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Quality Advantage? Provider Quality and Networks in Medicare Advantage

Simon F. Haeder – The Pennsylvania State University

Medicare Advantage plans have grown significantly over the past decade and the potential for their future growth seems unabated. Astonishingly, however, we know little about how Medicare beneficiaries access services, particularly whether those services are of high quality. This study explores access to cardiac surgeons for coronary artery bypass grafting (CABG) and heart valve surgery in California and New York. It is one of the first studies to analyze Medicare Advantage networks and interactions between provider networks and provider quality. Results of the study show that for large metropolitan areas, access is rather similar for traditional Medicare and Medicare Advantage beneficiaries. Limitations, however, exist for the latter. Important concerns emerge for Medicare Advantage beneficiaries outside of metropolitan areas where healthcare market challenges appear to be exacerbated by carrier restrictions. Results indicate no evidence that carriers selectively contract to improve quality. There is, however, significant diversity with regard to network breadth; and, this breadth does not stay static across distances. These results hold important implications for the future of the Medicare program, network adequacy regulations, and how consumers make choices about their insurance coverage.

Keywords: Medicare, Provider Networks, Healthcare Access, Provider Quality

Introduction

In recent years, Medicare Advantage plans have grown rapidly. Today, they enroll about 22 million Americans, or about one third of all Medicare beneficiaries nationwide (Jacobson, Freed, Damico, & Neuman, 2019). Yet, enrollment growth has only come with a limited assessment of its consequences. Indeed, although we have some information about plan choices for beneficiaries in Medicare Advantage, we know virtually nothing about provider networks beyond the fact that the Center for Medicare & Medicaid (CMS) has established certain time-and-distance standards for plans.

The few studies addressing the issue of provider networks are limited in their extent and only look at 20 of the nation's more than 3,000 counties. One of these studies found that the average Medicare Advantage plan includes about half of a county's hospitals (Jacobson, Trilling, Neuman, Damico, & Gold, 2016). In another study, researchers found that about 35% of enrollees were in plans with narrow networks. They also found that, on average, plans included just under 50% of physicians in a given county (Jacobson, Rae, Neuman, Orgera, & Boccuti, 2017).

The actual quality of providers in Medicare Advantage networks has been understudied (Haeder, 2019a, 2019b); and, CMS does not include quality measures in its regulations of Medicare Advantage plans (Haeder, Weimer, & Mukamel, 2019b). Thus, this study aims to answer two important questions about the potential role provider networks play in restricting access for Medicare Advantage beneficiaries. First, how significant are network restrictions that are imposed by Medicare Advantage plans when it comes to access to higher-quality surgeons? And second, do Medicare Advantage plans emphasize access to higher quality care by selectively contracting with surgeons of higher quality?

This study focuses specifically on access to coronary artery bypass graft (CABG) and heart valve surgery in California and New York. These two states were selected for several reasons. In both states, their CABG quality reporting programs are well-established, they use sophisticated techniques to risk-adjust the data, and they have been operational for years. To answer the questions in this study, geographic access for Medicare Advantage beneficiaries of local coordinated care plans is compared to an “unrestricted” provider network that would be available to traditional Medicare beneficiaries.

Medicare and Medicare Advantage

While the federal role in the nation’s healthcare system has consistently increased since the New Deal (Haeder & Weimer, 2015), the creation of Medicare and Medicaid in 1965 marks the most significant expansion of this commitment (Oberlander, 2003). Since its creation, Medicare (the federal program covering the vast majority of America’s aged population) has served a crucial role in providing access to medical care while protecting the financial security of America’s seniors (Oberlander, 2003). Yet, in the more than five decades since the program was first signed into law by President Johnson, it has seen significant statutory changes (Berenson & Dowd, 2008; Oberlander, 1997). One of the most obvious transformations has been the growing role of Medicare Advantage, the private sector complement to the traditional Medicare program (Neuman & Jacobson, 2018).

The involvement of private entities in Medicare, however, is nothing new. Indeed, early on the federal government heavily relied on private third parties, mostly Blue Shield and Blue Cross, to administer much of the program (Oberlander, 2003). The original Medicare legislation also allowed a limited role for so-called staff-model HMOs like Kaiser Permanente, then referred to as group practice prepayment plans (Jacobson, 2015; Zarabozo, 2000). Over time, this role increased, with the Social Security Amendments in 1972 serving as the first major expansion (Jacobson, 2015; Zarabozo, 2000). However, enrollment in HMO plans remained limited, and, because of unfavorable payment mechanisms, only a few dozen plans were offered across the entire country (Zarabozo, 2000).

The next major change occurred in the early 1980s, when Congress passed the Tax Equity and Fiscal Responsibility Act (TEFRA) of 1982 (Jacobson, 2015). While reductions in reimbursements led to a lower number of plan offerings, enrollment increased steadily due to the additional benefits offered to beneficiaries. The Balanced Budget Act (BBA) of 1997 expanded the types of plans insurers could offer while further adjusting payments to plans (Jacobson, 2015). A few years later, the Medicare Prescription Drug, Improvement, and Modernization Act (MMA) of 2003 expanded plan types even more while significantly altering plan payments in favor of insurers (Oberlander, 2007). The most recent adjustment came as part of the Affordable Care Act (ACA). The ACA led to significant payment reductions for carriers (Haeder, 2012; McGuire, Newhouse, & Sinaiko, 2011). However, some of these reductions have since been reversed (Kelly, 2015).

Proponents of Medicare Advantage have argued that it offers beneficiaries more choices while harnessing the power of the market to contain costs (McGuire et al., 2011). Other program

goals include the provision of additional benefits to Medicare beneficiaries (without establishing an explicit legal entitlement), improving the quality of care for all Medicare beneficiaries, and expanding access to care (Berenson & Dowd, 2008; Thorpe & Atherly, 2002). There is currently consensus that no cost savings have been realized for the overall Medicare program. However, beneficiaries have unquestionably gained access to additional benefits (e.g., dental coverage and gym memberships).

Evidence with regard to quality is decidedly mixed (e.g., Brennan & Shepard, 2010; DeParle, 2002; Neuman & Jacobson, 2018). Moreover, the program has been subject to allegations of cream skimming, i.e., disproportionately signing up the healthiest Medicare beneficiaries, which some have claimed has significantly increased profits for participating insurance carriers (McGuire et al., 2011; Oberlander, 1997).

More recently, claims of selection effects seem to have somewhat abated (McWilliams, Hsu, & Newhouse, 2012), though plans may still benefit financially from seeking out healthier beneficiaries (Neuman & Jacobson, 2018). There is some evidence, for instance, that high cost beneficiaries are particularly likely to switch to traditional Medicare over time (see, for instance, Frakt, 2016; Morrissey, Kilgore, Becker, Smith, & Delzell, 2013; Neuman & Jacobson, 2018; Oberlander, 1997; Rahman, Keohane, Trivedi, & Mor, 2015). As a result of these limitations, some have characterized the program as a policy failure (Newhouse & McGuire, 2014).

