Evaluation of the Medicare Care Choices Model

Technical Appendices

ANNUAL REPORT 3

Contract # HHSM-500-2014-000261/T0005

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About this Report

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List of Exhibits

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List of Acronyms and Abbreviations

CAHPS®	Consumer Assessment of Healthcare Providers and Systems	HCC	Hierarchical condition category
Caregiver survey	Caregiver Experience of Care Survey	HIV/AIDS	Human immunodeficiency virus/acquired immunodeficiency syndrome
CHF	Congestive heart failure	MCCM	Medicare Care Choices Model
CMS	Centers for Medicare & Medicaid Services	MHB	Medicare hospice benefit
COPD	Chronic obstructive pulmonary disease	24/7	Twenty-four hours a day, seven days a week

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Appendix A. Objectives and Features of Medicare Care Choices Model

This appendix supplements descriptions of the objectives and features of the Medicare Care Choices Model (MCCM) presented in **Section 1.1** in the main report.

A.1 CONCEPTUAL FRAMEWORK

Exhibit A.1 depicts the various hospice and beneficiary factors that influence MCCM implementation and the outcomes that are the focus of this evaluation. These outcomes are:

- Improved beneficiary and caregiver satisfaction with care at the end of life
- Enhanced quality of care and quality of life
- Reduced Medicare expenditures.

To achieve these outcomes, MCCM hospices must increase access to supportive services, use the principles of shared decision making to educate beneficiaries about their prognosis and treatment options in advance so beneficiaries can make informed choices about their care, and be experts in assessing and managing symptoms. Additionally, MCCM hospices need to coordinate care among hospices and other community providers, and ensure that the care addresses the needs and preferences of beneficiaries and their caregivers. The degree to which MCCM hospices achieve these objectives depends on internal organizational factors, such as staff training and technological capabilities; the environments in which hospices operate; as well as demographic, clinical, and social characteristics of beneficiaries in the model and their caregivers.

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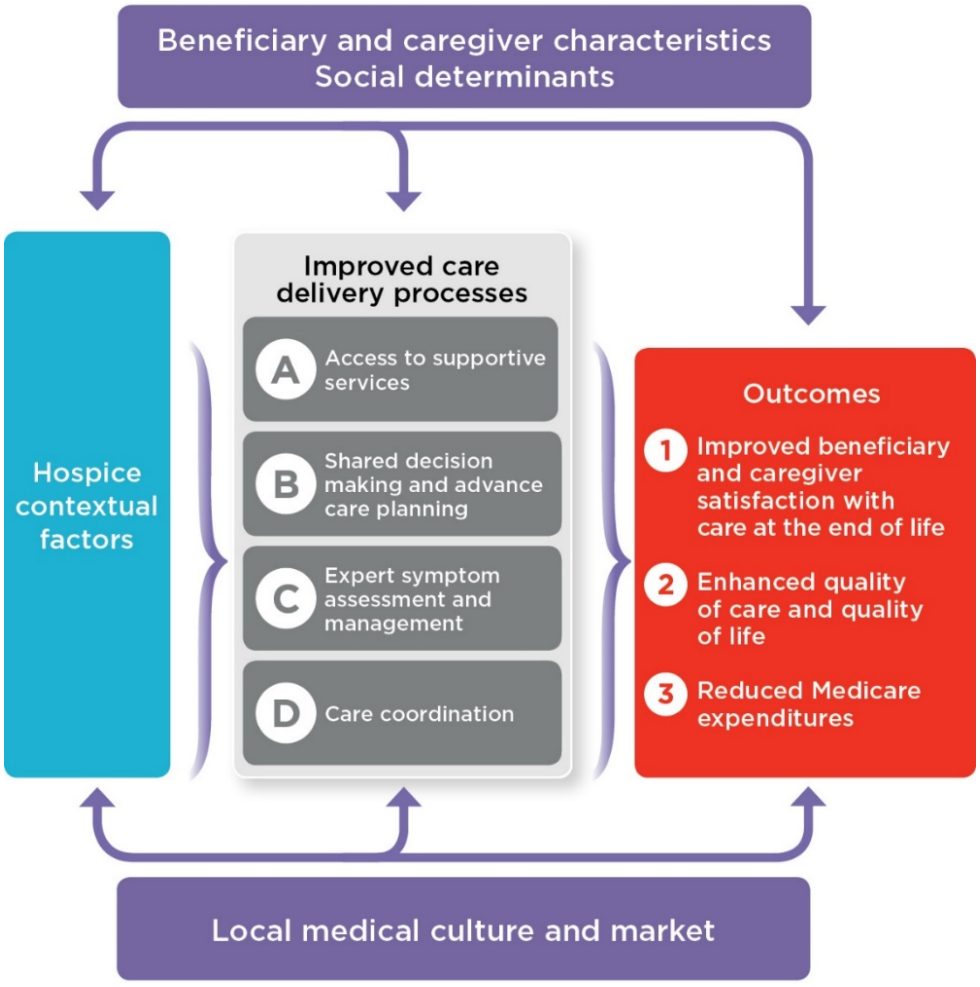
Exhibit A.1 Conceptual Framework Driving the MCCM Evaluation



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A.2 HALLMARKS OF MCCM

MCCM builds upon the six hallmarks of hospice care, as shown in **Exhibit A.2**. In the sections below we describe these six hallmarks. The center of the exhibit describes the intended outcomes of the model.

Exhibit A.2 Six Hallmarks of Hospice Care Serve as the Foundation of MCCM

Source: Adapted from the Centers for Medicare and Medicaid Services. (2018). *The Medicare Care Choices Model Resource Manual,* revised November 2018 and available to MCCM participants.

24/7 = twenty-four hours a day, seven days a week.

A.2.1 Care Coordination and Case Management

Care coordination and case management are vital to MCCM enrollees, many of whom receive services from multiple providers. Care coordination involves deliberately organizing activities and sharing information among all participants concerned with a patient's care. This means that individual needs and preferences are communicated at the right time to the right people; and that this information is used to provide safe, appropriate, and effective

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care.[1] Case management is a process in which a person (alone or in conjunction with a team) manages multiple aspects of a patient's care. Key components of case management include planning and assessment, coordination of services, patient education, and clinical monitoring.[2]

MCCM hospices assist in the coordination and management of both treatment for the terminal condition and selected hospice services, which is facilitated by shared decision making among the enrollee, the family, and his or her providers. MCCM hospice staff identify these partners and facilitate coordinated, complementary care. Care coordination and case management services provided by MCCM hospices may overlap with other care coordination and case management services received by MCCM enrollees.

A.2.2 24/7 Access to Hospice Team

MCCM hospices are expected to provide access to nursing services, physician services, and drugs and biologicals on a 24/7 basis. They also are required to provide beneficiaries and their families with a point of contact in the event the beneficiary's condition changes unexpectedly. By having 24/7 access to MCCM hospice professionals, MCCM enrollees benefit from the hospice's expertise in addressing pain, symptoms, and care management needs.

A.2.3 Person- and Family-Centered Care Planning

Person- and family-centered care planning involves addressing physical, intellectual, emotional, social, and spiritual needs; and facilitating autonomy, access to information, and choice. MCCM hospices are expected to assess enrollee preferences and ensure that health outcomes and goals are person-specific, rather than reflecting what health care professionals or the health care system consider to be the "best" alternative or treatment. These values are reflected in the individualized care plan that MCCM staff develop for each enrollee.

A.2.4 Shared Decision Making

Shared decision making is a process of interactive, meaningful dialogue between the beneficiary and care providers about treatment options, including harms, benefits, and alternatives. The process of shared decision making also includes eliciting information from

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1 Agency for Healthcare Research and Quality. (2014). *Care Coordination.* Retrieved on September 9, 2019 from http://www.ahrq.gov/professionals/prevention-chronic-care/improve/coordination/.

2 Agency for Healthcare Research and Quality. (2011). *Comparative Effectiveness of Case Management for Adults with Medical Illness and Complex Care Needs*. Retrieved on September 9, 2019 from https://effectivehealthcare.ahrq.gov/topics/case-management/research-protocol.

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beneficiaries about their values and preferences, and using this information to tailor their care.

A.2.5 Symptom Management

Symptom management involves ongoing screenings and assessments to ensure timely and appropriate interventions that are consistent with the enrollee's preferences and goals. MCCM hospices ensure management of the MCCM beneficiary's pain and other symptoms based on 24/7 availability, periodic comprehensive assessments, and individualized plans of care. MCCM enrollees may also need interventions and support to address symptoms other than pain (e.g., shortness of breath, nausea, vomiting, fatigue, compromised skin integrity, functional/cognitive deficits, anxiety, lack of appetite/malnutrition, fear, depression, constipation, diarrhea). The symptom management that MCCM hospices provide is expected to reduce the burden of hospital admissions and physician office visits.

A.2.6 Counseling

Counseling entails a wide range of interventions that can include help with advance care planning and bereavement, dietary counseling, and spiritual assistance and guidance to help beneficiaries and their families and caregivers cope with beneficiaries' terminal conditions. Similar to the Medicare hospice benefit (MHB), MCCM hospices offer appropriate levels of counseling to enrollees and their families based on a comprehensive assessment and individualized plan of care.

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A.3 COMPARISON OF MCCM TO MEDICARE HOSPICE AND HOME HEALTH BENEFITS

MCCM services are similar to those that MHB offers, and similar to some Medicare home health services, although there are important differences, as detailed in **Exhibits A.3** and **A.4**. Beneficiaries who enroll in MCCM retain the option to elect MHB at any time, if they wish to receive the full array of hospice services beyond those offered under the model.

Exhibit A.3 Goals, Eligibility, and Payment Differ for the Medicare Hospice Benefit, the Medicare Home Health Benefit, and MCCM

Program Feature	Medicare Hospice Benefit	MCCM	Medicare Home Health Benefit
Goals of care	Focuses on physical, intellectual, emotional, social, and spiritual needs; but Medicare does not pay for treatment related to the terminal condition.	Focuses on improving comfort and quality of life, and emotional and spiritual support. Beneficiaries can continue to receive treatment for their terminal condition.	Focuses on treatment of illness or injury that requires intermittent skilled care. Helps individuals improve or maintain their current level of function, or to slow decline.
Eligibility requirements "at a glance"	• Must have a certification of terminal illness signed by the patient's physician (prognosis of six months or less to live). Not limited to certain diagnoses. • Can reside in any type of setting, including a home, a skilled nursing facility, an intermediate care facility for the developmentally disabled, or an assisted living facility. • May have any Medicare coverage; however, Medicare-managed care plans revert to fee-for-service Medicare when the beneficiary elects hospice care.	• Must have a certification of terminal illness signed by the patient's physician (prognosis of six months or less to live). Terminal diagnosis must be for advanced cancer, congestive heart failure, chronic obstructive pulmonary disease, or human immunodeficiency virus/acquired immunodeficiency syndrome. • Must reside in a traditional home (not a nursing home or assisted living facility). • Must have Medicare Parts A & B as the primary payer. Cannot be enrolled in a Medicare-managed care plan.	• Must need intermittent skilled nursing or therapy services and under the care of a physician who establishes and reviews a plan of care. No certification of terminal illness is required. • Must have a face-to-face encounter with the physician within 90 days of the start of care or 30 days after the start of care. • Must be homebound and unable to leave the home without considerable effort unaided, or at all. Can reside in a home or institutional setting that is not providing care this is duplicative of home health services. Care can be provided in an assisted living facility under certain conditions. Must have Medicare Parts A & B. Cannot be enrolled in a Medicare-managed care plan.

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Program Feature	Medicare Hospice Benefit	MCCM	Medicare Home Health Benefit
Payment structure	Per-diem payment for all related care at the following rates (fiscal year 2018): • Routine home care is $193 per day for days 1-60, $151 per day for days 61+. • General inpatient care is $744 per day. • Continuous home care is $41 per hour. • Inpatient respite care is $173 per day. • Limited co-pays (i.e., $5 per prescription and 5% for inpatient respite care).	PBPM payment: • $400 per month for a full month of enrollment (15 days or more), and $200 per month for the initial month if less than 15 calendar days of enrollment. The Centers for Medicare & Medicaid Services pays $400 for the final month of enrollment, regardless of duration. To collect the PBPM payment, a hospice must provide at least one service in a given month to each enrolled beneficiary. Enrollees remain responsible for the usual share of other Medicare costs, including coinsurance. However, enrollees do not owe coinsurance on the $400 PBPM payment.	Payment is based on a 60-day episode of care (fiscal year 2018): • Base rate for a single 60-day episode is $3,040. Payment is case-mix adjusted, depending on the enrollee's number of therapy visits, functional impairment level, and diagnosis.

Sources:

- CMS. (no date). *Your Medicare Coverage: Hospice Care*. Retrieved on February 20, 2019 from https://www.medicare.gov/coverage/hospice-care.
- CMS Medicare Learning Network. (2017). Home Health Prospective Payment System (HH PPS) Rate Update for Calendar Year (CY) 2018. *MLN Matters Number: MM10310*. Retrieved on February 20, 2019 from https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNMattersArticles/downloads/MM10310.pdf.
- CMS. (no date). *Medicare & Home Health Care*. Retrieved on February 20, 2019 from https://www.medicare.gov/pubs/pdf/10969-medicare-and-home-health-care.pdf.

PBPM = per-beneficiary, per-month.

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Exhibit A.4 Services Provided by the Medicare Hospice Benefit, the Medicare Home Health Benefit, and MCCM Vary

Program Feature	Medicare Hospice Benefit	MCCM	Medicare Home Health Benefit
Beneficiary receives treatment for terminal diagnosis	No.	Yes, as covered under Medicare Parts A & B.	Yes, as covered under Medicare Parts A & B.
Levels of care and services offered	Four levels of care are offered: • Routine home care: Hospice services delivered at the beneficiary's residence. • General inpatient care: Services for acute symptom management that cannot be provided in another setting. • Continuous home care: Care provided in the residence for acute symptom management, as necessary, to maintain the beneficiary at home between 8 and 24 hours a day. • Inpatient respite care: Care that provides temporary respite for the primary caregiver for a maximum of five consecutive days.	MCCM supportive services are similar to services that the Medicare hospice benefit provides through routine home care.	The Medicare home health benefit does not differentiate services by level of care, but provides many services similar to those provided under routine home care in the Medicare hospice benefit.
Other services	Nursing, social work, aide services, volunteers, bereavement by chaplain, and counseling (e.g., nutritional, spiritual, emotional).	Nursing, social work, aide services, volunteers, bereavement by chaplain, and counseling (e.g., nutritional, spiritual, emotional).	Nursing, social work, and aide services.
Respite care	Inpatient.	In-home only.	None.
Durable medical equipment	Yes.	No. Available as covered under Medicare Part B.	No. Available as covered under Medicare Part B.
Medications	Yes. Covers all medications to relieve pain and manage symptoms related to the beneficiary's terminal condition. Medications that are unrelated to the terminal condition are available through the beneficiary's usual resources (including Medicare Part D, other insurance, or private pay).	No. Available through the beneficiary's usual resources (including Medicare Part D, other insurance, or private pay).	No. Available through the beneficiary's usual resources (including Medicare Part D, other insurance, or private pay).

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Program Feature	Medicare Hospice Benefit	MCCM	Medicare Home Health Benefit
Therapy	Yes. The hospice provides physical therapy, occupational therapy, and speech-language pathology services, as related to the beneficiary's terminal condition.	No. Available as covered under Medicare Part B.	Yes. The home health agency provides physical therapy, occupational therapy, and speech-language pathology services as established under a physician's plan of care.
Physician services	Yes. The hospice medical director and physician staff manage the beneficiary's care in collaboration with the beneficiary-identified attending physician, if any. The attending (non-hospice) provider can continue to see the beneficiary and bill Medicare separately for services and conditions unrelated to the beneficiary's terminal illness.	No. Available as covered under Medicare Part B.	No. The beneficiary must be under the care of a physician and have a plan of care that the physician has established and reviews periodically. A face-to-face encounter is also required with the physician to establish home health services. Physicians bill separately for their services.

Sources:

- CMS. (no date). *Your Medicare Coverage: Hospice Care*. Retrieved on February 20, 2019 from https://www.medicare.gov/coverage/hospice-care.
- CMS Medicare Learning Network. (2017). Update to Hospice Payment Rates, Hospice Cap, Hospice Wage Index and Hospice Pricer for FY 2018. *MLN Matters Number: MM10131.* Retrieved on February 20, 2019 from https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNMattersArticles/downloads/MM10131.pdf.
- CMS. (no date). *Medicare & Home Health Care*. Retrieved on February 20, 2019 from https://www.medicare.gov/pubs/pdf/10969-medicare-and-home-health-care.pdf.

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Appendix B. Evaluation Research Questions

This appendix provides a list of research questions addressed by the Medicare Care Choices Model (MCCM) evaluation, as shown in **Exhibit B.1**. By the end of the evaluation, we will have addressed all these research questions. This report addresses a subset of these questions, which are bolded in the exhibit.

Exhibit B.1 MCCM Evaluation Research Questions

Research Domain	Question
Implementation effectiveness	**1. What are the characteristics of beneficiaries enrolled in the model, and participating hospices and the hospices' markets?**
	2. What are the reasons for beneficiary participation or non-participation?[a]
	3. Are there any factors that limited the number of beneficiaries enrolled in the model? If so, to what degree?
	4. What are the characteristics of those beneficiaries and hospices that withdrew from the model, and why did they leave?[a]
	5. What are the elements of care delivered under this model?
	6. What is the length of time to implement the organizational changes necessary to deliver services?[a]
	7. What referral patterns are observed?
	8. What costs do hospices incur in providing services, and beneficiaries incur in receiving services?[b]
	9. What features of hospices' administration and structure account for the successes or failures of their implementation of the model?[a]
	10. Are learning system activities effective in preparing hospices to succeed and continue to succeed in the model?[a]
	11. What participant, provider, and beneficiary perceptions contribute to or hinder the success of the model?
	12. What unintended consequences are observed?
Utilization and costs	**13. Do beneficiaries in the model elect the Medicare hospice benefit at a higher rate and earlier in their disease?**
	14. Do beneficiaries in the model have lower Medicare expenditures?
	15. Do beneficiaries in the model receive different patterns of supportive services and life-prolonging treatment?
	16. Do beneficiaries in the model have greater access to curative services, including medications?[c]

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Research Domain	Question
Quality of care and health outcomes	**17. Do beneficiaries in the model have better health outcomes?**
	18. Do beneficiaries in the model receive better quality of care and/or experience a higher quality of life?
	19. Do beneficiaries in the model and their caregivers express greater satisfaction and improved experiences with their care?

