Getting What We Pay For: How Do Risk-Based Payments to Medicare Advantage Plans Compare with Alternative Measures of Beneficiary Health Risk?

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Objective. To estimate the relative health risk of Medicare Advantage (MA) beneficiaries compared to those in Traditional Medicare (TM).

Data Sources/Study Setting. Medicare claims and enrollment records for the sample of beneficiaries enrolled in Part D between 2008 and 2015.

Study Design. We assigned therapeutic classes to Medicare beneficiaries based on their prescription drug utilization. We then regressed nondrug health spending for TM beneficiaries in 2015 on demographic and therapeutic class identifiers for 2014 and used coefficients from this regression to predict relative risk of both MA and TM beneficiaries.

Principal Findings. Based on prescription drug utilization data, beneficiaries enrolled in MA in 2015 had 6.9 percent lower health risk than beneficiaries in TM, but differences based on coded diagnoses suggested MA beneficiaries were 6.2 percent higher risk. The relative health risk based on drug usage of MA beneficiaries compared to those in TM increased by 3.4 p.p. from 2008 to 2015, while the relative risk using diagnoses increased 9.8 p.p.

Conclusions. Our results add to a growing body of evidence suggesting MA receives favorable, or, at worst, neutral selection. If MA beneficiaries are no healthier and no sicker than similar beneficiaries in TM, then payments to MA plans exceed what is warranted based on their health status.

Key Words. Medicare advantage, risk adjustment, coding intensity

Risk adjustment's role in federal health policy has become increasingly important. As a recent example, the Affordable Care Act (ACA) introduced health care Marketplaces where plan revenues are adjusted for the risk that higher cost enrollees may disproportionately join certain plans. Risk adjustment in

the ACA Marketplaces builds on more than a decade of work in the Medicare program to risk adjust payments to Medicare Advantage (MA) plans and plans in the Medicare prescription drug (Part D) program.

This study focuses on two critical questions for MA payment policy: What is the relative health risk of MA beneficiaries compared with those in traditional Medicare (TM), and how do these relative rates of underlying health risk compare with the risk-adjusted payments that plans receive? The fiscal implications of these questions are large: In 2016 alone, the cost of the MA program was projected to be \$198 billion or 27 percent of total Medicare spending. Given the size of the MA program and ongoing concerns about whether payments to MA plans are higher than warranted due to differences between MA and TM in the intensity of diagnostic coding (GAO 2012; Kronick and Welch 2014; Geruso and Layton 2015; Kronick 2017; Medicare Payment Advisory Commission 2017), there is a clear need to better understand how both health risk and payment for that risk vary between MA and TM.

The Centers for Medicare and Medicaid Services (CMS) pays MA plans a fixed amount to cover the costs of beneficiary health spending. Payments are adjusted for health risk to discourage MA insurers from designing benefits or engaging in other practices that would attract healthy enrollees or dissuade sick ones, and also to compensate insurers when they do enroll sicker-than-average beneficiaries (Pope et al. 2004). Plans have an incentive to report as many diagnoses as possible, because this increases plan revenues through higher risk scores for their beneficiaries. More intense reporting of diagnoses for MA beneficiaries may well not be fraudulent, but it will still pose payment challenges. As described below, MA plans are paid assuming Medicare's coding intensity adjustment fully compensates for any differences between MA and TM in coding practices. To the extent that differences in coding are greater than those assumed in the coding intensity adjustment, payments to MA plans exceed what is warranted based on estimates of their health risk.

Among other strategies, MA plans encourage doctors to include all possible diagnostic codes for their patients, conduct retrospective reviews of medical records, and conduct health risk assessments in enrollees' homes (MedPAC 2015a). For beneficiaries enrolled in TM, there is no parallel

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incentive to capture diagnoses as carefully and no organizational entity that would perform retrospective chart reviews or in-home health assessments. Because MA plans appear to code more aggressively than providers in FFS (again, irrespective of the legitimacy of the coding behaviour), in 2010, CMS began reducing payments to MA plans, implementing a “coding intensity adjustment.” CMS has the authority to determine the level of the coding intensity adjustment, subject to minimum levels specified in statute. The statutory minimum coding intensity adjustment has varied over time and is scheduled to reach 5.91 percent in 2018 and remain flat thereafter. CMS has chosen, in each year since 2010, to promulgate the coding intensity adjustment at the statutory minimum level.

