Published in final edited form as:

Health Aff (Millwood). 2018 January ; 37(1): 70–77. doi:10.1377/hlthaff.2017.0974.

Medicare Advantage Ratings And Voluntary Disenrollment Among Patients With End-Stage Renal Disease

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Abstract

Populations with intensive health care needs and high care costs may be attracted to insurance plans that have high quality ratings, but patients may be likely to disenroll from a plan if their care needs are not met. We assessed the association between publicly reported Medicare Advantage plan star ratings and voluntary disenrollment of incident dialysis patients in the following year over the period 2007–13. We found that Medicare Advantage (MA) plans with lower star ratings had significantly higher rates of disenrollment by incident dialysis patients in the following year. Compared to MA plans with 4.0 or more stars, adjusted disenrollment rates were 3.9 percentage points higher for plans with 3.5 stars, 5.0 percentage points higher for those with 3.0 stars, and 12.1 percentage points higher for those with 2.5 or fewer stars. These findings suggest that low plan quality may lead to increased expenditures, as this high-cost population generally must shift from Medicare Advantage to traditional Medicare upon disenrollment.

The proportion of Medicare beneficiaries enrolling in Medicare Advantage (MA) plans has doubled in the past decade, accounting for 31 percent of the Medicare population in 2015.¹ Policy makers have sought to monitor the quality of care for MA beneficiaries and publicly

disseminate information on plan performance. In 2007 the Centers for Medicare and Medicaid Services (CMS) developed a five-star rating system for MA plans to reflect each plan's quality of care and inform enrollment decisions.² These star ratings incorporate widely accepted quality and patient experience measures from multiple sources such as the Health-care Effectiveness Data and Information Set (HEDIS) quality measures, the Consumer Assessment of Healthcare Providers and Systems (CAHPS) surveys, the Health Outcomes Survey, and other administrative data.³ In response to the Affordable Care Act provisions that dictate payment incentives for better overall performance, many MA plans are seeking to improve their star ratings.^{4–7} While there is growing evidence of an association between higher star ratings and beneficiaries' enrollment decisions,² there has been limited focus on the association between quality ratings and beneficiaries' quality experience as reflected in decisions to disenroll—particularly among high-cost populations with intensive health care needs.^{8–10}

Beneficiaries may consider information about quality when choosing health plans^{11–14} and may exit health plans if they are dissatisfied with their experience.⁸ They are more likely to choose better-performing health plans and are responsive to initiatives that provide quality information.^{2,11} The voluntary disenrollment rates from MA plans are strongly related to direct measures of beneficiary-reported patient experience.⁹ Although MA plans with higher star ratings may attract more beneficiaries, it is unclear whether these plans also retain more beneficiaries in subsequent years—a measure that would serve as evidence of positive beneficiary experience.

Understanding the association between MA plan star ratings at a baseline year and voluntary disenrollment of beneficiaries in the following year is particularly important for frail patients with intensive health care needs. Many studies suggest that, given the per member per month capitation payment received from the federal government that is designed to cover the entire cost of a patient's care,^{15–18} MA plans have an incentive to select people they expect to be low cost and to avoid covering those who are chronically ill, since risk-adjusted payments may be less than the costs of care for the latter group.^{17,18} By law, MA plans cannot select enrollees based directly on their health status. However, they can selectively contract with care providers¹⁹ and often restrict choice of providers in an effort to control costs. Restricted provider networks may lead to voluntary disenrollment of beneficiaries, particularly the elderly with greater needs for ongoing care.^{10,20} Thus, it is important to understand whether star ratings can reflect plan quality for vulnerable elderly patients.

In this study we examined the relationship between publicly reported MA plan star ratings and voluntary disenrollment of incident end-stage renal disease (ESRD) patients from MA plans to traditional Medicare in the following year. (Incident ESRD patients are patients with chronic kidney disease newly initiating dialysis in the study year.) We focused on the disenrollment of such patients for three reasons. First, they may be particularly sensitive to plan quality, since the onset of ESRD is frequently accompanied by increasingly complex health care needs.