Note: Information about answers to research questions addressed in earlier reports can be found at https://innovation.cms.gov/innovation-models/medicare-care-choices.

[a] See MCCM Annual Reports 1 and 2.

[b] See MCCM Annual Report 1.

[c] See MCCM Annual Report 2.

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Appendix C. Data Sources

This appendix describes the data sources used to generate the findings in the accompanying Annual Report 3 (referred to throughout as the 'main report'). These data sources include Medicare administrative data; Medicare Care Choices Model (MCCM) programmatic data from the MCCM portal and the MCCM implementation contractor; geographic data used to describe the markets in which MCCM participants and comparison hospices operate; Consumer Assessment of Healthcare Providers and Systems (CAHPS®) hospice survey data; and primary data collected by the MCCM evaluation team in the form of site visits, interviews, and provider and beneficiary surveys.

C.1 MEDICARE ADMINISTRATIVE DATA

- **Medicare Enrollment Database[3] and Master Beneficiary Summary files** were obtained from the Centers for Medicare & Medicaid Services (CMS) Chronic Conditions Data Warehouse Virtual Research Data Center for the period between January 1, 2012 and September 30, 2019.[4] We used these data to identify Medicare beneficiaries based on demographic characteristics and dual-eligibility status. We also used these data to characterize eligibility for the model, develop a comparison group of Medicare decedents similar to MCCM decedents, and control for time-invariant characteristics of the model and comparison decedents in difference-in-differences estimates of MCCM impacts. In addition, we used these data to conduct the analyses described in **Sections 2** and **4** in the main report and **Appendix F**.
- **Medicare claims data** were obtained from the CMS Chronic Conditions Data Warehouse Virtual Research Data Center for the period between January 1, 2012 and September 30, 2019. These data document the use of Medicare-covered services and diagnostic information (i.e., International Classification of Diseases 9/10 codes)

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[3] The Medicare Enrollment Database was changed to the Common Medicare Environment in 2018. The analytic files that we used for this evaluation combine enrollment data from before and after 2018. For this reason, we refer to these sources as the Medicare Enrollment Database throughout the main report and the technical appendices.

[4] January 1, 2012 is the earliest possible date for which we could measure covariates for baseline comparison decedents. For example, comparison decedents are assigned to the baseline based on their date of death, such that the first date of death we could observe is January 1, 2014. The anchor date at 365 days before death would be January 1, 2013 and we would measure covariates, at most, 365 days before this point, or January 1, 2012.

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associated with the use of these services. Unless otherwise noted, we extracted claims data analyzed after a three-month, run-out period for the following claim types[5]:

- Physician/supplier Part B
- Durable medical equipment
- Home health agency
- Hospice
- Inpatient
- Outpatient
- Skilled nursing facility.

We used these data to characterize Medicare beneficiaries enrolled in the model; select a matched comparison group of hospices; measure health status; and measure use of Medicare services, duration of MCCM and Medicare hospice benefit enrollments; and Medicare expenditures during the last 7, 30, 60, 90, and 180 days of life.[6] We used these data to conduct the analyses described in **Sections 2** and **4** in the main report and **Appendix F**.

- **CMS Provider of Services files**[7] documenting the characteristics of Medicare-approved hospices operating between calendar years 2015 and 2017 were obtained from the CMS.gov website to characterize the hospices enrolled in MCCM and to select a matched comparison group of hospices. We used these data to conduct the analyses described in **Section 4** in the main report.

C.2 MCCM PROGRAMMATIC DATA

- The MCCM portal is a secure, online website for programmatic data entry. Data submitted by participating hospices via this portal document beneficiary referrals, enrollments, administration of clinical and functional assessments, encounters with hospice staff, receipt of MCCM-covered services, and quality metrics documented between January 1, 2016 and September 30, 2019. We used these data to examine implementation and operation of the model, and to conduct the analyses described in **Section 5** in the main report and **Appendix I.4**.

  The implementation contractor launched a revised portal on January 1, 2018, coinciding with the start of cohort 2. The revised portal includes skip patterns and

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5 We did not analyze Medicare Part D claims because MCCM does not require beneficiaries to be enrolled in that plan.

6 We only include decedents who were enrolled in MCCM for the entire measurement period in each outcome measure. For example, decedents enrolled for 35 days before their date of death were only included in the last 7 and 30 days of life expenditure measures. We do not estimate the impact of MCCM on utilization and expenditures during the last 365 days of life because only a small number of administratively eligible beneficiaries were enrolled in MCCM more than 365 days before death (n=267). See **Appendix F.4.1** for additional information."

7 CMS. (2019). *Provider of Services Files.* Retrieved on September 5, 2019 from https://www.cms.gov/Research-Statistics-Data-and-Systems/Downloadable-Public-Use-Files/Provider-of-Services/index.html.

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numerous new data elements. **Section 5** in the main report describes the analysis results using data limited to that recorded in the revised portal; these analyses are based on 21 months of hospice experience.

- **Reports and data provided by the MCCM implementation contractor** describe implementation of the model and operation of MCCM hospices. We used these data to monitor the hospice withdrawals described in **Section 1** in the main report and the CMS-sponsored learning activities listed in **Appendix I.6**.

C.3 DARTMOUTH ATLAS OF HEALTH CARE GEOGRAPHIC DATA

- The Dartmouth Atlas of Health Care[8] is a publicly available database documenting geographic variations in the organization, delivery, and cost of hospice care; and other Medicare-covered services within market areas defined by hospital referral regions.[9] We used 2014, 2015, and 2016 Dartmouth Atlas of Health Care data to characterize the geographic market areas served by MCCM hospices and to select comparison hospices that were similar to MCCM hospices, as described in **Appendix F.2**. We describe data drawn from the Dartmouth Atlas of Health Care in **Appendix D.4**.

C.4 CAHPS® HOSPICE SURVEY DATA

- CAHPS® hospice survey data document the experiences of Medicare beneficiaries with care delivered by Medicare-certified hospices, as reported by caregivers, friends, and family members of deceased beneficiaries. We used CAHPS® hospice survey data from hospices operating in 2016 to select matched comparison hospices that are similar to MCCM hospices, as described in **Appendix F.2**. We describe data drawn from the CAHPS® hospice survey in **Appendix D.6**.

C.5 PRIMARY DATA COLLECTED BY THE MCCM EVALUATION TEAM

- The MCCM evaluation team collected primary data not available from Medicare administrative data and MCCM programmatic data. Primary data collection activities included:
  - *Qualitative interviews and site visits conducted in 2017 through 2019*. We integrated data from qualitative interviews into each section of the main report. We also present three beneficiary stories from in-depth interviews with MCCM enrollees describing their experiences in the model.
  - *Caregiver survey of MCCM and non-MCCM decedents.* CAHPS® hospice survey data document the experiences of Medicare beneficiaries with care delivered by Medicare-

[8] Dartmouth Atlas data can be accessed at http://www.dartmouthatlas.org/.

[9] A hospital referral region is a contiguous geographic region that has a minimum population size of 120,000 individuals and contains at least 1 hospital that performs major cardiovascular procedures and neurosurgery.

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certified hospices, as reported by caregivers, friends, and family members of deceased beneficiaries. We used CAHPS® hospice survey data from hospices operating in 2016 to select matched comparison hospices that are similar to MCCM hospices. We describe the survey methodology in **Appendix H**; and the survey results in **Sections 3** and **5** in the main report, and in **Appendices I.3** and **I.4**.

- *Organizational survey of MCCM hospices*. We surveyed MCCM and comparison hospices to learn about their organizational structures and characteristics affecting MCCM implementation. We describe the survey methodology in **Appendix H**. We report organization survey results describing hospice affiliations and contracts with outside organizations and access to medical record data in **Section 2** in the main report and **Appendix I.2**.

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Appendix D. Measures of Beneficiary, Hospice, and Market Characteristics; and MCCM Outcomes

This appendix includes measures of beneficiary, hospice, and market characteristics; as well as Medicare Care Choices Model (MCCM) outcomes. We used beneficiary, hospice, and market characteristics to develop a comparison group of MCCM decedents and to estimate MCCM impacts, as described in **Appendix F**. We also used beneficiary characteristics to describe the pre-enrollment characteristics of MCCM enrollees, as discussed in the main report in **Section 2**. In this appendix, we also specify the utilization (type of service), Medicare expenditure, and Medicare hospice benefit (MHB) transition outcomes that are presented in **Section 4** in the main document and **Appendix G**.

D.1 BENEFICIARY CHARACTERISTICS

In **Exhibit D.1**, we specify the measures used to (1) describe the characteristics of beneficiaries enrolled in MCCM; and (2) select a comparison group of beneficiaries eligible for, but not enrolled in, the model.[10]

Exhibit D.1 Characteristics of MCCM Enrollees and MCCM-Eligible Decedents Not Enrolled in MCCM

Characteristic	Data Source	Description
Age[a]	MCCM portal and Medicare Enrollment Database/Master Beneficiary Summary file	Continuous (0-maximum) and categorical (0-64, 65-74, 75-84, and 85+)[b] measure of the beneficiary's age calculated as the MCCM enrollment date and/or EB weighting anchor date less the date of birth.
Caregiver availability	MCCM portal	Categorical measure of five types of caregiver relationships reported at the time of MCCM enrollment (2016-2017) or the earliest measure recorded during an encounter (2018-present): • Spouse • Child/children • Paid caregiver other than family member • Other • No caregiver. These data are available only for MCCM enrollees.

[10] For more information on how we selected the comparison group of MCCM-eligible decedents, see **Appendix F.2**.

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Characteristic	Data Source	Description
Census region[a]	Medicare Enrollment Database/Master Beneficiary Summary file	Categorical measure of the census region of the state listed in the beneficiary's mailing address at enrollment and/or the EB weighting anchor date. Categories used include: • South (Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee) • Midwest (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin) • Northeast (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont) • West (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming)
Hierarchical condition category risk score[a]	Medicare Enrollment Database/Master Beneficiary Summary file/Medicare claims	Continuous (0-maximum) measure of future healthcare costs based on the ratio of predicted-to-actual Medicare fee-for-service expenditures by demographic characteristics and reason for Medicare entitlement, Medicaid enrollment, and clinical conditions.[a] The minimum score is bounded by zero. The higher scores indicate a more severe illness. We calculated the risk score using claims data during the 12 months before MCCM enrollment and/or the EB weighting anchor date. A detailed description of the methodology used to form and update hierarchical conditions categories can be found at https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Downloads/RTC-Dec2018.pdf.
Comorbidites[a]	Chronic Conditions Data Warehouse	Twenty-seven dichotomous (yes, no) indicators measuring whether the beneficiary had a common chronic condition in the 12 months before enrollment and/or the EB weighting anchor date as documented in the Chronic Conditions Data Warehouse.[c]
Dual eligibility[a]	Medicare Enrollment Database/Master Beneficiary Summary file	Dichotomous (yes, no) indicator that identifies whether the beneficiary is dually eligible for both Medicare and Medicaid in the 12 months before enrollment and/or the EB weighting anchor date.
Functional status	MCCM portal	Categorical measure of functional status at the time of MCCM enrollment (2016-2017) or during the earliest encounter that included a functional assessment (2018-present): • Independent: Able to carry on normal activity and no special care needed, or able to carry on normal activity with effort (these two categories were combined into one in 2018) • Needs some assistance • Dependent: Requiring considerable assistance and frequent care • Disabled and requires special care and assistance. These data are available only for MCCM enrollees.
Gender	Medicare Enrollment Database/Master Beneficiary Summary file	Dichotomous (male, female) indicator of the administratively recorded gender of MCCM enrollees and MCCM-eligible decedents not enrolled in the model.

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Characteristic	Data Source	Description
Ineligibility indicator[a]	MCCM portal	Dichotomous (yes, no) indicator used to assess MCCM eligibility as listed in the November 18, 2018 MCCM Resource Manual for each of the following criteria: • Enrolled in Medicare Part A as primary insurance for the past 12 months • Enrolled in Medicare Part B as primary insurance for the past 12 months • Not enrolled in a Medicare-managed care plan such as Medicare Advantage, the Health Care Pre-Payment Plan, or the Program of All-inclusive Care for the Elderly • Certification by the community provider of six months or less to live if the end-stage condition runs its usual course in accordance with §418.22, and co-signed by the hospice medical director • Given a diagnosis as identified by certain International Classification of Disease 10 codes for advanced cancer, chronic obstructive pulmonary disorder, human immunodeficiency virus/acquired immunodeficiency syndrome, or congestive heart failure (each condition is recorded separately) • Had at least 1 hospital encounter in the last 12 months for emergency department visit, observation stay, or admission • Had at least 3 office visits with any Medicare-certified provider within the last 12 months • Has not elected the MHB within the last 30 days • Lives in a traditional home and has continuously for the last 30 days • Patient's address is within the service area of the participating hospice. These data are available only for MCCM enrollees.
Living arrangement	MCCM portal	Dichotomous (yes, no) indicator of living arrangement: • Lives with other person(s) • Lives alone. These data are available only for MCCM enrollees.
Location: Urban/rural[a]	Medicare Enrollment Database/Master Beneficiary Summary file	Dichotomous (urban, rural) measure that identifies whether the beneficiary was a resident of a county that was included in a core-based statistical area as defined by the Office of Management and Budget on the MCCM enrollment and/or the EB weighting anchor date.
Marital status	MCCM portal	Categorical measure of marital status: • Never married • Married • Partner • Widowed • Divorced • Declined to report. These data are available only for MCCM enrollees.
MCCM enrollment date	MCCM portal	Date of MCCM enrollment. These data are available only for MCCM enrollees.

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Characteristic	Data Source	Description
MCCM screening date	MCCM portal	Date on which the MCCM hospice screened the beneficiary for MCCM eligibility. These data are available only for MCCM enrollees.
MCCM enrollment status	MCCM portal	Categorical measure of the enrollment status of Medicare beneficiaries referred to MCCM and MCCM enrollees: • Enrolled in MCCM • Declined to enroll in MCCM • Enrolled in the MHB • Died before completing enrollment. These data are available only for MCCM enrollees.
Race/ethnicity	Medicare Enrollment Database/Master Beneficiary Summary file	Categorical measure of race/ethnicity: • White • Black • Hispanic • Other.
Reason for declining MCCM	MCCM portal	Categorical measure of reasons for declining MCCM: • Not ready for palliative care • Declined care coordination • Declined staff in home • Other reason. These data are available only for MCCM enrollees.
Reason for disenrollment from MCCM	MCCM portal	Categorical measure of reasons for disenrollment from MCCM: • No longer terminally ill • Dissatisfaction with program • Declined to provide reason • Other. These data are available only for MCCM enrollees.
Reason for discharge from MCCM	MCCM portal	Categorical measure of reason for discharge from MCCM: • Elected the MHB • Died • Requested voluntary discharge from MCCM • Moved out of hospice service area • Resided in long-term nursing facility for more than 90 days • Discharged for cause • Transferred to another MCCM hospice • Other. These data are available only for MCCM enrollees.

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Characteristic	Data Source	Description
Specialty of referring provider	MCCM portal	Categorical measure of the specialty of the referring provider; one of the following: • Oncology • Internal medicine • Family practice medicine • Cardiology • Pulmonology • Palliative care • Hematology • Endocrinology • Gastroenterology • Gynecology • Immunology • Infectious disease • Neurology • Pain management • Radiology • Urology • Other specialty. We assessed open-text responses for "other" specialty and matched the provider to specialties on the list, in particular, palliative care specialist. These data are available only for MCCM enrollees.

Notes:

[a] In the EB weighting and difference-in-differences regression, we specified variables at the EB weighting anchor date for MCCM and comparison decedents. See **Appendix F** for more details on the specification of these covariates in the impact analyses.

[b] The small number of enrollees under age 65 (2.1% of enrollees to date are under 55) and over age 85 (2.6% are 95 and older) did not merit differentiating by age within those categories.

[c] A detailed description of the algorithms used to identify chronic conditions in the Centers for Medicare & Medicaid Services Chronic Conditions Data Warehouse can be found at https://www2.ccwdata.org/web/guest/condition-categories.

EB = entropy balancing, MHB = Medicare hospice benefit.

D.2 MCCM ELIGIBILITY

In **Exhibit D.2**, we describe the measures used to verify the eligibility of MCCM enrollees for their inclusion in the analytic sample and to select the group of comparison decedents, as described in **Appendix F.2**. We also use the five indicators of Medicare-related enrollment criteria for MCCM to identify MCCM decedents included in the entropy balancing weighting, as described in **Appendix F.3**. Descriptions of MCCM eligibility criteria can be found in **Section 1.1** in the main report.