A number of researchers have investigated whether, for the same beneficiary, payments made to MA plans are higher than they would be if the beneficiary was enrolled in TM. These studies (GAO 2012; Kronick and Welch 2014; Kronick 2017; MedPAC 2017) have consistently found that actual levels of coding intensity exceeded the minimum coding intensity adjustment that CMS applied to MA plans in the respective year of the study. Much of the previous evidence on the relative health risk of MA and TM beneficiaries has analyzed those switching between TM and MA, with studies confirming that enrollees who switch into MA are healthier than those who remain in TM (McWilliams, Hsu, and Newhouse 2012; Morrissey et al. 2013; Rahman et al. 2015). However, because of data limitations, both the extent to which enrollee health risk changes after switching relative to those that did not switch and the overall health status of the stock of MA beneficiaries at any point in time is not addressed by this line of research. Evidence from utilization data (Landon et al. 2012), survey data (McWilliams, Hsu, and Newhouse 2012; Kronick and Welch 2014), and mortality data (Kronick and Welch 2014) generally support the notion that the MA beneficiaries overall have lower health risk than those in TM.

In this study, we estimate the relative health risk of MA and TM beneficiaries using their utilization of prescription drugs covered by the Part D program as markers of health risk. Using data from as recently as 2015 and software that assigns therapeutic classes from prescription drug claims, we developed measures of relative risk that did not depend on plan-reported medical diagnoses and that are generalizable to the entire Part D-enrolled Medicare population. We then estimated relative risk for all enrollees, whether they are in MA or TM, and compared their levels and rates of growth over time. Because of differences between MA and TM in drug utilization management and/or plan characteristics, prescription drug utilization may be

differentially associated with underlying health risk in the two sectors. We conducted a series of robustness checks to address this possibility. To our knowledge, this analysis is one of the first to assign predicted levels of health risk to MA and TM beneficiaries that does not rely on the diagnostic data reported by MA plans and that did not rely on subgroups or small samples that may not reflect spending differences in the overall Medicare population.

METHODS

We estimated relative health risk based on prescription drug utilization in a given year, which predicts prospective Medicare spending for hospital and ambulatory services. Our model is similar in spirit to the Hierarchical Condition Category risk score methodology (CMS-HCC) that CMS generates for Medicare beneficiaries. Prospective risk adjustment models that rely on pharmaceutical utilization data have been shown to be comparable in statistical performance to those using medical diagnoses (Winkelman and Meymud 2007). And, because Part D plans are paid based on medical diagnoses, not utilization of prescription drugs, drug plans do not have an incentive to manipulate prescribing patterns for payment purposes in a way that would pollute our analysis (MedPAC 2015b), although we address other limitations below. To compute prescription drug-based risk scores for this study, we relied on a series of Medicare administrative databases, including the following: 100 percent Part D prescription drug event data, 100 percent Standard Analytic Files for Part A and B claims, Risk Adjustment Payment System data, and the Common Medicare Enrollment files for all beneficiaries.

First, we used the Johns Hopkins ACG[®] System (version 11.1) to assign morbidity indicators from the Part D prescription drug data. This software assigns morbidity indicators to individuals through a linkage from each National Drug Code obtained from pharmaceutical claims to one therapeutic class, or ACG[®] System Rx-Defined Morbidity Groups (Rx-MG). Rx-MGs define the morbidity profile of a population through their medication usage and have been used in other contexts to model prospective health risk (Lauffenburger et al. 2017). The ACG System was calibrated for different age groups, including the elderly, and has been shown to have reasonably high predictive value in other contexts, making it an appropriate choice for our analysis (Kuo and Lai 2010). We assigned up to 66 Rx-MGs for each beneficiary. These Rx-MGs mostly contain therapeutic indicators for chronic diseases such as diabetes, HIV/AIDs, and liver disease, but several acute

symptoms and diseases are also present, including infections, severe pain, and tuberculosis. The full list of these groups can be found in Appendix SA2.

Second, using data on TM beneficiaries, we performed regression analyses of Part A and Part B claims data closely following the approach CMS uses in the CMS–HCC model. Like CMS, we used demographic and diagnostic variables for TM beneficiaries from an initial year (in our case 2014) to predict spending in the subsequent year (2015). Our dependent variable was the annualized Medicare payments for Part A- and Part B-covered services in 2015 excluding any spending on hospice care, which is not covered by MA. Like the treatment of diagnostic indicators in the CMS–HCC model, in an initial stage, we included all 66 Rx-MGs, but then excluded those with negative coefficients. (The CMS–HCC model similarly excludes conditions with negative coefficients in an initial stage; our results were insensitive to this choice.) Our final model included the 49 Rx-MGs that predicted higher (positive) marginal Medicare spending. Our model also contained demographic indicators from 2014 including the following: 12 age groups for each gender, whether beneficiaries obtained Medicare originally because of a disability (interacted with gender), and whether beneficiaries were eligible for full or partial Medicaid coverage (each interacted with gender). Like the CMS–HCC model, we estimated separate regression models for TM beneficiaries living in the community and in long-term institutionalized (LTI) settings. Each of the models was weighted by the number of months the TM beneficiary lived in that setting in 2015.