Second, by law, ESRD patients who disenroll must leave the MA program unless their original plan no longer provides insurance coverage or they move out of their MA plan's

geographic area.²¹ In such cases, ESRD patients may change to another MA plan in a special enrollment period. This means that most incident ESRD patients cannot switch to another MA plan with a higher star rating. If they leave their plan, they must enroll in traditional Medicare. According to the 2016 annual report of the US Renal Data System, spending per patient per year among hemodialysis or peritoneal dialysis patients is above \$70,000, some seven times higher than the \$11,800 average Medicare spending per capita.²² The disenrollment of incident ESRD patients from MA would mean an immediate transfer of their costs from MA plans to traditional Medicare. The shifting of high-cost ESRD patients from MA to traditional Medicare could result in overpayment to MA plans and increased costs for the Medicare program as a whole.

Third, MA plans often offer care management and other related programs that coordinate services for chronically ill patients such as those with ESRD.²³ Disenrollment of an ESRD patient from an MA plan to traditional Medicare has the potential to disrupt access to these services and lead to worse health outcomes. Thus, it is critical for policy makers to understand the extent to which MA plan star ratings reflect plan quality for frail patients, as reflected in their decisions to remain enrolled in their MA plan. The regulations for incident ESRD patients in MA plans provided us with a unique opportunity to “validate” MA plan star ratings in this particularly high-cost, high-need population.

Study Data And Methods

Data Sources

We merged data for the period 2007–13 from five national databases: Medicare Star Ratings data, which contains star ratings for MA plans that reflect plans’ quality ratings when patients initiated dialysis; Renal Management Information System (REMIS) data, which contains dates of initiation of dialysis and hospitalizations, hemoglobin levels, and other quality measures for ESRD patients; HEDIS data, which contains individual-level information on enrollment in MA plans; CMS’s Out-of-Pocket Costs (OOPC) data, which provides a summary measure of the generosity of each plan’s benefits, estimating average expected monthly medical out-of-pocket spending (including premiums and cost sharing) in each MA plan; and the Medicare Beneficiary Summary File, which provides the demographic characteristics of enrollees. We matched 97 percent of the observations in the HEDIS data set to this latter file.

Study Sample

The Medicare Beneficiary Summary File contained data on 6.9–12.4 million MA enrollees for each year in 2007–13. Using the initial dialysis dates in the REMIS data for 2007–12, we identified 87,780 incident dialysis patients. We excluded patients who died or were under age sixty-five in the year of dialysis initiation. We also excluded plan contracts without star-rating information and those that were terminated in the year after dialysis initiation (the follow-up year). Our final sample included 50,391 patients (see online appendix exhibit A1).²⁴

Variables

The dependent variable had two categories: remaining in the MA plan throughout the follow-up year or until death; and disenrollment from the MA plan at any time in the following year. The primary independent variable was the MA plan star rating. We grouped star ratings into four categories: 2.5 or fewer stars, 3.0 stars, 3.5 stars, and 4.0 or more stars. To control for preexisting conditions and co-morbidities, we included three conditions for primary cause of ESRD and sixteen comorbid conditions at dialysis initiation from the Medicare Evidence Form (CMS-2728),²⁵ obtained from the REMIS data. We used a categorical variable for the year of dialysis initiation to control for time trends. Other covariates included patient age, sex, race, census region of residence, socioeconomic status derived from income information at the ZIP code level, a summary measure of the generosity of each plan's benefits derived from out-of-pocket spending data, and dual eligibility for Medicaid coverage according to the Medicare Beneficiary Summary File.

Statistical Analyses

The baseline year was the year of dialysis initiation. We used bivariate and multivariate methods to examine the relationship between MA plan star ratings at the baseline year and disenrollment rates of incident dialysis patients from MA plans to traditional Medicare in the follow-up year. We used a logit model to assess the association between MA plans' star ratings and disenrollment among incident patients who survived through the end of the baseline year. We included a plan fixed effect to account for the clustering of observations in health plans. Our model therefore estimated the mean within-plan effect of MA plan star ratings. All models were weighted by the number of months that subjects were enrolled in their plan. Since deaths before disenrollment can bias results, we restricted the analysis to subjects who did not die during the follow-up year.