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Exhibit D.2 Administratively Verifiable MCCM Eligibility Criteria

Eligibility Criterion	Source Data	Description
Qualifying utilization events for MCCM		
MCCM-qualifying diagnosis	Inpatient, outpatient, and carrier claims	Dichotomous (yes, no) indicator of having 1 or more claims with a qualifying MCCM International Classification of Diseases 9/10 code for cancer, chronic obstructive pulmonary disease, congestive heart failure, or human immunodeficiency virus/acquired immunodeficiency syndrome primary diagnosis in the prior 12 months. See **Exhibit D.9** for a list of International Classification of Diseases codes 9/10 codes required by CMS for MCCM.
Hospital encounter	Inpatient and outpatient claims	Dichotomous (yes, no) indicator of having at least one inpatient admission, emergency department visit,[a] or observational stay encounter[b] in the past 12 months.
Office visits	Carrier and outpatient claims	Dichotomous (yes, no) indicator of having 3 or more office visits in the past 12 months. Office visits are evaluation and management[c] visits with providers in community and institutional settings.
Lives in a traditional home	Medicare minimum dataset assessments, and skilled nursing facility and inpatient claims	Dichotomous (yes, no) indicator of not having lived in a nursing facility, a skilled nursing facility, or an inpatient rehabilitation facility in the past 30 days.[d]
Medicare-related enrollment criteria for MCCM		
Medicare as primary payer	Master Beneficiary Summary file: Enrollment database	Dichotomous (yes, no) indicator of having Medicare as a primary payer in the past 12 months.[e]
Medicare hospice benefit enrollment	Master Beneficiary Summary file: Enrollment database	Dichotomous (yes, no) indicator of not having elected the Medicare hospice benefit in the past 30 days.
Medicare Part A enrollment	Master Beneficiary Summary file: Enrollment database	Dichotomous (yes, no) indicator of having been enrolled in Medicare Part A in the past 12 months.
Medicare Part B enrollment	Master Beneficiary Summary file: Enrollment database	Dichotomous (yes, no) indicator of having been enrolled in Medicare Part B in the past 12 months.
Medicare-managed care enrollment	Master Beneficiary Summary file: Enrollment database	Dichotomous (yes, no) indicator of not having been enrolled in a Medicare-managed care plan in the past 12 months.

Note: This exhibit reports indicators for eligibility criteria that can be verified using Medicare claims data, which we refer to as "administratively-verifiable" eligibility criteria. MCCM also requires that a physician certify the enrollee has a six-month prognosis or less. The evaluation team did not have data to verify this eligibility criterion and we discuss our approach to incorporate this requirement in **Appendix F.3**. To identify the analytic sample, we assessed all eligibility criteria at the enrollment date for MCCM decedents, as described in **Appendix F.2**. MCCM-eligible decedents were included in the analytic sample based on the presence of an MCCM-qualifying diagnosis and meeting each of the five Medicare-related enrollment requirements, as evaluated at a given anchor date. We use the five indicators of Medicare-related enrollment criteria for MCCM assessed at the anchor date to identify MCCM decedents included in the entropy balancing weighting, as described in **Appendix F.3**.

[a] Emergency department visits were identified using revenue center codes 0450, 0451, 0452, 0456, or 0459.

[b] Observational stays were identified using revenue center codes 0760 or 0762, or Healthcare Common Procedure Coding System codes G0378 or G0379.

[c] Office-based visits were identified using Healthcare Common Procedure Coding System codes 99201-99499.

[d] This criterion would also exclude those living in an assisted living facility; however, we cannot identify beneficiaries in assisted living facilities using Medicare claims data.

[e] The eligibility criterion of Medicare as the primary payer requires that beneficiaries enrolled in Part A and Part B do not have primary health insurance coverage through another payer (e.g., through an employer group health plan).

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Exhibit D.3 MCCM Eligibility Criteria Used for Entropy Balancing Weighting

MCCM Eligibility-Related Covariates	Source Data	Description
Use of MCCM eligibility-related services		
ED visits	Inpatient and outpatient claims[a]	Number of ED visits during the 12 months before the anchor date.
ICU stays	Inpatient claims[b]	Number of ICU stays during the 12 months before the anchor date.
Inpatient admissions	Inpatient claims	Number of inpatient admissions during the 12 months before the anchor date.
Observational stays	Inpatient and outpatient claims[c]	Number of observational stays during the 12 months before the anchor date.
Office visits	Carrier and outpatient claims[d]	Number of office visits during the 12 months before the anchor date. Office visits are evaluation and management visits with providers in community and institutional settings.
MCCM-qualifying diagnoses		
Cancer	Inpatient, outpatient, and carrier claims	Number of claims with an MCCM-qualifying diagnosis of cancer during the 12 months before the anchor date. See **Exhibit D.9** for a list of ICD-9/10 codes.
Congestive heart failure	Inpatient, outpatient, and carrier claims	Number of claims with an MCCM-qualifying diagnosis of congestive heart failure during the 12 months before the anchor date. See **Exhibit D.9** for a list of ICD-9/10 codes.
Chronic obstructive pulmonary disease	Inpatient, outpatient, and carrier claims	Number of claims with an MCCM-qualifying diagnosis of chronic obstructive pulmonary disease during the 12 months before the anchor date. See **Exhibit D.9** for a list of ICD-9/10 codes.
Human immunodeficiency virus/acquired immunodeficiency syndrome	Inpatient, outpatient, and carrier claims	Number of claims with an MCCM-qualifying diagnosis of human immunodeficiency virus/acquired immunodeficiency syndrome during the 12 months before the anchor date. See **Exhibit D.9** for a list of ICD-9/10 codes.

[a] ED visits were identified using revenue center codes 0450, 0451, 0452, 0456, or 0459.

[b] ICU stays were identified using revenue center codes 0200, 0201, 0202, 0203, 0204, 0207, 0208, or 0209.

[c] Observational stays were identified using revenue center codes 0760 or 0762, or Healthcare Common Procedure Coding System codes G0378 or G0379.

[d] Office-based visits were identified using Healthcare Common Procedure Coding System codes 99201-99499.

ED = emergency department, ICD = International Classification of Diseases, ICU = intensive care unit.

D.3 MEASURES OF SERIOUS ILLNESS AND FRAILTY

Using Medicare administrative data, we assembled two sets of measures of health conditions and functional status limitations that are indicative of the presence of serious illness and frailty at the end of life, as shown in **Exhibits D.4** and **D.5**. We used these measures to:

- Describe the frequency and recency of Medicare service use during the year before MCCM enrollment, as presented in **Section 2** in the main report.

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- Balance the observable characteristics of comparison decedents to be similar to MCCM decedents by including them as covariates in the entropy balancing weighting specified at each beneficiary's anchor date, as described in **Appendix F.3.3**.

A key eligibility requirement for MCCM is that a person must have a life expectancy of six months or less if their terminal illness runs its usual course. When selecting comparison decedents to estimate the impact of the model, it is therefore important that they would have also had a six-month prognosis or less.

In collaboration with a consulting physician with subject matter expertise in end-of-life care, we conducted a literature review to identify claims-based variables that are strongly related to six-month survival rates to use in the selection of comparison beneficiaries. In addition to identifying variables that predict mortality, a large component of the literature review also focused on identifying variables that predict functional impairment since functional status is an important predictor of mortality. Based on the literature review,[11,12,13,14,15,16,17,18] we identified measures of serious illness and frailty associated with a six-month prognosis. From this set of measures, we removed those that were disease-specific or that were

[11] Kim, DH, Schneeweiss, S. (2014). Measuring frailty using claims data for pharmacoepidemiologic studies of mortality in older adults: Evidence and recommendations. *Pharmacoepidemiol Drug Saf*, 23, 891-901. doi: 10.1002/pds.3674.

[12] Joynt KE, Figueroa JF, Beaulieu N, Wild RC, Orav EJ, Jha AK. (2016). Segmenting high-cost Medicare patients into potentially actionable cohorts. *Healthcare*, 5. doi: 10.1016/j.hjdsi.2016.11.002.

[13] Davidoff AJ, Gardner LD, Zuckerman IH, Hendrick F, Ke X, Edelman MJ. (2014). Validation of disability status, a claims-based measure of functional status for cancer treatment and outcomes studies. *Med Care,* 52(6), 500-510.

[14] Faurot KR, Jonsson-Funk M, Pate V, Patrick A, Hanson LC, Castillo WC, Stürmer T. (2014). Using claims data to predict dependency in activities of daily living as a proxy for frailty. *Pharmacoepidemiol Drug Saf*, 24, 59–66.

[15] Fortinsky RH, Garcia RI, Sheehan TJ, Madigan EA, Tullai-McGuinness S. (2003). Measuring disability in Medicare home care patients: Application of Rasch modeling to the outcome and assessment information set. *Med Care*, 41(5), 601-615.

[16] Knaus WA, Harrell FE, Lynn J, et al. (1995). The SUPPORT prognostic model. Objective estimates of survival for seriously ill hospitalized adults. Study to understand prognoses and preferences for outcomes and risks of treatments. *Ann Intern Med.*, 122(3), 191-203.

[17] Levy WC, Mozaffarian D, Linker DT, et al. (2006). The Seattle Heart Failure Model: Prediction of survival in heart failure. *Circulation*, 113(11), 1424-1433.

[18] Lee DS, Austin PC, Rouleau JL, Liu PP, Naimark D, Tu JV. (2003). Predicting mortality among patients hospitalized for heart failure: Derivation and validation of a clinical model. *JAMA*, 290(19), 2581-2587.

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present in less than 5 percent of MCCM decedents.[19] The final list of measures in the entropy balancing weighting includes:

- Use of durable medical equipment (e.g., home oxygen, wheelchair), as shown in **Exhibits D.4** and **D.5**,
- Use of Medicare services (e.g., emergency department visits, inpatient admissions), as shown in **Exhibit D.4**,
- Indicators of chronic conditions (e.g., obesity, diabetes mellitus complication), as shown in **Exhibit D.5**,
- Diagnoses of geriatric syndromes and markers of disease complications that increase the risk of frailty (e.g., gait abnormality, malnutrition, difficulty walking), as shown in **Exhibit D.5**.

Exhibit D.4 presents Medicare service measures that are indicative of serious illness and frailty. As shown in the exhibit, we specified the measures differently for the purposes of identifying pre-enrollment utilization trends in **Section 2** and to calculate weights in the entropy balancing described in **Appendix F.3.3.**[20] Measures included in the pre-enrollment analysis and entropy balancing weighting reflect utilization during the year before MCCM enrollment and the anchor date, respectively.

[19] We used a threshold of five percent to identify measures of serious illness and frailty that were commonly observed among MCCM decedents, specifically.

[20] Based on guidance from our clinical consultant, we specified service use measures at multiple points in time relative to beneficiaries' dates of death to characterize their unique disease trajectory. For example, we observed intensive care unit visits in the 30 days before enrollment; while we observed inpatient admissions in the 30 days, 31 to 120 days, and 121 to 365 days before enrollment.

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Exhibit D.4 Measures of Medicare Services Indicative of Serious Illness and Frailty

Measure	Source Data	Description
Ambulance transports	Carrier, DME, HHA, hospice, inpatient, outpatient, and SNF revenue and claim line files[a]	*Measures in pre-enrollment utilization analysis:* • Six dichotomous (yes, no) indicators of ambulance transports during the 12 months before enrollment.[b] *Measures in entropy balancing weighting:* • Three dichotomous (yes, no) indicators of ambulance transports during the 12 months before the anchor date.[c]
DME	DME claims [d]	*Measures in entropy balancing weighting:* • Three dichotomous (yes, no) indicators of any DME[i] use during the 12 months before the anchor date.[c] • Three dichotomous (yes, no) indicators of home oxygen use during the 12 months before the anchor date.[c] • Three dichotomous (yes, no) indicators of home hospital bed use during the 12 months before the anchor date.[c] • Three dichotomous (yes, no) indicators of wheel chair use during the 12 months before the anchor date.[c]
ED visits	Inpatient and outpatient claims[e]	*Measures in pre-enrollment utilization analysis:* • Six dichotomous (yes, no) indicators of ED visits during the 12 months before enrollment.[b] *Measures in entropy balancing weighting:* • Number of ED visits in the 12 months before the anchor date. • Three dichotomous (yes, no) indicators of ED visits during the 12 months before the anchor date.[c]
HHA episodes	HHA claims	*Measures in pre-enrollment utilization analysis:* • Six dichotomous (yes, no) indicators of HHA episodes during the 12 months before enrollment.[b]
Inpatient admission	Inpatient claims	*Measures in pre-enrollment utilization analysis:* • Six dichotomous (yes, no) indicators of inpatient admissions during the 12 months before enrollment.[b] *Measures in entropy balancing weighting:* • Number of inpatient admissions in the 12 months before the anchor date. • Dichotomous (yes, no) indicator of a hospital stay greater than 12 days during the 12 months before the anchor date. • Three dichotomous (yes, no) indicators of inpatient admissions visits during the 12 months before the anchor date.[c]
ICU admissions	Inpatient claims[f]	*Measures in pre-enrollment utilization analysis:* • Six dichotomous (yes, no) indicators of ICU admissions during the 12 months before enrollment.[b] *Measures in entropy balancing weighting:* • Number of ICU admissions in the 12 months before the anchor date. • Dichotomous (yes, no) indicator of ICU admissions during the 30 days before the anchor date.
Observational stays	Inpatient and outpatient claims[g]	*Measures in pre-enrollment utilization analysis:* • Six dichotomous (yes, no) indicators of observational stays during the 12 months before enrollment.[b] *Measures in entropy balancing weighting:* • Number of observational stays in the 12 months before the anchor date.

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Measure	Source Data	Description
Office/ outpatient visits	Carrier and outpatient claims[h]	*Measures in pre-enrollment utilization analysis:* • Six dichotomous (yes, no) indicators of evaluation and management visits with providers in community and institutional settings during the 12 months before enrollment.[b] *Measures in entropy balancing weighting:* • Number of evaluation and management visits with providers in community and institutional settings in the 12 months before the anchor date.
SNF admissions	SNF claims[i]	*Measures in pre-enrollment utilization analysis:* • Six dichotomous (yes, no) indicators of office visits during the 12 months before enrollment.[b]

[a] Ambulance transports were identified using HCPCS codes A0426, A0427, A0428, A0429, and A0999.

[b] We specified six dichotomous indicators of the use of Medicare-covered services during the 0-30, 31-60, 61-90, 91-180, 181-365, and 0-365 days before MCCM enrollment for conisistency with the anchor date definitions in **Section F.2** and the MCCM eligibility look-back period).

[c] We calculated the number of service use events during the last month, 2 to 3 months, and 4 to 12 months before the anchor date.

[d] DME is doctor-prescribed and meets the following criteria: Durable (can withstand repeated use), used for a medical reason, not usually useful to someone who is not sick or injured, used in the home, and generally has an expected lifetime of at least three years (https://www.medicare.gov/coverage/durable-medical-equipment-dme-coverage). Examples of DME include, but are not limited, to blood sugar monitors, blood sugar test strips, canes, commode chairs, continuous passive motion devices, continuous positive airway pressure devices, crutches, hospital beds, infusion pumps and supplies, lancet devices and lancets, nebulizers and nebulizer medications, oxygen equipment and accessories, patient lifts, pressure-reducing support surfaces, suction pumps, traction equipment, walkers, and wheelchairs and scooters.

[e] ED visits were identified using revenue center codes 0450, 0451, 0452, 0456, or 0459.

[f] ICU stays were identified using revenue center codes 0200, 0201, 0202, 0203, 0204, 0207, 0208, or 0209.

[g] Observational stays were identified using revenue center codes 0760 or 0762, or HCPCS codes G0378 or G0379.

[h] Office/outpatient visits were identified using HCPCS codes 99201-99499.

[i] SNF stays were identified using non-swing bed or swing bed claims.

DME = durable medical equipment, ED = emergency department, HCPCS = Healthcare Common Procedure Coding System, HHA = home health agency, ICU = intensive care unit, SNF = skilled nursing facility.

Exhibit D.5 presents additional indicators of serious illness and frailty related to diagnoses of geriatric syndromes and markers of disease complications.[21] These measures are included as covariates in the entropy balancing weighting and reflect diagnoses in the 12 months before the anchor date.[22]

[21] Based on guidance from our clinical consultant, many measures are observed over different points in time over the year.

[22] See **Appendix F** for a description of the entropy balancing weighting used to align the characteristics of MCCM and comparison decedents.

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Exhibit D.5 Measures Indicative of Serious Illness and Frailty

Measure	Source Data	Description
Abnormal gait	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Three dichotomous (yes, no) indicators of being diagnosed with an abnormal gait during the 12 months before the EB weighting anchor date.[a,b]
Cerebral vascular accident/ traumatic brain injury	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Three dichotomous (yes, no) indicators of being diagnosed with a cerebral vascular accident/traumatic brain injury during the 12 months before the EB weighting anchor date.[a,b]
Cor pulmonale	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Dichotomous (yes, no) indicator of being diagnosed with cor pulmonale during the 12 months before the EB weighting anchor date.[b]
Deep vein thrombosis	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Dichotomous (yes, no) indicator of being diagnosed with deep vein thrombosis during the 12 months before the EB weighting anchor date.[b]
Delirium or altered mental status	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Three dichotomous (yes, no) indicators of being diagnosed with delirium or an altered mental status during the 12 months before the EB weighting anchor date.[a,b]
Depression	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Three dichotomous (yes, no) indicators of being diagnosed with depression during the 12 months before the EB weighting anchor date.[a,b]
Diabetes mellitus complication	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Three dichotomous (yes, no) indicators of being diagnosed with a diabetes mellitus complication during the 12 months before the EB weighting anchor date.[a,b]
Difficulty walking	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Three dichotomous (yes, no) indicators of being diagnosed with difficulty walking during the 12 months before the EB weighting anchor date.[a,b]
Hypercalcemia	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Dichotomous (yes, no) indicator of being diagnosed with hypercalcemia during the 12 months before the EB weighting anchor date.[b]
Hyponatremia	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Dichotomous (yes, no) indicator of being diagnosed with hyponatremia during the 12 months before the EB weighting anchor date.[b]

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Measure	Source Data	Description
Malnutrition	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Three dichotomous (yes, no) indicators of being diagnosed with malnutrition during the 12 months before the EB weighting anchor date.[a,b]
Muscle weakness	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Three dichotomous (yes, no) indicators of being diagnosed with muscle weakness during the 12 months before the EB weighting anchor date.[a,b]
Obesity	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Three dichotomous (yes, no) indicators of being diagnosed with obesity during the 12 months before the EB weighting anchor date.[a,b]
Paralysis	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Three dichotomous (yes, no) indicators of being diagnosed with paralysis during the 12 months before the EB weighting anchor date.[a,b]
Pericardial effusion (non-inflammatory)	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Dichotomous (yes, no) indicator of being diagnosed with a pericardial effusion (non-inflammatory) during the 12 months before the EB weighting anchor date.[b]
Pleural effusion	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Dichotomous (yes, no) indicator of being diagnosed with a pleural effusion during the 12 months before the EB weighting anchor date.[b]
Pneumonia	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Three dichotomous (yes, no) indicators of being diagnosed with pneumonia during the 12 months before the EB weighting anchor date.[a,b]
Pulmonary embolism	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Dichotomous (yes, no) indicator of being diagnosed with a pulmonary embolism during the 12 months before the EB weighting anchor date.[b]
Respiratory failure	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Three dichotomous (yes, no) indicators of being diagnosed with respiratory failure during the 12 months before EB weighting the anchor date.[a,b]
Sepsis	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Three dichotomous (yes, no) indicators of being diagnosed with sepsis during the 12 months before the EB weighting anchor date.[a,b]

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Measure	Source Data	Description
Urinary tract infection	Inpatient, HHA, hospice, SNF, outpatient, carrier, and DME claims; and HHA assessments, SNF and outpatient revenue, carrier, and DME line file	Three dichotomous (yes, no) indicators of being diagnosed with a urinary tract infection during the 12 months before the EB weighting anchor date.[a,b]

[a] We specified 3 indicators of health status during the last month, 2 to 3 months, and 4 to 12 months before the anchor date.