Overall, since its inception the program has not only undergone a number of name changes (e.g., 1876 plans, Medicare Part C, Medicare+Choice, and Medicare Advantage), but it has also repeatedly been curtailed and expanded (McGuire et al., 2011). Indeed, the success of the program, i.e., the percentage of Medicare beneficiaries enrolling, appears to be a direct consequence of the federal government's generosity with regard to payment to insurers (DeParle, 2002; McGuire et al., 2011; Oberlander, 2007). Notably, these changes in payments to insurance carriers have had major implications for beneficiaries in terms of the availability of plans and the benefits offered by those plans (DeParle, 2002).

Still, Medicare Advantage has been popular with seniors for a variety of reasons including limited out-of-pocket costs, the convenience to be able to one-stop shop for insurance coverage, and the aforementioned access to additional benefits like dental coverage and gym memberships (Neuman & Jacobson, 2018; Oberlander, 2007). Today, enrollment amounts to roughly 22 million, compared to 10.5 million in 2009 and 6.9 million in 1999 (Jacobson et al., 2019); and, with newly eligible beneficiaries particularly likely to enroll in Medicare Advantage, the program is slated for further growth (Jacobson, Neuman, & Damico, 2015).

Medicare Advantage plans are open to the vast majority of beneficiaries across the nation, except in the most rural regions (Jacobson, Damico, & Neuman, 2017). However, Medicare Advantage plan penetration rates continue to show diversity across states. As previously mentioned, while roughly one-third of Medicare beneficiaries are enrolled in the program nationwide, enrollment rates range from lows of 1% in Alaska and 3% in Wyoming to a high of 71% in Puerto Rico. Several states, including the two states that are the focus of this study (California and New York), enroll more than 40% of their Medicare recipients (Jacobson et al., 2019).

Even within states, Medicare Advantage enrollment differs. For example, in New York and California enrollment rates range from below 1% to well above 50% (Jacobson et al., 2019). While many of the lower penetration counties tend to be rural, this is not always the case (Jacobson et al., 2019). Medicare Advantage plans appear equally diverse in terms of benefits provided by specific plans (DeParle, 2002; McBride, 1998).

Cardiac Surgery in the United States

In the United States, heart disease is a prevalent and costly disease. In 2015, the 17 million Americans suffering from heart disease were responsible for \$89 billion in medical costs (American Heart Association, 2017). These costs are expected to balloon to \$215 billion annually by 2035 (American Heart Association, 2017). While percutaneous coronary interventions (PCI) have increased in significance (Haeder, 2019b), two common procedures conducted for patients with heart disease are coronary artery bypass graft (CABG) surgery and heart valve surgery.

On average, CABG costs per procedure exceed \$75,000 (Papanicolas, Woskie, & Jha, 2018), while those for heart valve surgery exceed \$60,000 per procedure (Robinson, 2011). In the vast majority of cases, these cardiac surgeries are scheduled in advance and are not conducted in an emergency setting. This allows patients to compare providers in terms of quality if they choose to do so (American College of Emergency Physicians, 2013; Schumer et al., 2016). Extensive pre- and post-operative testing and consultation is usually required for both procedures.

The mean age for patients who undergo CABG surgery is around 65 years of age (Epstein, Polsky, Yang, Yang, & Groeneveld, 2011; Zheng et al., 2017). However, a quarter of surgeries involve patients above the age of 75 (Epstein et al., 2011). The number of seniors in this age group, or even older, is expected to increase significantly over the next decade (Aziz & Grover, 1999). Given the prevalence of coronary artery disease in America's seniors, CABG surgeries are relatively common among Medicare beneficiaries (Clark et al., 2012; Culler, Kugelmass, Brown, Reynolds, & Simon, 2015). Notably, costs associated with CABG are the largest expenditure for any medical or surgery procedure in the Medicare program (Epstein et al., 2011).

As a response to the high cost and frequent occurrence of these procedures, beginning in the 1990s, a number of states began implementing provider report cards. Research has shown that these report cards, based on risk-adjusted mortality rates, have led to improvements in quality over time (Fung, Lim, Mattke, Damberg, & Shekelle, 2008; Mukamel, Haeder, & Weimer, 2014). Further, studies have found that published risk-adjusted mortality rates seem to have positively affected insurance carriers and patients in their choice of providers (Mukamel, Weimer, Zwanziger, & Mushlin, 2002; Mukamel, Weimer, Zwanziger, Gorthy, & Mushlin, 2004). However, with exception of the effects of the Affordable Care Act (Haeder, Weimer, & Mukamel, 2015a; Yasaitis, Bekelman, & Polsky, 2017), we lack a detailed understanding of how provider networks interact with provider quality, particularly as it relates to Medicare Advantage.

Data

Quality reporting has shown to be beneficial to consumers. However, not all states provide quality information regarding individual providers to consumers about CABG and heart valve surgery outcomes (or most other medical procedures). Importantly, risk-adjusted mortality rates for CABG are generally considered the gold standard for quality measures because of the unidimensional nature of the outcome of interest (i.e., survival), appropriate and validated methodologies for risk-adjustment, and utilization over several decades (Mukamel et al., 2014; Mukamel, Murthy, & Weimer, 2000).

California and New York are the two states with the most sophisticated data collection efforts regarding CABG or CABG and heart valve surgeries. These states make those data widely available. Importantly, the programs in these states are well vetted and have been operational for years.

In California, the California Office of Statewide Planning and Development (OSHPD), a state agency which provides a large amount of data on the state's healthcare infrastructure, collects risk-adjusted mortality scores for CABG or CABG and valve surgery provides. These annual measures are based on operative mortality, which is defined as death within 30 days of surgery outside the hospital or death within 90 days inside of the hospital. The mortality rates use a sophisticated methodology that allows for appropriate comparisons across providers (Office of Statewide Health Planning and Development, 2017, 2019).

Similarly, in New York, the New York State Department of Health works with the New York State Cardiac Advisory Committee to collect and publish bi-annual cardiac care quality measures. In line with California's approach, New York also relies on advanced and validated methods to make mortality rates comparable across patients and providers (New York State Department of Health, 2018).

Data about Medicare Advantage plans was obtained from the website medicarehelp.org, which lists information on all Medicare Advantage plans available in a given county. As necessary, these data were supplemented with data from the Centers for Medicare & Medicaid Services (CMS). Surgeon quality measures and provider, plan, and network data were linked using data obtained from *Vericred*. *Vericred*, under contract with the Robert Wood Johnson Foundation, obtains these data from insurers or machine-readable provider directories. Although not perfect, *Vericred* provides the most complete provider network data available and it is commonly used by researchers to assess provider networks (e.g., Haeder, Weimer, & Mukamel, forthcoming; Polsky, Weiner, & Zhang, 2017; Zhu, Zhang, & Polsky, 2017).

Methods, Measures, and Analytic Approach

Do Medicare Advantage plans in California and New York significantly restrict beneficiaries' access to high quality cardiac surgeons for CABG and heart valve replacements as compared to access for traditional Medicare beneficiaries? And, do they selectively contract with higher quality providers? To answer these questions, I undertook the following approach. First, I assessed to what degree Medicare Advantage plans imposed restrictions on beneficiaries by failing to include appropriate providers in their networks. I did so by analyzing whether beneficiaries had access to at least one higher quality provider within their respective Medicare Advantage network. Next, I assessed the choices offered to beneficiaries in terms of the number of higher quality surgeons available within their Medicare Advantage network.

