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Medicare Care Choices Model Improved End-Of-Life Care, Lowered Medicare Expenditures, And Increased Hospice Use

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ABSTRACT The Medicare Care Choices Model (MCCM) tested a new option for eligible Medicare beneficiaries to receive conventional treatment for terminal conditions along with supportive and palliative care from participating hospice providers. Using claims data, we estimated differences in average outcomes from enrollment to death between deceased MCCM enrollees and matched comparison beneficiaries who received usual services covered by original Medicare. Enrollees were 15 percentage points less likely to receive an aggressive life-prolonging treatment at the end of life and spent more than five more days at home. MCCM also reduced net Medicare expenditures by 13 percent, decreased inpatient admissions by 26 percent, reduced outpatient emergency department visits by 12 percent, and increased hospice use by 18 percentage points. Although the Centers for Medicare and Medicaid Services did not expand the model, given concerns about generalizability, these results provide evidence that MCCM is a promising approach to transforming care delivery at the end of life.

Hospice and palliative care are important facets of Medicare policy and innovation.^{1–7} The Medicare hospice benefit provides comprehensive support to people nearing the end of life and their families.⁸ Hospice care focuses on palliative care (that is, comfort and symptom management) for anyone with a medical prognosis of six months or less to live.⁹ Beneficiaries who choose hospice care must waive the right to Medicare payment for nonhospice services intended to treat their terminal condition and related conditions.¹⁰ As a result, those who wish to continue conventional treatment of their terminal illness might postpone or avoid hospice enrollment, leading to hospice underuse.^{11,12} Only about half of all Medicare decedents enroll in hospice, with a median length of stay of just eighteen days.¹³

Prior research shows that hospice and palliative

care tend to increase terminally ill beneficiaries' and caregivers' satisfaction with care and quality of life.^{14–17} In contrast, services that include frequent transitions across settings or intensive and burdensome procedures might be inconsistent with patients' care goals.^{18,19} Providing access to palliative care for patients with poor prognoses who are unwilling to enroll in hospice could better align with individual care preferences and potentially generate cost savings to Medicare.^{1,20–22}

The Centers for Medicare and Medicaid Services (CMS) Center for Medicare and Medicaid Innovation (the Innovation Center) developed the Medicare Care Choices Model (MCCM) to test whether allowing eligible Medicare beneficiaries nearing the end of life to receive supportive and palliative care services from hospice providers concurrently with conventional treatments would improve their quality of life and

care, increase beneficiaries' and caregivers' satisfaction, and reduce Medicare expenditures.²³ CMS tested MCCM over the course of six years, from January 1, 2016, to December 31, 2021, with 141 hospice providers across the United States volunteering to participate.²⁴ CMS did not expand the model, given concerns about participant attrition and generalizability.

MCCM providers had to recruit Medicare beneficiaries, offer them the option to enroll in the model, verify their eligibility, enroll them, and provide supportive and palliative care services to them.²⁵ Beneficiaries enrolled in MCCM received services (described later) resembling those provided through routine home care under Medicare's hospice benefit.²⁶ CMS paid participating providers per beneficiary per month and gave them some flexibility in determining the quantity, types, and features of MCCM services they provided to patients.²⁵ Enrollees received an average of 2.6 encounters per week in the model, which was a lower average frequency of encounters than hospice provides.²⁷ Typically, MCCM services were provided by clinically trained health professionals in the patients' homes.²⁸ MCCM providers achieved high ratings on metrics they self-reported to CMS,²⁸ and model enrollees and caregivers reported high levels of satisfaction with model services, receiving care consistent with their wishes and their quality of life.²⁹

MCCM enrollees continued to receive Medicare fee-for-service coverage for treating their terminal conditions, which would not have been the case if they had instead elected Medicare's hospice benefit. That is, enrollees received supportive and palliative care through MCCM that original Medicare (Parts A and B) does not normally cover outside of the hospice benefit. Although MCCM enrollees received model services from one of the participating hospice providers, their other health care providers and suppliers continued billing CMS for furnishing reasonable and necessary services covered by Medicare Parts A and B. In other words, patients could receive conventional care for their terminal condition (such as chemotherapy for cancer) while enrolled in the model. CMS recognized MCCM providers' staff would need to assist patients in the coordination of, access to, and use of services from providers at other organizations.²⁵

This study sought to understand whether MCCM improved patterns in enrollees' end-of-life care or reduced their Medicare expenditures. We hypothesized that enrolled beneficiaries would become more amenable to palliative care versus conventional treatments, with a corresponding effect on their care delivery choices. We also hypothesized that Medicare expendi-

tures for beneficiaries in the model would decrease, as expert symptom and case management would lead to fewer emergency department (ED) visits, inpatient hospital stays, and procedures. This article builds on previous reports on MCCM^{29,30} by using data covering all six model years, employing new analytic methods including Bayesian subgroup analyses, and discussing how findings have influenced CMS's palliative care policies.

Study Data And Methods

This study was part of a mixed-methods independent evaluation of MCCM.²⁸⁻³⁰ To estimate the association between enrolling in MCCM and enrollees' outcomes in the period from enrollment to death, using Medicare administrative data, we estimated the average difference in outcomes between deceased MCCM enrollees and a matched comparison group of eligible deceased Medicare beneficiaries who were not referred to the model.