[b] See **Exhibit D.9** for a list of International Classification of Diseases and/or Healthcare Common Procedure Coding System codes.

DME = durable medical equipment, EB = entropy balancing, HHA = home health agency, SNF = skilled nursing facility.

D.4 ORGANIZATIONAL AND MARKET-LEVEL CHARACTERISTICS

To demonstrate the similarity of matched comparison and MCCM hospices discussed in **Section F.2**, we compared organizational and market-level characteristics of hospices participating in MCCM; the set of 236 matched, comparison hospices; and all the other hospices that submitted at least 1 MHB claim in 2015. To identify potential drivers of enrollment-related performance, we compared the organizational and market characteristics of hospices by cumulative enrollment levels and of active and withdrawn hospices, as shown in **Exhibits I.26** and **I.27**, respectively. In **Exhibits D.6** and **D.7**, we include the measures used to describe the organizational and market characteristics of hospices, respectively.[23] To describe hospice markets, we gathered ZIP codes of all individuals enrolled in the MHB in the United States in 2014, counted the number of beneficiary-ZIP code combinations served by each hospice in the United States, and assigned the hospice to the hospice referral region that contained the largest share of beneficiary ZIP codes. We then downloaded and tabulated data describing the characteristics of each hospice referral region from the Dartmouth Atlas of Health Care website.[24]

Exhibit D.6 Organizational Characteristics of Hospices

Characteristic	Data Source	Description
Age	CMS Provider of Services file[a]	We specified hospice age as a categorical variable as follows: • Founded in 1980s • Founded in 1990s • Founded in 2000s • Founded in 2010s.
Census region	CMS Provider of Services file[a]	Categorical measure of the census region in which the hospice is located based on the United States Federal Information Processing Standards state code[b] corresponding to the hospice's mailing address.

[23] The group of all other hospices are hospices that submitted at least one MHB claim in 2015; did not participate in MCCM; and did were not included in the set of matched, comparison hospices.

[24] For a description of data drawn from the Dartmouth Atlas of Health Care, see **Appendix C.3**.

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Characteristic	Data Source	Description
Chain affiliation[c]	CMS Provider of Services file[a]	Dichotomous (yes, no) measure of whether the hospice is part of a state-based, regional, or national chain.
Duration of stay in hospice[d]	Medicare claims	Continuous (0-100%) measure of the percentage of stays on MHB out of all stays that are[e]: • Under 7 days • Over 180 days. These cut points (less than 7 days and more than 180 days) inform whether MHB is serving its intended population, those with a 6-month or less prognosis.
Facility type	CMS Provider of Services file[a]	Dichotomous (yes, no) measure of hospice type: • Freestanding • Facility-based.
Hospice level of care[c]	Medicare claims	Continuous (0-100%) measure of the percentage of days of MHB enrollment for each level of care: • Continuous home care • General inpatient care • Inpatient respite care • Routine home care.
Hospice-level beneficiary demographics[c]	Medicare Enrollment Database	Continuous (0-100%) measure of the percentage of beneficiaries with each of the following demographics served by the hospice: • Female • White • Black • Hispanic • Asian • Other race • Ages under 65 • Ages 65-74 • Ages 75-84 • Ages 85+.
Mean length of stay[d]	Medicare claims	Continuous (0-maximum) measure of the average duration of MHB enrollment in days for all beneficiaries enrolled in MHB.
Non-hospice Medicare expenditures[f]	Medicare claims	Continuous ($0-maximum) measure of Medicare expenditures for care provided outside the hospice benefit while enrolled in MHB.
Nursing home penetration[g]	Medicare claims	Continuous (0-100%) measure of the percentage of routine home care days under MHB for beneficiaries residing in nursing homes (out of total routine home care days).

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Characteristic	Data Source	Description
Ownership	CMS Provider of Services file[a]	Categorical measure of the ownership type of the hospice provider. Ownership-type codes used to construct these categories include: • Non-profit 01 = Voluntary non-profit – church 02 = Voluntary non-profit – private 03 = Voluntary non-profit – other • For-profit 04 = Proprietary – individual 05 = Proprietary – partnership 06 = Proprietary – corporation 07 = Proprietary – other • Government 08 = Government – state 09 = Government – county 10 = Government – city 11 = Government – city-county 12 = Combination of government and non-profit • Other 13 = Other.
Quality of care ratings[h]	Consumer Assessment of Healthcare Providers and Systems Hospice Survey	Continuous (0-100) measure of care quality from the Consumer Assessment of Healthcare Providers and Systems Hospice Survey in quarters 2 through 4 of 2015: • Hospice team communication • Getting timely care • Overall rating.
Religious affiliation	CMS Provider of Services file[a]	Dichotomous (yes, no) measure identifying whether the hospice has a religious affiliation.
Size	Medicare claims	Continuous (0-maximum) measure of the number of days of MHB services provided in fiscal year 2015,[a,d] as defined by CMS for hospice payment and policy: https://www.federalregister.gov/documents/2017/08/04/2017-16294/medicare-program-fy-2018-hospice-wage-index-and-payment-rate-update-and-hospice-quality-reporting in Table 20. Size categories were based on the number of routine home care days the hospice provided MHB services in 2015 (the year before MCCM began): • Small: 0-3,499 routine home care days • Medium: 3.500-19,999 routine home care days • Large: 20,000 or more routine home care days

[a] We used the Provider of Services file from December 2015, which represents the year before MCCM implementation. We chose this year so that MCCM participation would not confound hospice characteristics in ways that could bias estimates of MCCM impacts. For eight new hospices in 2016, we used information in the Provider of Services file from December 2016.

[b] The U.S. Federal Information Processing Standards to census region crosswalk is available at: https://www2.census.gov/programs-surveys/popest/geographies/2011/state-geocodes-v2011.xls.

[c] We are missing chain information for 112 hospices, all of which come from the group of all other hospices. We have full information for MCCM hospices and the set of matched, comparison hospices.

[d] We are missing duration of stay, level of care, and beneficiary-level demographic data for 315 hospices, all of which come from the group of all other hospices. We have full information for MCCM hospices and the set of matched, comparison hospices.

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[e] We are missing mean length of stay for 328 hospices, all of which come from the group of all other hospices. We have full information for MCCM hospices and the set of matched, comparison hospices.

[f] Medicare expenditures outside the hospice benefit did not exist for 577 hospices, 2 of which were in the group of matched comparison hospices, and 575 of which were in the group of all other hospices. We have full information for MCCM hospices.

[g] We are missing nursing home penetration rates for 316 hospices, all of which come from the group of all other hospices. We have full information for MCCM hospices and the set of matched, comparison hospices.

[h] Quality-of-care information was not available for 1,621 hospices, 2 of which are MCCM hospices; 5 of which are matched, comparison hospices; and 1,614 of which are in the group of all other hospices.

MHB = Medicare hospice benefit.

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Exhibit D.7 Market Characteristics of Hospices

Characteristic	Data Source	Description
Percent of deaths occurring in hospital	Dartmouth Atlas of Health Care, hrr_eolchronic_dead6699ffs file	Continuous (0-100%) measure of the percentage of deaths occurring in a hospital as documented in the 100% MedPAR file for Medicare FFS beneficiaries during the measurement period.
Home health agency reimbursements per decedent	Dartmouth Atlas of Health Care, hrr_stdprices_ffs file	Continuous ($0-maximum) measure of risk-adjusted, per-decedent spending from the 100% home health agency files for Medicare FFS beneficiaries during the last two years of life.
Hospice reimbursements per decedent	Dartmouth Atlas of Health Care, hrr_eolchronic_dead6699ffs file	Continuous ($0-maximum) measure of risk-adjusted, per-decedent spending from the 100% hospice file for Medicare FFS beneficiaries during the last two years of life.
Hospice reimbursements per beneficiary	Dartmouth Atlas of Health Care, hrr_stdprices_ffs file	Continuous ($0-maximum) measure of risk-adjusted, annual per beneficiary spending from the 100% hospice file for Medicare FFS beneficiaries enrolled in hospice during the measurement period.
Hospital and skilled nursing facility reimbursements per decedent	Dartmouth Atlas of Health Care, hrr_stdprices_ffs file	Continuous ($0-maximum) measure of risk-adjusted, per-decedent spending from the 100% MedPAR file for Medicare FFS beneficiaries during the last two years of life.
Hospital care intensity index	Dartmouth Atlas of Health Care, hrr_eolchronic_dead6699ffs file	Continuous (0-maximum) measure of the amount of time spent in the hospital and the intensity of physician intervention during hospitalization, based on two variables: The number of days spent in the hospital and the number of inpatient physician visits experienced. For each variable, the Dartmouth Atlas of Health Care computes the ratio to the national average, and the index represents the simple average of these two ratios for Medicare FFS beneficiaries during the last two years of life.
Inpatient days per Medicare enrollee	Dartmouth Atlas of Health Care, hrr_medutil_6599ffs file	Continuous (0-maximum) measure of the number of inpatient days per Medicare FFS beneficiary from 100% MedPAR file during the measurement period.
Intensive care unit days per decedent	Dartmouth Atlas of Health Care, hrr_eolchronic_dead6699ffs file	Continuous (0-maximum) measure of the number of intensive care days divided by the number of Medicare FFS beneficiaries during the last two years of life from the 100% MedPAR files.
Share of MHB election within three days of death	Medicare Enrollment Database/Master Beneficiary Summary file	Continuous (yes, no) measure of the share of Medicare decedents enrolled in MHB within three days at the end of life within each HRR during 2015
Share of no MHB election	Medicare Enrollment Database/Master Beneficiary Summary file	Continuous (yes, no) measure of the share of Medicare decedents who did not enroll in MHB before death within each HRR.

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Characteristic	Data Source	Description
Medicare reimbursements per decedent	Dartmouth Atlas of Health Care, hrr_eolchronic_dead6699ffs file	Continuous ($0-maximum) measure of the sum of per-decedent spending rates from the combined 100% MedPAR, home health agency, hospice, durable medical equipment Part B, and outpatient files for Medicare FFS beneficiaries during the last two years of life.
Mortality rate among Medicare beneficiaries	Dartmouth Atlas of Health Care, hrr_mortality_dead6599ffs file	Continuous (0-100%) percentage of Medicare FFS beneficiaries who died during the measurement period.
Reimbursement for physician visits per decedent	Dartmouth Atlas of Health Care, hrr_eolchronic_dead6699ffs file	Continuous ($0-maximum) measure of the sum of per-decedent spending from the 100% Part B and outpatient files for Medicare FFS beneficiaries during the last two years of life.
Physician visits per decedent	Dartmouth Atlas of Health Care, hrr_eolchronic_dead6699ffs file	Continuous (0-maximum) measure of the number of all visits with an evaluation and management claim in the Part B file, and visits in federally qualified health centers and rural health centers in the outpatient file during Medicare FFS beneficiaries' last two years of life.
Medicare Advantage penetration rate	Medicare Enrollment Database/Master Beneficiary Summary file	Continuous (0-100%) percentage of beneficiaries who were enrolled in Medicare Advantage during the measurement period.

Note: To assign market characteristics to hospices, we first assigned hospices to HRRs based on the most frequent HRR among their beneficiaries in 2014, which corresponds to the first year of participation in MCCM. We verified that the results from this analysis would be similar had we assigned hospices to HRRs based on 2015 data. When 2016 HRR information was missing and information for 2015 was available (158 out of 4,162 hospices in the analysis), we assigned hospices to HRRs based on the 2015 data. When HRR information in both 2016 and 2015 was missing and 2014 data were available (41 hospices), we assigned hospices to HRRs based on the 2014 data. For all imputations, when two HRRs in the same year tied as the most frequent, we chose a single HRR at random. In the resulting data, 44 hospices were not assigned an HRR. Approximately 92% of hospices had at least 50% of their days in 2016 in a single HRR, and 72% of hospices had at least 75% of their days in a single HRR. We made no further imputations for these hospices. Medicare utilization, expenditures, and mortality rates were adjusted for age, sex, and race by the Dartmouth Atlas of Health Care. For descriptions of variables found in documentation provided by the Dartmouth Atlas of Health Care, see: http://www.dartmouthatlas.org/tools/faq/researchmethods.aspx.

FFS = fee-for-service, HRR = hospital referral region, MedPAR = Medicare Provider Analysis and Review, MHB = Medicare hospice benefit.

D.5 MEASURES OF MCCM IMPACTS ON UTILIZATION AND EXPENDITURE OUTCOMES

In **Exhibit D.8**, we describe the outcome measures used to estimate MCCM's impacts on end-of-life utilization, Medicare expenditures, and hospice transitions. For utilization and Medicare expenditure measures, we estimate impacts during the last 7, 30, 60, 90, and 180 days of life. We report estimated impacts of these measures in **Section 4** of the main report and **Appendix G**.

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Exhibit D.8 Measures of MCCM Impacts on Utilization and Expenditure Outcomes

Measure	Source Data	Description[f]
Utilization (per 1,000 decedents)		
Ambulance transports	Carrier and outpatient claims[a]	Number of ambulance transport claims in the relevant outcome measurement period.[b]
ED visits	Inpatient and outpatient claims[c]	Number of ED visit claims in the relevant outcome measurement period.[b]
HHA episodes	HHA claims	Number of HHA episode claims in the relevant outcome measurement period.[b]
Inpatient admissions	Inpatient claims	Number of claims for planned or unplanned inpatient admissions in the relevant outcome measurement period; if an observation stay and/or ED visit resulted in an inpatient admission, that inpatient admission is included.[b]
Inpatient 30-day readmissions	Inpatient claims	Number of claims for unplanned inpatient 30-day readmissions in the relevant outcome measurement period.[b]
ICU stays	Inpatient claims[d]	Number of ICU stay claims in the relevant outcome measurement period.[b]
Observational stays	Inpatient and outpatient claims[e]	Number of observational stay claims in the relevant outcome measurement period.[b]
Office/ outpatient visits	Carrier and outpatient claims[f]	Number of claims for evaluation and management visits with providers in community and institutional settings in the relevant outcome measurement period.[b]
Medicare expenditures		
Total Medicare expenditures	Inpatient, outpatient, carrier, HHA, SNF, hospice, and DME claims	Total Part A and B Medicare expenditures in the relevant outcome measurement period.[b]
Inpatient admission expenditures	Inpatient claims	Inpatient admission expenditures in the relevant outcome measurement period.[b]
Outpatient expenditures	Outpatient claims	Outpatient expenditures in the relevant outcome measurement period.[b]
Physician/ supplier Part B expenditures	Carrier and outpatient claims[f]	Expenditures for evaluation and management visits with providers in community and institutional settings in the relevant outcome measurement period.[b]
HHA expenditures	HHA claims	HHA expenditures in the relevant outcome measurement period.[b]
SNF expenditures	SNF claims	SNF expenditures in the relevant outcome measurement period.[b]
Hospice expenditures	Hospice claims	Hospice expenditures under the traditional MHB, excluding per-beneficiary, per-month payments to hospices participating in MCCM in the relevant outcome measurement period.[b]
DME expenditures	DME claims	DME expenditures in the relevant outcome measurement period.[b]

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Measure	Source Data	Description[f]
Transitions to MHB		
Number of days from MHB enrollment to death	Medicare Enrollment Database/Master Beneficiary Summary file	Number of days from date of enrollment in MCCM to date of death among MCCM enrollees that transitioned to MHB.
Transition to hospice	Medicare Enrollment Database/Master Beneficiary Summary file	Dichotomous (yes, no) indicator designating whether the beneficiary was enrolled in MHB before death.
Transition to hospice in the last two days of life	Medicare Enrollment Database/Master Beneficiary Summary file	Dichotomous (yes, no) indicator designating whether the beneficiary enrolled in MHB for one or two days. The number of days in MHB is calculated as the number of days from the date of enrollment in MHB (discharge from MCCM to MHB) to date of death, less any days the beneficiary was not enrolled in MHB during that time period.

[a] Ambulance transports were identified using HCPCS codes A0426, A0427, A0428, A0429, and A0999.

[b] Each utilization and expenditure outcome is measured during the last 7, 30, 60, 90, and 180 days of life.

[c] ED visits were identified using revenue center codes 0450, 0451, 0452, 0456, or 0459.

[d] ICU stays were identified using revenue center codes 0200, 0201, 0202, 0203, 0204, 0207, 0208, or 0209.

[e] Observational stays were identified using revenue center codes 0760 or 0762, or HCPCS codes G0378 or G0379.

[f] Office-based visits were identified using HCPCS codes 99201-99499.

DME = durable medical equipment, ED = emergency department, HHA = home health agency, HCPCS = Healthcare Common Procedure Coding System, ICU = intensive care unit, MHB = Medicare hospice benefit, SNF = skilled nursing facility.