To test the robustness of the models, we restricted the analysis to MA plans with out-of-pocket spending data and further controlled for projected medical cost sharing for each MA plan. We performed a series of sensitivity analyses: We stratified the analysis by dual-eligibility status and socioeconomic status. We also used multinomial logit models to assess the association between MA plans' star ratings and disenrollment, while accounting for death as a competing risk. In this case, disenrollment status was a multivalued outcome variable that had three levels: remaining in an MA plan, disenrollment from MA plans, and death. All of the regression analyses described above used the same covariates as the main analysis. To understand the differences in disenrollment between incident ESRD patients and all beneficiaries in the same MA plans, we stratified the analysis by 2012 star rating level and compared the disenrollment rates between all beneficiaries and incident ESRD patients in 2013—including the two groups' switching rates between MA plans and from MA plans to traditional Medicare. For this analysis we controlled for age, sex, race, census region of residence, and the fixed effect of hospital referral regions. We used both the logit and mlogit commands from Stata to fit binary and multinomial logit models.²⁶ The marginal effects were estimated by the margins command.²⁷ Results are reported with two-tailed 95 percent confidence intervals.

All analyses were performed with Stata, version 14. The Brown University Human Research Protections Office and the CMS Privacy Board approved the study protocol.

Limitations

This study had several limitations. First, we could not fully exclude the possibility that unobserved differences among MA plan populations influenced our results. For instance, there are many complexities during the transition from the non-ESRD chronic kidney disease phase of illness to the ESRD phase of illness that we did not consider.

Second, the CMS-2728 form might misclassify the presence and absence of some comorbid conditions.^{28,29} However, the accuracy of these data is unlikely to vary according to MA star ratings. Furthermore, we focused on incident dialysis patients and included an extensive set of socio-demographic and clinical covariates in our models.

Third, we lacked information on plan networks. Disenrollment may occur through restricted availability of either higher-performing or geographically accessible dialysis facilities. It may also be prompted by limited treatment options or poor coordination of care.

Fourth, we could not directly assess the relationship between beneficiary experience and disenrollment from MA plans. Nevertheless, our findings were consistent with the study by Terry Lied and coauthors, which was based on beneficiary-reported experience from the CAHPS data.⁹

Fifth, lower disenrollment rates in high-quality plans might not be driven by differences in the quality of care. For instance, MA plans with higher star ratings get paid more and may offer benefits that require lower out-of-pocket payment. This may lead to lower disenrollment rates in these plans. In one of our sensitivity analyses, we controlled for projected out-of-pocket payment for each MA plan, which yielded results consistent with those of the main analysis. However, further research on the mechanism of this voluntary disenrollment is warranted.

Study Results

Enrollees in MA plans with lower star ratings were more likely to be younger, female, black, dually eligible for Medicaid, living in lower-income areas, located in the South, and with selected clinical comorbidities, compared to enrollees in plans with higher star ratings (exhibit 1). These attributes differed significantly by plan star rating. Enrollees in plans with lower star ratings were also more likely to have diabetes as the primary cause of ESRD and to have comorbid conditions such as cerebrovascular diseases, hypertension, amputation, diabetes on insulin, diabetes on oral medications or with complications, tobacco use, and inability to ambulate or need of assistance with daily activities. In recent years, patients became more likely to initiate dialysis in MA plans with higher star ratings (appendix exhibit A2).²⁴

In the year after the initiation of dialysis, we observed a 14 percent disenrollment rate for the overall incident ESRD patients, ranging from 8.8 percent for plans with 4.0 or more stars to 22.7 percent for plans with 2.5 or fewer stars (exhibit 2). Compared to MA plans with 4.0 or more stars, adjusted disenrollment rates were 12.1 percentage points higher for plans with

2.5 or fewer stars, 5.0 percentage points higher for plans with 3.0 stars, and 3.9 percentage points higher for plans with 3.5 stars. We also observed greater disenrollment rates in the Northeast (3.9 percentage points higher) and South (4.5 percentage points higher), compared to those in the West. Partially dual-eligible enrollees (those eligible for only a subset of Medicaid benefits) were 2.4 percentage points, and fully dual eligible enrollees were 13.0 percentage points, more likely to disenroll than those without dual eligibility. Compared to patients who initiated dialysis in 2007, patients who started dialysis in 2012 had a 2.4-percentage-point greater rate of disenrollment. Compared to patients without any of the sixteen comorbid conditions documented, we observed 0.9-percentage-point higher rates of disenrollment among patients with cerebrovascular diseases or with diabetes who were currently on insulin, and a 2.2-percentage-point higher rate among patients with an inability to ambulate (exhibit 2 and appendix exhibit A3).²⁴ Both binary and multinomial logit models yielded similar results, with and without controlling for cost sharing. In stratified analyses, MA plans with 2.5 or fewer stars had significantly higher disenrollment rates than plans with 4.0 or more stars for all population subgroups, especially the fully dual eligible. For the subgroup with partial or full dual eligibility, there was no significant difference in disenrollment rates among MA plans with 3.5 and 4.0 or more stars, although plans with 2.5 and 3.0 stars differed significantly from plans with 4.0 or more stars (appendix exhibit A4).