MODEL ELIGIBILITY CRITERIA The model focused on a subset of all Medicare beneficiaries eligible for hospice.²⁵ To be eligible for MCCM, Medicare beneficiaries had to be enrolled in Medicare Parts A and B, have a physician certify a prognosis of less than six months to live, and have one of four qualifying terminal diagnoses: cancer, congestive heart failure, chronic obstructive pulmonary disease (COPD), or HIV/AIDS. They also needed to live in the community (not a long-term care institution), have had a hospital encounter and three office visits in the twelve months before enrollment, and not have been in hospice in the thirty days before enrollment.

MCCM enrollees could disenroll from the model at any time, including to transition from MCCM to the Medicare hospice benefit. Beneficiaries could not choose hospice and MCCM simultaneously, and patients typically had access to more palliative care services through hospice than through MCCM. However, as we described previously, transitioning from MCCM to hospice involved patients choosing to waive their rights to Medicare payments for nonhospice services for their terminal conditions.

MODEL SERVICES Hospice providers participating in MCCM delivered selected coordination and supportive services to model enrollees. CMS expected providers to assess enrollees' health and health-related social needs and provide care coordination and case management, 24/7 access to the care team, person-centered care planning, shared decision making, pain and symptom management, and counseling services.²⁵ Further, CMS expected interdisciplinary teams to review and, if needed, revise an enrollee's care

plan as beneficiary and family needs changed or every fifteen calendar days, whichever came first. CMS paid participating providers a flat fee of \$400 per month for each enrolled beneficiary (reduced to \$200 per month in the first month if the beneficiary was enrolled fewer than fifteen days). As described previously, other health care providers billed Medicare separately for services rendered.

STUDY DATA We used research-identifiable Medicare Parts A, B, and D claims and enrollment data from the period 2013–21 from the CMS Virtual Research Data Center. We combined these data with rosters of participating providers and referred beneficiaries, data on MCCM services provided, and publicly available data from the Dartmouth Atlas and the Census Bureau's American Community Survey. (See the online methods appendix for details.)³¹

STUDY POPULATION Our study's intervention group included Medicare beneficiaries with paid claims for MCCM services from January 1, 2016 (the model's start date), to June 30, 2021 (the last date of model enrollment), who died on or before December 31, 2021 (the model's end date), and satisfied the model eligibility criteria we could observe in Medicare administrative data.

To create a matched comparison group, we selected up to three comparison Medicare beneficiaries who resembled each MCCM enrollee in terms of survival prognosis, demographics, health conditions, health care services use in the year before enrollment, and other observed characteristics. Potential comparison beneficiaries lived in the market area of an MCCM provider, were not referred to or enrolled in MCCM, were not in hospice, and otherwise satisfied the study inclusion criteria that we applied to the intervention group. To select matched comparison beneficiaries and the dates they entered the study (pseudo-enrollment dates), we used an optimal matching technique designed for evaluating interventions with rolling enrollment.³² By limiting the analysis to beneficiaries who died by the end of the study period, we could measure outcomes from enrollment to death for everyone. By assigning pseudo-enrollment dates to the comparison beneficiaries using this matching approach, we achieved balance on observed characteristics between MCCM and matched comparison beneficiaries, including creating close balance on the two groups' survival-time distributions. Survival time is the number of days from enrollment or pseudo-enrollment until death. (See the methods appendix for details.)³¹

STUDY OUTCOMES We analyzed seven primary outcomes that we measured from enrollment (or pseudo-enrollment) to death: percentage who

Receiving access to end-of-life care earlier in the disease trajectory led to improved patterns in end-of-life care for enrollees.

received an aggressive life-prolonging procedure, surgical procedure, or diagnostic test in the last thirty days of life (interventions generally believed to be inappropriate at the end of life); average number of days at home; average Medicare Parts A and B expenditures plus MCCM payments; average Medicare Parts A and B expenditures (without model payments); average number of inpatient admissions; average number of outpatient ED visits (including observation stays); and percentage of beneficiaries who used Medicare's hospice benefit. In secondary analyses, we analyzed the percentage with more than one ED visit, more than one hospitalization, or an intensive care unit admission in the last thirty days of life; the percentage who died in an inpatient facility; subcomponents of expenditures; and the average number of days in hospice.

STATISTICAL ANALYSIS We estimated regression-adjusted differences in outcomes between beneficiaries enrolled in MCCM and the matched comparison group, controlling for beneficiaries' characteristics and health care services use at or before enrollment (or pseudo-enrollment). The regressions were principally for improved statistical precision; they had little effect on estimates with our well-balanced intervention and comparison groups (appendix exhibit S.17).³¹ We also used Bayesian hierarchical modeling to assess how intervention-comparison differences in outcomes varied across qualifying diagnoses or by survival time.³³ (See the methods appendix.)³¹

LIMITATIONS This study had three main limitations. First, as with any observational study, differences in outcomes between the intervention and comparison groups might be biased by differences in the two groups' unobserved characteristics. We matched on a variety of observed characteristics, however, including patterns of service use in the period before enroll-

ment, to mitigate risk of selection bias. We also conducted sensitivity analyses using the E-value methodology.³⁴ The estimated E-values suggested that our results were robust to plausible unobserved differences in beneficiaries' characteristics; the intervention and comparison groups would have to have very large unobserved differences to fully explain differences in outcomes (appendix exhibit S.16).³¹

Second, modest participation in MCCM and the subsequent attrition limited the generalizability of our results. The limited number of hospice providers that volunteered to participate in MCCM or enrolled the most patients were not representative of all hospice providers nationwide, nor were the beneficiaries they enrolled in the model representative of all eligible, deceased Medicare beneficiaries in their market areas. MCCM could have affected other organizations and beneficiaries differently.