Finally, and again analogous to the CMS–HCC model, we used the coefficients from the community and LTI regressions to assign predicted health risk scores for all Medicare beneficiaries in our sample including those enrolled at any point from 2008 to 2015. The risk scores in this study are the weighted average of the community and LTI risk scores using the number of months beneficiaries spent in each setting as weights. In Tables 1 and 2, we rank the Rx-MGs by their associated incremental change in Medicare spending (Table 1) and their prevalence across the Medicare population (Table 2).

We made several sample restrictions to yield our results (a detailed description can be found in Appendix SA3). From a total Medicare population of 46.2 million beneficiaries with Parts A and B coverage in 2014 and 2015, we excluded 2.3 million beneficiaries who (1) had end-stage renal disease; (2) were enrolled in nontraditional MA plans; (3) were covered by Medicare as a secondary payer; or (4) received hospice services (MA plans are not required to cover hospice care). We further excluded 11,336,246 beneficiaries who were not continuously enrolled in Part D throughout 2014. (As detailed

Table 1: Prevalence Rates for the 20 Prescription Drug Therapeutic Classes Associated with the Highest Spending Among Traditional Medicare (TM) Enrollees by TM or Medicare Advantage (MA), 2014–2015

<i>Prescription Drug Therapeutic Classes</i>	<i>Additional TM Spending per Beneficiary</i>	<i>Prevalence in 2014 among:</i>			<i>Ratio of MA-to-TM Rates (%)</i>
		<i>All Enrollees (%)</i>	<i>TM Enrollees (%)</i>	<i>MA Enrollees (%)</i>	
Cystic fibrosis	\$21,983	0.01	0.02	0.01	81.4
Severe acute infections	\$16,914	0.61	0.77	0.40	51.9
Chronic renal failure	\$11,970	0.15	0.16	0.12	72.1
Acute toxic symptoms	\$8,306	0.07	0.07	0.08	112.3
Transplants	\$7,636	0.20	0.22	0.17	76.5
Immune disorders	\$7,291	0.07	0.07	0.06	81.6
Malignancies	\$7,084	2.22	2.43	1.94	79.9
Severe pain	\$5,252	5.60	6.28	4.69	74.7
Tuberculosis	\$5,229	0.13	0.15	0.11	76.2
Diabetes with insulin	\$5,067	6.79	6.75	6.84	101.4
Chronic liver disease	\$4,803	0.27	0.30	0.22	73.7
Acute infections	\$4,645	0.30	0.34	0.24	72.0
Chronic respiratory diseases	\$4,535	4.60	5.06	3.99	78.9
Chronic gastrointestinal or hepatic diseases	\$4,480	0.17	0.19	0.15	79.4
Chronic cardiovascular diseases	\$4,202	18.44	19.61	16.85	85.9
Chronic neurologic diseases	\$3,437	0.54	0.63	0.43	68.6
HIV/AIDS	\$3,370	0.49	0.58	0.36	61.2
Cardiovascular disorders	\$3,230	15.40	16.07	14.49	90.2
Congestive heart failure	\$3,208	9.60	10.09	8.93	88.4
Inflammatory conditions	\$3,036	2.38	2.49	2.23	89.5
Average (unweighted)					79.8
Average (weighted by prevalence)					86.5

Notes. TM spending includes Part A and Part B expenditures. Spending amounts are coefficients from a regression of annualized spending for TM beneficiaries on 49 therapeutic classes and demographic characteristics. The sample included beneficiaries enrolled in TM or MA with Part D coverage. Prescription drug therapeutic classes were assigned using the Johns Hopkins ACG[®] System version 11.1.1. For more details, see text.

below, because of the impact of the Part D enrollment restriction, we adjust our prescription drug scores to reflect the health risk of the entire Medicare population.) After these exclusions, our regressions of TM spending in 2015 contained 18,194,929 TM beneficiaries who resided in the community for at

Table 2: Prevalence Rates for the 20 Prescription Drug Therapeutic Classes Associated with the Highest Prevalence among All Medicare Enrollees by Traditional Medicare (TM) or Medicare Advantage (MA), 2014–2015