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D.6 DIAGNOSTIC AND STANDARDIZED BILLING CODES

Exhibit D.9 International Classification of Disease and Healthcare Common Procedure Coding System Codes Used to Identify Serious Health Conditions and Medicare Services Used by MCCM Enrollees

Measure	ICD and HCPCS Codes
MCCM-qualifying diagnoses[a]	
Cancer claim codes	ICD 9: 1400, 1420, 1421, 1422, 1428, 1429, 1430, 1431, 1438, 1439, 1440, 1441, 1448, 1449, 1450, 1451, 1452, 1453, 1454, 1455, 1456, 1458, 1459, 1460, 1461, 1462, 1463, 1464, 1465, 1466, 1467, 1468, 1469, 1470, 1471, 1472, 1473, 1478, 1479, 1480, 1481, 1482, 1483, 1488, 1489, 1490, 1491, 1498, 1499, 1500, 1501, 1502, 1503, 1504, 1505, 1508, 1509, 1510, 1511, 1512, 1513, 1514, 1515, 1516, 1518, 1519, 1520, 1521, 1522, 1523, 1528, 1529, 1530, 1531, 1532, 1533, 1534, 1535, 1536, 1537, 1538, 1539, 1540, 1541, 1542, 1543, 1548, 1550, 1551, 1552, 1560, 1561, 1562, 1568, 1569, 1570, 1571, 1572, 1573, 1574, 1578, 1579, 1580, 1588, 1589, 1590, 1591, 1598, 1599, 1600, 1601, 1602, 1604, 1605, 1608, 1609, 1610, 1611, 1612, 1613, 1618, 1619, 1620, 1622, 1623, 1624, 1625, 1628, 1629, 1630, 1631, 1638, 1639, 1640, 1641, 1642, 1643, 1648, 1649, 1650, 1658, 1659, 1700, 1701, 1702, 1703, 1704, 1705, 1706, 1707, 1708, 1709, 1710, 1712, 1713, 1714, 1715, 1716, 1717, 1718, 1719, 1720, 1721, 1722, 1723, 1724, 1725, 1726, 1727, 1728, 1729, 1730, 1740, 1741, 1742, 1743, 1744, 1745, 1746, 1748, 1749, 1750, 1759, 1760, 1761, 1762, 1763, 1764, 1765, 1768, 1769, 1800, 1801, 1808, 1820, 1821, 1828, 1830, 1832, 1833, 1834, 1835, 1838, 1840, 1841, 1842, 1843, 1844, 1848, 1849, 185X, 1860, 1869, 1871, 1872, 1873, 1874, 1875, 1876, 1877, 1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1890, 1891, 1892, 1893, 1894, 1898, 1899, 1900, 1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1928, 1929, 193X, 1940, 1941, 1943, 1944, 1945, 1946, 1948, 1949, 1950, 1951, 1952, 1953, 20000, 20001, 20002, 20003, 20004, 20005, 20006, 20007, 20008, 20010, 20011, 20012, 20013, 20014, 20015, 20016, 20017, 20018, 20020, 20021, 20022, 20023, 20024, 20025, 20026, 20027, 20028, 20030, 20031, 20032, 20033, 20034, 20035, 20036, 20037, 20038, 20040, 20041, 20042, 20043, 20044, 20045, 20046, 20047, 20048, 20050, 20051, 20052, 20053, 20054, 20055, 20056, 20057, 20058, 20060, 20061, 20062, 20063, 20064, 20065, 20066, 20067, 20068, 20070, 20071, 20072, 20073, 20074, 20075, 20076, 20077, 20078, 20080, 20081, 20082, 20083, 20084, 20085, 20086, 20087, 20088, 20100, 20101, 20102, 20103, 20104, 20105, 20106, 20107, 20108, 20110, 20111, 20112, 20113, 20114, 20115, 20116, 20117, 20118, 20120, 20121, 20122, 20123, 20124, 20125, 20126, 20127, 20128, 20140, 20141, 20142, 20143, 20144, 20145, 20146, 20147, 20148, 20150, 20151, 20152, 20153, 20154, 20155, 20156, 20157, 20158, 20160, 20161, 20162, 20163, 20164, 20165, 20166, 20167, 20168, 20170, 20171, 20172, 20173, 20174, 20175, 20176, 20177, 20178, 20190, 20191, 20192, 20193, 20194, 20195, 20196, 20197, 20198, 20200, 20201, 20202, 20203, 20204, 20205, 20206, 20207, 20208, 20220, 20221, 20222, 20223, 20224, 20225, 20226, 20227, 20228, 20230, 20231, 20232, 20233, 20234, 20235, 20236, 20237, 20238, 20240, 20241, 20242, 20243, 20244, 20245, 20246, 20247, 20248, 20250, 20251, 20252, 20253, 20254, 20255, 20256, 20257, 20258, 20260, 20261, 20262, 20263, 20264, 20265, 20266, 20267, 20268, 20270, 20271, 20272, 20273, 20274, 20275, 20276, 20277, 20278, 20280, 20281, 20282, 20283, 20284, 20285, 20286, 20287, 20288, 20290, 20291, 20292, 20293, 20294, 20295, 20296, 20297, 20298, 20300, 20301, 20302, 20400, 20402, 20500, 20502, 20600, 20602, 20700, 20702, 20800, 20802 ICD 10: C01, C020, C021, C022, C023, C024, C028, C029, C030, C031, C039, C040, C041, C048, C049, C050, C051, C052, C058, C059, C060, C061, C062, C0680, C0689, C069X, C07X, C080, C081, C089, C090, C091, C098, C099, C100, C101, C102, C103, C104, C108, C109, C110, C111, C112, C113, C118, C119, C12X, C130, C131, C132, C138, C139, C140, C142, C148, C153, C154, C155, C158, C159, C160, C161, C162, C163, C164, C165, C166, C168, C169, C170, C171, C172, C173, C178, C179, C180, C181, C182, C183, C184, C185, C186, C187, C188, C189, C19X, C20X, C210, C211, C212, C218, C220, C221, C222, C223, C224, C227, C228, C229, C23X, C240, C241,

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Measure	ICD and HCPCS Codes
	C248, C249, C250, C251, C252, C253, C254, C257, C258, C259, C260, C261, C269, C300, C301, C310, C311, C312, C313, C318, C319, C320, C321, C322, C323, C328, C329, C33X, C3400, C3401, C3402, C3410, C3411, C3412, C342X, C3430, C3431, C3432, C3480, C3481, C3482, C3490, C3491, C3492, C37XX, C380, C381, C382, C383, C384, C388, C390, C399, C4000, C4001, C4002, C4010, C4011, C4012, C4020, C4021, C4022, C4030, C4031, C4032, C4080, C4081, C4082, C4090, C4091, C4092, C410, C411, C412, C413, C414, C419, C430, C4310, C4311, C4312, C4320, C4321, C4322, C4330, C4331, C4339, C434X, C4351, C4352, C4359, C4360, C4361, C4362, C4370, C4371, C4372, C438, C439, C450, C451, C452, C457, C459, C460, C461, C462, C463, C464, C4650, C4651, C4652, C467, C469, C470, C4710, C4711, C4712, C4720, C4721, C4722, C473X, C474, C475, C476, C478, C480, C481, C482, C488, C490, C4910, C4911, C4912, C4920, C4921, C4922, C493, C494, C495, C496, C498, C499, C50011, C50012, C50019, C50021, C50022, C50029, C50111, C50112, C50119, C50121, C50122, C50129, C50211, C50212, C50219, C50221, C50222, C50229, C50311, C50312, C50319, C50321, C50322, C50329, C50411, C50412, C50419, C50421, C50422, C50429, C50511, C50512, C50519, C50522, C50529, C50611, C50612, C50619, C50621, C50622, C50629, C50811, C50812, C50819, C50821, C50822, C50829, C50911, C50912, C50919, C50921, C50922, C50929, C510, C511, C512, C518, C519, C530, C531, C538, C539, C540, C541, C542, C543, C548, C549, C55, C561, C562, C569, C5700, C5701, C5702, C5710, C5711, C5712, C5720, C5721, C5722, C573, C574, C577, C578, C579, C58, C600, C601, C602, C608, C609, C61, C6200, C6201, C6202, C6210, C6211, C6212, C6290, C6291, C6292, C6300, C6301, C6302, C6310, C6311, C6312, C632, C637, C638, C639, C641, C642, C649, C651, C659, C661, C669, C670, C671, C672, C673, C674, C675, C676, C677, C678, C679, C680, C681, C688, C689, C6900, C6901, C6902, C6910, C6911, C6912, C6920, C6921, C6922, C6930, C6931, C6932, C6940, C6941, C6942, C6950, C6951, C6952, C6960, C6961, C6962, C6980, C6981, C6982, C6990, C6991, C6992, C700, C701, C709, C710, C711, C712, C713, C714, C715, C716, C717, C718, C719, C720, C721, C7220, C7221, C7222, C7230, C7231, C7232, C7240, C7241, C7242, C7250, C7259, C729, C73, C7400, C7401, C7402, C7410, C7411, C7412, C7490, C7491, C7492, C750, C751, C752, C753, C754, C755, C758, C759, C7A00, C7A010, C7A011, C7A012, C7A019, C7A020, C7A021, C7A022, C7A023, C7A024, C7A025, C7A026, C7A029, C7A090, C7A091, C7A092, C7A093, C7A094, C7A095, C7A096, C7A1, C7A8, C7B00, C7B01, C7B02, C7B03, C7B04, C7B09, C7B1, C7B8, C760, C761, C762, C763, C7640, C7641, C7642, C7650, C7651, C7652, C768, C770, C771, C772, C773, C774, C775, C778, C779, C7800, C7801, C7802, C781, C782, C7830, C7839, C784, C785, C786, C787, C7880, C7889, C7900, C7902, C7910, C7911, C7919, C792, C7931, C7932, C7940, C7949, C7951, C7952, C7960, C7961, C7962, C7970, C7971, C7972, C7981, C7982, C7989, C799, C800, C801, C802, C8100, C8101, C8102, C8103, C8104, C8105, C8106, C8107, C8108, C8109, C8110, C8111, C8112, C8113, C8114, C8115, C8116, C8117, C8118, C8119, C8120, C8121, C8122, C8123, C8124, C8125, C8126, C8127, C8128, C8129, C8130, C8131, C8132, C8133, C8134, C8135, C8136, C8137, C8138, C8139, C8140, C8141, C8142, C8143, C8144, C8145, C8146, C8147, C8148, C8149, C8170, C8171, C8172, C8173, C8174, C8175, C8176, C8177, C8178, C8179, C8190, C8191, C8192, C8193, C8194, C8195, C8196, C8197, C8198, C8199, C8200, C8201, C8202, C8203, C8204, C8205, C8206, C8207, C8208, C8209, C8210, C8211, C8212, C8213, C8214, C8215, C8216, C8217, C8218, C8219, C8220, C8221, C8222, C8223, C8224, C8225, C8226, C8227, C8228, C8229, C8230, C8231, C8232, C8233, C8234, C8235, C8236, C8237, C8238, C8239, C8240, C8241, C8242, C8243, C8244, C8245, C8246, C8247, C8248, C8249, C8250, C8251, C8252, C8253, C8254, C8255, C8256, C8257, C8258, C8259, C8260, C8261, C8262, C8264, C8265, C8266, C8267, C8268, C8269, C8280, C8281, C8282, C8283, C8284, C8285, C8286, C8287, C8288, C8289, C8290, C8291, C8292, C8293, C8294, C8295, C8296, C8297, C8298, C8299, C8300, C8301, C8302, C8303, C8304, C8305, C8306, C8307, C8308, C8309, C8310, C8311, C8312, C8313, C8314, C8315, C8316, C8317, C8318, C8319, C8330, C8331, C8332, C8333, C8334, C8335, C8336, C8337, C8338, C8339, C8350, C8351, C8352, C8353,

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Measure	ICD and HCPCS Codes
	C8354, C8355, C8356, C8357, C8358, C8359, C8370, C8371, C8372, C8374, C8375, C8376, C8377, C8378, C8380, C8381, C8382, C8383, C8384, C8385, C8386, C8387, C8388, C8389, C8390, C8391, C8392, C8393, C8394, C8395, C8396, C8397, C8398, C8399, C8400, C8401, C8402, C8403, C8405, C8406, C8407, C8408, C8409, C8410, C8411, C8412, C8413, C8414, C8415, C8416, C8417, C8418, C8419, C8440, C8441, C8442, C8443, C8444, C8445, C8446, C8447, C8448, C8449, C8460, C8461, C8462, C8463, C8464, C8465, C8466, C8467, C8468, C8469, C8470, C8471, C8472, C8473, C8474, C8475, C8476, C8477, C8478, C8479, C84A0, C84A1, C84A2, C84A3, C84A4, C84A5, C84A6, C84A7, C84A8, C84A9, C84Z0, C84Z1, C84Z2, C84Z3, C84Z4, C84Z5, C84Z6, C84Z7, C84Z8, C84Z9, C8490, C8491, C8492, C8493, C8494, C8495, C8496, C8497, C8498, C8499, C8510, C8511, C8512, C8513, C8514, C8515, C8516, C8517, C8518, C8519, C8520, C8521, C8522, C8523, C8524, C8525, C8526, C8527, C8528, C8529, C8580, C8581, C8582, C8583, C8584, C8585, C8586, C8587, C8588, C8589, C8590, C8591, C8592, C8593, C8594, C8595, C8596, C8597, C8598, C8599, C860, C861, C862, C863, C864, C865, C866, C880, C882, C883, C884, C888, C889, C9000, C9001, C9002, C9010, C9011, C9012, C9021, C9022, C9030, C9031, C9032, C9100, C9101, C9102, C9110, C9111, C9112, C9130, C9131, C9132, C9140, C9141, C9142, C9150, C9151, C9152, C9160, C9161, C9162, C91A0, C91A1, C91A2, C91Z0, C91Z1, C91Z2, C9190, C9191, C9192, C9200, C9201, C9202, C9210, C9211, C9212, C9220, C9221, C9222, C9230, C9231, C9232, C9240, C9241, C9242, C9250, C9251, C9252, C9260, C9261, C9262, C92A0, C92A1, C92A2, C92Z0, C92Z1, C92Z2, C9290, C9291, C9292, C9300, C9301, C9302, C9310, C9311, C9312, C9330, C9331, C9332, C93Z0, C93Z1, C93Z2, C9390, C9392, C9400, C9401, C9402, C9420, C9421, C9422, C9430, C9431, C9432, C9440, C9441, C9442, C946, C9480, C9481, C9482, C9500, C9501, C9502, C9510, C9511, C9512, C9590, C9591, C9592, C960, C962, C964, C965, C966, C96A, C96Z
Chronic obstructive pulmonary disease claim codes	ICD 9: 49120, 49121, 49122, 4920, 4928, 49320, 49321 ICD 10: J430, J431, J432, J438, J439, J440, J441, J449, J470, J471, J479
Congestive heart failure claim codes	ICD 9: 40201, 40211, 40291, 40401, 40411, 40491, 4281, 4282, 42821, 42822, 42823, 42830, 42831, 42832, 42833, 42840, 42841, 42842, 42843, 4289 ICD 10: I110, I130, I501, I5020, I5021, I5022, I5023, I5030, I5031, I5032, I5033, I5040, I5042, I5043, I509
Human immunodeficiency virus/acquired immunodeficiency syndrome claim codes	ICD 9: B20 ICD 10: 042
Indicators of serious illness and frailty	
Acute renal failure in past year	ICD 9: 584 ICD 10: N179
Abnormal gait in past month	ICD 9: 781.2, 719.7 ICD 10: R29.6, R26.2, R26.89, R26.9

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Measure	ICD and HCPCS Codes
Cerebral vascular accident/ traumatic brain injury in past year	ICD 9: 348, 430, 431, 432, 852, 853, 854, 349.82, 433.01, 433.11, 433.21, 433.31, 433.91, 434.01, 434.11, 434.91 ICD 10: G930, G93.1, G93.2, G93.40, G93.41, G93.49, I67.83, G93.5, G93.6, G93.81, G93.82, G93.89, G93.9, S066X0A, S066X1A, S066X2A, S066X3A, S066X4A, S066X5A, S066X6A, S066X7A, S066X8A, S066X9A, S066X9A, S0190XA, S065X0A, S065X1A, S065X2A, S065X3A, S065X4A, S065X5A, S065X6A, S065X7A, S065X8A, S065X9A, S064X0A, S064X0A, S064X1A, S064X2A, S064X3A, S064X4A, S064X5A, S064X6A, S064X7A, S064X8A, S064X9A, S06360A, S06362A, S06363A, S06364A, S06365A, S06366A, S06367A, S06368A, S06369A, S06890A, S061X0A, S069X0A, S061X1A, S061X2A, S069X1A, S069X2A, S069X3A, S069X4A, S061X5A, S069X5A, S061X6A, S061X7A, S061X8A, S069X6A, S061X9A, S069X9A, S060X0A, S06890A, S06891A, S06892A, S06893A, S06894A, S06895A, S06896A, S06897A, S06898A, S06899A, S06890A, G92, I6322, I63139, I63239, I63019, I63110, I63219, I6359, I6320, I6330, I6340, I6350 HCPCS: S8040, G9538
Cor pulmonale	ICD 9: 4169, 415 ICD 10: I2781, I26
Deep vein thrombosis	ICD 9: 275.42, 453.42, 453.4, 453.82 453.72, 453.41, 453.42, 453.5, 453.82, 453.51, 453.52, 453, 459.1 ICD 10: E83.52, I82.491, I82.492, I82.499, I82.591, I82.592, I82.49, I82.59, I82.40, I82.62, 182.72, 182.4Y, 182.4Z, 182.493, 182.593, 182.599, 182.629, 182.50, 182.5Y, 182.5Z, 182.409, 182, 187.009
Delirium or altered mental status	ICD 9: 29.3, 293.1, 780.97, 780.02, 780.09, 780.39 ICD 10: F05, F062, F060, F0630, F064, F061, F53, F068, R41.82, R40.4, R40.0, R40.1, R56.9
Depression	ICD 9: 311, 296.82, 296.31, 296.32, 296.33, 296.34, 288.0, 296.35, 296.36, 296.30, 296.20, 296.34, 298.0, 296.24, 296.21, 296.22, 296.23, 296.25, 296.26, 296.32, 296.33 ICD 10: F32.8, F32.89, F33, F33.9, F32.9, F33.3, F32.3, F33.4, F32.0, F32.1, F32.2, F32.4, F32.5, F33.1, F33.2, F33.41, F33.42, F33.8 HCPCS: G8126
Diabetes mellitus complication	ICD 9: 250.40, 250.41, 250.42, 250.43, 250.60, 250.61, 250.62 250.7, 250.9 ICD 10: E1129, E1029, E1121, E1165, E1021, E1065, E1140, E1040, E1051, E1151, E118, E108
Difficulty walking	ICD 9: 719.7, 781.2, 781.3, 438.85, V46.3 ICD 10: R26.2, Z99.3, R26.0, R26.1, R26.89, R26.9
Hypercalcemia	ICD 9: 275.42 ICD 10: E83.52
Hyponatremia	ICD 9: 2760, 2761 ICD 10: E870, E871
Malnutrition	ICD 9: 261, 262, 263. ICD 10: E40-E46
Muscle weakness	ICD 9: 728.87 ICD 10: M62.81
Obesity	ICD 9: 278.0, 278.00, 278.01, 278.03, V85.3, V85.30, V85.31, V85.32, V85.33, V85.34, V85.35, V85.36, V85.37, V85.38, V85.39, V85.4, V85.41, V85.42, V85.43, V85.44, V85.45 ICD 10: E66.01, E66.09, E66.1, E66.2, E66.8, E66.9, Z68.30, Z68.31, Z68.32, Z68.33, Z68.34, Z68.35, Z68.36, Z68.37, Z68.38, Z68.39, Z68.41, Z68.42, Z68.43, Z68.44, Z68.45 HCPCS: G0447, G0473, S2085, G0449
Paralysis	ICD 9: 342, 438.2, 438.3, 438.4, 438.5, 344, 781.4 ICD 10: G81.00, G81.01, G81.02, G81.03, G81.04, G81.10, G81.11, G81.12, G81.13, G81.14, G81.90, G81.91, G81.92, G81.94, G81.90, G81.91, G81.92, G8.93, G8.94, I69959, I69951, I69952, I69953, I69954, I69939, I69931, I69932, I69933, I69934, I69949, I60041, I60042, I60043, I69944, I69969, I69961, I69962, I69963, I69964, I69965, G82.50,