Third, our study included only beneficiaries who had died by the end of MCCM, so we could measure outcomes from enrollment to death and match on survival times. Aside from excluding 12 percent of beneficiaries who were alive at the end of the study period from the estimation sample, this approach assumes that MCCM did not affect survival. Average results from this retrospective analysis with decedents might not apply to nondecedents. Our sample did, however, include some decedents with relatively long survival times (if they enrolled early in the model period), and we conducted subgroup analyses by survival time.

Study Results

MODEL PARTICIPANTS The 141 hospice providers that CMS selected to participate in MCCM tended to be larger than the average hospice nationally and were more likely to be a nonprofit organization (appendix exhibit S.1).³¹ Significant attrition occurred over time, partly because of low model payments, administrative burden, and challenges recruiting eligible beneficiaries.^{28,29} During the full six years of the model, only 81 (57 percent) of the 141 selected providers remained in the model and thus received payments for providing MCCM services to enrollees, and just thirty-two of the participating providers (23 percent) enrolled fifty or more beneficiaries in the model. The five participants with the most enrollees together accounted for 46 percent of all MCCM enrollees.

MCCM providers received \$16.7 million in model payments for providing services to 6,559 unique beneficiaries, of whom 5,153 (79 percent) met our study inclusion criteria (appendix exhibit S.2).³¹ Sixty-five percent of

all eligible beneficiaries referred to MCCM decided to enroll. The MCCM enrollees in our study used more health care services, had higher Medicare expenditures, and had higher Hierarchical Condition Categories risk scores before enrollment than all potential comparison beneficiaries (exhibit 1). In other words, enrollees tended to have a greater need for health care services than other eligible beneficiaries who died in the same geographic regions. MCCM enrollees were also more likely to be younger, non-Hispanic White, not dually eligible for Medicaid, and living in nonrural areas. On average, enrollees lived 199 days after enrollment and remained in MCCM for 134 days.

We identified 15,269 matched comparison beneficiaries who closely resembled MCCM enrollees in terms of survival times; demographics; and levels of and trends in Medicare expenditures, inpatient admissions, and other measures before enrollment or pseudo-enrollment (exhibit 1).

END-OF-LIFE CARE MCCM enrollees were 15.3 percentage points less likely than comparison beneficiaries to receive an aggressive life-prolonging procedure, surgical procedure, or diagnostic test in the last thirty days of life (61.2 percent versus 76.5 percent; see exhibit 2). Enrollees also spent 5.5 more days at home (183.5 days at home versus 178.0 days at home; a 3 percent increase). We also found that enrollees were considerably less likely to have multiple acute hospitalizations or intensive care unit stays in the last thirty days of life (21.0 percent versus 36.8 percent), and they were 11.4 percentage points less likely to die in an inpatient facility (10.4 percent versus 21.8 percent). The associations between MCCM participation and each of the outcome measures reported in exhibits 2 and 3 were statistically significant at the $p < 0.01$ level.

MEDICARE EXPENDITURES MCCM enrollees had, on average, lower Medicare expenditures than beneficiaries in the comparison group (exhibit 3). Specifically, average Medicare Parts A and B expenditures per person were \$46,810 for MCCM enrollees and \$56,385 for comparison beneficiaries—a difference of \$9,576, or 17 percent of the expenditures for the comparison beneficiaries. After we accounted for CMS's model payments for MCCM services (\$1,971 per enrollee, on average, or about 4 percent of total expenditures), model enrollees' net Medicare expenditures averaged \$7,604 (13 percent) lower per person. A 38 percent reduction in inpatient expenditures drove the overall decrease in Medicare expenditures and more than offset the significant increase in hospice expenditures. All other expenditures declined by 15 percent.

EXHIBIT 1

Characteristics of deceased Medicare Care Choices Model (MCCM) enrollees and comparison beneficiaries (before and after matching), January 1, 2016–June 30, 2021

Characteristics	MCCM enrollees in the study (N = 5,153)	Potential comparison beneficiaries (N = 1,934,407)	Matched comparison beneficiaries (N = 15,269)
Average age (years)	77.3	79.0	77.1
Female (%)	50.5	49.5	47.9
Race and ethnicity (%)			
Non-Hispanic White	86.4	81.9	87.7
Non-Hispanic Black or African American	8.1	10.2	8.0
Other or unknown	5.5	7.9	4.4
Dually eligible for Medicaid (%)	11.4	19.4	11.4
Resides in rural area (%)	13.3	21.8	13.7
MCCM-qualifying diagnosis (%)			
Cancer	71.8	44.6	71.7
Congestive heart failure	38.0	49.5	38.0
COPD	33.4	36.0	33.4
HIV/AIDS	0.4	0.4	0.4
Average HCC score at MCCM enrollment ^a	5.6	4.7	5.4
Selected diagnoses (%)			
Ischemic or unspecified stroke	9.3	10.6	9.2
Kidney disease	48.9	50.7	50.9
Diabetes with acute or chronic complications	33.7	36.0	36.0
Dementia with or without complication	15.3	23.8	12.7
Cardio-respiratory failure and shock	36.8	34.3	36.2
Acute myocardial infarction	11.6	13.3	10.9
Average Medicare service use, 90 days before MCCM enrollment			
Total Medicare Parts A and B expenditures (\$)	31,211	24,458	30,621
Part B drug expenditures (\$)	4,781	1,447	5,051
No. of inpatient admissions	1.1	0.8	1.0
No. of ED visits ^b	0.7	0.5	0.7
No. of ambulatory visits with primary care providers	4.2	3.4	4.0
No. of ambulatory visits with specialists	4.9	2.8	4.8
Received drugs for advanced stage cancer (%)	35.9	13.2	35.3
Advance care planning, previous 2 years (%)	21.9	11.5	16.8
Any durable medical equipment, previous year (%)	72.6	59.3	71.5
Average survival time (days)	198.8	184.5	196.5