<i>Prescription Drug Therapeutic Classes</i>	<i>Prevalence in 2014 among:</i>			<i>Ratio of MA-to-TM Rates (%)</i>	<i>Additional TM Spending per Beneficiary</i>
	<i>All Enrollees (%)</i>	<i>TM Enrollees (%)</i>	<i>MA Enrollees (%)</i>		
Minor infections	54.56	56.42	52.04	92.2	\$1,265
General symptoms of pain	37.54	38.84	35.78	92.1	\$1,415
Peptic disease	30.64	31.31	29.73	95.0	\$662
Depression	27.59	29.33	25.23	86.0	\$1,083
Acute and recurrent skin conditions	26.50	27.41	25.25	92.1	\$728
Thyroid disorders	18.65	19.17	17.95	93.6	\$241
Chronic cardiovascular diseases	18.44	19.61	16.85	85.9	\$4,202
Chronic inflammatory allergies	16.77	17.33	16.02	92.5	\$2,251
Seizure disorder	16.67	17.48	15.58	89.2	\$1,897
Airway hyperactivity	16.55	17.35	15.47	89.2	\$619
Minor urinary disorders	15.57	15.55	15.59	100.3	\$1,221
Cardiovascular disorders	15.40	16.07	14.49	90.2	\$3,230
Anxiety disorders	14.97	16.28	13.19	81.0	\$862
Minor gastrointestinal or hepatic disorders	10.31	10.75	9.71	90.3	\$1,436
Congestive heart failure	9.60	10.09	8.93	88.4	\$3,208
Signs and symptoms of nausea and vomiting	9.05	9.72	8.15	83.8	\$2,925
Acute curative eye disorders	8.57	8.86	8.18	92.3	\$463
Sleep disorders	7.43	7.87	6.83	86.8	\$795
Glaucoma	7.34	7.35	7.33	99.6	\$361
Diabetes with insulin	6.79	6.75	6.84	101.4	\$5,067
Average (unweighted)				91.1	
Average (weighted by prevalence across all enrollees)				91.1	

Notes. TM spending includes Part A and Part B expenditures. Spending amounts are coefficients from a regression of annualized spending for TM beneficiaries on 49 therapeutic classes and demographic characteristics. The sample included beneficiaries enrolled in TM or MA with Part D coverage. Prescription drug therapeutic classes were assigned using the Johns Hopkins ACG[®] System version 11.1. For more details, see text.

least 1 month and 756,850 with at least 1 month in an LTI setting. Our sample sizes for assigning risk scores varied by year. In 2008, we assigned risk scores for 13.7 million beneficiaries enrolled in TM and 7.2 million in MA and in

2015 18.7 million enrolled in TM and 13.8 million in MA. New enrollees to Medicare are excluded from our sample in their first year but are included upon their first full year enrolled in Part D. We made no restrictions on private fee-for-service plans or special needs plans.

We compared prescription drug-based risk scores for MA and TM beneficiaries both in 2015 and over time. We also compared how temporal changes in prescription drug-based scores compare with the growth in risk scores CMS uses to pay plans under the CMS–HCC model. CMS uses this latter score to adjust the capitated payments to MA plans. Because CMS revised how risk scores are calculated over this time period, we present scores derived from the most recent version of the payment system (referred to as the “2017 V22 model”), which have been standardized across years to remove the effects of any changes to the CMS–HCC model.

Our estimates of the predicted health spending of TM and MA beneficiaries result from the extent of their pharmaceutical utilization in the Part D claims data. A potential criticism of this approach for comparing predicted spending in TM with that in MA is that stand-alone Part D plans (which cover TM beneficiaries) and MA-PD plans manage pharmaceutical utilization in different ways. However, previous research has established that, to the extent Part D plans differ in covered benefits and drug utilization management strategies, MA-PD plans are often more generous than stand-alone Part D plans. In particular, MA-PD plans are less likely to require prior authorization or step therapy before the use of brand-name drugs (Lavetti and Simon 2016), generally have lower copayments (Huskamp et al. 2014), and MA enrollees report easier access to getting medications than those in stand-alone plans (Elliot et al. 2016). This may arise because MA-PDs have a much greater incentive to encourage compliance with drugs that help to reduce other forms of health care spending, such as hospitalizations and provider visits. As detailed below in the Results section, we consistently estimate that MA beneficiaries have lower overall predicted spending than beneficiaries in TM. More generous coverage by MA-PD plans than stand-alone plans and their less restrictive nature would tend to increase drug utilization among MA beneficiaries relative to those in TM, and for this reason, our estimates of predicted spending differences are a conservatively low estimate of underlying health risk differences.