In adjusted analyses, we observed a graded relationship between lower MA plan star ratings and increased rates of disenrollment in the follow-up year after patients' initiation of dialysis. The adjusted disenrollment rate among MA plans with 4.0 or more stars was 9.5 percent. Compared with these plans, those with fewer stars had significantly higher disenrollment rates (exhibit 3). The overall disenrollment rate from MA plans among incident ESRD patients was significantly higher than among all MA beneficiaries (14.9 percent versus 12.0 percent; data not shown). Moreover, incident ESRD patients had higher disenrollment rates than did all MA beneficiaries across all four levels of star ratings (exhibit 4). There were two types of disenrollment in MA plans: switching from MA plans to traditional Medicare and switching between MA plans (which is possible only under limited circumstances, as explained earlier).²¹ The switching rate from MA plans to traditional Medicare among incident ESRD patients was significantly higher than that of all MA beneficiaries, especially in MA plans with lower star ratings (exhibit 4).

Discussion

This is the first study to assess the association between Medicare Advantage plan star ratings and the voluntary disenrollment of vulnerable elderly patients from MA plans. The experience of these patients, who have intensive health care needs, might not be reflected in star ratings, which are calculated based on clinical quality and patient experience for all beneficiaries. Looking specifically at incident dialysis patients, we found that MA plans with lower star ratings had higher rates of voluntary disenrollment among such patients in the follow-up year. The association between star ratings and disenrollment was stronger among incident dialysis patients than among all MA beneficiaries. The difference in disenrollment between these two populations was driven by the switching rate from MA to traditional Medicare.

Looking at previous research sheds more light on the issue of disenrollment and quality of plans. Jonathan Kolstad and Michael Chernew found that consumers were more likely to choose better-performing health plans and were responsive to initiatives that provide quality information.¹¹ Rachel Reid and coauthors observed a positive association between CMS's star ratings of MA plans and enrollment,² while Lied and coauthors demonstrated that voluntary disenrollment rates from MA plans were strongly related to direct measures of beneficiary-reported experience in CAHPS.⁹ Recently, Momotazur Rahman and coauthors found that patients using home health care and both short- and long-term nursing home care exited their MA plans for traditional Medicare at substantial rates.³⁰

Our findings are consistent with those of Lied and coauthors, which demonstrated that voluntary disenrollment from MA plans was strongly related to quality measures for health plan performance.⁹ We extended Reid and coauthors' finding of a positive association between CMS's five-star MA quality ratings and enrollment.² Our examination of incident ESRD patients in MA plans provided us with a unique opportunity to "validate" MA plan star ratings in this particularly high-cost, high-need population. The findings of these studies provide CMS with justification to continue to advance quality reporting.

Policy Implications

This study has important implications for both the Medicare ESRD program and MA plans. There is very limited knowledge of ESRD patients in managed care plans, despite rapid growth in MA enrollment. Essential questions about the proportion of ESRD patients who are enrolled in MA and their likelihood of remaining in their plan have been unaddressed in the peer-reviewed literature. Our study suggests that a substantial and increasing fraction of the ESRD population is enrolled in an MA plan at the time of dialysis initiation and that the majority of these enrollees remain in their plans during the following year. This means that it is important for CMS to monitor the outcomes and experiences of such patients and the effectiveness of MA plans in managing care for people with ESRD.

In the MA context, it is important for policy makers to pay close attention to the measurement of quality and the retention of patients with high spending and complex medical conditions. The public reporting of star ratings was introduced to help patients make better insurance choices. Therefore, it is critical to ensure that this composite rating reflects both clinical quality and patient experience, particularly for high-cost populations with intensive health care needs.

In managed care, health insurers selectively contract with care providers,¹⁹ thus increasing competition not only between care providers but also between health insurers, and giving beneficiaries the option to switch insurers if they are not satisfied with their providers or their experience in health plans.^{8,31} Voluntary disenrollment in the subsequent year is a potentially important quality indicator, particularly for elderly patients with complex health care needs.²⁰ Our study shows that disenrollment rates among incident dialysis patients, especially rates of switching from MA to traditional Medicare, were significantly higher than those of all MA beneficiaries. We also observed higher disenrollment rates of incident dialysis patients from lower-quality plans. By regulation, most dialysis patients who

disenroll from an MA plan must join traditional Medicare. Higher disenrollment and switching rates in low-quality plans appear to transfer these patients' costs directly from MA to traditional Medicare. This shift may result in overpayment to MA plans, which may lead to higher costs for Medicare as a whole.

