



WHITE PAPER

Harvard-Inovalon Medicare Study:

Utilization and Efficiency
Under Medicare Advantage vs.
Medicare Fee-for-Service

Christie Teigland, Zulkarnain Pulungan, Yalun Su,
Zarek Brot-Goldberg, Scott Bilder, Barton Jones,
Iman Mohammadi, Boris Vabson¹

SUMMARY

- While Medicare Advantage (MA) now covers over half of Medicare beneficiaries and accounts for over \$350 billion in expenditures annually, there is limited understanding of how utilization and efficiency under MA compare to Medicare Fee-for-Service (FFS), especially after adjusting for enrollment differences across the two programs.
- Harvard and Inovalon have partnered to answer this critical question definitively using Inovalon's unique data assets. Inovalon's combined data tracks individuals' pre-65 healthcare utilization under commercial insurance coverage, as well as post-65 utilization under MA or FFS coverage. Looking at a recent five-year time period, 2015 through 2019, Inovalon's data allowed us to produce much more statistically rigorous findings than possible with conventional data sources.
- We found that MA has substantially lower utilization and expenditures than FFS, even after rigorously adjusting for member enrollment differences across the two programs, including baseline demographic, clinical, and social risk factors. MA enrollees have in excess of 50% fewer inpatient stays and 22% fewer emergency doctor (ED) visits. At the same time, we found that MA has comparable amounts of primary and routine care relative to FFS, with only 7% fewer primary care provider (PCP) visits and similar prescription drug utilization. Consistent with the lower utilization, we found that overall healthcare costs, in terms of price-normalized total health expenditures, are 12% lower under MA than FFS.
- We also found that FFS has substantially higher utilization and expenditures compared to standard commercial coverage. Beneficiaries who enroll in FFS at age 65 have 35% higher utilization in the two years following their enrollment, relative to the two years prior when they were enrolled in commercial coverage. This significantly higher health resource use likely reflects shortcomings of FFS program design, such as the absence of active care management, and suggests that recent FFS value-based reforms have been insufficient.
- This work is intended to support health plans and policymakers by providing valuable analytics and new insights. Specifically, this research and development work gives Inovalon the foundational capabilities to benchmark a specific MA plan's utilization and performance against its peers. Harvard and Inovalon's analytic insights can pinpoint opportunities for health plans to optimize performance in operations and benefit design to drive both quality and cost improvements.

INTRODUCTION

For the past 40 years, beneficiaries in Medicare have been able to freely choose between two different types of insurance coverage: publicly-administered coverage through traditional Medicare Fee-for-Service (FFS), and privately-administered coverage through a managed Medicare Advantage (MA) plan. In recent years, enrollment in MA has grown dramatically, from 17% of Medicare beneficiaries in 2000 to over 50% in 2023.² Medicare is the largest healthcare payer in the U.S., accounting for over \$800 billion in federal spending annually, \$350 billion of which is MA.³

Even though MA has become increasingly consequential, in terms of both dollars spent and lives covered, woefully little data and insights exist on critical aspects of the program. Inovalon and Harvard researchers have partnered to fill this information void in service to key stakeholders who have been hindered by the lack of data, including Medicare beneficiaries, health plans, policymakers, and other industry stakeholders. The key enabler in this joint effort is Inovalon's unique and highly comprehensive data assets. Inovalon's claims data have longitudinal coverage on over 30% of all privately insured lives and 100% of public Medicare lives at any given point in time, making it the largest longitudinal claims dataset in the U.S., and surpassing the data assets of even the federal government and Centers for Medicare & Medicaid Services (CMS). From the vantage point of researchers such as Harvard's, Inovalon's data assets are the closest equivalent to a nationwide all-payer claims database that exists. These data provide the Harvard and Inovalon research team with unprecedented visibility into the inner workings of Medicare and the U.S. healthcare system, allowing it to tackle critical Medicare-related questions that have previously been impossible to answer with alternative data. One feature of the data that is particularly valuable for this research effort is the ability to follow individuals and their healthcare utilization and health outcomes as they transition across different types of insurance coverage, including the transition from commercial to Medicare coverage at age 65.