MA-PD plans may nevertheless have more influence over how the providers in their networks prescribe medicine, and they might effectively discourage providers from prescribing drugs in scenarios where there is discretion. MA-PDs could thus reduce pharmaceutical utilization through avenues that are less observable to researchers, which would tend to lower

prescription-based risk scores for MA beneficiaries relative to those in TM. This concern is less relevant to our estimates of how health risk has changed over time than point-in-time estimates because differences in utilization management between MA-PD and stand-alone plans are not likely to have changed substantially over time.

We tested the robustness of our estimates in two separate sensitivity tests that were designed to exclude the usage of pharmaceuticals where physicians would have some discretion in prescribing. In our first sensitivity test, we asked a panel of three physicians to rank each of the Rx-MG classes on a three-point scale varying by the degree to which the physician thought the underlying drugs in each class were discretionary. We then compared the weighted average prevalence rates in MA and TM for all of the Rx-MGs in our main model to prevalence rates constructed from only those Rx-MGs where at least two of the three physicians designated the Rx-MG as “Most likely not including any drugs that are discretionary.” For more information about how this analysis was conducted, see Appendix SA4.

In a second sensitivity analysis, we limited the drugs in the Part D claims files to those that CMS is considering using as part of its methodology for determining the health risk of Marketplace enrollees beginning in 2018 (CMS 2016). As above, we then compared the weighted average prevalence rates in MA and TM for these Rx-MGs to the rates for all of the Rx-MGs in our main model. This significantly shorter list of drugs corresponded to only 3,065 individual NDC codes out of a universe of over 200 thousand. This list was culled by numerous experts and physicians with the primary aim of improving the predictive accuracy of risk adjustment in the Marketplaces, but a critical criterion for inclusion in the model was that physicians would be unlikely to have discretion in whether they would prescribe these drugs. CMS stated their intention to identify pharmaceuticals that would capture beneficiary risk independent of an insurer’s “level of experience with medical coding.”

Because we used prescription drug utilization data to identify health risk, our health risk scores derived from our regression models are generalizable to the Medicare population with Part D coverage. However, some Medicare beneficiaries do not enroll in Part D either because they have an alternative source of coverage for drugs (e.g., through a current or former employer) or because they have declined to participate in the program. To reflect the experience of the entire Medicare population, we also present prescription drug-based risk scores after adjusting them using CMS–HCC risk scores to reflect the overall risk of the MA and TM populations irrespective of whether they were enrolled in Part D.

$$RX_Adjusted_{st} = RX_Raw_{st} * \frac{CMS_HCC_{st}|Overall}{CMS_HCC_{st}|PartD}$$

The adjustment multiplies the average prescription drug-based risk score from our model (RX_Raw_{st}) for the particular sector (MA or TM), s , and year, t , by the ratio of a standardized CMS–HCC risk score using coefficients from the 2013 V12 model for the entire Medicare population in each year ($CMS_HCC_{st}|Overall}$) to the same standardized risk score for the Part D-enrolled population ($CMS_HCC_{st}|PartD}$). This procedure removes the effects of differential health risk selection into Part D, either at a point in time or over time, because there is no reason to believe that coding intensity would be different for enrollees with Part D coverage versus those without. Due to data availability, we made this adjustment using a consistent version of the CMS–HCC based on the 2013 V12 score rather than more recent versions.

RESULTS

Comparison of Prevalence of Rx-MGs in MA and TM

In 2015, beneficiaries enrolled in MA with Part D coverage had systematically lower prevalence rates across the 20 Rx-MGs in our model that were associated with the largest incremental increase in Medicare spending (Table 1). On the left-hand side of Table 1, we show the coefficients from our community-based regression model, which represent the additional Medicare spending associated with that Rx-MG holding other covariates (including demographic and other Rx-MGs) constant.¹ Prevalence rates for MA beneficiaries were lower than for TM beneficiaries for 18 of the 20 morbidity groups that were associated with the highest marginal spending, including cystic fibrosis, severe acute infections, and chronic renal failure and the average MA-to-TM prevalence ratio was 86.5 percent.

When Rx-MGs were ranked by prevalence across the entire Part D-enrolled Medicare population, MA beneficiaries also tended to have lower prevalence than TM beneficiaries (Table 2). For the 20 Rx-MGs with the highest overall prevalence rates among Medicare beneficiaries with Part D coverage, those enrolled in MA had lower prevalence rates than TM beneficiaries in 18 and the average MA-to-TM prevalence ratio was 91.1 percent.