Conclusion

Our study shows a strong association between MA plans' star ratings and incident ESRD patients' voluntary disenrollment from MA plans to traditional Medicare in the year following the initiation of dialysis. These patients' disenrollment rates, especially rates of switching from MA to traditional Medicare, were significantly higher than disenrollment rates among all MA beneficiaries. These findings suggest that the rate of voluntary disenrollment among high-cost, high-need patients may be an important measure of MA plan quality, that CMS and other policy stakeholders may want to monitor such disenrollment rates, and that low plan quality may lead to increased spending in traditional Medicare by shifting the costs of the ESRD population from some MA plans to traditional Medicare. Further research is needed to understand whether these findings extend to other chronically ill populations.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

An earlier version of this article was presented at was presented at the Annual Meeting of the American Kidney Society, Chicago, Illinois, November 4, 2016. The research reported in this publication was supported by the Agency for Healthcare Research and Quality (Award No. 1R36HS023959-01).

NOTES

1. Jacobson, G., Damico, A., Neuman, T., Gold, M. Medicare Advantage 2015 spotlight: enrollment market update [Internet]. Menlo Park (CA): Henry J. Kaiser Family Foundation; 2015. Jun 30. [cited 2017 Nov 28]. (Issue Brief). Available from: <http://kff.org/medicare/issue-brief/medicare-advantage-2015-spotlight-enrollment-market-update/>
2. Reid RO, Deb P, Howell BL, Shrank WH. Association between Medicare Advantage plan star ratings and enrollment. JAMA. 2013; 309(3):267–74. [PubMed: 23321765]
3. Centers for Medicare and Medicaid Services. Choose higher quality for better health care [Internet]. Baltimore (MD): CMS; 2013. Jul. [revised 2013 Jul; cited 2017 Nov 28]. Available from: <https://www.medicare.gov/wp-content/uploads/2014/04/11226.pdf>
4. Cosgrove, JC. Medicare Advantage: quality bonus payment demonstration undermined by high estimated costs and design shortcomings [In-ternet]. Washington (DC): Government Accountability Office; 2012. Mar 21. Report No. GAO-12-409R[cited 2017 Nov 28]Available from: <http://www.gao.gov/assets/590/589473.pdf>
5. Diamond F. Funding up for grabs in Medicare advantage. Manag Care. 2010; 19(10):34–7.
6. Carroll J. Some plans may prosper despite Medicare Advantage cuts. Manag Care. 2010; 19(4):14–6. 22–3.
7. Weaver, C. Chasing the stars, insurers improve quality—and revenue. Kaiser Health News [serial on the Internet]. 2011. Oct 12. [cited 2017 Nov, 28]. Available from: <https://khn.org/news/insurers-improve-quality-revenue/>

