savings.

Looking across sites and types of care, we observed savings associated with enrollment in a tiered-network plan for claims in the outpatient setting (\$576.89 versus \$604.76, or a 4.6 percent decrease), and for outpatient radiology (\$93.71 versus \$100.23, or a 6.5 percent decrease). The magnitude of these savings was similar to that for overall savings. The savings for inpatient care (\$217.15 versus \$226.92, or a 4.3 percent decrease), though negative and similar in magnitude, was not significant.

We found a similar pattern of results when we stratified the analysis by employer size and looked separately at enrollees with large and small employers (Exhibit 3), and in a sensitivity analysis that excluded firms whose employees had a choice among health plans. Collectively, these findings suggest that our results were not driven by nonrandom employee selection into a tiered network (see the Appendix).⁹ In sensitivity analyses that omitted a measure of enrollee health risk or that measured enrollee health based on claims from the previous year (that is, using a prospective risk score) instead of those from the current year, we found similar results for total, outpatient, and outpatient radi-

EXHIBIT 2

Characteristics of nonelderly enrollees in commercial health plans in Massachusetts with or without tiered networks, 2012

| Characteristic | Tiered network plan | Non-tiered-network plan |
|--|---------------------|-------------------------|
| Mean age (years) | 34 | 33**** |
| Age range (years) | | |
| 0-5 | 6.2% | 7.1%**** |
| 6-17 | 16.1 | 16.5 |
| 18-34 | 26.6 | 27.7 |
| 35-44 | 15.3 | 16.0 |
| 45-55 | 21.4 | 20.6 |
| 56-64 | 14.4 | 12.2 |
| Female | 49.9 | 50.5**** |
| CONCURRENT RISK SCORE | | |
| Mean (standard deviation) | 1.37 (4.08) | 1.28**** (3.81) |
| Median | 0.53 | 0.51 |
| REGION OF RESIDENCE | | |
| Boston metropolitan area | 18.14% | 25.29%**** |
| Western MA | 4.78 | 11.48 |
| Central MA | 17.91 | 13.82 |
| Northeastern MA | 31.18 | 21.35 |
| Cape Cod | 2.29 | 3.26 |
| Southeastern MA | 14.36 | 14.33 |
| Other | 11.34 | 10.46 |
| EMPLOYER GROUP SIZE (NUMBER OF EMPLOYEES) | | |
| 5-25 | 25.30 | 23.08**** |
| 26-49 | 12.27 | 14.90 |
| 50-99 | 14.00 | 17.95 |
| 100-999 | 28.63 | 34.39 |
| 1,000 or more | 19.79 | 9.67 |

SOURCE Authors' analysis of administrative enrollment and medical claims data from Blue Cross Blue Shield of Massachusetts. **NOTES** In 2012 there were 149,004 enrollees continuously enrolled in a tiered-network plan for at least one quarter and 346,912 in non-tiered-network plans. Concurrent risk score is a measure of an enrollee's health risk estimated using age, sex, and diagnoses from the current year's medical claims data. Percentages may not sum to 100 because of rounding. ****p < 0.001

ology spending. In addition, the lower inpatient spending by tiered-network enrollees relative to that of non-tiered-network enrollees became significant (see the Appendix).⁹

Discussion

Enrolling in a tiered-network health plan resulted in a decrease of 5 percent in total health care spending per member per quarter. The key concerns with our study design were whether there was biased selection by employers into tiered-network health plans and whether our control group represented a good counterfactual for tiered-network enrollees. We examined these concerns through an empirical comparison of trends in health care spending for tiered-network enrollees and the control group, and we found a small difference between the groups in spending trends in the pre period. The difference was equivalent to less than 0.5 percent per quarter. Even if the difference in the rate of spending growth between the intervention and control

groups had persisted at this level (as opposed to reverting to the mean and disappearing), that would have suggested that the decrease in total medical spending associated with enrollment in tiered-network plans was over 4 percent.

Spending for outpatient medical care and for outpatient radiology by enrollees in tiered-network plans was significantly lower than that by enrollees in plans without a tiered network—and the magnitude of the difference was similar to that for total spending. The difference in spending for inpatient care between tiered and non-tiered plans was in the same direction but not significant in our main specifications, although it became significant in some sensitivity analyses. It is unknown whether these findings are because patients' shifting to preferred inpatient providers is less common than shifting to preferred outpatient providers (perhaps in part because only nonacute inpatient stays were subject to tiering), or because the savings from using preferred providers instead of nonpreferred providers is greater in outpatient care than in inpatient care.