RX-based Risk Scores in 2015

Based on their demographics and lower utilization of prescription drugs, MA beneficiaries with Part D coverage had average predicted spending in 2015 of \$8,792, which was 11.2 percent lower than the \$9,897 average for beneficiaries in TM with Part D coverage (Table 3). The lower relative risk of MA enrollees in Part D was consistent across three key subgroups: beneficiaries designated as LTI, those with Medicaid and living in the community, and those without Medicaid living in the community.

After adjusting raw prescription drug-based risk scores to reflect the health risk of the entire MA and TM populations irrespective of Part D enrollment, the ratio of MA to TM risk scores in 2015 was 0.931 (Figure 1). This suggests that, overall, MA beneficiaries had expected spending that was 6.9 percent lower than those enrolled in TM. This result differed from the 11.2 percent unadjusted comparison of MA and TM spending because TM beneficiaries enrolled in Part D have higher health risks than the overall TM population.

Changes in RX-based Risk Scores over Time

The risk of the TM population enrolled in Part D, as indicated by the prescription drug-based risk score, has been relatively constant over time increasing

Table 3: Prescription Drug-Based Risk Scores and Predicted Spending by Traditional Medicare (TM) or Medicare Advantage (MA) and by Subgroup, 2015

	<i>Percent of Enrollees</i>		<i>Prescription Drug-Based Risk Score</i>		<i>Predicted Spending if Enrolled in TM</i>	
	<i>TM (%)</i>	<i>MA (%)</i>	<i>TM</i>	<i>MA</i>	<i>TM</i>	<i>MA</i>
Overall	100	100	1.000	0.888	\$9,897	\$8,792
Long-term institutionalized (LTI)	4	1	1.803	1.701	\$17,844	\$16,831
Medicaid enrollees living in the community	28	18	1.167	1.128	\$11,551	\$11,162
Neither LTI nor Medicaid	69	81	0.890	0.822	\$8,810	\$8,137

Notes. Predicted spending in TM includes Part A and Part B expenditures. Predicted spending amounts if enrolled in TM are predicted values from a regression of annualized spending for TM beneficiaries. The regression included 49 prescription drug-based therapeutic classes (Rx-MGs) and demographic characteristics. Rx-MGs were assigned using the Johns Hopkins ACG[®] System version 11.1. Prescription drug-based risk scores for each group were derived by dividing these predicted amounts by the overall mean predicted spending in 2015 of \$9,897. The sample was limited to beneficiaries enrolled in TM or MA who also had Part D coverage. For more details, see text.

Figure 1: Ratio of MA-to-TM Prescription Drug-Based Risk Scores, All Enrollees Compared with Part D Enrollees, 2008–2015

Notes. Prescription drug-based risk scores derived using the sample of Medicare beneficiaries enrolled in Traditional Medicare (TM) or Medicare Advantage (MA) who also had Part D coverage. The ratio of MA-to-TM risk scores for all enrollees was constructed by multiplying the prescription drug-based score for Part D enrollees in either MA or TM in each year by the average CMS–HCC score (version 12) for all MA or TM enrollees divided by the average CMS–HCC score for MA or TM enrollees with Part D coverage.

only slightly from 0.992 in 2008 to 1.000 in 2015 (bottom bank of Figure 1). By contrast, the health risk of MA beneficiaries with Part D has increased over this same period from 0.838 to 0.888. The relatively flat predicted risk for the TM population and the increase in the MA risk score resulted in an increase in the ratio of MA-to-TM predicted risk for Part D enrollees from 0.845 in 2008 to 0.888 in 2015 and, for all enrollees, including those without Part D coverage, from 0.897 in 2008 to 0.931 in 2015. The ratio of predicted spending for Part D enrollees in MA to Part D enrollees in TM increased by about 4.3 p.p. from 2008 to 2015, and after adjusting raw prescription drug-based risk scores for the health risk of the entire Medicare population, we found relative risk increased by a similar amount: 3.4 p.p..

We next compare changes for two measures of relative risk: the prescription drug-based risk scores of MA and TM beneficiaries—adjusted for the

health risk of the entire Medicare population—and the risk scores used to pay MA plans under the CMS–HCC model (standardized using the model for payment year 2017). While the implied relative risk of all MA beneficiaries using our prescription drug-based model increased by 3.4 p.p. from 2008 to 2015, the relative risk reported to CMS by MA plans increased 9.8 p.p. over the same period (Figure 2). Our analysis of relative risk in Medicare suggests that the underlying relative health risk of MA beneficiaries compared with those in TM increased at an annualized rate of 0.5 percent from 2008 to 2015. By comparison, over that same period, the relative health risk as reported by MA plans increased at an annualized rate of 1.4 percent or almost three times as quickly as the measure of underlying health risk from prescription drug utilization.