This white paper is the second in a series authored by Harvard and Inovalon researchers. In contrast to the inaugural white paper, which compared who enrolled in MA vs. FFS at 65, this paper looks at what happens to MA vs. FFS beneficiaries once they're enrolled. We look specifically at healthcare resource utilization, comparing overall as well as service-specific utilization between MA and FFS beneficiaries. We make this comparison across a comparable set of MA and FFS enrollees, to be able to capture the program-specific impacts of the two types of coverage. We use detailed patient matching and other statistical techniques to capture what the utilization and cost differences would be if the populations enrolled in MA and FFS looked the same in terms of demographic, clinical, and social risk factor characteristics, to get at the impacts of the programs themselves. Our examination of utilization is meant to answer a question of special concern to policymakers and health plans alike: Does MA deliver care more efficiently than FFS?

While there have been previous studies on this topic, they have often been restricted to narrow types of care or specific populations. In our study, by leveraging Inovalon's data, we can look at the full continuum of care for a large and nationally representative population, over a five-year time span, as beneficiaries transition from commercial insurance coverage to either MA or FFS coverage. Even more problematically, past work has been unable to fully adjust for enrollment differences across MA and FFS, when making comparisons between the two programs. As a result, many of the differences between MA and FFS identified by past work could be artifacts of differences in who is enrolling in the programs, rather than actual impacts of the programs themselves.

We overcome this perennial challenge by leveraging the availability of pre-65 commercial data on beneficiaries prior to their enrollment in MA or FFS. We leverage these data to match the MA and FFS cohorts based on their pre-65 health diagnoses and their demographic and socioeconomic characteristics to make the two groups as comparable as possible. Past studies have matched cohorts based on post-65 health characteristics, which is potentially problematic, as these measures could be influenced by whether a beneficiary is in MA vs. FFS. We also leverage the pre-65 data to implement a difference-in-differences design, which allows us to make additional adjustments for enrollment differences, effectively based on each individual's pre-65 utilization. In other words, we are not only comparing the difference in healthcare utilization and cost of beneficiaries in MA vs. FFS after they enroll, but also netting out any differences that already existed before the beneficiaries enrolled in Medicare and while they were all in a private commercial insurance plan.

Future white papers in this series will compare MA and FFS in terms of quality of care and health equity outcomes. Future studies will also compare different types of plans within MA to one another, such as comparing Health Maintenance Organizations (HMOs) to Preferred Provider Organizations (PPOs) and zero to non-zero premium plans, to help stakeholders understand the implications of different MA plan design features.

OBJECTIVE

In this white paper, we document how utilization differs under MA vs. FFS coverage for comparable populations, during the two years following Medicare enrollment at age 65. We do so to address the broader question of whether MA is more efficient or effective than FFS.

DATA, SAMPLE, AND METHODS

For this research, we leverage Inovalon's Medical Outcomes Research for Effectiveness and Economics (MORE²) Registry[®] dataset, which covers about 30% of the U.S. privately-insured population in any given year. These nationally representative data assets include medical and pharmacy claims and member enrollment files covering a variety of different market segments, including employer-sponsored commercial health insurance, individually-purchased Affordable Care Act (ACA) plans, Managed Medicaid, and MA plans. These data are combined, harmonized, de-duplicated, and linked together at the patient level to fully and accurately track healthcare resource utilization and outcomes. This consolidated dataset enables us to capture individuals' healthcare utilization over time as individuals transition from commercial to either MA or FFS coverage at age 65. Inovalon's CMS data are approved for research use through a research data use agreement (DUA) with CMS. These data include 100% of the medical and pharmacy insurance claims for all Medicare beneficiaries enrolled in FFS, as well as enrollment data covering all Medicare beneficiaries enrolled in MA and FFS.

Using these datasets, we construct a sample of beneficiaries who turned age 65 between 2015 and 2019. We limited the sample to those who fully enrolled in the Medicare program (i.e., for FFS in Parts A, B, and D and for MA in a Part C plan with Part D coverage) within three months of turning 65. We defined whether a beneficiary "counted" as an MA or FFS enrollee based on their initial enrollment status and restricted the study population to those who remained enrolled in their initially chosen coverage type—either MA or FFS—for all 24 months following initial Medicare enrollment. We excluded those simultaneously enrolled in a Medicaid (i.e., "dual eligible") or a commercial plan during the 24 months after enrolling in Medicare.

We further limited to those enrolled in an employer-sponsored health insurance plan tracked in the MORE² Registry for all 24 months before turning 65. This guaranteed that we had enough time to establish a baseline level of utilization for sample beneficiaries. With these restrictions in place, our final analytic sample included 50,512 individuals who enrolled in FFS and 10,158 individuals who enrolled in MA at age 65. We are able to track both cohorts' utilization throughout all 24 months preceding and 24 months following Medicare enrollment.