SOURCE Mathematica's analysis of MCCM program data and data from the Medicare Enrollment Database, Master Beneficiary Summary File, and Medicare claims, January 1, 2013–June 30, 2021. **NOTES** Before matching, the potential comparison group comprised 23,687,256 observations (copies) for 1,934,407 unique beneficiaries, with beneficiaries weighted equally. Survival times for the intervention and potential comparison-group beneficiaries were loosely balanced before matching by construction. More details are in appendix exhibits S.3–S.6 (see note 31 in text). COPD is chronic obstructive pulmonary disease. ^aHierarchical Condition Categories (HCC) scores indicate comorbidities, with higher values indicating greater patient complexity. ^bOutpatient emergency department (ED) visits (including observation stays).

HOSPITAL SERVICE USE MCCM enrollees had fewer inpatient admissions and ED visits than matched comparison beneficiaries (exhibit 3). Specifically, enrollees had, on average, 0.43 fewer inpatient admissions between enrollment and death than beneficiaries in the comparison group (a 26 percent reduction, from 1.68 to 1.24 admissions, on average). The rate of ED visits was also 12 percent lower among enrollees.

HOSPICE USE Most MCCM enrollees chose to transition from the model to hospice.³⁵ MCCM enrollees were 17.9 percentage points more like-

ly to use hospice: 83.2 percent of model enrollees used hospice, compared with 65.3 percent of comparison beneficiaries (exhibit 3). In addition to using hospice more often, MCCM enrollees entered hospice earlier than those in the matched comparison group. In all, MCCM enrollees spent an additional 22.8 days in hospice—more than double (122 percent more) the average number of days in hospice among the comparison group.

In secondary analyses, we found that \$4,806 of the overall \$9,470 reduction in average Medicare

EXHIBIT 2
End-of-life care outcomes for deceased Medicare Care Choices Model (MCCM) enrollees and matched comparison beneficiaries, January 1, 2016–December 31, 2021

Outcomes	(1) MCCM enrollees	(2) Comparison beneficiaries (adjusted)	(3) Difference, 1-2	Percent difference ^a
Received an aggressive life-prolonging procedure, surgical procedure, or diagnostic test in last 30 days of life ^b (%)	61.2	76.5	-15.3 ^c	-20
Aggressive life-prolonging procedure (%)	41.0	58.9	-17.9 ^c	-30
Surgical procedure (%)	42.5	57.4	-14.9 ^c	-26
Diagnostic test (%)	55.9	72.0	-16.1 ^c	-22
Average no. of days at home ^b	183.5	178.0	+5.5	+3
More than 1 ED visit ^d or hospitalization or at least 1 ICU admission in last 30 days of life (%)	21.0	36.8	-15.8 ^c	-43
More than 1 ED visit (%)	2.5	3.2	-0.8 ^c	-24
More than 1 hospitalization (%)	5.1	9.7	-4.5 ^c	-47
At least 1 ICU admission (%)	17.5	32.1	-14.5 ^c	-45
Died in an inpatient facility (%)	10.4	21.8	-11.4 ^c	-52

SOURCE Mathematica's analysis of data from the Medicare Enrollment Database, Master Beneficiary Summary File, and Medicare claims, January 1, 2013–December 31, 2021, for beneficiaries who enrolled in MCCM through June 30, 2021, and who died on or before December 31, 2021, and matched comparison beneficiaries. **NOTES** We report regression-adjusted differences between deceased MCCM enrollees (N = 5,153) and matched comparison beneficiaries (N = 15,269 before weighting). We rounded numbers in this table after performing the calculations. Each of the 10 regression-adjusted differences was statistically significant at the $\alpha = 0.01$ level. More details are in appendix exhibit S.7 (see note 31 in text). ICU is intensive care unit. ^aMCCM-comparison difference (column 3) divided by the comparison mean (column 2). ^bPrimary study outcomes. ^cPercentage points. ^dOutpatient emergency department (ED) visits (including observation stays).

Parts A and B expenditures could be attributed to MCCM enrollees' more frequent and earlier receipt of hospice care (appendix exhibit S.13).³¹

SUBGROUP ANALYSES The associations between MCCM and beneficiary outcomes were remarkably consistent between the subgroups of enrollees with cancer, congestive heart fail-

ure, or COPD (appendix exhibit S.14).³¹ For example, net Medicare expenditures (including model payments) were reduced by 12–15 percent for enrollees with each of the three diagnoses. Associations varied, however, by survival time. For example, the reduction in net Medicare expenditures per beneficiary was largest among the

EXHIBIT 3
Per beneficiary Medicare expenditures and health care services use for deceased Medicare Care Choices Model (MCCM) enrollees and matched comparison beneficiaries, January 1, 2016–December 31, 2021

Outcomes	(1) MCCM enrollees	(2) Comparison beneficiaries (adjusted)	(3) Difference, 1-2	Percent difference ^a
Average Medicare Parts A and B expenditures plus MCCM payments ^b (\$)	48,781	56,385	-7,604	-13
Average Medicare Parts A and B expenditures ^b (\$)	46,810	56,385	-9,576	-17
Inpatient expenditures (\$)	16,284	26,172	-9,887	-38
Hospice expenditures (\$)	8,375	4,128	+4,248	+103
Other expenditures (\$)	22,150	26,086	-3,936	-15
MCCM payments (\$)	1,971	0	+1,971	—
Average no. of inpatient admissions ^b	1.24	1.68	-0.43	-26
Average no. of ED visits ^{b,c}	0.89	1.01	-0.12	-12
Percent who used Medicare hospice benefit ^b	83.2	65.3	+17.9 ^d	+27
Average no. of days in hospice	41.6	18.7	+22.8	+122