8. Hirschman, AO. Exit, voice, and loyalty: responses to decline in firms, organizations, and states. Cambridge (MA): Harvard University Press; 1970.
9. Lied TR, Sheingold SH, Landon BE, Shaul JA, Cleary PD. Beneficiary reported experience and voluntary disenrollment in Medicare managed care. *Health Care Financ Rev.* 2003; 25(1):55–66. [PubMed: 14997693]
10. Elkin EB, Ishill N, Riley GF, Bach PB, Gonen M, Begg CB, et al. Disenrollment from Medicare managed care among beneficiaries with and without a cancer diagnosis. *J Natl Cancer Inst.* 2008; 100(14):1013–21. [PubMed: 18612131]
11. Kolstad JT, Chernew ME. Quality and consumer decision making in the market for health insurance and health care services. *Med Care Res Rev.* 2009; 66(1, Suppl):28S–52S. [PubMed: 19029288]
12. Faber M, Bosch M, Wollersheim H, Leatherman S, Grol R. Public reporting in health care: how do consumers use quality-of-care information? A systematic review. *Med Care.* 2009; 47(1):1–8. [PubMed: 19106724]
13. Dafny L, Dranove D. Do report cards tell consumers anything they don't know already? The case of Medicare HMOs. *Rand J Econ.* 2008; 39(3):790–821. [PubMed: 19013864]
14. Werner RM, Norton EC, Konetzka RT, Polsky D. Do consumers respond to publicly reported quality information? Evidence from nursing homes. *J Health Econ.* 2012; 31(1):50–61. [PubMed: 22307033]
15. Levy JM, Robst J, Ingber MJ. Risk-adjustment system for the Medicare capitated ESRD program. *Health Care Financ Rev.* 2006; 27(4):53–69. [PubMed: 17290658]
16. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation. Payment for Medicare Advantage plans: policy issues and options [Internet]. Washington (DC): ASPE; 2009. Jun 30. [cited 2017 Nov 28]. Available from: http://aspe.hhs.gov/health/reports/09/medicare_advantage/
17. Brown, J., Duggan, M., Kuziemko, I., Woolston, W. How does risk selection respond to risk adjustment? Evidence from the Medicare Advantage program [Internet]. Cambridge (MA): National Bureau of Economic Research; 2011. Apr. NBER Working Paper No. 16977[cited 2017 Nov 28]Available from: <http://www.nber.org/papers/w16977.pdf>
18. McWilliams JM, Hsu J, Newhouse JP. New risk-adjustment system was associated with reduced favorable selection in Medicare Advantage. *Health Aff (Millwood).* 2012; 31(12):2630–40. [PubMed: 23213147]
19. Bes RE, Wendel S, Curfs EC, Groenewegen PP, de Jong JD. Acceptance of selective contracting: the role of trust in the health insurer. *BMC Health Serv Res.* 2013; 13:375. [PubMed: 24083663]
20. Galewitz, P. GAO: more oversight needed over Medicare Advantage provider networks. *Kaiser Health News* [serial on the Internet]. 2015. Sep 30. [cited 2017 Nov 28]. Available from: <http://khn.org/news/more-oversight-needed-over-medicare-advantage-provider-networks/>
21. Washington State Office of the Insurance Commissioner. Medicare Advantage (MA) enrollment time-lines: “when can I join, leave, or change Medicare Advantage plans?” [Internet]. Tumwater (WA): The Office; 2015. [revised 2015 Aug cited 2017 Nov 28] Available from: <https://www.insurance.wa.gov/sites/default/files/documents/ma-plan-enrollment-timeline.pdf>
22. Saran R, Robinson B, Abbott KC, Agodoa LY, Albertus P, Ayanian J, et al. US Renal Data System 2016 Annual Data Report: epidemiology of kidney disease in the United States. *Am J Kidney Dis.* 2017; 69(3, Suppl 1):A7–8. [PubMed: 28236831]
23. Brunelli SM, Sibbel S, Colson C, Hunt A, Nissenson AR, Krishnan M. Medicare Advantage associated with lower mortality for incident dialysis patients. *Nephrol News Issues.* 2015; 29(13): 16–7. 21, 26–9.
24. To access the appendix, click on the Details tab of the article online.
25. Krishnan M, Weinhandl ED, Jackson S, Gilbertson DT, Lacson E Jr. Co-morbidity ascertainment from the ESRD Medical Evidence Report and Medicare claims around dialysis initiation: a comparison using US Renal Data System data. *Am J Kidney Dis.* 2015; 66(5):802–12. [PubMed: 26015277]
26. Long, JS., Freese, J. Regression models for categorical dependent variables using Stata. 3rd. College Station (TX): Stata Press; 2014.

27. Williams R. Using the margins command to estimate and interpret adjusted predictions and marginal effects. *Stata J.* 2012; 12(2):308–31.
28. Longenecker JC, Coresh J, Klag MJ, Levey AS, Martin AA, Fink NE, et al. Validation of comorbid conditions on the end-stage renal disease medical evidence report: the CHOICE study. Choices for Healthy Outcomes in Caring for ESRD. *J Am Soc Nephrol.* 2000; 11(3):520–9. [PubMed: 10703676]
29. Beaubrun AC, Kanda E, Bond TC, McClellan WM. Form CMS-2728 data versus erythropoietin claims data: implications for quality of care studies. *Ren Fail.* 2013; 35(3):320–6. [PubMed: 23227806]
30. Rahman M, Keohane L, Trivedi AN, Mor V. High-cost patients had substantial rates of leaving Medicare Advantage and joining traditional Medicare. *Health Aff (Millwood).* 2015; 34(10):1675–81. [PubMed: 26438743]
31. McGuire TG, Newhouse JP, Sinaiko AD. An economic history of Medicare part C. *Milbank Q.* 2011; 89(2):289–332. [PubMed: 21676024]