I further illustrated this second measure by utilizing the approach pioneered by Polsky and Weiner (Polsky & Weiner, 2015), which relied on t-shirt size (from extra-small to extra-large) to illustrate network breadth. Sizes ranged from extra-small (less than 10% of available providers), small (10% to 25% of available providers), medium (25% to 40% of available providers), large (40% to 60% of available providers), and extra-large (more than 60% of available providers). In this analysis, I restricted the denominator to only surgeons of higher quality (opposed to all available surgeons). I also adapted Polsky and Weiner's (2015) approach further by accounting for the distance between the beneficiary and the provider since the effective size of networks could differ with distance from the beneficiary.

It should be noted that distance between beneficiary and cardiac surgeon could play an important role in determining patient access (Haeder et al., 2015a). From a consumer perspective, choice and access may be most important closer to home. However, as most CABG and valve surgeries are scheduled in advance, consumers may be willing to travel long distances in order to gain access to higher quality surgeons. Therefore, I compared access at 15 miles, 30 miles, 60 miles, 120 miles, and 240 miles for all assessments. In all cases, I compared the Medicare Advantage plans to access in traditional Medicare.

Finally, I analyzed the composition of provider networks in Medicare Advantage. Specifically, I assessed the percentage of higher quality providers in Medicare Advantage plans compared to their availability in traditional Medicare. By definition, Medicare Advantage plans restrict access by selectively contracting with a subset of available providers. Although restricting the number of providers, i.e., the adequacy of networks, is a relevant and important concern, some have argued that consumers could benefit from these restrictions if carriers disproportionately limited networks to higher quality providers (Haeder, Weimer, & Mukamel, 2015b).

Measures and Analytic Approach

In order to assess access to quality providers, I calculated two measures. First, utilizing the quality measures available for both states, I determined whether a cardiac surgeon's quality measure was better than the state average (i.e., "above average quality"). This measure was available for both California and New York. Second, again utilizing the available quality measures, I repeated the process for providers that were at least one standard deviation above the state average (i.e., "high quality"). It is important to point out that in California not a single provider was at least one standard deviation above average. As such, no high quality measure could be constructed.

To compare access to higher quality surgeons, I made use of dyads comparing access to surgeons based on the network offered by Medicare Advantage plans sold in both states to traditional Medicare. Unfortunately, the data provided by *Vericred* does not include all Medicare Advantage networks. It does, however, provide data for the vast majority of enrollees. In California, the plans provided coverage to about 1.13 million beneficiaries. Data for 170,000 beneficiaries (22%) were not available. Data were available for 230 of the state's 263 distinct Medicare Advantage CCP plans. In New York, about 500,000 enrollees (or 75%) were included in this study. This amounts to about 83%, or 989, of the state's 1,195 distinct Medicare Advantage CCP plans.

To create the dyads, I first established which Medicare Advantage plan was sold in each census block group in the two states. Second, I established a plan's provider network using the network and provider data collected by *Vericred*. Third, I determined the distance between the centroid of each respective census block group where the plan was sold and each cardiac surgeon's location. Fourth, I established a count for each census block group and Medicare Advantage plan combination for the number higher quality of surgeons within 15 miles, 30 miles, 60 miles, 120 miles, and 240 miles based on the network for the specific Medicare Advantage plan. This also allowed me to establish whether there was at least one surgeon available at the various levels of distance. For the second part of the dyad, I repeated this process for all appropriate providers in the state, the "network" available to beneficiaries in traditional Medicare.

The final step utilized the aforementioned dyads to compare the proportion of census block group/Medicare Advantage plan combinations that had at least one higher quality cardiac surgeon (see Table 1), the number of higher quality surgeons available (see Table 2), and the percentage of networks made up of higher quality surgeons (see Table 3) within the various distance levels to traditional Medicare in the two states. This approach offered the advantage of controlling directly for confounding factors, such as characteristics of the population and local healthcare environment. It also allowed for simple statistical tests (e.g., *t*-tests or tests of proportion) of differences within dyads (Haeder, Weimer, & Mukamel, 2020).

It should be noted that two important factors could significantly affect beneficiary access. First, Medicare Advantage plans sold as Preferred Preference Providers (PPOs) allow beneficiaries, by definition, to go outside their network (albeit generally at higher out-of-pocket costs). Health Maintenance Organization (HMO) customers do not have this choice. Network composition can also vary between these two types of coverage. Therefore, I provide separate analyses for each insurance type.

Table 1. Results for Tests of Proportion of Access to At Least One Surgeon

			Large Metro (Distance in Miles)					Metro (Distance in Miles)					Micro and Rural (Distance in Miles)				
			15	30	60	120	240	15	30	60	120	240	15	30	60	120	240
California	Above Average	HMO MA	0.78	0.91	0.99	0.99	0.10	0.52	0.71	0.87	0.95	0.10	0.00	0.00	0.43	0.50	1.00
		HMO TM	0.96	0.98	1.00	1.00	1.00	0.76	0.93	0.98	0.10	1.00	0.06	0.58	0.95	1.00	1.00
		PPO MA	0.78	0.98	1.00	1.00	1.00	0.42	0.72	0.92	0.99	1.00	--	--	--	--	--
		PPO TM	0.96	0.98	1.00	1.00	1.00	0.79	0.95	0.99	0.10	1.00	--	--	--	--	--
New York	Above Average	HMO MA	0.88	0.90	0.90	0.90	0.90	0.41	0.57	0.68	0.86	0.93	0.02	0.17	0.61	0.88	0.99
		HMO TM	0.98	0.10	1.00	1.00	1.00	0.66	0.87	0.95	1.00	1.00	0.03	0.26	0.79	0.96	1.00
		PPO MA	0.85	0.91	0.95	0.95	1.00	0.35	0.52	0.59	0.75	0.88	0.04	0.16	0.55	0.85	0.99
		PPO TM	0.97	0.99	1.00	1.00	1.00	0.61	0.82	0.90	1.00	1.00	0.04	0.22	0.66	0.95	1.00
	High Quality	HMO MA	0.72	0.80	0.83	0.83	0.83	0.09	0.15	0.29	0.56	0.79	0.00	0.00	0.08	0.44	0.82
		HMO TM	0.90	0.10	1.00	1.00	1.00	0.15	0.24	0.41	0.10	1.00	0.00	0.03	0.31	0.86	1.00
		PPO MA	0.70	0.85	0.94	0.95	0.95	0.03	0.06	0.18	0.55	0.74	0.00	0.00	0.06	0.48	0.87
		PPO TM	0.88	0.99	1.00	1.00	1.00	0.13	0.21	0.34	0.10	1.00	0.00	0.02	0.23	0.81	1.00

Note: Bold highlighting indicates statistically significant differences between Traditional Medicare (TM) and Medicare Advantage (MA) at $p < 0.001$. “HMO” indicates Health Maintenance Organization; “PPO” indicates Preferred Provider Organization.