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Measure	ICD and HCPCS Codes
	G82.51, G82.52, G82.53, G82.54, G82.50, G82.20, G83.0, G83.10, G83.11, G83.12, G83.13, G83.14, G83.20, G83.21, G83.22, G83.23, G83.24, G83.30, G93.4, G93.5, G83.31, G83.84, G83.89, G83.9, R56.9
Pericardial effusion (non-inflammatory)	ICD 9: 423.9 ICD 10: I313
Pleural effusion	ICD 9: 5111, 51189, 51181, 5119 ICD 10: I26, Z86.711, Z86.718, I27.82
Pneumonia	ICD 9: 480-486 ICD 10: J12.X, J13, J14, J15.x, J16.X, J18.X HCPCS: G9679
Pulmonary embolism	ICD 9: 415.1, V12.55, V12.51, 416.2 ICD 10: J90, J910, J918
Respiratory failure	ICD 9: 51881, 51883, 51884 ICD 10: J96
Sepsis	ICD 9: 995.91, 995.92, 036, 038, 040.0, 041, 032.0, 032.1, 681, 682, 730, 031.0, 031.2, 790.7, 032.82, 032.83, 053.0, 053.13, 054.5, 136.3, 320.0, 785.4, 112.83, 112.81, 112.5 ICD 10: A419, R6520, A409, A412, A4101, A4102, A411, A403, A414, A4150, A413, A4151, A4152, A4153, A4159, A4189, A419, A480, B95.X, B96.X, A36.0, A36.1, R78.81, A36.81, A36.89, B02.1, B02.23, B0.07, B59, G0.00, I96, B3.75, B37.6, B37.7
Urinary tract infection	ICD 9: 599 ICD 10: N39.0 HCPCS: G9684
Durable medical equipment	
Use of any durable medical equipment	ICD 9: 96.6, V46.2, V46.3, V49.84, V53.8 ICD 10: 3E0G36Z, F08Z0FZ, F0FZ0EZ, F0FZ0FZ, F0FZ0UZ, Z99.3, Z46.89, Z99.81 HCPCS: E0100, E0105, A4636, E2207, K0102, A4637, E0130, E0135, E0140, E0141, E0143, E0144, E0147, E0148, E0149, E0154, E0155, E0156, E0157, E0158, E1050, E1060, E1070, E1083-1093, E1100, E1110, E1120, E1140, E1150, E1160, E1161, E1170, K0001-9, E0240, E0241, E0242, E0245, E0245, E0247, E0248, E0249, E0163, E0164, E0165, E0166, E0170, E0171, E0175, E0168, E0968, E0169, E0243, E0244, E0250, E0251, E0255, E0256, E0260, E0261, E0265, E0266, E0270, E0290, E0291-297, E0301-304, E0316, B9002 , B9004, B9006, B9998, B9999, B4164, B4168, B4172, B4176, B4178, B4180, B4185, B4189, B4193, N4197, B4199, B4216, B4220, B4222, B4224, B5000, B5100, B5200, B4034-B4036, B4081-B4083, B4087-88, B4100-4104, B4149-B4155, B4157-B4162, E1390-1392, E0431, E0433-435, E0439, E0441-443
Use of home oxygen	ICD 9: V46.2 ICD 10: Z99.81 HCPCS: E1390-1392, E0431, E0433-435, E0439, E0441-443
Use of hospital bed	ICD 9: V49.84 ICD 10: Z74.01 HCPCS: E0250, E0251, E0255, E0256, E0260, E0261, E0265, E0266, E0270, E0290, E0291-297, E0301-304, E0316
Use of wheelchair	ICD 9: V46.3, V53.8 ICD 10: Z99.3, Z46.89 HCPCS: E1050, E1060, E1070, E1083-E1093, E1100, E1110, E1120, E1140, E1150, E1160, E1161, E1170, K0001-K0009

[a] The list of ICD codes used to identify an MCCM-qualifying diagnosis (i.e., cancer, chronic obstructive pulmonary disease, congestive heart failure, human immunodeficiency virus/acquired immunodeficiency syndrome claim codes). This list is stored on the MCCM portal.

HCPCS = Healthcare Common Procedure Coding System, ICD = International Classification of Diseases.

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Appendix E. MCCM Service Delivery and Quality Measures

This appendix describes our approaches for measuring Medicare Care Choices Model (MCCM) service delivery, quality of care, transitions to the Medicare hospice benefit (MHB), and beneficiaries' use of selected Medicare services while enrolled in the model, as described in **Section 4** in the main report and **Appendix I.4**. We used these measures to assess whether MCCM delivered supportive services, as needed, and curative treatment; and promoted beneficiaries' quality of life.

E.1 MEASURING CARE RECEIVED BY MCCM ENROLLEES

MCCM hospices record the services and activities received by MCCM enrollees and their caregivers in the MCCM portal. The MCCM portal is a secure, online website for entering structured data describing three distinct components of MCCM-delivered care that are depicted in **Exhibit E.1**:

- **Encounters**: Meetings during which an MCCM hospice provider performs a service for an MCCM enrollee or caregiver/family member. Meetings may occur in person; by phone; or online in the form of a visit or interdisciplinary group meeting, or after-hours triage care.
- **Providers**: Professionals or volunteers who deliver MCCM services to enrolled beneficiaries.
- **Services**: Types of care that occur during the encounters; typically, multiple services are delivered during a single encounter by a single provider.

When compiled, these data comprehensively describe the care provided by MCCM hospice staff to enrolled beneficiaries.

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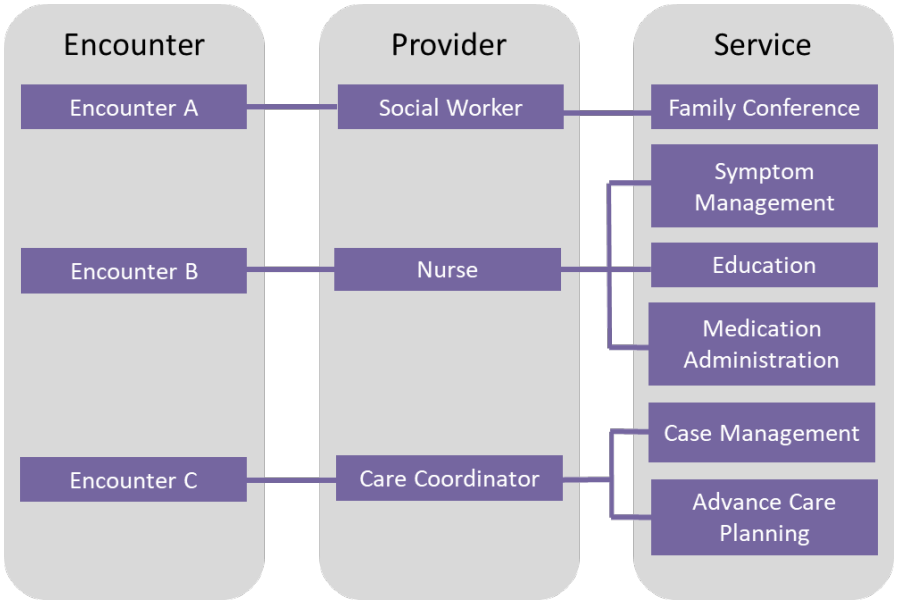
Exhibit E.1 Relationships among Components of MCCM-Delivered Care



Below we specify the measures that we used to describe the services and activities provided by MCCM hospice staff, as shown in **Exhibit E.2**. Revisions to the MCCM portal effective January 1, 2018 included changes to the data elements related to the documentation of:

- Interdisciplinary group meetings
- Initial and comprehensive assessments
- Hospitalizations
- Treatment preferences.

Exhibit E.2 Services and Activities Reported by Hospices in the MCCM Portal

Measure	Data Source	Description
Length of enrollment	MCCM portal	Continuous (0-maximum) measure calculated as the MCCM discharge date minus the MCCM enrollment date plus one (e.g., a person discharged on his or her admission day would have an enrollment length of one day, a person discharged the day after his or her enrollment day would have an enrollment length of two days).
Encounter[a]		
Encounter date	MCCM portal	Date on which MCCM hospice staff performed a service for an MCCM enrollee or caregiver/family member.
Encounters per month	MCCM portal	Continuous (0–maximum) measure of the total number of encounters for an enrollee first divided by that enrollee's length of MCCM enrollment, producing a daily rate of encounters, then multiplied by 30 to create a monthly rate of encounters.

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Measure	Data Source	Description
Location	MCCM portal	Categorical measure of the location of the encounter: • Beneficiary's home/residence • Skilled nursing facility • Inpatient rehabilitation facility • Inpatient hospital • Inpatient psychiatric facility • Place not otherwise specified.
Service delivery mode	MCCM portal	Categorical measure of service delivery mode for the encounter: • Phone (clinical/support) • In person (home or community) • Mail • Video conferencing • Phone (administrative) • Email.
Provider type	MCCM portal	Categorical measure of the professional affiliation of the service provider for the encounter: • MCCM RN care coordinator • Hospice RN/LPN • Nurse practitioner • Nursing aide • Hospice physician • Social worker • Pharmacist • Chaplain • Volunteer • Nutritional counselor • Bereavement counselor • Other spiritual counselor • Art therapist • Music therapist • Massage therapist • Pet therapist • Additional therapist • Administrative/non-clinical.
Recipient	MCCM portal	Categorical measure of the recipient of the encounter (one or more of the following): • Beneficiary • Family member • Paid/unpaid caregiver.
Encounter type		
First visit	MCCM portal	Dichotomous (yes, no) indicator designating whether the visit was the first visit.
Follow-up visit	MCCM portal	Dichotomous (yes, no) indicator designating whether the visit was a follow-up visit.
Post-inpatient discharge	MCCM portal	Dichotomous (yes, no) indicator designating whether the visit was a post-inpatient discharge.
Inpatient coordination of care	MCCM portal	Dichotomous (yes, no) measure designating whether the visit was related to inpatient coordination of care.

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Measure	Data Source	Description
After-hours triage	MCCM portal	Dichotomous (yes, no) measure designating whether the visit was for after-hours triage care.
IDG	MCCM portal	Dichotomous (yes, no) measure designating whether the encounter was an IDG. • During 2016-June 2017, the portal did not systematically record IDGs by hospices • As of July 1, 2017, CMS instructed hospices to record IDG meetings by selecting "other" service type and writing "interdisciplinary group" or "IDG" in the open-text description. • Starting in 2018, the portal directly captured IDGs using a checkbox.
Service type[b]		
Advance care planning	MCCM portal	January 1, 2016 through December 31, 2017: Dichotomous (yes, no) indicator of the response to the question: *Was the patient asked about advance care planning such as goals of care, treatment preferences, transition to hospice, appointing a health care agent, etc.?* Starting January 1, 2018: Categorical measures of two-part responses to the question: Part 1: *Was the patient asked about advance care planning such as goals of care, treatment preferences, and transition to hospice, appointing a health care agent, etc.?* • No • Yes, and discussion occurred • Yes, but the enrollee refused to discuss • Yes, but enrollee is unable and party/caregiver refused to discuss. Part 2: *If no, reason there was no counseling about advance care planning*: • Declined to discuss • Enrollee unable to discuss/participate • Outside hospice team member scope of practice • Other (free text).

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Measure	Data Source	Description
Assessment	MCCM portal	Categorical measure of the timing of the administration of assessments of enrollee symptoms, health status, and psychological well-being: • 48-hour initial assessment • Comprehensive assessment within five days of admission • Subsequent comprehensive assessment that is expected to occur every 15 days. January 1, 2016 through December 31, 2017: Because the original portal did not differentiate among assessment types between 2016 and 2017, we developed a decision rule to determine the type of assessment. To do this, we assumed that an encounter was an initial assessment if: • The service type was "initial" and the encounter date was the same as the "date of completion of comprehensive assessment" reported on the enrollee baseline form from the MCCM portal. This may identify some visits as comprehensive assessments when they are not, as some hospices used "initial" service type to record the first visit by a discipline (e.g., RN/LPN) rather than the first visit for an enrollee. • The assessment was performed by an MCCM care coordinator, RN/LPN, nurse practitioner, or hospice physician; was in-person (including at a facility bedside); was provided to the enrollee (not a family member or caregiver); and occurred after a change in the enrollee's health status, a hospitalization, or an emergency department visit. Starting January 1, 2018: Hospices report initial and comprehensive assessments in the portal. We combined the 48-hour initial assessment and the 5-day comprehensive assessment into a categorical variable with 5 levels: • Forty-eight-hour comprehensive assessment only • Five-day comprehensive assessment only • Both 48-hour and 5-day comprehensive assessments reported in 1 encounter • Both 48-hour and 5-day comprehensive assessments reported on different days • Neither an initial assessment nor a 5-day comprehensive assessment.
Bereavement support	MCCM portal	Dichotomous indicator of family and caregiver receipt of bereavement support: • Pre-death • Post-death.
Care coordination	MCCM portal	Categorical measure of ways that hospice staff coordinate with a wide range of professionals affiliated with outside entities about the health of MCCM enrollees during an encounter: • Primary care provider • Physician specialist • Palliative care provider • Home health agency • Other. This information is recorded at the encounter level. Only one provider type can be selected.

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Measure	Data Source	Description
Counseling	MCCM portal	Categorical measure of type of counseling provided: • Nutritional • Psychological/emotional • Spiritual • Other.
Education	MCCM portal	Dichotomous (yes, no) indicator of whether educational support occurred.
Family conference	MCCM portal	Dichotomous (yes, no) indicator of whether a family conference occurred.
Homemaker services	MCCM portal	Dichotomous (yes, no) indicator of whether homemaker services were provided.
Hospitalization	MCCM portal	Dichotomous (yes, no) measure indicating that the enrollee had been hospitalized.
Medication administration	MCCM portal	Dichotomous (yes, no) indicator of whether medication administration occurred.
Shared decision making	MCCM portal	Dichotomous (yes, no) indicator of whether shared decision making occurred.
Symptom management	MCCM portal	Dichotomous (yes, no) indicator of whether symptom management occurred.
Supportive/active listening	MCCM portal	Dichotomous (yes, no) indicator of whether supportive/active listening occurred.
Transitional planning	MCCM portal	Dichotomous (yes, no) indicator of whether transitional planning occurred.
Wound care	MCCM portal	Dichotomous (yes, no) indicator of whether wound care occurred.
Other	MCCM portal	Dichotomous (yes, no) indicator of whether other types of services were provided.
Treatment preferences		
Treatment preferences updated	MCCM portal	Dichotomous (yes, no) measure for each treatment if preferences were updated: • Do not resuscitate • Do not intubate • Do not hospitalize • Antibiotic restrictions • Comfort care preferences • Parenteral nutrition preferences • Tube feeding preferences • Intravenous hydration preferences • Other. In 2016-2017, the portal asked whether the hospice followed the patient's treatment preferences, but did not record the preferences. In 2018-present, the portal collects information about whether each treatment preference has been documented in the MCCM clinical record. For each treatment preference, the date(s) the preference was added or updated is listed.

[a] Encounter refers to an event during which an MCCM provider performs a service for an MCCM enrollee or caregiver/family member.

[b] In 2016-2017, hospices could attribute multiple providers to an encounter but could not specify which provider performed which service. Thus, a single service may be attributed to multiple providers (i.e., be double-counted). In 2018-present, hospices can only attribute a single provider to an encounter, so each service is attributed to just one provider. Thus, data from 2016 to 2017 may result in a greater number of total services than data from 2018 to the present when summing across multiple providers.