Robustness of Estimates

We noted above that the average predicted spending in 2015 for MA beneficiaries in Part D was 11.2 percent lower than for Part D enrollees in TM.

Figure 2: Ratio of MA-to-TM Prescription Drug–Based and CMS–HCC Risk Scores, 2008–2015

Notes. Prescription drug-based risk scores derived using the sample of Medicare beneficiaries enrolled in Traditional Medicare (TM) or Medicare Advantage (MA) who also had Part D coverage and adjusted for the entire Medicare population using CMS–HCC averages. CMS–HCC Version 22 scores for payment year 2017 obtained through personal correspondence with the Centers for Medicare and Medicaid Services on May 11, 2017.

Underlying that estimate, prevalence rates across all of the Rx-MGs were, on average and when weighted by the coefficients from that model, 13.1 percent lower for MA beneficiaries in Part D than for TM beneficiaries in Part D. Using either nondiscretionary Rx-MGs selected by a panel of physicians (12.4 percent lower prevalence), or when limited to prescription drugs CMS intends to use for Marketplace risk adjustment (12.0 percent lower prevalence), the results were similar to our main specification.

Both of these sensitivity analyses also confirmed our finding that the predicted risk of MA beneficiaries increased relative to beneficiaries in TM from 2008 to 2015. The relative prevalence of Rx-MGs between MA and TM beneficiaries increased 5.9 p.p. over that time period under our preferred model, and the prevalence of Rx-MGs also increased 5.9 p.p. using only the nondiscretionary Rx-MGs from the panel of physicians. Prevalence increased 8.6 p.p. when we limited the model to only those prescription drugs CMS intends to use for Marketplace risk adjustment beginning in 2018.

DISCUSSION

Our results reveal several insights into the relative risk of the MA and TM populations in Medicare. In each year of our study period, MA enrollees had substantially lower predicted health spending than enrollees in TM. As of 2015, MA enrollees with Part D coverage had 11.2 percent lower health risk compared to Part D enrollees in TM. Our results adjusted for the entire Medicare population showed that MA enrollees had 6.9 percent lower health risk compared with TM enrollees in 2015. We found that predicted spending was consistently lower for MA beneficiaries than beneficiaries in TM across key subgroups, including those living in an institution, and those living in the community with or without Medicaid coverage.

Our results from prescription drug-based models suggest that the health risk of MA beneficiaries relative to TM beneficiaries has been increasing over time, with the ratio of predicted spending for Part D enrollees rising from 0.845 in 2008 to 0.888 in 2015, and for all enrollees from 0.897 in 2008 to 0.931 in 2015. While the health risk of the MA population appears to be increasing relative to the TM population, according to our models, the annual rate of this increase (0.5 percent for all enrollees) is substantially less than the rate at which the risk scores used to pay MA plans are increasing (1.4 percent using the 2017 payment model). These estimates of changes in relative risk over our study period were robust to several alternative specifications, and,

because these estimates are not subject to static differences in utilization management between MA-PDs and stand-alone plans, help to support our finding that MA beneficiaries appear to have lower health risk at any point in time than TM beneficiaries.

Our study is one of the first to predict Medicare spending using indicators of health risk that are independent of the diagnostic information that MA plans report for their enrollees and that beneficiaries do not report themselves. Another advantage is that our estimates of health risk are derived from the universe of MA and TM beneficiaries enrolled in Part D coverage and were further adjusted to reflect the risk of the entire universe of Medicare beneficiaries.

We have shown that MA enrollees are less likely than TM beneficiaries to use prescription drugs, and we infer from this observation that MA enrollees are in better health than TM beneficiaries. While this finding may have arisen from differential cost-sharing or plan characteristics, including more coordinated care in MA-PDs compared with stand-alone plans, a series of robustness checks and the consistency of lower MA utilization across a wide range of disease classes support this inference. Our finding that expected health risk is lower in MA than in TM in each year of our study period is consistent with evidence from a number of other studies that have examined related measures of relative risk, including mortality rates and Medicare claims data for beneficiaries who switch from TM to MA (Newhouse et al. 2012; Kronick and Welch 2014; Kronick 2017). Alternatively, prescription-based risk scores may be lower for MA beneficiaries because, conditional on having a medical condition, MA enrollees may be healthier than their counterparts in TM and therefore less likely to be taking prescription medications. These concerns are likely to be muted in our analysis of growth rates for drug-based versus diagnosis-based risk scores. Moreover, when we limited the analysis in two separate ways to less discretionary drugs, the differences in MA-to-TM prevalence were similar to the difference for all classes of drugs, giving us confidence that the lower utilization of drugs in MA primarily reflects better health status, and not simply differential prescribing patterns.