We employ a number of statistical approaches to ensure that our MA vs. FFS comparison only captures the impact of the programs themselves. As shown in our first white paper [“Who Enrolls in Medicare Advantage vs. FFS,”](#) the populations who enroll in MA vs. FFS are very different from one another, especially in terms of social determinants of health (SDOH). Therefore, any difference in raw outcomes across the two programs captures not only the impact of MA vs. FFS, but also underlying differences in who enrolls in MA vs. FFS. We use a combination of our unique dataset and statistical techniques to control for these underlying enrollment differences, which past studies have largely been unable to do.

As a first step, we strictly matched the MA and FFS groups, grouping together beneficiaries with identical characteristics as determined at the age of 64 including: commercial plan type before Medicare enrollment (HMO vs. PPO), state of residence, and calendar year of initial Medicare enrollment. Within each matched group, we then performed a second round of propensity-score based matching using additional age-64 characteristics, including socioeconomic status (income and net worth), gender, race, CMS's composite risk adjustment factor (RAF) score, and disease indicators based on high-level Hierarchical Chronic Condition (HCC) groupings. We matched each MA enrollee with up to 10 closely comparable FFS enrollees.

Following the matching exercise, we employed a difference-in-differences research design. This technique compares two groups who received different treatments (in this case, MA vs. FFS), both after the treatment was applied (i.e., after Medicare enrollment at age 65) and before, when the treatment had not yet been applied (i.e., before the age of 65). Essentially, we control for underlying differences between eventual MA vs. FFS enrollees by measuring their utilization differences before they enroll in Medicare. At ages 63 and 64, differences in utilization reflect only underlying differences and not the impact of MA vs. FFS. Controlling for these pre-Medicare enrollment differences allows us to uncover the pure impact of MA relative to FFS, disentangling it from differences in who enrolls in each program. We include specific controls to account for differences between the MA and FFS cohorts that already existed before Medicare enrollment and that are not attributable to the programs themselves; these include person-level fixed effects (which account for pre-existing differences between MA and FFS in utilization levels) as well as matched group identifiers interacted with pre/post-quarter-level indicators (which account for pre-existing differences in utilization trends).

We constructed a number of utilization measures, tracking service-specific as well as overall care usage across the full range of coverage types (i.e., “treatment settings”). In addition to tracking utilization in terms of visits, we also constructed separate measures of healthcare expenditures. Costs were normalized and calculated based on unit prices (Medicare allowed amounts) under FFS. This approach allowed us to consistently measure utilization intensity across different types of coverage, while retaining a consistent measure of the average price of a service. This was necessary given the variation in negotiated prices for a given service, across different private and public insurance options.

RESULTS

The results track utilization of the MA and FFS groups over time, beginning two years before Medicare enrollment, and show whether and how much MA reduces utilization relative to FFS during the two years following Medicare enrollment.

Demographic, socioeconomic, and health characteristics of the matched MA and FFS cohorts are presented in Table 1, showing that our matching approach was effective given that the resulting cohorts appear fairly comparable. While pre-65 healthcare expenditures are a bit lower for the MA cohort, this is to be expected given that we matched the groups on health conditions rather than utilization to avoid potential mean reversion and other statistical issues. Furthermore, these modest baseline differences were controlled for through our difference-in-differences approach.

Table 1. Baseline Pre-65 Characteristics Before and After Matching: MA vs. FFS

	Before Matching		After Matching	
	MA	FFS	MA	FFS
% Female	57.4%	60.2%	58.1%	59.5%
% White	92.5%	96.0%	93.1%	92.2%
% Urban	70.0%	66.6%	69.9%	69.9%
% HMO Prior Medicare	40.5%	24.4%	40.0%	40.1%
% PPO Prior Medicare	48.8%	60.8%	49.8%	50.0%
Median Household Income in Enrollee ZIP9 (Mean)	\$78,441	\$86,430	\$77,853	\$78,588
Average Spending Per Quarter at 64	\$1,309	\$1,621	\$1,448	\$1,612
CMS HCC-Based Risk Score at 64	0.513	0.551	0.511	0.521
# Individuals	11,549	117,059	10,158	50,512

Our key finding, that MA reduces utilization significantly relative to FFS, jumps out when we track each group's utilization over time (Figure 1). Overall utilization is measured in terms of price-normalized healthcare expenditures to ensure that the measure only picks up differences in utilization intensity and not any accompanying differences in unit price. We see a substantial gap in utilization emerge between the MA and FFS cohorts immediately after both enter Medicare (quarter 0). Furthermore, this gap grows considerably in the two years that follow, as a result of FFS health expenditures increasing much faster than MA's.