Exhibit 3. Adjusted disenrollment rates of incident end-stage renal disease patients, by Medicare Advantage (MA) star rating

SOURCE Authors' analysis of information for 2007–13 from the five national databases listed in the notes to exhibit 1. **NOTES** Star ratings were for 2012. The error bars indicate 95 percent confidence intervals. Model adjusts for all covariates listed in exhibit 2, at the patient and area levels. The adjusted results were based on the binary logistic model, with four or more stars as the reference group. The marginal effects were estimated by the margins command (see note ²⁷ in text). Compared with MA plans with four or more stars, plans with fewer stars had significantly higher disenrollment rates ($p < 0.001$).

Exhibit 1

Selected characteristics of incident end-stage renal disease (ESRD) patients by Medicare Advantage plan star rating

Characteristic	Star rating in 2012				
	2.5 or fewer (n = 7,043)	3.0 (n = 17,503)	3.5 (n = 11,753)	4.0 or more (n = 14,092)	All (N = 50,391)
Age range (years)					
85 or more	6.2%	7.5%	9.2%	9.9%	8.4% ****
75–84	34.3	39.0	40.7	42.6	39.7 ****
65–74	59.5	53.5	50.1	47.5	51.9 ****
Female	47.1	46.7	44.0	43.2	45.1 ****
Black	34.2	28.0	20.7	15.7	23.7 ****
Census region of residence					
Northeast	17.0	21.4	22.7	27.8	22.8 ****
Midwest	17.2	12.8	18.7	20.6	17.0 ****
South	45.3	36.6	31.9	18.1	31.6 ****
West	13.9	24.2	24.5	32.1	25.1 ****
Annual income in patient ZIP code					
Less than \$30,000	19.0	15.2	9.6	5.9	11.8 ****
\$30,000–\$50,000	47.5	42.5	42.5	38.6	42.1 ****
More than \$50,000	33.5	42.2	47.9	55.5	46.0 ****
Dual eligibility					
Full duals	26.4	22.5	15.1	12.5	18.5 ****
Partial duals	10.2	9.0	7.7	4.7	7.7 ****
Nonduals	62.6	68.1	76.9	82.3	73.4 ****
Year of dialysis initiation					
2012	4.9	14.5	30.9	28.4	20.9 ****

Characteristic	Star rating in 2012				
	2.5 or fewer (n = 7,043)	3.0 (n = 17,503)	3.5 (n = 11,753)	4.0 or more (n = 14,092)	All (N = 50,391)
2011	9.0	14.8	24.9	29.0	20.3 ****
2010	14.0	15.1	22.9	17.8	17.5 ****
2009	23.4	18.7	12.0	10.8	15.6 ****
2008	36.6	13.7	9.3	6.3	13.8 ****
2007	12.1	23.2	0.0	7.7	11.9 ****
Primary cause of ESRD					
Diabetes	49.2	46.6	44.4	44.0	45.7 ****
Hypertension	34.1	36.0	34.9	33.3	34.7 ****
Glomerulonephritis	3.4	3.5	4.1	4.7	4.0 ****
Comorbid conditions at dialysis initiation					
Cerebrovascular diseases	11.1	10.9	10.2	10.1	10.6 ***
Hypertension	88.8	88.3	88.1	86.9	87.9 ****
Diabetes, on insulin	36.7	35.1	35.7	34.7	35.4 ***
Inability to ambulate	7.6	7.5	7.3	6.0	7.1 ****

SOURCE Authors' analysis of information for 2007–13 from five national databases (Medicare Star Ratings data, Renal Management Information System data, the Healthcare Effectiveness Data and Information Set, the Centers for Medicare and Medicaid's Out-of-Pocket Cost data, and the Medicare Beneficiary Summary File) of and of income information at the ZIP code level from the Census Bureau.

NOTES Significance refers to the difference in the rates of the area or patient characteristics as a function of the plan's five-star level. Additional baseline characteristics are in online appendix exhibit A2 (see note 24 in text).