The reason for the overall increase in the relative risk of MA beneficiaries is outside the scope of this study. A simple explanation is that as the percentage of Medicare beneficiaries enrolled in MA has increased—from 13 percent to 31 percent from 2005 to 2016 (Kaiser Family Foundation 2016)—the opportunity for favorable selection has decreased. The marginal enrollee considering choosing MA instead of TM in recent years may simply be in

worse health than when the MA sector had a more selected, and therefore healthier, group of enrollees. This shift might also have reflected the implementation, since 2006, of enrollment lock-in periods wherein beneficiaries switching from TM to MA generally cannot leave MA before the next open enrollment window (Newhouse et al. 2012).

Our finding of increased relative health risk among MA enrollees compared with those in TM has important implications for MA payment policy. We found that the increase in relative risk based on drug utilization from 2008 to 2015 (3.4 p.p.) is 6.4 p.p. less than the relative increase in diagnostic risk scores for MA enrollees compared with those in TM over that time period (9.8 p.p.). The gap between these rates indicates that increases in coding intensity among MA plans relative to TM is likely outpacing relative increases in actual health risk with direct implications for CMS' coding intensity adjustment. Specifically, CMS has historically implemented the statutory minimum increase of 0.25 p.p. each year, but the gap between the growth in relative diagnostic scores (1.4 p.p. per year) and prescription drug-based scores (0.5 p.p. per year) suggests these rates may be widening at a rate (0.9 p.p. per year) that is faster than the statutory minimum adjustment. At the moment, this issue is particularly important because the minimum annual increase in the coding intensity adjustment percentage is set to expire after 2018.

There are other potentially significant financial implications of our findings. As shown in Kronick (2017), payments to MA plans exceeded the level warranted by estimated health risk by approximately 3 p.p. in 2014: the difference between reported risk scores after subtracting CMS' coding intensity adjustment (0.999) and those derived from a model adjusting for demographic differences in the MA and TM populations (0.971). Our results suggest payments to MA plans in excess of risk may have been as large as 7.9 p.p. or roughly \$16 billion in 2015, resulting from a difference between reported risk scores after subtracting CMS' coding intensity adjustment in that year (1.014) and those based on prescription drug use (0.931 from Figure 2). However, as discussed above, it is possible that, conditional on health status, drug utilization may be lower in some MA plans than in TM. As a result, we do not suggest that payments to MA plans were almost 8 percent too high in 2015. However, our results provide further support for the premise that MA enrollees are no sicker, and may well be healthier, than similar beneficiaries in TM, and further support changing the method of computing the coding intensity adjustment to reflect this principle.

ACKNOWLEDGMENTS

Joint Acknowledgment/Disclosure Statement: Richard Kronick was funded by an Intergovernmental Personnel Agreement from the Agency for Healthcare Research and Quality (AHRQ) while working on this manuscript. The authors would like to thank Pete Welch from the Office of The Assistant Secretary for Planning and Evaluation at the Department of Health and Human Services for his guidance and assistance throughout this project and Thomas Selden and Joel Cohen of AHRQ as well as Pete Welch for their comments on earlier drafts of the manuscript. The authors also thank Acumen LLC for excellent data and programming assistance. The views expressed in this article are those of the authors, and no official endorsement by the Department of Health and Human Services or AHRQ is intended or should be inferred.

Disclosure: None.

Disclaimer: None.

NOTE

1. In Appendix SA5, we report all coefficients, including for medical diagnoses and demographic covariates, from both our community-based and LTI regressions.

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SUPPORTING INFORMATION

Additional Supporting Information may be found online in the Supporting Information section at the end of the article:

Appendix SA1: Author Matrix.

Appendix SA2: Means for Variables Included in Prescription Drug-Based Risk Score, by Medicare Advantage (MA) and Traditional Medicare (TM), 2008 and 2015.

Appendix SA3: Sample Criteria Applied to Medicare Administrative Databases to Impute Risk Scores and to Run Prescription Drug-Based Regression Models, 2015.

Appendix SA4: Description of Methods Used to Test Robustness of Results to Non-Discretionary Prescription Drug Therapeutic Classes (Rx-MGs).

Appendix SA5: Regression Results from Models Used to Calculate Prescription Drug-Based Risk Scores Separately for Beneficiaries Living in the Community and Those Living in Long-Term Institutional Settings, 2015.