Another key finding emerges from Figure 1: utilization was substantially higher under FFS than it was for the same patients under commercial insurance, given a sharp, 20% utilization increase immediately after beneficiaries' transition from commercial to FFS, which grows into a 35% increase within two years of the transition. Meanwhile, utilization in the MA cohort appears to be relatively flat, both pre-and post-Medicare enrollment. Consequently, FFS appears to be a glaring outlier compared to commercial coverage as well as compared to MA. While patients generally use more care as they age, it is unlikely that the sudden spike in costs reflects FFS beneficiaries suddenly getting dramatically sicker following their 65th birthday. It is also unlikely that the spike reflects strategic delays to care, given that this would produce a transient spike, rather than the sustained and growing one we see. Furthermore, higher utilization under FFS appears to be driven disproportionately by inpatient care, as our data indicates that inpatient utilization doubles as beneficiaries go from commercial to FFS coverage (Figure 3).

We used regression analyses to statistically validate these findings, as well as more precisely quantify their magnitudes. These statistical analyses also allow us to further adjust for differences in who enrolls in MA vs. FFS, even beyond the cohort matching. As stated above, the regression models specifically capture the impact of MA, relative to an identical population that was enrolled in FFS. Our regression results indicate that post-65 utilization under MA (in terms of price normalized healthcare expenditures) is 12% lower, relative to a comparable population in FFS, when incorporating the full suite of possible controls (Table 2, column 4). This finding is highly statistically significant, at almost a 1% significance level. We also find a substantial reduction when using less extensive sets of controls (Table 2, columns 1-3).

Figure 1.
Healthcare Spending by Quarter: MA vs. FFS

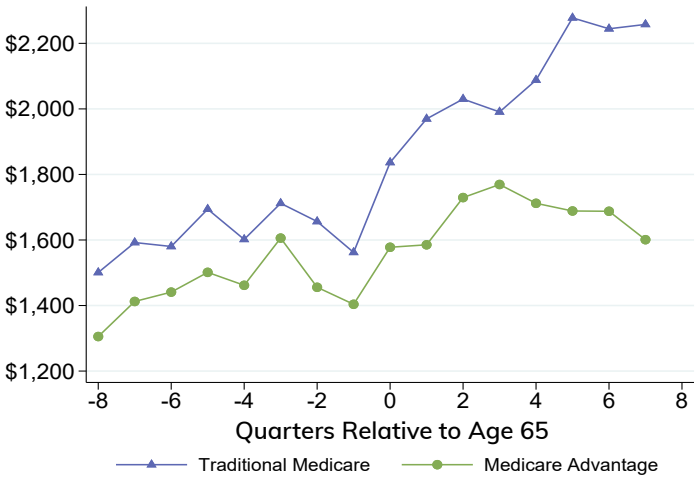


Figure 2.
Regression Analysis: Reduction in Utilization Under MA Relative to FFS by Quarter

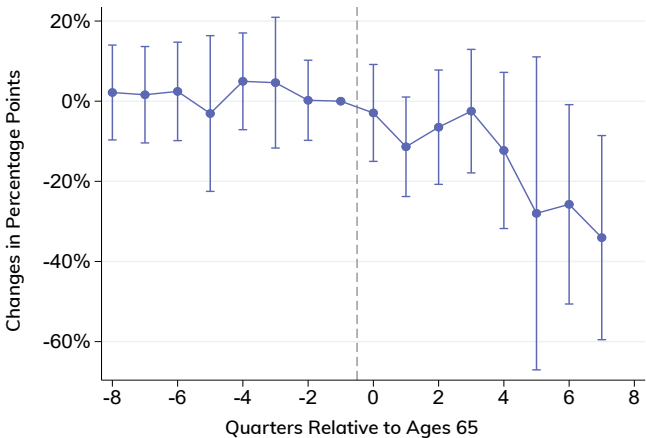
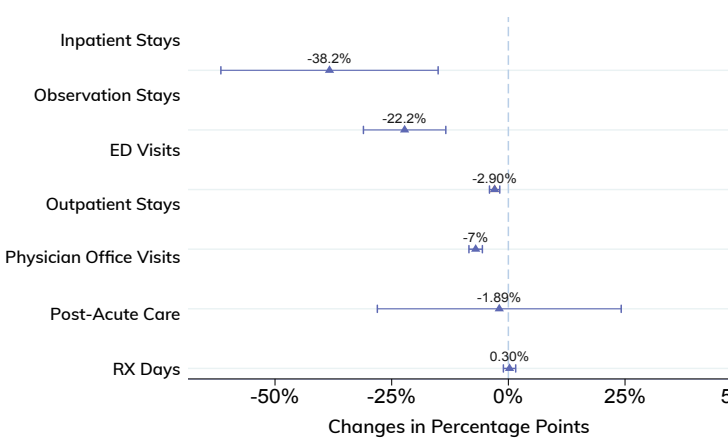