Table 2. T-Test Results for the Number of Available Surgeons

			Large Metro (Distance in Miles)					Metro (Distance in Miles)					Micro and Rural (Distance in Miles)				
			15	30	60	120	240	15	30	60	120	240	15	30	60	120	240
California	Above Average	HMO MA	3.5	9.1	17.1	21.3	23.8	1.6	3.6	8.5	19.2	24.2	0.0	0.0	0.8	2.5	7.4
		HMO TM	13.2	31.2	55.0	78.2	97.7	5.0	10.1	24.9	65.8	92.4	0.3	2.0	6.6	30.3	80.2
		HMO Pr	0.3	0.3	0.3	0.3	0.2	0.3	0.4	0.3	0.3	0.3	0.0	0.0	0.1	0.1	0.1
	Above Average	PPO MA	1.2	3.5	8.6	10.8	13.9	0.7	1.8	4.0	9.5	12.3	--	--	--	--	--
		PPO TM	13.8	32.7	57.3	80.1	100.1	6.5	12.8	27.7	70.2	94.4	--	--	--	--	--
		PPO Pr	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	--	--	--	--	--
New York	Above Average	HMO MA	18.3	26.3	30.7	31.7	34.3	1.0	2.1	4.5	8.6	18.5	0.0	0.3	2.2	9.1	22.7
		HMO TM	35.5	52.9	63.1	67.1	77.0	1.8	3.8	9.5	18.7	49.9	0.1	0.5	3.7	21.3	63.0
		HMO Pr	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.5	0.5	0.4	0.0	0.6	0.6	0.4	0.4
	Above Average	PPO MA	5.7	8.5	10.0	11.0	11.6	1.0	1.7	3.3	6.4	10.5	0.1	0.4	2.2	7.0	11.1
		PPO TM	33.3	51.5	63.2	67.3	77.1	1.9	3.5	9.6	20.2	64.4	0.1	0.5	3.5	19.3	65.6
		PPO Pr	0.2	0.2	0.2	0.2	0.2	0.5	0.5	0.3	0.3	0.2	1.0	0.8	0.6	0.4	0.2
	High Quality	HMO MA	3.9	5.6	6.7	6.7	6.7	0.1	0.3	0.8	1.4	3.4	0.0	0.0	0.1	1.2	4.0
		HMO TM	7.5	10.9	13.9	15.0	15.0	0.3	0.7	2.0	3.9	10.2	0.0	0.0	0.5	4.0	13.0
		HMO Pr	0.5	0.5	0.5	0.5	0.5	0.3	0.4	0.4	0.4	0.3			0.2	0.3	0.3
	High Quality	PPO MA	1.4	1.7	2.0	2.0	2.1	0.0	0.1	0.3	0.8	1.8	0.0	0.0	0.1	0.6	1.8
		PPO TM	7.0	10.7	14.0	15.0	15.1	0.2	0.5	1.7	4.0	13.3	0.0	0.0	0.3	3.4	13.5
		PPO Pr	0.2	0.2	0.1	0.1	0.1	0.0	0.2	0.2	0.2	0.1			0.3	0.2	0.1

Note: “Pr” indicates proportion. Bold highlighting indicates statistically significant differences between Traditional Medicare (TM) and Medicare Advantage (MA) at $p < 0.001$. “HMO” indicates Health Maintenance Organization; “PPO” indicates Preferred Provider Organization.

Table 3. Percentage of Networks Made Up of Higher Quality Surgeons

			Large Metro (Distance in Miles)					Metro (Distance in Miles)					Micro and Rural (Distance in Miles)				
			15	30	60	120	240	15	30	60	120	240	15	30	60	120	240
California	Above Average	HMO MA	53.0	54.0	56.8	56.7	57.3	67.8	66.6	63.5	62.1	61.1	--	--	100.0	96.1	86.2
		HMO TM	59.0	59.2	60.6	61.7	63.6	69.4	68.2	65.8	64.4	63.8	--	--	77.6	73.9	72.2
		PPO MA	87.3	83.2	68.4	59.8	58.3	42.8	49.6	56.1	60.7	57.5	--	--	--	--	--
		PPO TM	56.6	57.0	59.3	60.4	62.4	71.9	71.2	67.3	63.0	61.7	--	--	--	--	--
New York	Above Average	HMO MA	74.0	74.2	74.3	74.5	71.4	32.4	36.0	36.0	41.8	49.5	25.9	32.0	39.7	50.5	57.6
		HMO TM	70.2	70.1	68.5	69.0	64.7	40.5	42.3	42.8	47.7	54.3	17.8	31.8	42.7	50.9	58.7
		PPO MA	78.4	78.0	78.9	79.1	72.3	41.1	45.0	42.4	40.4	49.2	32.4	30.5	41.5	47.5	49.7
		PPO TM	71.4	70.5	68.6	68.9	64.7	43.4	46.0	46.6	50.0	58.3	24.3	26.0	42.1	52.1	59.6
	High Quality	HMO MA	14.7	14.6	15.0	14.7	13.1	3.2	3.4	5.4	7.4	10.7	0.0	0.1	1.5	6.0	11.5
		HMO TM	14.7	14.6	15.1	15.4	12.6	6.6	7.4	7.8	11.1	10.5	0.0	0.8	5.1	8.8	11.8
		PPO MA	17.3	16.2	16.1	14.7	12.3	0.9	1.5	3.8	4.5	7.0	0.0	0.0	1.6	3.6	6.7
		PPO TM	14.5	14.5	15.1	15.4	12.6	3.3	4.7	5.3	10.1	11.7	0.0	0.4	4.8	7.9	12.1

Note: Bold highlighting indicates statistically significant differences between Traditional Medicare (TM) and Medicare Advantage (MA) at $p < 0.001$. “HMO” indicates Health Maintenance Organization; “PPO” indicates Preferred Provider Organization.

Second, the urbanity of a given area could directly affect healthcare markets. CMS accounts for this factor and designates each of the nation's counties as large metropolitan, metropolitan, micropolitan, rural or Counties with Extreme Access (CEAC) based on population and population density. I follow CMS's designation and provide separate analyses based on county type; however, I combine micropolitan, rural, and CEAC areas because of the limited number of these cases.

Results

Minimum Level of Access to Higher Quality Providers

Minimum access to higher quality providers, if defined as access to at least one higher quality cardiac surgeon, will likely always be superior for traditional Medicare beneficiaries because all surgeons available to Medicare Advantage beneficiaries are also accessible in traditional Medicare. Although it may be possible that Medicare Advantage plans contract with providers of higher quality, they may do so by creating "artificial provider deserts"—that is, by failing to contract with providers in certain areas. The empirical issue, then, becomes assessing whether this is the case; and, if so, examining how substantive the differences are.

In California (Table 1), using tests of proportion, important patterns are evident. Looking at the results for large metropolitan areas, traditional Medicare fares better at the smallest distance level compared to Medicare Advantage. However, the difference is substantively small, except at 15 miles, for both HMOs and PPOs. For HMOs, the limitations reach distances of 30 miles. Access within Medicare Advantage is essentially similar between HMOs and PPOs.

Regarding metropolitan areas, overall access (even for traditional Medicare beneficiaries) is reduced when compared to large metropolitan areas. Access, however, is rather similar between Medicare Advantage PPOs and HMOs at the various distance levels. Notably, HMOs fare slightly better at shorter distances. Carrier network decisions contribute to access restrictions up to a distance of 30 miles; and, at times even up to 60 miles. Finally, access is decidedly worse (even at large distances) in micropolitan and rural areas where only HMO Medicare Advantage plans are sold in California. It is important to point out that carrier imposed restrictions here create areas devoid of providers up to distances of 60 miles. This creates significant access limitations even at distances of 120 miles.