 $p < 0.01$

 $p < 0.001$

Exhibit 2

Marginal effect of Medicare Advantage (MA) plan star ratings on disenrollment of incident end-stage renal disease (ESRD) patients from original MA contracts

			Marginal effect ³	
Variable	Patients	Disenrollment rate	Unadjusted	Adjusted
STAR RATING IN 2012				
2.5 or fewer	7,043	22.7%	13.9 ****	12.1 ****
3.0	17,503	15.2	6.4 ****	5.0 ****
3.5	11,753	13.3	4.5 ****	3.9 ****
4.0 or more	14,092	8.8	Ref	Ref
CENSUS REGION OF RESIDENCE				
Northeast	11,514	15.1	4.5 ****	3.9 ***
Midwest	8,549	12.9	2.2 ****	2.2
South	15,899	16.9	6.2 ****	4.5 ****
West	12,623	10.6	Ref	Ref
ANNUAL INCOME IN PATIENT ZIP CODE				
Less than \$30,000	5,971	16.3	3.6 ****	−0.3
\$30,000-\$50,000	21,219	14.7	2.0 ****	−0.4
More than \$50,000	23,201	12.7	Ref	Ref
DUAL ELIGIBILITY				
Full duals	9,336	26.1	15.3 ****	13.0 ****
Partial duals	3,857	15.6	4.8 ****	2.4 ****
No duals	36,969	10.8	Ref	Ref
YEAR OF DIALYSIS INITIATION				
2012	10,515	14.9	0.2	2.4 ***
2011	10,225	11.7	−3.0 ****	−1.2
2010	8,837	13.2	−1.5 ***	−0.6
2009	7,847	16.2	1.6 ***	0.7
2008	6,967	14.0	−0.6	−2.4 ***
2007	6,000	14.7	Ref	Ref
PRIMARY CAUSE OF ESRD				
Diabetes	23,035	14.6	1.5 ****	−0.3
Hypertension	17,488	13.8	0.6	−0.2
Glomerulonephritis	1,993	12.3	−0.8	0.2
Other	7,875	13.1	Ref	Ref
COMORbID CONDITIONS AT DIALYSIS INITIATION				
Cerebrovascular	5,322	16.2	1.8 ****	0.9 ***
Diabetes, on insulin	17,814	15.1	1.7 ***	0.9 ***

Variable	Patients	Disenrollment rate	Marginal effect ³	
			Unadjusted	Adjusted
Inability to ambulate	3,557	19.7	4.2 ***	2.2 ***

SOURCE Authors' analysis of information for 2007–13 from the five national databases listed in the notes to exhibit 1.

NOTES The model included all incident patients with a binary outcome variable for disenrollment status: either remaining in the same MA plan or having disenrolled from it. Model adjusts for all covariates listed in the table, at the patient and area levels. All of the marginal effects estimated by the model are in online appendix exhibit A3 (see note ²⁴ in text).

^aPercentage points.

 $p < 0.01$

 $p < 0.001$

Exhibit 4

Comparison of adjusted 2013 disenrollment rates of incident end-stage renal disease (ESRD) Medicare Advantage (MA) patients and of all MA beneficiaries, by MA plan star rating

Star rating in 2012	Disenrollment (%)				
	All beneficiaries	Incident ESRD patients	All beneficiaries	Incident ESRD patients	Adjusted difference
TOTAL DISENROLLMENT					
2.5 or fewer stars	235,812	343	21.8	28.9	5.8***
3.0 stars	1,999,601	2,539	16.4	18.9	3.0****
3.5 stars	3,345,418	3,633	13.9	15.9	1.9****
4.0 or more stars	4,068,826	4,000	7.7	10.2	1.8****
SWITCHING FROM MA PLAN TO TRADITIONAL MEDICARE					
2.5 or fewer stars	235,812	343	6.7	21.9	15.7****
3.0 stars	1,999,601	2,539	5.4	16.4	10.4****
3.5 stars	3,345,418	3,633	4.4	11.6	6.8****
4.0 or more stars	4,068,826	4,000	3.2	8.7	4.9****

SOURCE: Authors' analysis of information for 2007–13 from the five national databases listed in the notes to exhibit 1.

NOTES: The study excluded beneficiaries who died or were younger than age sixty-five in 2012. Stratified regression analyses were used to obtain adjusted results, controlling for age, sex, race, census region of residence, and the fixed effect of hospital referral regions. ESRD patients in MA plans may have a one-time special enrollment period to enroll in another MA plan if their original plan no longer provides insurance coverage or if they move out of their MA plan's area (see note 21 in text). *** $p < 0.01$ **** $p < 0.001$