SOURCE Mathematica's analysis of data from the Medicare Enrollment Database, Master Beneficiary Summary File, and Medicare claims, January 1, 2013–December 31, 2021, for beneficiaries who enrolled in MCCM through June 30, 2021, and who died on or before December 31, 2021, and matched comparison beneficiaries. **NOTES** We report regression-adjusted differences between deceased MCCM enrollees (N = 5,153) and matched comparison beneficiaries (N = 15,269 before weighting). We rounded numbers in this table after performing the calculations. Each of the 9 regression-adjusted differences was statistically significant at the $\alpha = 0.01$ level. More details are in appendix exhibits S.8–S.12 (see note 31 in text). ^aMCCM-comparison difference (column 3) divided by the comparison mean (column 2). ^bPrimary study outcomes. ^cOutpatient emergency department (ED) visits (including observation stays). ^dPercentage points.

enrollees who survived 91–180 days, and the percentage reductions in net Medicare expenditures were largest among beneficiaries who survived 1–30 days (exhibit 4). Nonetheless, estimates indicate that MCCM affected all seven primary outcomes in the hypothesized direction, regardless of length of survival time (appendix exhibit S.15).³¹

Discussion And Policy Implications

Because of the low rate of hospice use among Medicare beneficiaries,¹³ the MCCM sought to address a frequently identified barrier to hospice uptake: waiving the right to Medicare payment for nonhospice services intended to treat the terminal condition.^{10,11} The model succeeded in that goal among the narrow subset of hospice-eligible beneficiaries with specific terminal con-

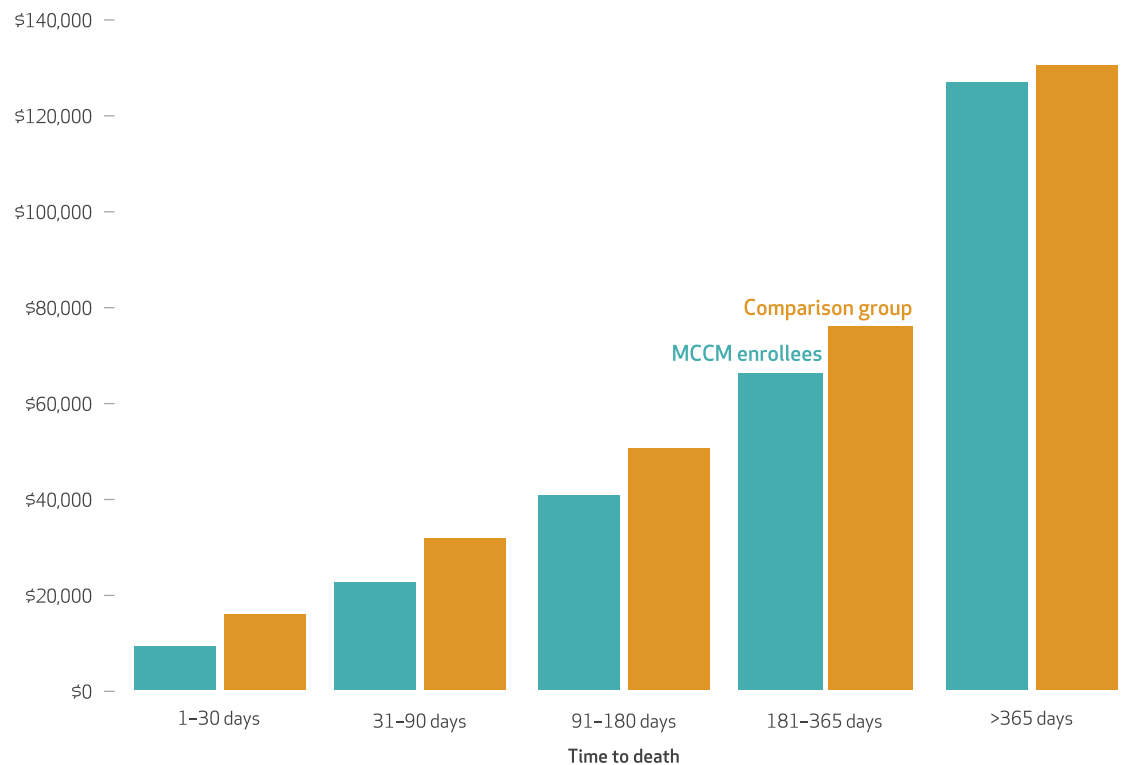
ditions. Most eligible beneficiaries referred to MCCM chose to enroll in it, which suggests a demand for palliative care services among beneficiaries who prefer to continue treating their terminal conditions. Beneficiaries who chose to enroll in MCCM were subsequently 18 percentage points more likely to enroll in hospice and spent more than twice as many days in hospice as the matched comparison group. This suggests that providing a glide path to hospice through concurrent care might ease the decision to choose hospice.¹

Receiving access to end-of-life care earlier in the disease trajectory led to improved patterns in end-of-life care for enrollees. MCCM enrollees spent more days at home and were less likely to receive aggressive life-prolonging procedures in the last thirty days of life—changes that generally align with beneficiaries' wishes.^{18,36,37}