The picture is rather similar in New York's large and standard metropolitan areas. Access appears slightly better in large metropolitan areas. However, access is slightly worse in standard metropolitan areas when compared to California (Table 1). However, access to above average surgeons is somewhat better in the less populated parts of New York state, particularly at distances of 60 and 120 miles. For both PPOs and HMOs, differences from traditional Medicare are relatively small in these areas. This is a stark contrast to California. In New York, then, it appears that carriers play a more limited role in creating artificial access barriers.

Overall, Medicare Advantage fares consistently worse than traditional Medicare. The differences, however, are often substantively small. With regard to high quality surgeons, access mirrors the situation for above average surgeons in large metropolitan areas, albeit at slightly lower levels. A significant difference emerges, however, for metropolitans versus micropolitan and rural areas. Access is relatively limited in micropolitan and rural areas, even for traditional Medicare beneficiaries, due to the limited number of higher quality surgeons. Similarly, Medicare Advantage is worse in these areas, often substantively so, as carriers tend to exclude providers up to 240 miles.

Beneficiary Choice

Providing a minimum level of access is important but providing a level of choice to beneficiaries also matters. Indeed, some providers may not have the capacity to serve additional beneficiaries because they are unable to accept new patients. Moreover, beneficiaries may favor a degree of choice. Therefore, my next step was to compare the overall number of higher quality surgeons available to traditional Medicare and Medicare Advantage beneficiaries. Again, members of traditional Medicare should do at least as well as Medicare Advantage beneficiaries in terms of access because surgeons available to Medicare Advantage members are also available to traditional Medicare.

In California (Table 2), results of *t*-tests show that access for HMO beneficiaries in large metropolitan areas amounts to about one quarter to one third of that compared to their traditional Medicare counterparts. While access is slightly better (percentage wise) in metropolitan areas, it is somewhat worse (particularly at shorter distances) in terms of the overall number of providers. Access levels in rural areas are relatively poor for both traditional Medicare and Medicare Advantage. While traditional Medicare members' access improves at 60 miles, Medicare Advantage access appears to lag. Again, a significant role is played by carriers in creating access barriers. Differences are consistently statistically and substantively different across varying degrees of rurality. Notably, Medicare Advantage PPO plans fare significantly worse than their HMO counterparts (reaching about half in terms of numbers as compared to HMOs) and access levels hover around 0.09 to 0.15.

In New York (Table 2), the overall pattern of a reduction in choice with an increase in rurality holds for both above average and high quality surgeons. Moreover, HMOs generally offer a larger degree of choice to their beneficiaries, both in absolute terms and percentage wise. Yet, the results differ significantly from California in several respects. While the best access in New York is also in large and standard metropolitan areas, Medicare Advantage beneficiaries in the former have far more providers to choose from in both PPOs and HMOs than in California. Importantly, access in micropolitan and rural areas, while worse than in metropolitan areas of any kind, is better in absolute and relative terms than in California.

Overall, PPOs again offer more limited access than HMOs; and, the differences are rather large. The one exception to this pattern appears to occur in micropolitan and rural areas at distance levels up to 120 miles, where PPOs appear to outperform HMOs. In relative terms, PPOs fare better in standard metropolitan areas than in large metropolitan areas. The patterns described for above average surgeons are remarkably similar for high quality surgeons. However, it is worth noting that these surgeons appear to be particularly clustered in large metropolitan areas with implications for travel distances in metropolitan and rural areas.

Breadth of Networks

As previously mentioned, another way to think about beneficiary choice is the approach offered by Polsky and Weiner (2015). This approach compares the number of providers in a network with all available providers in percentage terms. Polsky and Weiner (2015) then categorize network breadth based on t-shirt sizes from extra-small to extra-large.

Using the adapted Polsky and Weiner (2015) classification, in California the previous pattern for access based on the rurality of the area is again evident (see Figure 1). Access is best in large metropolitan areas, but standard metropolitan areas show improvements in access at a 30-mile distance for both HMOs and PPOs. Additionally, networks tend to be more limited in breadth for PPO plans when compared to HMO plans across all distance levels. HMOs also offer a larger amount of diversity in terms of network breadth. However, for HMOs, medium to extra-large network sizes make up the majority of networks at distances up to 120 miles. Narrower networks are more prevalent at 240 miles.

The low levels of access in micropolitan and rural areas at smaller distances are again evident. Indeed, it takes up to 60 miles for near-universal access to exist. Notably, a substantial number of beneficiaries in rural areas have access to no providers at distances exceeding 60 miles. Even then, networks are extremely narrow.

In New York (see Figure 2), access to above average surgeons in HMOs is best in large metropolitan areas. It is slightly worse in standard metropolitan areas; and, it is significantly worse at distances of up to 60 and 120 miles in micropolitan and rural areas. Notably, in large metropolitan areas and metropolitan areas at distances in excess of 15 miles, medium to extra-large networks make up the majority of plans (at times close to 80%).

Micropolitan and rural areas exhibit a relatively large percentage of networks without any provider up to 60 miles, compared to 30 miles in California. As in California, PPO plans trend toward smaller networks in large metropolitan areas. However, in standard metropolitan areas, there is also a substantive number of extra-large networks at distances of up to 120 miles. Access in micropolitan and rural areas is similarly restricted as it is in HMO plans.

When it comes to high quality surgeons (see Figure 3), large metropolitan areas fare significantly better than all other areas at distances of up to 60 miles; and, at this distance level, at least 60% of networks do not have access to any providers at all outside of large metropolitan areas. Even in large metropolitan areas, at distances of 15 miles and fewer, 10% of plans do not include any surgeons. However, overall network sizes tend to be diverse and trending larger even at the largest distance levels.

Interestingly, when it comes to high quality surgeons, metropolitan areas in New York tend to be more similar to micropolitan and rural areas than they do to large metropolitan areas. As for PPOs, similar patterns emerge comparing large metropolitan areas to others. As previously described, PPOs also are disproportionately small and extra small.