Figure 3.
Utilization Reduction Under MA Relative to FFS by Service Type



We performed additional regressions to look at how the impact of MA changes quarter-by-quarter over the two years following Medicare enrollment, and whether its impact becomes more pronounced over time, incorporating the full set of controls applied in Table 2.

Figure 2 shows the difference in utilization between MA enrollees and FFS enrollees in the quarters before and after enrollment, along with associated 95% confidence intervals. For example, Figure 2 shows that at four quarters (one year) after enrolling, MA members have 17% lower utilization relative to FFS members. We find that the magnitude of utilization reductions under MA compared to FFS appear to grow over time. Further, Figure 2 provides additional support for the statistical validity of our general findings, given that a change in MA utilization relative to FFS only emerges after Medicare enrollment, with both cohorts trending similarly pre-Medicare enrollment.

Finally, we used regression analyses to break out how much MA reduces service-specific utilization following Medicare enrollment for major care types (Figure 3). We found that MA results in substantially lower acute care utilization, relative to FFS, including a 51% reduction in inpatient stays and 22% reduction in ED visits (all highly statistically significant). We found that MA produces much more modest reductions in outpatient care, with a 7% reduction in office visits, a 3% reduction in use of outpatient services, and 2% reduction in post-acute care utilization, including skilled nursing facilities. Prescription drug utilization was effectively unchanged. The key finding is that the utilization reductions under MA arise largely through MA's ability to reduce hospitalizations.

Table 2. Regression Analysis: Pre vs. Post Reduction in Overall Quarterly Healthcare Expenditures Under MA Relative to FFS

Patient Matching Controls	(1)	(2)	(3)	(4)
Pre-65 Risk Adjusted	✓	✓	✓	✓
Difference-in-Difference Design		✓	✓	✓
Individual-Level Indicators			✓	✓
Patient Matching				✓
Reduction in Quarterly, Per Person Spending Under MA ⁴ : \$ (Std. Dev. in Parentheses)	-\$394.0	-\$117.6	-\$173.7	-\$246.2
	(38.8)	(48.6)	(49.1)	(109.4)
Reduction in Spending Under MA: As % of FFS Baseline Spending (Std. Dev. in Parentheses)	-18.30%	-5.50%	-8.10%	-11.80%
	(1.80%)	(2.25%)	(2.28%)	(5.24%)

⁴Corresponds to the coefficient on the MA*Post term in the difference-in-differences regression. This captures the pre vs. post Medicare enrollment change in the MA cohort relative to the pre vs. post change for the FFS cohort. It is meant to capture the impact of the MA program itself, relative to FFS, disentangled from differences in who's enrolled in each program.

DISCUSSION

This study comprehensively and rigorously compares healthcare utilization under MA and FFS on a population and risk-adjusted basis, across the full continuum of inpatient, outpatient, and pharmacy care. The study overcomes challenges and limitations that have plagued previous studies by leveraging Inovalon's large and nationally representative dataset. Inovalon's data allows us to cleanly compare the effects of the MA and FFS programs in and of themselves while controlling for the impact of enrollment differences across these programs.

We found compelling evidence that MA reduces utilization and improves overall efficiency relative to FFS, with overall expenditures 12% lower under MA than under FFS. This reduction is concentrated primarily in acute care services such as inpatient stays and ED visits, without any meaningful change in use of primary care services such as physician office visits. Given that inpatient and ED care is relatively more costly and preventable in nature, this suggests that MA reduces wasteful care without reducing access to high-value primary care. If MA was actually reducing access to high-value care, we would expect this to produce an offsetting increase in ED or observation stay utilization (through increased complications) rather than the decrease that we actually observe.