LPN = licensed practical nurse, RN = registered nurse,

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E.2 MEASURING MCCM QUALITY OF CARE

We used the portal-recorded data elements described in **Appendix E.1** to measure the quality of care received by enrollees under the model. To do this, we adapted 11 specifications of National Quality Forum-endorsed measures of advance care planning; bowel regimen initiation and outcomes; shortness-of-breath screening, treatment, and outcomes; pain management, outcomes, and screening; psychological and emotional well-being outcomes, screening, and treatment; and spiritual and religious discussions. We describe these measure specifications in **Exhibit E.3**.

Our primary population for measurement was Medicare beneficiaries enrolled in the model for seven or more days. This restriction helped ensure that hospice staff had time to conduct measured screenings in a manner consistent with the delivery of high-quality hospice care. We also excluded hospices with 10 or fewer enrollees on a measure-specific basis in order to ensure that our reported measure results were stable and reliable.

We then applied measure-specific numerator and denominator exclusions to reflect clinically appropriate standards of practice. For instance, the MCCM advance care planning quality measure excludes encounters where an enrollee or caregiver could not respond to screening questions or refused care. We describe the measure-specific exclusions in **Exhibit E.3**, such as encounters where an enrollee declined or was unable to discuss the screening topic. Differences in the application of measure-specific denominator exclusions that contributed to the variation in sample sizes are presented in **Section 5** in the main report.

Screening measure specifications finalized in May 2018 required information that hospices collect during either the 48-hour initial assessment or a comprehensive assessment after a change in functional status. Starting January 1, 2018, the MCCM portal was able to differentiate among different types of assessments, as shown in **Exhibit E.2**. After this time, we included an indicator of whether the enrollee had received an assessment within 48 hours[25] in the screening measure denominator and assigned a value of zero or "no" to the numerator. Thus, hospices did not receive credit for a screening when they did not administer a 48-hour initial assessment. Hospices continue to get credit for screenings that occur during comprehensive assessments after a change in functional status.

[25] CMS guidance dated December 6, 2018 indicated that if a 5-day comprehensive assessment was performed within 48 hours of enrollment, the 48-hour initial assessment was not necessary. If an enrollee was neither given a 48-hour initial assessment nor a 5-day comprehensive assessment within 48 hours of enrollment, we set the screening numerator to "no."

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Exhibit E.3 Specifications for MCCM Quality Measures

Measure	Data Source	Description	NQF Endorsement	MCCM Numerator	MCCM Denominator
Advance care planning	MCCM portal	Percentage of eligible MCCM encounters in which the enrollee and/or responsible party/caregiver was asked about advance care planning	Adaptation of NQF 1641: Treatment Preferences; the enrollee/responsible party was asked about preference regarding the use of cardiopulmonary resuscitation, life-sustaining treatments other than cardiopulmonary resuscitation, and hospitalization	Number of eligible MCCM encounters in which the enrollee and/or responsible party/caregiver was asked about advance care planning.	Number of MCCM encounters meeting all of the following criteria for beneficiaries enrolled in MCCM for at least seven days[a]: • Care coordinator, RN/LPN, NP, or physician provided encounter • Encounter occurred during in-person visit or at facility bedside • Encounter occurred within the first seven days of MCCM enrollment • Encounter occurred during an initial assessment; a subsequent comprehensive assessment; or a visit following a change in the enrollee's status, planned ED visit/hospitalization, or unplanned ED visit/hospitalization. We removed the encounter from the denominator if the enrollee declined to discuss or was unable to discuss.
Bowel regimen initiation	MCCM portal	Percentage of eligible MCCM encounters in which the enrollee treated with an opioid had a bowel regimen initiated	Adaption of NQF 1617: Patients Treated with an Opioid Who Are Given a Bowel Regimen; percentage of vulnerable adults treated with an opioid that are offered and/or prescribed a bowel regimen or documentation of why this was not needed	Number of eligible MCCM encounters in which the enrollee was treated with an opioid and had a bowel regimen initiated or was already on a bowel regimen. Unlike NQF 1617, there are no exclusions related to the use of opioids prescribed in outpatient settings before enrollment in MCCM.	Number of MCCM encounters meeting all of the following criteria for beneficiaries enrolled in MCCM at least seven days[a]: • Care coordinator, RN/LPN, NP, or physician provided encounter • Encounter occurred during an in-person visit or at facility bedside • Enrollee received services during a 48-hour initial assessment or a visit following a change in the enrollee's status • Enrollee was using opioids at the time. We removed the encounter from the denominator if a medical reason was provided as to why a bowel regimen for opioids was not needed (underlying medical condition) or why the MCCM enrollee did not want to take the scheduled opioids.

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Measure	Data Source	Description	NQF Endorsement	MCCM Numerator	MCCM Denominator
Bowel regimen outcomes	MCCM portal	Percentage of eligible MCCM encounters in which the bowel regimen was effective	Not an NQF-endorsed measure	Number of eligible MCCM encounters in which the bowel regimen was effective.	Number of MCCM encounters meeting all of the following criteria for beneficiaries enrolled in MCCM at least seven days[a]: • Care coordinator, RN/LPN, NP, or physician provided encounter • In-person visit or at facility bedside • Enrollee must be the recipient of services, which occurred during a 48-hour initial assessment or a visit following a change in the enrollee's status • Enrollee must currently use opioids • MCCM hospice initiated the bowel regimen for the patient. If the provider responded that the current bowel regimen was not effective for the enrollee, we removed the encounter from the denominator if the reason was that it was "too soon to determine." This outcome measure is available only for services recorded on or after January 1, 2018.
Dyspnea (shortness of breath) screening	MCCM portal	Percentage of eligible MCCM encounters in which the enrollee was screened for shortness of breath	Adaption of NQF 1639: Hospice and Palliative Care – Dyspnea Screening; percentage of hospice or palliative care enrollees who were screened for dyspnea during the hospice admission evaluation/ palliative care initial encounter	Number of eligible MCCM encounters in which the hospice screened the enrollee for shortness of breath.	Number of MCCM encounters meeting all of the following criteria for beneficiaries enrolled in MCCM at least seven days[b]: • Care coordinator, RN/LPN, NP, or physician provided encounter • In-person visit or at facility bedside • Enrollee must be the recipient of services, which occurred during a 48-hour initial assessment or a visit following a change in the enrollee's status.[b] We removed the encounter from the denominator if the provider gave one of the following reasons for not screening the enrollee for a condition: • Declined to discuss • Declined to acknowledge condition • Unable to respond.

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Measure	Data Source	Description	NQF Endorsement	MCCM Numerator	MCCM Denominator
Dyspnea (shortness of breath) treatment	MCCM portal	Percentage of eligible MCCM encounters in which treatment was initiated when the enrollee was experiencing shortness of breath	Adaption of NQF 1638: Hospice and Palliative Care – Dyspnea Treatment; percentage of enrollees who screened positive for dyspnea and received treatment within 24 hours of screening	Number of eligible MCCM encounters in which treatment was initiated when the enrollee was experiencing shortness of breath.	Number of MCCM encounters meeting all of the following criteria for beneficiaries enrolled in MCCM at least seven days[a]: • Care coordinator, RN/LPN, NP, or physician provided encounter • In-person visit or at facility bedside • Enrollee must be the recipient of services, which occurred during a 48-hour initial assessment or a visit following a change in the enrollee's status • MCCM hospice diagnosed the enrollee with dyspnea. We removed the encounter from the denominator if the reason that treatment for dyspnea was not given was that the enrollee declined treatment intervention.
Dyspnea (shortness of breath) outcomes	MCCM portal	Percentage of eligible MCCM encounters in which the treatment reduced shortness of breath	Not an NQF-endorsed measure	Number of eligible MCCM encounters in which the treatment was effective at reducing shortness of breath.	Number of MCCM encounters meeting all of the following criteria for beneficiaries enrolled in MCCM at least seven days[a]: • Care coordinator, RN/LPN, NP, or physician provided encounter • In-person visit or at facility bedside • Enrollee must be the recipient of services, which occurred during a 48-hour initial assessment or a visit following a change in the enrollee's status • Enrollee was diagnosed with dyspnea • MCCM hospice treated the patient for shortness of breath. If the provider responded that treatment for dyspnea did not improve the enrollee's breathing, we removed the encounter from the denominator if the reason was that it was "too soon to determine." This outcome measure is available only for services recorded on or after January 1, 2018.

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Measure	Data Source	Description	NQF Endorsement	MCCM Numerator	MCCM Denominator
Pain management	MCCM portal	Percentage of eligible MCCM encounters in which the enrollee screened positive for pain (mild, moderate, or severe) and had a pain management plan established or already in place	Adaption of NQF 1637: Hospice and Palliative Care – Pain Assessment; percentage of hospice or palliative care enrollees who screened positive for pain and received a clinical assessment of pain within 24 hours of screening	Number of eligible MCCM encounters in which the enrollee screened positive for pain (mild, moderate, or severe) and had a pain management plan established or already in place.	Number of MCCM encounters meeting all of the following criteria for beneficiaries enrolled in MCCM at least seven days[a]: • Care coordinator, RN/LPN, NP, or physician provided encounter • In-person visit or at facility bedside • Enrollee must be the recipient of services, which occurred during a 48-hour initial assessment or a visit following a change in enrollee's status • Enrollee was screened for pain • Enrollee had mild, moderate, or severe pain • Provider initiated a pain management plan or the enrollee was already on such a plan.
Pain outcomes	MCCM portal	Percentage of eligible MCCM encounters in which the treatment was effective at reducing pain	Adaption of NQF 0209: Comfortable Dying: Pain Brought to a Comfortable Level within 48 Hours of Initial Assessment; percentage of enrollees who reported being uncomfortable because of pain during the initial assessment and who, at the follow-up assessment, reported their pain was brought to a comfortable level within 48 hours	Number of eligible MCCM encounters in which the treatment was effective at reducing pain. Note that this is a departure from NQF 0209 in that this analysis did not examine the time sequence.	Number of MCCM encounters meeting all of the following criteria for beneficiaries enrolled in MCCM at least seven days[a]: • Care coordinator, RN/LPN, NP, or physician provided encounter • In-person visit or at facility bedside • Enrollee must be the recipient of services, which occurred during a 48-hour initial assessment or a visit following a change in enrollee's status • Enrollee was screened for pain • Enrollee had mild, moderate, or severe pain • Provider initiated a pain management plan or enrollee must already be on such a plan. We removed the encounter from the denominator if the reason given that the pain was not at an acceptable level was that the enrollee declined pain intervention. We also removed the encounter from the denominator if the reason given that pain management did not achieve the patient's comfort goals was that it was "too soon to determine."

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Measure	Data Source	Description	NQF Endorsement	MCCM Numerator	MCCM Denominator
Pain screening	MCCM portal	Percentage of eligible MCCM encounters in which the enrollee was screened for pain	Adaption of NQF 1634: Hospice and Palliative Care – Pain Screening; percentage of hospice or palliative care enrollees who were screened for pain during the hospice admission evaluation/ palliative care initial encounter	Number of eligible MCCM encounters in which the hospice screened the enrollee for pain.	Number of MCCM encounters meeting all of the following criteria for beneficiaries enrolled in MCCM at least seven days[a]: • Care coordinator, RN/LPN, NP, or physician provided encounter • In-person visit or at facility bedside • Enrollee must be the recipient of services, which occurred during a 48-hour initial assessment or a visit following a change in the enrollee's status.[b] We removed the encounter from the denominator if the provider gave one of the following reasons for not screening the enrollee for a condition: • Declined to discuss • Declined to acknowledge condition • Unable to respond.
Psychological and emotional well-being outcomes	MCCM portal	Percentage of eligible MCCM encounters in which the enrollee screened positive for psychological or emotional needs and a follow-up plan was initiated	Not an NQF-endorsed measure	Number of eligible MCCM encounters in which the enrollee screened positive for having psychological or emotional needs and for which a follow-up plan was initiated.	Number of MCCM encounters meeting all of the following criteria for beneficiaries enrolled in MCCM at least seven days[a]: • Care coordinator, RN/LPN, NP, physician, or social worker provided encounter • In-person visit or at facility bedside • Enrollee must be the recipient of services, which occurred during a 48-hour initial assessment or a visit following a change in the enrollee's status • Enrollee screened positive for psychological or emotional needs. We removed the encounter from the denominator if the provider gave one of the following reasons why a follow-up plan for psychological or emotional needs was not established or continued: • Enrollee refused to discuss • Enrollee functionally unable to participate • No caregiver present.

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Measure	Data Source	Description	NQF Endorsement	MCCM Numerator	MCCM Denominator
Psychological and emotional well-being screening	MCCM portal	Percentage of eligible MCCM encounters in which the enrollee was screened positive for psychological or emotional needs	Not an NQF-endorsed measure	Number of eligible MCCM encounters in which the enrollee was screened positive for having psychological or emotional needs	Number of MCCM encounters meeting all of the following criteria for beneficiaries enrolled in MCCM at least seven days[a]: • Care coordinator, RN/LPN, NP, physician, or social worker provided encounter • In-person visit or at facility bedside • Enrollee must be the recipient of services, which occurred during a 48-hour initial assessment or a visit following a change in the enrollee's status[b] • Enrollee screened positive for psychological or emotional needs. We removed the encounter from the denominator if the provider gave one of the following reasons why a follow-up plan for psychological or emotional needs was not established or continued: • Enrollee refused to discuss • Enrollee functionally unable to participate. No caregiver present.
Psychological and emotional well-being treatment	MCCM portal	Percentage of eligible MCCM encounters in which the enrollee screened positive for psychological or emotional needs	Not an NQF-endorsed measure	Number of eligible MCCM encounters in which the enrollee screened positive for having psychological or emotional needs.	Number of MCCM encounters meeting all of the following criteria for beneficiaries enrolled in MCCM at least seven days[a]: • Care coordinator, RN/LPN, NP, physician, or social worker provided encounter • In-person visit or at facility bedside • Enrollee must be the recipient of services, which occurred during a 48-hour initial assessment or a visit following a change in the enrollee's status • Enrollee screened positive for psychological or emotional needs. We removed the encounter from the denominator if the provider gave one of the following reasons why a follow-up plan for psychological or emotional needs was not established or continued: • Enrollee refused to discuss • Enrollee functionally unable to participate. No caregiver present.

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Measure	Data Source	Description	NQF Endorsement	MCCM Numerator	MCCM Denominator
Spiritual and religious discussion	MCCM portal	Percentage of eligible MCCM encounters in which a discussion of spiritual/religious concerns was attempted	Adaption of NQF 1647: Beliefs and Values; this measure reflects the percentage of hospice enrollees with documentation of a discussion of spiritual/religious concerns or documentation that the enrollee/ caregiver/family did not want to discuss	Number of eligible MCCM encounters in which a discussion of spiritual/religious concerns was attempted (pre-death or post-death).	Number of MCCM encounters meeting all of the following criteria for beneficiaries enrolled in MCCM at least seven days[a]: • Physician, RN/LPN, care coordinator, social worker, chaplain, bereavement/grief counselor, or other spiritual counselor provided encounter • In-person visit or at facility bedside • Enrollee was the recipient of services, which occurred during an initial assessment within the first seven days of enrollment; a subsequent comprehensive assessment; or a visit following a change in the enrollee's status, planned ED visit/hospitalization, or unplanned ED visit/hospitalization. We removed the encounter from the denominator if the reason given that the enrollee was not asked about spiritual/religious concerns was that he or she declined to discuss or was unable to discuss.

Notes: Unless noted, information required to specify the measure is available from the start of the model (January 1, 2016).

[a] Restricting the denominator to beneficiaries who were enrolled in MCCM for at least seven days ensured that all beneficiaries in our analysis had enough time to be screened and treated, or achieve a clinical outcome. We also excluded hospices with fewer than 10 enrollees in order to ensure that the measure results we reported were stable and reliable.

[b] Screening measure denominators include comprehensive assessments performed within 48 hours of enrollment.

ED = emergency department, LPN = licensed practical nurse, NP = nurse practitioner, NQF = National Quality Forum, RN = registered nurse.

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E.3 LINKING MCCM PORTAL DATA TO CENTERS FOR MEDICARE AND MEDICAID SERVICES CLAIMS DATA

We linked enrollee information recorded in the MCCM portal to Medicare claims and enrollment data. In cases where enrollee identifiers in the MCCM portal were incomplete and/or inaccurate, we developed and implemented the following 10-step matching algorithm to capture the enrollee who received services:

1. Health insurance claim number or Medicare beneficiary identifier, last name, first name, and date of birth
2. Health insurance claim number or Medicare beneficiary identifier, and phonetic coding of last and first names
3. Health insurance claim number or Medicare beneficiary identifier, and first letter of first and last names
4. Phonetic coding[26] of first and last names, date of birth, state, and ZIP code
5. Health insurance claim number, and phonetic coding of last and first names
6. Health insurance claim number only
7. Last name, phonetic coding of first name, and date of birth
8. Last name, phonetic coding of first name, ZIP code, and month or year of birth
9. We matched some enrollees manually by reviewing the Medicare Enrollment Database/Master Beneficiary Summary file data (instances when last names and first names were inverted)
10. Railroad health insurance claim numbers.[27]

We applied each step in succession until we were able to identify a successful match. Through this process, we were able to match the 4,988 MCCM enrollees used for analysis in this report to a beneficiary identifier in the Centers for Medicare & Medicaid Services Chronic Conditions Data Warehouse.

[26] More information on the SOUNDEX phonetic coding system is available at: https://www.archives.gov/research/census/soundex.html.

[27] Some beneficiaries have health insurance claim values indicating they are Railroad Retirement Board beneficiaries (https://www.grotenhuisguide.com/A55956/grotenhuis.nsf/f9d12e89344f312585256d8e0068128f/2fb304c58af3e6cd85257bf10054aaf3/$FILE/HICNsuffixesprefixesfinal.pdf), which are not included in the Chronic Conditions Data Warehouse HIC-BENE_ID crosswalk.

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E.4 MEASURING UTILIZATION OF MEDICARE SERVICES

We used data from Medicare claims, the Medicare Enrollment Database, and the MCCM portal to analyze transitions to MHB by MCCM enrollees and use of Medicare home health services. We describe the measures of MHB transitions and the use of Medicare home health services below.