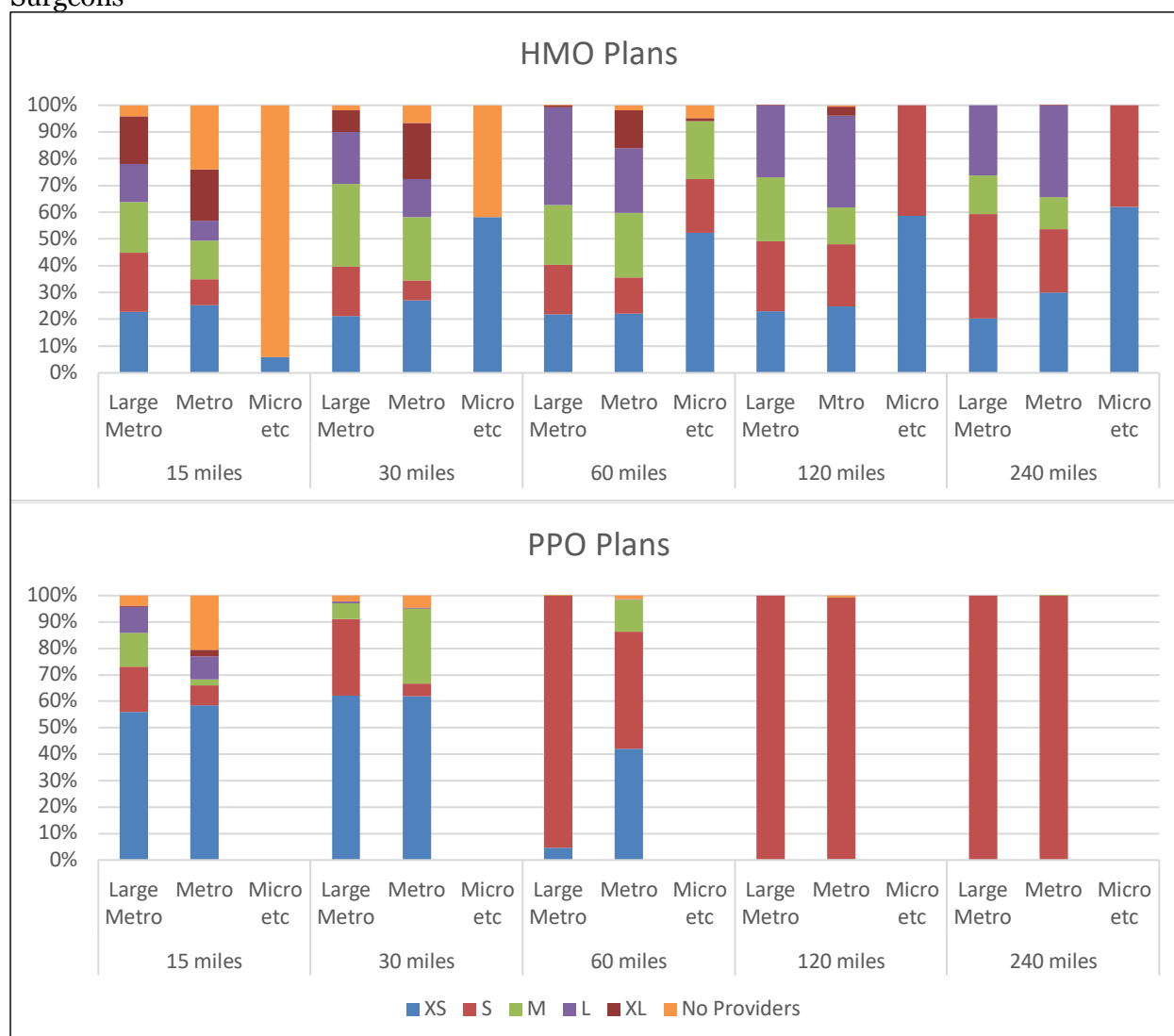
Selectively Contracting for Quality

As mentioned above, selective contracting by Medicare Advantage plans may benefit consumers if carriers deliberately exclude lower quality providers. Table 3 compares (by using *t*-tests) the percentage of provider networks in Medicare Advantage and traditional Medicare made up of higher quality surgeons. It should be noted that these comparisons are biased since they exclude Medicare Advantage plans without any providers. That is, comparisons are limited to cases in which networks for both Traditional Medicare and Medicare Advantage include at least one provider (the case of empty networks or artificial provider deserts has been previously discussed).

In California's large metropolitan areas, traditional Medicare consistently fares about four to six percentage points better than Medicare Advantage HMOs at all distance levels. Traditional Medicare also fares better in standard metropolitan areas. The differences, however, become even less substantive and make up about two percentage points. Overall percentage levels are similar across areas. However, in micropolitan and rural areas, Medicare Advantage plans consistently outperform traditional Medicare. These results should be taken with caution given the limited number of observations in this category.

The situation differs for PPO plans. In large metropolitan areas, Medicare Advantage PPO plans do better in terms of quality than traditional Medicare up to the 60-mile marker. Moreover, the differences are substantive, ranging from 10 to 30 percentage points. At larger distances, traditional Medicare and Medicare Advantage become substantively similar. In standard metropolitan areas, traditional Medicare outperforms Medicare Advantage by between 10 and 30 percentage points. Again, at larger distances the differences become less consequential.

Figure 1. Network Breadth of Medicare Advantage Plans (CA): Above Average Quality Surgeons

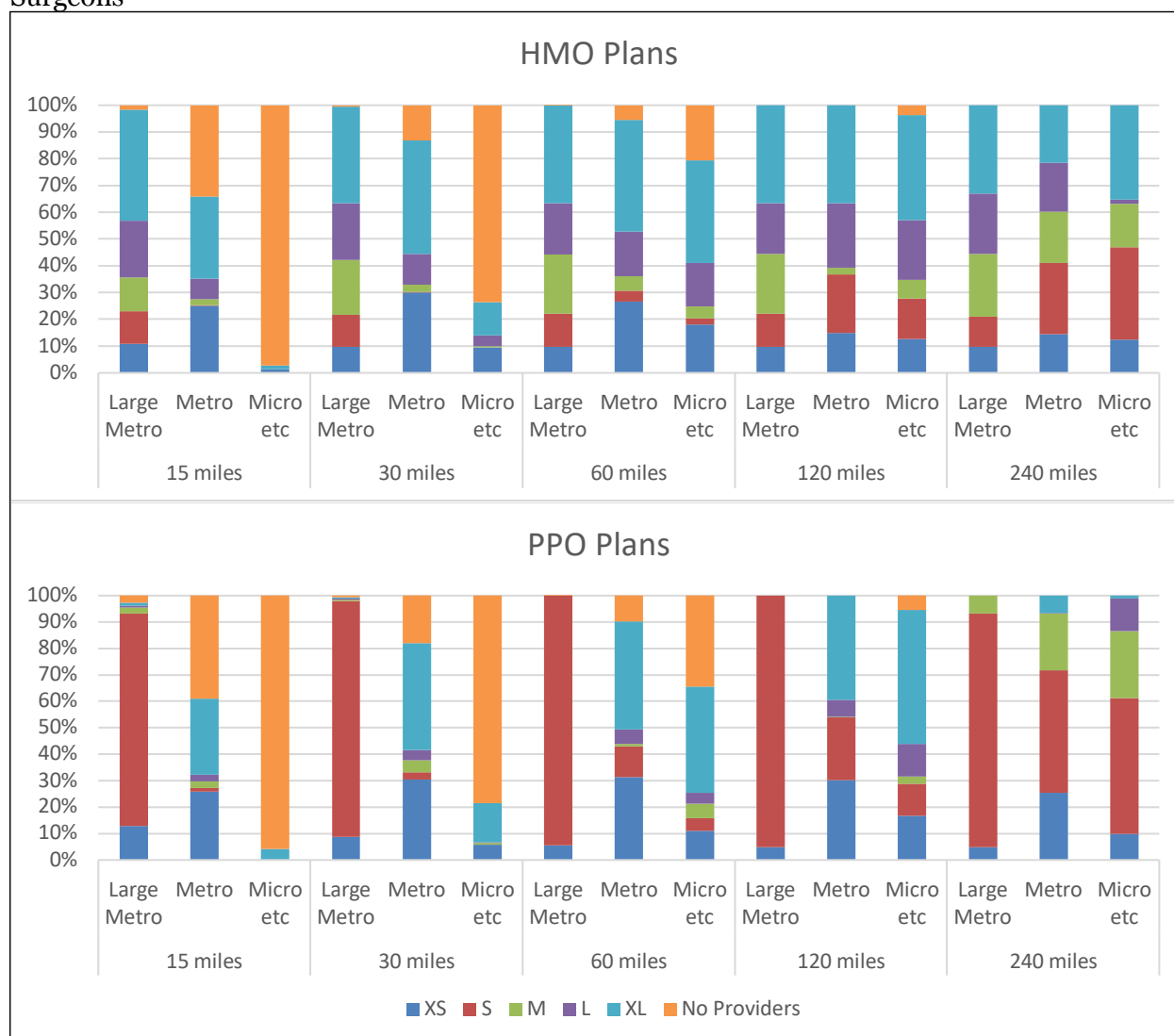


An important Medicare Advantage carrier in California is Kaiser Permanente; and, it is well known for its approach to providing healthcare. In order to assess whether this carrier biases the results, I reanalyzed the California data excluding Kaiser Permanente plans (results omitted, available upon request). The findings were almost identical in every aspect.