EXHIBIT 4

Per beneficiary Medicare Parts A and B spending in the Medicare Care Choices Model (MCCM) as compared with the comparison group, by time from enrollment to death, January 1, 2016–December 31, 2021

Medicare expenditures (per beneficiary)



SOURCE Mathematica's analysis of data from the Medicare Enrollment Database, Master Beneficiary Summary File, and Medicare claims, January 1, 2013–December 31, 2021, for beneficiaries who enrolled in MCCM through June 30, 2021, and who died on or before December 31, 2021, and matched comparison beneficiaries. **NOTES** The figure depicts regression-adjusted per beneficiary Medicare Parts A and B expenditures for deceased MCCM enrollees ($N = 5,153$) and matched comparison beneficiaries ($N = 15,269$ before weighting), separately for five beneficiary subgroups by survival time, estimated with a Bayesian regression model. More details are in appendix exhibit S.15 (see note 31 in text). There were 1,003 MCCM enrollees in the 1–30 days subgroup, 1,355 in the 31–90 days subgroup, 1,038 in the 91–180 days subgroup, 886 in the 181–365 days subgroup, and 871 in the >365 days subgroup. For all categories except ">365 days," the 90% credible interval does not contain zero.

MCCM enrollment was associated with significant savings to Medicare among those who enrolled and died before the model ended, providing a reasonable expectation that allowing concurrent receipt of conventional treatments and palliative care from hospice providers at the end of life could generate cost savings. About half of the Medicare Parts A and B savings were because MCCM enrollees entered hospice earlier and more often than comparison beneficiaries.³⁸ The other half of the savings principally came from reduced inpatient stays during the time they were enrolled in the model—further evidence suggesting that palliative care services have a role in reducing acute care and postacute care stays.

Beneficiaries who enrolled in MCCM at least one month before death generally experienced larger changes in outcomes than those who enrolled closer to their deaths. These results align with results from evaluations of previous Innovation Center models that suggested that lengths of exposure to palliative care services between three and twelve months—longer than the exposure typically seen among hospice recipients—contributed to improved outcomes.² Meanwhile, effects might be smaller for beneficiaries enrolled longer than twelve months.

Overall, MCCM achieved the goals of improved quality and reduced spending that Congress set for all Innovation Center model tests.²³ This might suggest that the model may meet the criteria to be expanded, but the low participation rates (especially among for-profit providers), high attrition rates, low rates of beneficiary referral to MCCM, and underrepresentation in the model of certain types of hospice providers and beneficiaries suggested that participation may be inadequate to support large-scale access to care if the model were expanded. In addition, the population eligible for MCCM was a narrow set of beneficiaries who had one of four specific qualifying diagnoses. For these reasons, the model results could not be generalized to the larger Medicare population. Therefore, building on the model's results and improving care delivery at the end of Medicare beneficiaries' lives will require new approaches to overcome the challenges that limited this study's generalizability.

Although MCCM was not certified for expansion, CMS's experience implementing the model and early MCCM evaluation results informed end-of-life care components of four more recent Innovation Center models: the Guiding an Improved Dementia Experience model;⁷ the Value Based Insurance Design (VBID) model;⁶ the Accountable Care Organization Realizing Equity, Access, and Community Health (ACO REACH) model;⁵ and the Kidney Care Choices model.⁴

These models allow participants to offer supportive and palliative care services delivered by hospice and palliative care providers concurrently with conventional treatments. In addition, CMS gave VBID and ACO REACH participants flexibilities to design their beneficiary eligibility criteria for palliative care and their delivery of palliative care services.^{5,6} Expanding access to supportive care to non-hospice-eligible beneficiaries with serious illnesses, as well as to other hospice-eligible Medicare beneficiaries (including those without cancer, congestive heart failure, COPD, or HIV/AIDS), could help answer questions about whether improved quality and Medicare cost savings are possible.

Testing the availability of concurrent end-of-life supportive and palliative care in these models will help determine whether these services have similar effects on beneficiary outcomes in other contexts. This is especially important for three reasons. First, the Biden administration aims to have all people with original Medicare in a care relationship with participating providers or in care plans with accountability for quality and total cost of care by 2030.³⁹ Also, the percentage of Medicare beneficiaries enrolled in Medicare Advantage plans has increased to nearly half,¹³ and Medicare beneficiaries' participation in total-cost-of-care models continues to increase as a setting for innovation in palliative care.

MCCM's lower-than-expected referrals have sparked policy discussions about removing certification of a six-month prognosis or less as a requirement for hospice enrollment. This requirement can create a barrier to primary care provider referrals and beneficiaries' acceptance of palliative care services. CMS defines palliative care as taking place "throughout the continuum of illness," which is not limited to the end of life.¹⁰ Still, there is risk that eliminating the life-expectancy certification requirement could lead to a broader population receiving services, negating Medicare savings or even increasing costs. VBID and ACO REACH participants might not be willing to take this risk under a total-cost-of-care model.

Last, low provider enrollment and high attrition among MCCM participants suggest that payment might have been inadequate to support enrollees' needs or incentivize providers' participation. The lack of geographic adjustment for payment might also have contributed to consolidated participation in certain regions. Conversely, the payments might have been sufficient if CMS had expanded the population of eligible beneficiaries or if more eligible beneficiaries had enrolled, allowing more MCCM providers to achieve economies of scale. Total-cost-of-care

programs (such as VBIID and ACO REACH) offer opportunities for incentives beyond the monthly payment structure of MCCM, which participants could leverage to entice more hospice and palliative care providers. Regardless, challenges remain to identifying the right payment amount for palliative care services and the patient populations most likely to benefit.