The utilization impact of MA is both potentially efficiency-enhancing from a cost perspective resulting in lower costs to Medicare and potentially beneficial to patients from a health outcomes perspective. We also find that the reduction in utilization under MA is not transitory, but actually becomes more pronounced over the two years following Medicare enrollment. This is consistent with the decrease in utilization being driven by care management and preventive care—both of which are much more prevalent in MA. Care coordination and use of preventive services have delayed impacts that grow over time. Given these delayed impacts, our findings may actually miss some of the longer-term benefits of MA, meaning that the overall impact and benefits of MA may be even greater than what we estimate here, if we look over a longer timeframe.

Our other key finding is that FFS has strikingly high utilization, compared not just to MA coverage but also to pre-65 commercial coverage. For example, we find that overall utilization under FFS is 35% higher than when the same beneficiary was enrolled in commercial insurance. We find that this difference is real, sustained over time, and reflects actual program differences rather than confounding factors such as beneficiaries delaying care to after age 65 or differences in the patient populations being evaluated. FFS appears to be a glaring outlier relative to other common forms of coverage, in terms of overall utilization and especially its reliance on costly inpatient and ED care. This is not altogether surprising, given that FFS program design also deviates from other common insurance types. Specifically, FFS lacks basic and valuable features common to most private health plans, such as active patient management and care coordination. While there have been efforts to introduce more cost and quality incentives into FFS, such as the rollout of Accountable Care Organizations (ACOs), our findings suggest that these efforts did not go far enough and that additional reforms are needed.

HOW CAN THIS RESEARCH HELP HEALTH PLANS?

For health plans, our study and related analytics can help plans understand their own utilization and cost efficiency, and how it compares to those of peers, particularly after adjusting for underlying characteristics of the health plan's members. Our analytics can offer very specific insights on where a health plan is over or underperforming by supporting fine-grained benchmarking, broken down in terms of utilization types, geographic areas, and member subpopulations based on select chronic conditions, demographic, and social risk factor characteristics. This can offer plans actionable insights that can then drive operational and design improvements to deliver better cost and health outcomes.

HOW CAN THIS RESEARCH HELP POLICYMAKERS?

For policymakers, our study sheds new light on the relative effectiveness of MA and the ineffectiveness of FFS, in terms of managing healthcare utilization. The study underscores the role that MA could play in reducing costs and improving efficiency within the Medicare program and across American healthcare more broadly. Furthermore, the study indicates that recent reforms to FFS, such as the introduction of ACOs and value-based initiatives, have clearly not gone far enough given how much FFS falls short relative to MA and also to commercial insurance coverage.

Future white papers in this series will leverage Inovalon's data to pinpoint specific, actionable opportunities for improving care efficiency, from both a policy and plan design perspective. These insights can drive policy actions and create meaningful improvements for tens of millions of Medicare beneficiaries.

AUTHORS

Christie Teigland, Zulkarnain Pulungan, Yalun Su, Zarek Brot-Goldberg, Scott Bilder, Barton Jones, Iman Mohammadi, Boris Vabson¹

SOURCES

¹ Bilder, Jones, Mohammadi, Pulungan, and Teigland: Inovalon. Brot-Goldberg, Su, and Vabson: Harvard University. The content of this paper is solely the responsibility of the authors and does not necessarily represent the official views of Inovalon.

² “Medicare Advantage in 2023: Enrollment Update and Key Trends,” Nancy Ochieng, Jeannie Fuglesten Biniek, Meredith Freed, Anthony Damico, and Tricia Neuman, KFF, August 9, 2023, <https://www.kff.org/medicare/issue-brief/medicare-advantage-in-2023-enrollment-update-and-key-trend>

³ “What to Know about Medicare Spending and Financing,” Juliette Cubanski, Tricia Neuman, KFF, January 19, 2023, <https://www.kff.org/medicare/issue-brief/what-to-know-about-medicare-spending-and-financing/#:~:text=Medicare%20plays%20a%20major%20role,drug%20sales%20> (Figure 1).

ABOUT INOVALON

Inovalon is a leading provider of cloud-based SaaS solutions empowering data-driven healthcare. The Inovalon ONE® Platform brings together national-scale connectivity, real-time primary source data access, and advanced analytics to enable improved clinical outcomes and economics across the healthcare ecosystem. The company’s analytics and capabilities are used by nearly 20,000 customers. For more information, visit www.inovalon.com.



Inovalon
4321 Collington Road
Bowie, MD 20716

301-809-4000
www.inovalon.com

Inovalon and design®, Inovalon®, and the MORE2 Registry® are trademarks of Inovalon, Inc.

PAY-23-1601