In New York, Medicare Advantage consistently does better than traditional Medicare in large metropolitan areas for both PPO and HMO plans in terms of above average surgeons. For HMOs, plan differences amount to about four percentage points, while for PPOs the differences are somewhat larger. In metropolitan areas, this picture is reversed; and, traditional Medicare offers better access to above average surgeons. The difference is about six to eight percentage points for HMOs, and two to nine percentage points for PPOs. The difference for PPOs increases at larger distance levels.

Overall, access is reduced when compared to large metropolitan areas. For micropolitan and rural areas, Medicare Advantage provides better access at shorter distances while the reverse holds true at larger distances. In general, access is worse at shorter distances but improves as distance increases.

Figure 2. Network Breadth of Medicare Advantage Plans (NY): Above Average Quality Surgeons



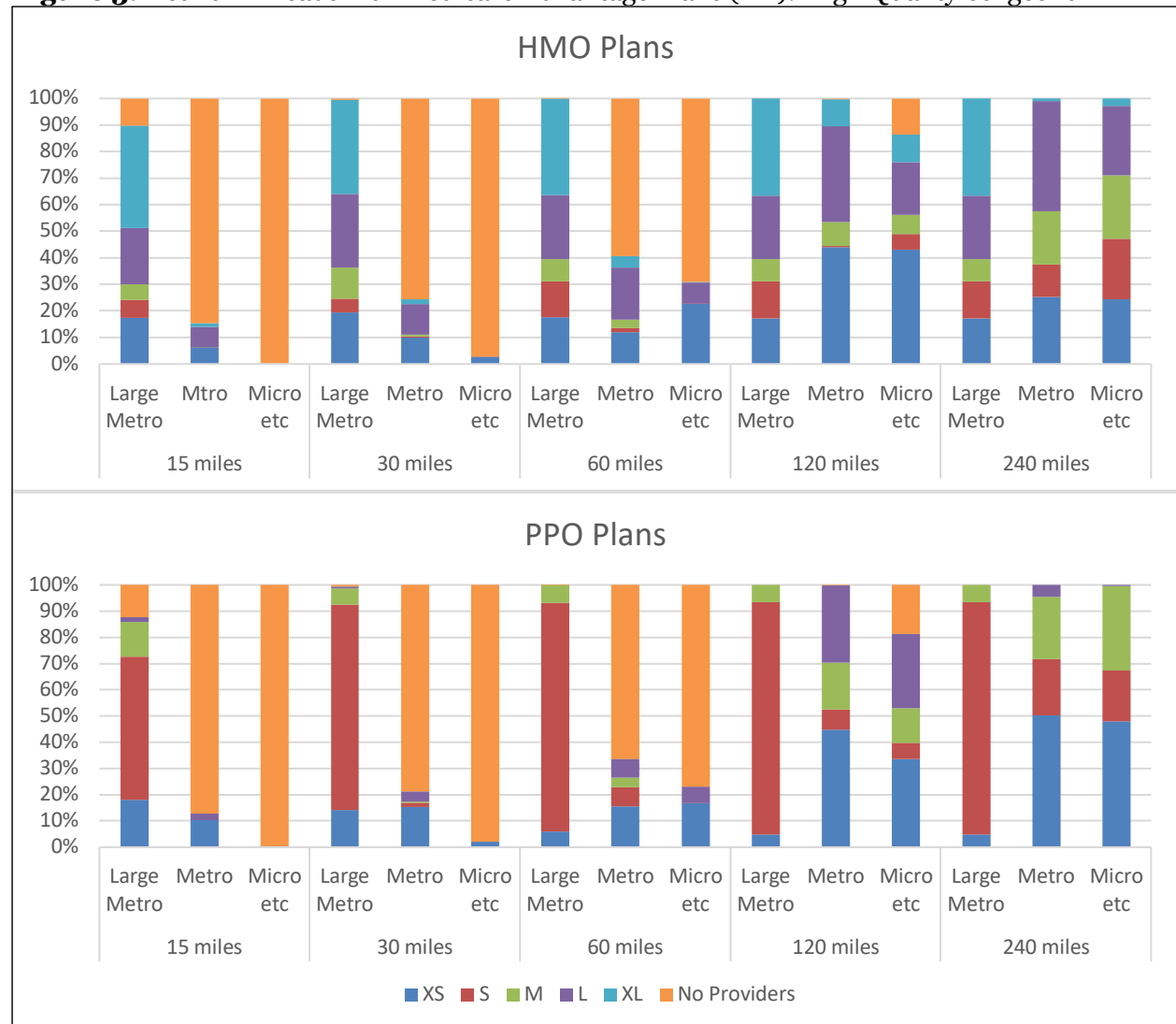
Finally, differences in access to high quality surgeons in New York's large metropolitan areas is rather similar for HMOs and PPOs. However, traditional Medicare appears to perform somewhat better in metropolitan areas, particularly up to 120 miles. Notably, there is a marked difference in terms of absolute numbers between large metropolitan areas and the two other types of areas (i.e., micropolitan and rural areas). Traditional Medicare also generally outperforms Medicare

Advantage plans in micropolitan and rural areas of the state. For HMOs, differences are somewhat meaningful at 60 and 120 miles, while the same holds true for PPOs at 60 miles and above.

Discussion and Limitations

The Medicare Advantage program has seen significant, but relatively unexamined, expansion over the past decade; and, we know little about how Medicare Advantage beneficiaries access services, particularly services of higher quality. We also know little about how access is connected to provider networks. This study is one of the first to address this issue. As such,

Figure 3. Network Breadth for Medicare Advantage Plans (NY): High Quality Surgeons



this study adds to our limited knowledge of both Medicare Advantage and network design with regard to access to higher quality providers.

The findings from this study should be somewhat encouraging for those concerned about network restrictions in Medicare Advantage. Beneficiaries in metropolitan areas of both California and New York, particularly large metropolitan areas, have comparable access to above average and high quality cardiac surgeons as do traditional Medicare beneficiaries. However, as shown in this study, limitations may be present at shorter distances. Moreover, financial and transportation barriers may impose undue restrictions on a subset of low income seniors. It should also be pointed out that Medicare Advantage beneficiaries may be more limited in their choices, as they consistently have fewer surgeons to choose from than traditional Medicare. This may also lead to longer waiting times. Overall, however, in large metropolitan areas, market forces may create sufficient incentives for carriers to provide appropriate levels of access.