Conclusion

MCCM provided a new alternative to hospice care, offering enrollees supportive services and palliative care that they would not otherwise have received through Medicare. Model enroll-

ees experienced improved end-of-life care, had lower Medicare expenditures and acute care service use, and used hospice more than the comparison group. These results highlight the importance of transforming care delivery at the end of life to improve beneficiaries' and caregivers' experiences and reduce costly service use that might not be consistent with their preferences. Although CMS did not expand MCCM because of concerns about the generalizability of these findings, it is a promising approach. It provided valuable lessons that have informed other Innovation Center models that are testing supportive and palliative care services among a broader set of patients and alongside other interventions. ■

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staff at the Centers for Medicare and Medicaid Services. The statements contained in this article are solely those of the authors and do not necessarily reflect the views or policies of the Centers for Medicare and Medicaid Services. The study was exempt from federal policies on human subjects research as an evaluation of public benefits or services [45 CFR 46.104(d)(5)]. To access the authors' disclosures, click on the Details tab of the article online.

NOTES

- Harrison KL, Connor SR. First Medicare demonstration of concurrent provision of curative and hospice services for end-of-life care. *Am J Public Health.* 2016;106(8):1405–8.
- Center for Medicare and Medicaid Innovation. Palliative care projects: synthesis of evaluation results 2012–2021 [Internet]. Baltimore (MD): Centers for Medicare and Medicaid Services; 2022 [cited 2023 Sep 7]. Available from: <https://innovation.cms.gov/data-and-reports/2022/palliative-care-synthesis-2012-2021>
- Gilstrap LG, Huskamp HA, Stevenson DG, Chernew ME, Grabowski DC, McWilliams JM. Changes in end-of-life care in the Medicare Shared Savings Program. *Health Aff (Millwood).* 2018;37(10):1693–700.
- Center for Medicare and Medicaid Innovation. Kidney Care Choices (KCC) model [Internet]. Baltimore (MD): Centers for Medicare and Medicaid Services; 2019 Nov 9 [last updated 2023 Jan 17; cited 2023 Sep 7]. Available from: <https://www.cms.gov/priorities/innovation/innovation-models/kidney-care-choices-kcc-model>
- Center for Medicare and Medicaid Innovation. ACO REACH [Internet]. Baltimore (MD): Centers for Medicare and Medicaid Services; 2022 Feb 24 [last updated 2023 Aug 14; cited 2023 Sep 7]. Available from: <https://www.cms.gov/priorities/innovation/models/aco-reach>
- Center for Medicare and Medicaid Innovation. Medicare Advantage Value-Based Insurance Design (VBIID) model [Internet]. Baltimore (MD): Centers for Medicare and Medicaid Services; 2020 Oct 8 [last updated 2022 Dec 16; cited 2023 Sep 7]. Available from: <https://www.cms.gov/priorities/innovation/innovation-models/vbid>
- Center for Medicare and Medicaid Innovation. Guiding an Improved Dementia Experience (GUIDE) model [Internet]. Baltimore (MD): Centers for Medicare and Medicaid Services; 2023 Jul 31 [cited 2023 Sep 7]. Available from: <https://www.cms.gov/priorities/innovation/innovation-models/guide>
- Centers for Medicare and Medicaid Services. Hospice [Internet]. Baltimore (MD): CMS; 2022 [last updated 2023 Sep 6; cited 2023 Sep 7]. Available from: <https://www.cms.gov/medicare/payment/fee-for-service-providers/hospice>
- National Institute on Aging. What are palliative care and hospice care? [Internet]. Bethesda (MD): National Institutes of Health; 2021 May 14 [cited 2023 Sep 7]. Available from: <https://www.nia.nih.gov/health/what-are-palliative-care-and-hospice-care>
- Aldridge Carlson MD, Barry CL, Cherlin EJ, McCorkle R, Bradley EH. Hospices' enrollment policies may contribute to underuse of hospice care in the United States. *Health Aff (Millwood).* 2012;31(12):2690–8.
- Stanley JM. What the people would want if they knew more about it: A case for the social marketing of hospice care. In: Jennings B, Ryndes T, D'Onofrio C, Bailey MA. Access to hospice care: expanding boundaries, overcoming barriers [Internet]. Garrison (NY): Hastings Center; 2003 [cited 2023 Sep 7]. p. S22–3. (Hastings Center Report Special Supplement). Available from: https://www.thehastingscenter.org/wp-content/uploads/access_hospice_care.pdf
- Medicare Payment Advisory Commission. Report to the Congress: Medicare payment policy [Internet]. Washington (DC): MedPAC; 2022 Mar 15 [cited 2023 Sep 7]. Available from: https://www.medpac.gov/wp-content/uploads/2022/03/Mar22_MedPAC_ReportToCongress_v3_