All providers in the preferred tiers met quality standards, but overall provider performance on quality was high across the tier rankings. Thus, tiers were not closely aligned with variation in quality. As a result, this study focused on the impact of the tiered network on medical spending and did not evaluate the impact on quality of care. Further investigation of unintended spillovers on quality would be warranted.

Policy Implications

The promise of the tiered-network benefit design is that—unlike cost sharing that does not vary within types of providers and is often referred to as a “blunt” instrument—it explicitly relies on employee cost sharing to channel patients to lower-cost, often likely higher-value, providers.

Moreover, tiered-network plans offer generous coverage after higher copayments or deductibles for using nonpreferred providers, in contrast to narrow-network plans, which offer no coverage for care from nonpreferred providers that are excluded from the network entirely. As a result, tiered-network plans may be more palatable to consumers. Like those of narrow-network plans, premiums for tiered networks are lower than for plans with broad networks. Thus, tiered-network plans could be considered alongside narrow-network plans in settings that aim to offer an array of affordable commercial plan options, such as the health insurance exchanges created by the Affordable Care Act.

This analysis did not examine the amounts of spending by plan versus patient. Recent analyses

from Massachusetts have found that enrollees in tiered-network plans have more cost sharing, compared to enrollees in other plans.⁸ To understand the full impact of any expansion of tiered-network plans, it is important to take into account the extent to which premium savings offset increases in cost sharing and the mechanisms and distribution of out-of-pocket spending across patient groups.

Our findings also suggest the potential for tiered-network plans as a tool for providers to improve value. For example, for provider groups facing increasing pressure to minimize spending relative to a benchmark or global payment, aligning referral patterns with tiered-network plans could help achieve spending targets.

Conclusion

This study adds to the evidence that tiered-network benefit designs have the potential to deliver higher value and be a tool that employers and other payers can use to decrease spending in the US health care system. The effects of any tiered-network plan will depend on the details of tiering. Further research should assess whether similar results are seen in different markets and in populations such as the elderly or people with chronic illnesses, to understand the best contexts for the implementation of tiered networks. ■

EXHIBIT 3

Changes in average spending per member per quarter in the intervention and control groups, 2008–12

| Group size (number of employees) | Tiered-network plan | Non-tiered-network plan | Difference |
|----------------------------------|---------------------|-------------------------|--------------|
| 5 OR MORE | | | |
| Total quarterly spending | \$830.07 | \$873.43 | −\$43.36**** |
| Inpatient | 217.15 | 226.92 | −9.77 |
| Outpatient | 576.89 | 604.76 | −27.86**** |
| Outpatient radiology | 93.71 | 100.23 | −6.52**** |
| 50 OR MORE | | | |
| Total quarterly spending | 831.57 | 889.09 | −57.51**** |
| Inpatient | 219.00 | 234.60 | −15.60 |
| Outpatient | 581.49 | 609.77 | −28.28*** |
| Outpatient radiology | 94.33 | 100.61 | −6.28** |
| 5–49 (SMALL GROUPS) | | | |
| Total quarterly spending | 817.82 | 850.16 | −32.34*** |
| Inpatient | 216.16 | 221.59 | −5.43 |
| Outpatient | 563.38 | 589.67 | −26.28**** |
| Outpatient radiology | 92.81 | 99.05 | −6.25** |

SOURCE Authors' analysis of claims data from Blue Cross Blue Shield of Massachusetts. **NOTES** The intervention group consisted of 184,385 people who were enrolled in a tiered network plan for at least one quarter. The control group consisted of 927,491 people who were never enrolled in a tiered network plan. All spending amounts are average current-year dollars. "Total quarterly spending" excludes spending on pharmacy claims. "Inpatient," "outpatient," and "outpatient radiology" all include both professional and facility fees. Estimated spending is based on multivariate linear regression models that controlled for age, sex, and concurrent health risk; that included time, region, and employer-group fixed effects; and that clustered standard errors on employer group. ** $p < 0.05$ *** $p < 0.01$ **** $p < 0.001$

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