Despite these possible encouraging findings, the study also raises significant concerns about the restricted access provided under Medicare Advantage plans outside of large metropolitan areas, at least with regard to CABG and heart valve surgeries. These concerns grow exponentially with increasing degrees of rurality. Importantly, while some of these limitations

are inherent in the market dynamics of healthcare and the maldistribution of providers, particularly at shorter distances, Medicare Advantage carriers exacerbate the situation via their network designs. Indeed, the data analyzed here indicate that relatively good levels of access are achievable at distances of at least 120 miles for traditional Medicare beneficiaries. Often, Medicare Advantage beneficiaries do not reach comparable levels until 240 miles. This is particularly evident in California and for high quality providers in New York.

There are also notable differences between the two states in this study. Unquestionably, some of these differences are a direct result of general healthcare system characteristics of the respective states. This includes the general distribution of population centers and medical providers. Additionally, both states exhibit different Medicare Advantage market characteristics. Specifically, there are a limited number of larger carriers in California and a rather large number of smaller carriers in New York, including many staff-based HMOs. Indeed, local healthcare environments and historical developments have been shown to play a crucial role in the development of Medicare Advantage markets (Brown & Gold, 1999). Although the Medicare Advantage program is mostly regulated by the federal government, state regulatory environments can also account for some of the differences via spillover from state regulated insurance products. This may also account for the fact the HMOs appear to generally outperform PPOs since the former are often more tightly regulated.

The findings presented on insurance plans indicate substantial diversity across and even within states. That is, insurance products differ significantly with regard to their networks and the limitations they impose on beneficiaries. Similarly, network size does not stay static across distances from potential beneficiaries, even within the same insurance product. In both states, it was evident that the extent of networks, as measured by t-shirt sizes, changed significantly across distances in terms of individual networks and the overall proportion of sizes.

Overall, the findings presented in this study raise important questions about the connection between provider networks and beneficiary access to medical services. While the study focuses on Medicare Advantage, other insurance products with limitations on provider access such as the Affordable Care Act marketplace-based or commercial plans may exhibit similar problems. Thus, these also deserve empirical assessment. This may particularly hold for the Affordable Care Act's insurance marketplaces, which are prone to be rather narrow in terms of networks (Haeder et al., 2015a, 2015b; Haeder, Weimer, & Mukamel, 2019a).

Another important avenue for future research connects the findings on access limitations presented here to actual health outcomes for beneficiaries. Given the established literature on the detrimental effects of travel distance and provider access for "transportation-disadvantaged" populations (U.S. Government Accountability Office, 2014, p. 4), there may be significant health implications for these populations. Moreover, analyses utilizing surveys and information from claims databases could further illuminate the real world implications of these initial findings. The effect of network design on beneficiaries switching to traditional Medicare also deserves scholarly attention.

This study is not without imitations. For one, the analysis is limited to two states, which means that it is not wholly generalizable. However, as mentioned above, both states exhibit different healthcare characteristics. Moreover, larger patterns are rather consistent across both states by plan type and demographic area, while both states offer significant diversity within their boundaries with regard to the degree of rurality of their counties. This may provide some indication that the underlying drivers of the findings here are applicable to other states and regions.

This study is also focused on only one specialty and procedure. However, the underlying market forces and incentive structures for carriers are quite similar across medical specialties, particularly those with a limited supply of providers. Moreover, the fact that the Medicare

Advantage program is largely regulated and overseen by the federal government further eases concerns about the external validity of findings.

Another limitation is that, given the lack of detailed enrollment data, I was only able to focus on plans and not beneficiaries. This, however, does not diminish the overall patterns established and the concerns that have been raised. Finally, network data were not available for all plans offered in the two states. This is unfortunate, but again, incentives and market forces apply to all carriers. Moreover, a cursory examination of missing plans does not indicate a systematic pattern, and the vast majority of plans and beneficiaries in the two states are covered by this analysis.

Conclusion

This study adds to a growing literature that illustrates the mounting challenges of accessing healthcare services in rural America. While some of these challenges may be inherently related to rural living, the analyses presented here indicate that insurance carriers can further exacerbate the problem. Indeed, given their history of biased selection as well as the generally higher healthcare needs of rural populations, one can speculate that provider network limitations may serve as another tool for discriminating against sicker consumers in order to maximize profitability. Concerns are more limited for Medicare Advantage beneficiaries in large metropolitan areas. One should note that at times it may be prudent to trade longer travel distances for access to higher quality providers. However, many Medicare Advantage beneficiaries are of lower income and limited mobility. Hence, even short distances may pose significant problems for healthcare access.

The findings of this study hold important policy implications. For one, they indicate a potential need for revising CMS network adequacy standards and oversight for Medicare Advantage plans, particularly in rural areas. For now, Medicare Advantage beneficiaries should at the very least be made aware of the potential need to travel long distances when making their coverage decisions during open enrollment.

Second, policymakers and stakeholders should assess whether the unquestionable benefits of Medicare Advantage, i.e., its expanded benefits and out-of-pocket protections, are worth the limitations described here. For many beneficiaries, particularly those in good health and with ample resources, accepting network limitations may not be a problem. Yet, from a policy perspective, we should be mindful of the ongoing segmentation of the Medicare population. Indeed, sicker enrollees may disproportionately end up in traditional Medicare, while insurance carriers and healthier enrollees may be subsidized in an alternate system.

Third, the findings from this study highlight the role of social determinants of health, particularly access to transportation, in healthcare access. That is, concerns about the contributions of travel and barriers to travel point to the inclusion of nonemergency medical transportation as an essential benefit of health insurance. This, of course, is already the case in Medicaid (Adelberg & Simon, 2017). Notably, a small number of Medicare Advantage plans have also moved in this direction (Pope, 2016).

Long term, these findings indicate the need for a better approach toward thinking about provider networks and assessing network size by scholars and regulators that accounts for distance between the beneficiary and the provider. Given that CMS currently assesses provider networks in Medicare Advantage for adequacy, a more nuanced approach may be useful. Until then, given the complexities of network regulation, it may be most beneficial to provide meaningful and understandable information to consumers who are inherently and personally affected by network restrictions when making decisions about their insurance coverage (Haeder et al., 2019b; Mukamel et al., 2014).

Of course, there is ample evidence that consumers are often overwhelmed by making these types of choices (Schwartz, 2004). This may especially apply to the aging beneficiary population in Medicare (Hanoch & Rice, 2006; McWilliams, Afendulis, McGuire, & Landon, 2011). Nonetheless, until we move toward more meaningful approaches to network regulation, Medicare beneficiaries expecting to undergo one of the surgeries described here should be mindful of the choices they make during open enrollment.

Disclosure Statement

The author declares that there are no conflicts of interest that relate to the research, authorship, or publication of this article.

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Author Biography

Simon F. Haeder is an Assistant Professor of Public Policy in the School of Public Policy at The Pennsylvania State University. He is also a Fellow in the Interdisciplinary Research Leaders Program, a national leadership development program supported by the Robert Wood Johnson Foundation to equip teams of researchers and community partners in applying research to solve real community problems. He was part of the inaugural cohort of the American Enterprise Institute's Emerging Poverty Scholars program.