- SEC.pdf
- 14 Harrison KL, Cenzer I, Ankuda CK, Hunt LJ, Aldridge MD. Hospice improves care quality for older adults with dementia in their last month of life. *Health Aff (Millwood)*. 2022; 41(6):821–30.
 - 15 Kelley AS, Morrison RS. Palliative care for the seriously ill. *N Engl J Med*. 2015;373(8):747–55.
 - 16 Krakauer R, Spettell CM, Reisman L, Wade MJ. Opportunities to improve the quality of care for advanced illness. *Health Aff (Millwood)*. 2009; 28(5):1357–9.
 - 17 Temel JS, Greer JA, Muzikansky A, Gallagher ER, Admane S, Jackson VA, et al. Early palliative care for patients with metastatic non-small-cell lung cancer. *N Engl J Med*. 2010;363(8):733–42.
 - 18 Wright AA, Keating NL, Ayanian JZ, Chrischilles EA, Kahn KL, Ritchie CS, et al. Family perspectives on aggressive cancer care near the end of life. *JAMA*. 2016;315(3):284–92.
 - 19 Wennberg JE, Bronner K, Skinner JS, Fisher ES, Goodman DC. Inpatient care intensity and patients' ratings of their hospital experiences. *Health Aff (Millwood)*. 2009;28(1): 103–12.
 - 20 Obermeyer Z, Makar M, Abujaber S, Dominici F, Block S, Cutler DM. Association between the Medicare hospice benefit and health care utilization and costs for patients with poor-prognosis cancer. *JAMA*. 2014; 312(18):1888–96.
 - 21 Mor V, Wagner TH, Levy C, Ersek M, Miller SC, Gidwani-Marszowski R, et al. Association of expanded VA hospice care with aggressive care and cost for veterans with advanced lung cancer. *JAMA Oncol*. 2019; 5(6):810–6.
 - 22 Baquet-Simpson A, Spettell CM, Freeman AN, Bates AM, Paz HL, Mirsky R, et al. Aetna's Compassionate Care Program: sustained value for our members with advanced illness. *J Palliat Med*. 2019; 22(11):1324–30.
 - 23 Section 1115A of the Social Security Act authorizes the Innovation Center to test innovative payment and service delivery models to reduce program expenditures while preserving or enhancing the quality of care furnished to beneficiaries. A separate provision in the Affordable Care Act directed the Centers for Medicare and Medicaid Services to test a concurrent hospice care program (42 U.S.C., Sect. 3140).
 - 24 Beneficiary enrollment started on January 1, 2016, for a randomly selected seventy-one hospices, with the remaining seventy hospices scheduled to start on January 1, 2018. A model extension, announced June 25, 2020, added twelve months to the Medicare Care Choices Model period of performance, through December 31, 2021. Only 44 (31 percent) of the initial 141 hospices participated for all six years.
 - 25 Center for Medicare and Medicaid Innovation. Request for applications: Medicare Care Choices Model [Internet]. Baltimore (MD): Centers for Medicare and Medicaid Services; 2014 Mar 18 [cited 2023 Sep 7]. Available from: <https://www.cms.gov/priorities/innovation/files/x/mccm-rfa.pdf>
 - 26 Routine home care is the least intensive of four levels of hospice care. Medicare Care Choices Model enrollees did not receive more-intensive levels of hospice care, such as inpatient respite care or continuous care in the home.
 - 27 In comparison, beneficiaries in hospice received 4.3 in-person visits per week in 2019 (see note 13).
 - 28 Kranker K, Gilman B, Niedzwiecki M, Pohl RV, Chen A, Gellar J, et al. Evaluation of the Medicare Care Choices Model: fifth and final annual evaluation report [Internet]. Princeton (NJ): Mathematica; 2023 Nov [cited 2023 Nov 6]. Available for download from: <https://www.cms.gov/priorities/innovation/innovation-models/medicare-care-choices>
 - 29 Harris K, Christopher L, Brower HM, Christian TJ, Etolue J, Fout B, et al. Evaluation of the Medicare Care Choices Model: annual report 3 [Internet]. Rockville (MD): Abt Associates; 2020 Oct [cited 2023 Sep 7]. Available from: <https://www.cms.gov/priorities/innovation/data-and-reports/2020/mccm-thirdannrpt>
 - 30 Kranker K, Niedzwiecki M, Pohl RV, Chen A, Luhr M, Forrow LV, et al. Evaluation of the Medicare Care Choices Model: annual report 4 [Internet]. Princeton (NJ): Mathematica; 2022 Apr [cited 2023 Sep 7]. Available from: <https://www.cms.gov/priorities/innovation/data-and-reports/2022/mccm-fourth-annrpt>
 - 31 To access the appendix, click on the Details tab of the article online.
 - 32 Pimentel SD, Forrow LV, Gellar J, Li J. Optimal matching approaches in health policy evaluations under rolling enrollment. *J R Stat Soc [Ser A]*. 2020;183(4):1411–35.
 - 33 Because of small sample sizes, we do not report subgroup analysis results for the twenty beneficiaries with HIV/AIDS.
 - 34 VanderWeele TJ, Ding P. Sensitivity analysis in observational research: introducing the E-value. *Ann Intern Med*. 2017;167(4):268–74.
 - 35 Only 13 percent of all model enrollees remained in the Medicare Care Choices Model until their death.
 - 36 Medicare Payment Advisory Commission. Report to the Congress: Medicare and the health care delivery system [Internet]. Washington (DC): MedPAC; 2015 Jun 15 [cited 2023 Sep 22]. Available from: https://www.medpac.gov/wp-content/uploads/import_data/scrape_files/docs/default-source/reports/june-2015-report-to-the-congress-medicare-and-the-health-care-delivery-system.pdf
 - 37 Lee H, Shi SM, Kim DH. Home time as a patient-centered outcome in administrative claims data. *J Am Geriatr Soc*. 2019;67(2):347–51.
 - 38 Our larger evaluation findings support the hypothesis that hospice can reduce net Medicare expenditures (see note 28). The literature on this question has been mixed (see note 13).
 - 39 Center for Medicare and Medicaid Innovation. Innovation Center strategy refresh. Baltimore (MD): Centers for Medicare and Medicaid Services; 2021 [cited 2023 Sep 7]. Available from: <https://www.cms.gov/priorities/innovation/strategic-direction-whitepaper>