E.4.1 Transitions from MCCM to MHB

We calculated the number of days from MCCM enrollment to MHB transition, and the number of days from MHB until death, as described in **Exhibit E.4**. We present these results in **Section 3** in the main report.

Exhibit E.4 Length of MCCM and Medicare Hospice Benefit Enrollment

Measure	Data Source	Description
Days from MCCM enrollment to MHB transition	MCCM portal	Continuous (0-maximum) measure of number of days from date of enrollment in MCCM to date of enrollment in MHB.
Days from MHB enrollment to death	Medicare claims	Continuous (0-maximum) measure of number of days from date of enrollment in MHB following discharge from MCCM to date of death, less any days the beneficiary was not enrolled in MHB during that time period.
Days from MCCM enrollment to death	MCCM Portal/Medicare Enrollment Database/Master Beneficiary Summary file	Continuous (0-maximum) measure of number of days from date of enrollment in MCCM to date of death.

MHB = Medicare hospice benefit.

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E.4.2 Home Health Services

We updated descriptive analyses of the use of Medicare home health services by MCCM enrollees to understand any overlap in care across the two programs. We analyzed the six types of home health visits covered by Medicare, as shown in **Exhibit E.5**. The results of this analysis are shown in **Appendix I.5**.

Exhibit E.5 Medicare Home Health Visit Types by Discipline

Home Health Discipline	Data Source	Description
Home health aide	Medicare claims	Dichotomous (yes, no) indicator of the receipt of care from a home health aide while enrolled in MCCM with revenue code 057x
Medical social services	Medicare claims	Dichotomous (yes, no) indicator of the receipt of medical social services at home while enrolled in MCCM with revenue code 056x
Occupational therapy	Medicare claims	Dichotomous (yes, no) indicator of the receipt of occupational therapy at home while enrolled in MCCM with revenue code 043x
Physical therapy	Medicare claims	Dichotomous (yes, no) indicator of the receipt of physical therapy at home while enrolled in MCCM with revenue code 042x
Skilled nursing	Medicare claims	Dichotomous (yes, no) indicator of the receipt of skilled nursing at home while enrolled in MCCM with revenue code 055x
Speech therapy	Medicare claims	Dichotomous (yes, no) indicator of the receipt of speech therapy at home while enrolled in MCCM with revenue code 044x

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Appendix F. Methodology for Estimating MCCM Impacts

F.1 QUASI-EXPERIMENTAL DIFFERENCE-IN-DIFFERENCES APPROACH

This appendix describes the approaches we used to estimate the impact of the Medicare Care Choices Model (MCCM) on utilization, Medicare expenditures, and transitions to the Medicare hospice benefit (MHB):

- **Section F.1.1** describes how our estimation approach accounts for key features of the model and yields rigorous estimates of MCCM impacts.
- **Section F.2** describes the development of the analytic sample of MCCM and comparison decedents who are represented in the impact analyses.
- **Section F.3** describes the estimation of weights for our comparison group of Medicare decedents based on observable characteristics related to use of Medicare services, and the presence of serious illness and frailty.
- **Section F.4** explains the difference-in-differences approach we used to estimate the impact of MCCM on end-of-life outcomes and its limitations.
- **Section F.5** describes the calculation of MCCM's total net savings to Medicare.
- **Section F.6** describes how we tested the sensitivity of our impact estimates to the inclusion of alternative samples of MCCM decedents.
- **Section F.7** discusses analyses that assess whether impact estimates differed for policy-relevant subgroups of MCCM decedents.

F.1.1 Overview

We used a difference-in-differences approach to estimate the impact of MCCM on end-of-life healthcare expenditures and utilization. The difference-in-differences approach is a quasi-experimental method that estimates the impact of MCCM as the difference in outcomes across beneficiaries who enrolled in the model, the intervention group, and those who would have enrolled if MCCM had been offered, the comparison group, before and after model implementation. This approach identifies the average effect of participation in MCCM in the absence of random assignment into the model.

To isolate the effect of MCCM on utilization and expenditure outcomes in a difference-in-differences approach, the comparison group must be as similar as possible to the model decedents, with the exception that they did not enroll in MCCM. To ensure similarity of the two groups, the approach had to overcome two challenges:

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1. ***Wide variation in post-MCCM enrollment survival times.*** While MCCM requires Medicare beneficiaries to have a 6-month prognosis at the time of enrollment, only 74 percent of decedents enrolled within 6 months of death and the distribution of post-enrollment survival ranged from 2 days to over 3 years.
2. ***Comparison group decedents lacked MCCM enrollment dates.*** The MCCM enrollment date marks the point in time when participating hospices could begin to influence utilization and expenditure outcomes, and transitions to hospice. There is no analogous point in time for comparison decedents.

Exhibit 1.7 in **Section 1** in the main report shows the distribution of MCCM decedents' post-enrollment survival time. MCCM decedents enrolled between 2 and 1,304 days before death, with 22 percent of decedents enrolling 1 month before death and 9 percent of decedents enrolling more than 1 year before death. It is likely that survival time was associated with unobserved aspects of health status at enrollment, which in turn affected post-enrollment outcomes. **Exhibit F.1** shows that end-of-life expenditures for MCCM decedents who enrolled further from death had lower average monthly expenditures in the last 60 days of life than those who enrolled closer to death. Specifically, beneficiaries who enrolled in MCCM 30 days or less before death had significantly higher average monthly Medicare expenditures in the last 60 days of life compared to beneficiaries who enrolled in MCCM more than 365 days before death ($15,127 and $9,928, respectively). This pattern is consistent for average monthly expenditures in the last 30, 90, 180, and 365 days of life. It is therefore important to account for the wide variation in post-enrollment survival, as decedents' survival times were associated with significant differences in end-of-life expenditures.

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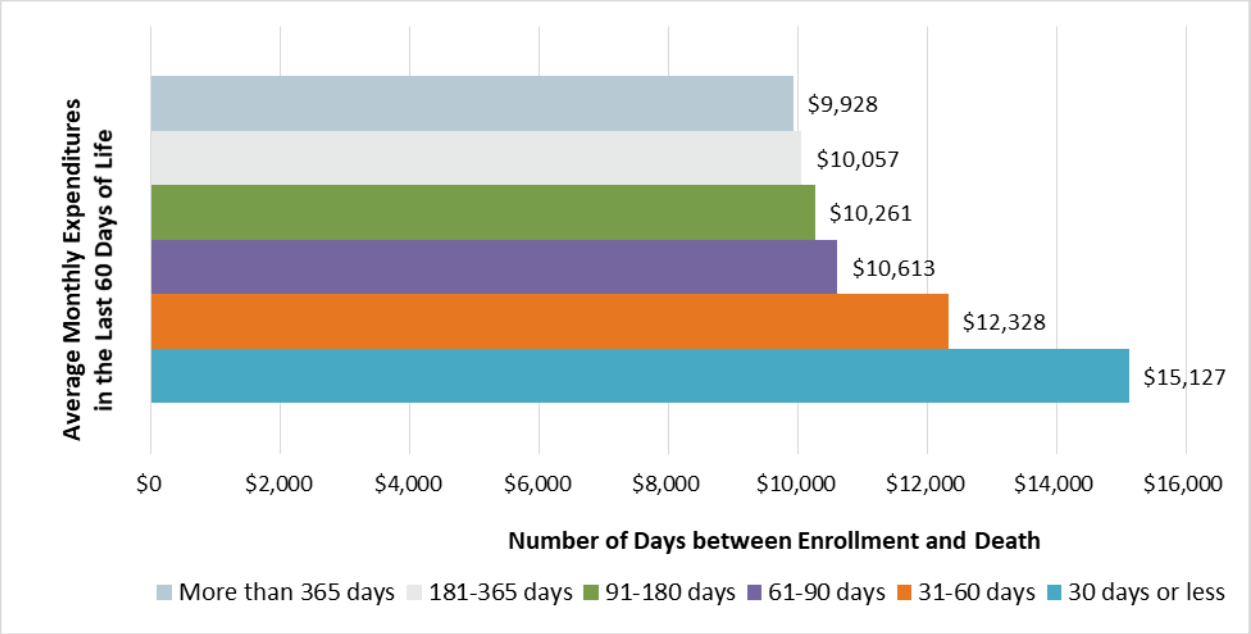
Exhibit F.1 Average Monthly Total Medicare Expenditures in the Last 60 Days of Life by Post-MCCM Enrollment Survival Times



Sources: Medicare claims data and MCCM portal data, January 1, 2016-September 30, 2019.

Note: This exhibit shows average total Medicare expenditures per month at different points in time before death across groups of MCCM decedents based on the number of days between their enrollment in the model and death. This analysis included 3,603 Medicare beneficiaries enrolled in MCCM on or before September 30, 2019.

We addressed these two challenges by identifying hypothetical enrollment dates that reflect the distribution of MCCM decedents' post-enrollment survival (called "anchor dates"). Specifically, we selected 5 anchor dates at 30, 60, 90, 180, and 365 days before death. We then observed comparison decedents on these anchor dates (i.e., we observed comparison beneficiaries at 30, 60, 90, 180, and 365 days before death) so that the comparison group consisted of observations at the decedent, anchor-date level. To further ensure similarity between MCCM and comparison decedents, we weighted the comparison group such that their characteristics related to enrollment in MCCM and end-of-life outcomes aligned with those of MCCM decedents, on average.

In **Section F.2** we discuss our methods to create a valid comparison group and address both of these challenges in detail.

F.2 ANALYTIC SAMPLE DEVELOPMENT

This section describes our approach to develop the analytic sample used to estimate the impact of MCCM on utilization, Medicare expenditures, and transitions to hospice. We identified 3,603 MCCM decedents with dates of death on or before September 30, 2019; 2,766 of these decedents were used in the impact analyses. These MCCM decedents were those who:

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- Met MCCM eligibility criteria at the time of enrollment, and
- Enrolled in MCCM one year or less before death.

We used Medicare claims and enrollment data to select a subset of Medicare decedents who were as similar as possible to MCCM decedents in terms of having:

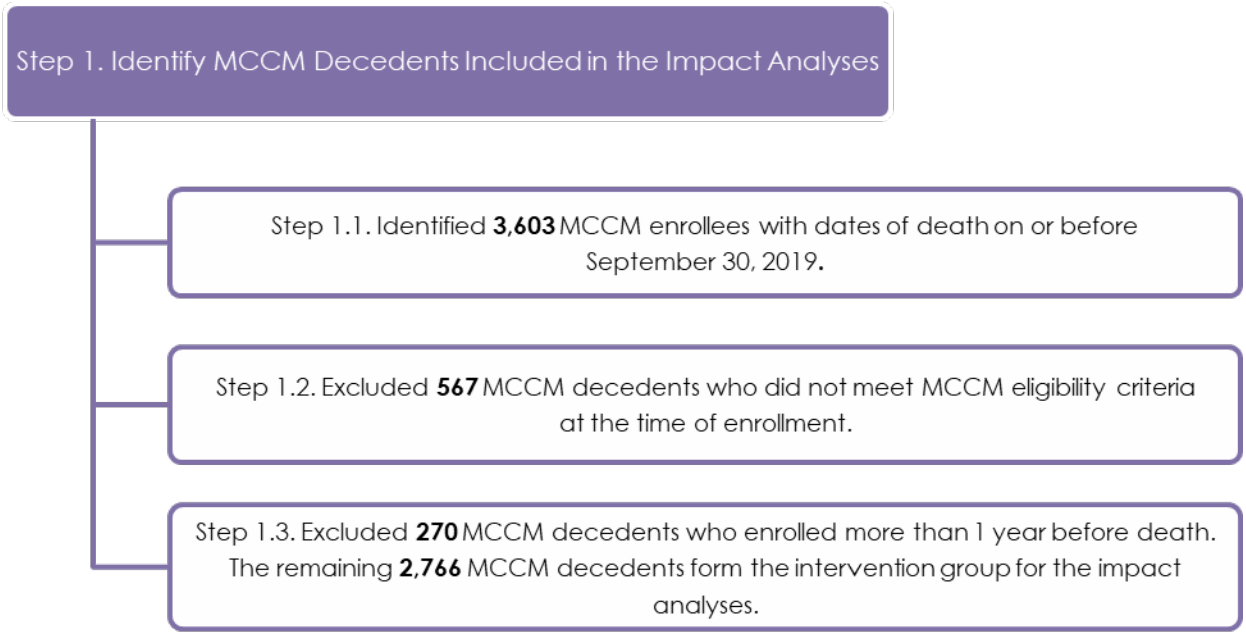
- Not been enrolled in the MHB at the time of selection,
- Met MCCM eligibility criteria related to diagnosis, enrollment in fee-for-service Medicare, and use of Medicare hospital and office-based services,
- Been similar to MCCM beneficiaries in terms of demographic characteristics, and
- Had health conditions and used Medicare services indicative of serious illness and frailty; and the likelihood of having a physician-certified, terminal illness.

Sections F.2.1 and **F.2.2** describe the development of the analytic sample in detail.

F.2.1 Identification of MCCM Decedents

We used a three-step process to identify the analytic sample of MCCM decedents. We summarize these steps in **Exhibit F.2**.

Exhibit F.2 Identification of MCCM Decedents Included in the Impact Analyses



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F.2.1.1 Step 1.1. Identified MCCM enrollees with dates of death on or before September 30, 2019

We identified 4,988 Medicare beneficiaries who enrolled in MCCM between January 1, 2016 and September 30, 2019 by linking enrollee information recorded by hospices in the MCCM portal to Medicare claims and enrollment data. This group of decedents contains beneficiaries enrolled by all participating MCCM hospices, including hospices that withdrew from the model before September 30, 2019. The evaluation's outcomes of interest are end-of-life expenditures, utilization, and hospice transitions; and we therefore retained the subset of enrollees who died on or before September 30, 2019. This process yielded 3,603 MCCM decedents. We describe pre-enrollment demographic characteristics, Medicare service use, health status, and patterns of transition to MHB for these decedents in **Sections 2** and **3** in the main report.[28]

F.2.1.2 Step 1.2. Excluded 567 MCCM decedents who did not meet MCCM eligibility criteria at the time of enrollment

We used Medicare claims and enrollment data to exclude 567 of the 3,603 MCCM decedents (15.7 percent) who did not meet 1 or more of the MCCM eligibility criteria that could be verified using Medicare administrative data on their enrollment dates.[29,30] These exclusions ensured that the analytic sample represented the population of Medicare beneficiaries targeted by the model.

Exhibit F.3 shows the number and percent of the 567 ineligible MCCM decedents who did not meet each MCCM eligibility criterion.[31] One-third of MCCM decedents did not have a primary diagnosis code for a qualifying MCCM diagnosis in the Medicare claims data in the year before enrollment. About half of MCCM decedents did not meet all 5 of the Medicare enrollment-related eligibility criteria (52.9 percent). A quarter of MCCM decedents did not have a hospitalization in the year before enrollment. A few MCCM decedents did not have three or more office visits in the year before enrollment (5.6 percent) or did not live in a traditional home during the month before enrollment (5.6 percent). After Step 1.2, we retained 3,036 MCCM decedents in the analytic sample.

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[28] See **Appendix E.3** for a description of the matching algorithm used to link beneficiary information in the MCCM portal to Medicare claims data.

[29] See **Exhibit D.2** for a description of the MCCM eligibility criteria and the data sources used to verify them.

[30] MCCM also requires that a physician certify the enrollee has a six-month or less prognosis. The evaluation team did not have data to verify this eligibility criterion and we discuss our approach to incorporate this requirement in **Section F.3**.

[31] Differences in real-time administrative data available to Medicare administrative contractors at the time of enrollment and historical data available to the evaluation team, and unobserved time intervals between eligibility assessments and recorded enrollment dates may cause MCCM decedents who were eligible at enrollment appear ineligible in the data.

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Exhibit F.3 MCCM Decedents Who Did Not Meet Eligibility Criteria Verifiable with Medicare Administrative Data

MCCM Criterion	Number of MCCM Ineligibles Who Did Not Meet the Criterion	Percent of MCCM Ineligibles Who Did Not Meet the Criterion
Qualifying MCCM diagnosis	189	33.3%
Medicare enrollment-related eligibility criteria		
Enrolled in Medicare Part A for 12 consecutive months	27	4.8%
Enrolled in Medicare Part B for 12 consecutive months	44	7.8%
Not enrolled in Medicare Advantage in prior 12 consecutive months	71	12.5%
Medicare is primary payer	200	35.3%
Not enrolled in Medicare hospice benefit in prior 30 days	8	1.4%
Did not meet all five Medicare enrollment-related eligibility criteria	**300**	**52.9%**
Utilization-related eligibility requirements		
At least 1 hospital encounter in prior 12 months	139	24.5%
At least 3 office visits in prior 12 months	32	5.6%
Resided in a traditional home	32	5.6%
Total administratively ineligible MCCM decedents	**567**	**15.7%**

Sources: Medicare claims, Medicare Enrollment Database, and Minimum dataset, January 1, 2016-September 30, 2019.

Note: This exhibit shows the reasons for ineligibility among 567 of the 3,604 MCCM decedents with dates of death on or before September 30, 2019. Percentages in the right-most column do not sum to 100% because ineligible beneficiaries could fail to meet more than 1 of the criteria listed in the exhibit. **Exhibit D.2** described how we evaluated each requirement.

F.2.1.3 Step 1.3. Excluded 270 MCCM decedents who enrolled more than 1 year before death

We identified 270 administratively eligible MCCM decedents (8.8 percent of all MCCM decedents) who enrolled in the model more than 365 days before death. MCCM targets beneficiaries with a six-month prognosis and these enrollees lived significantly longer than expected at the time of enrollment.[32] We therefore treated these enrollees as outliers.[33] After Step 1.3, the final analytic sample contained 2,766 MCCM decedents.

[32] MCCM decedents who lived more than 365 days after enrollment were younger and less likely to be dual eligible at the time of enrollment, and had lower end-of-life expenditures than MCCM decedents who enrolled closer to death.

[33] In **Section F.6**, we discuss the analyses conducted to test the sensitivity of MCCM's impact on end-of-life outcomes with the inclusion of MCCM decedents who enrolled more than 365 days before death.

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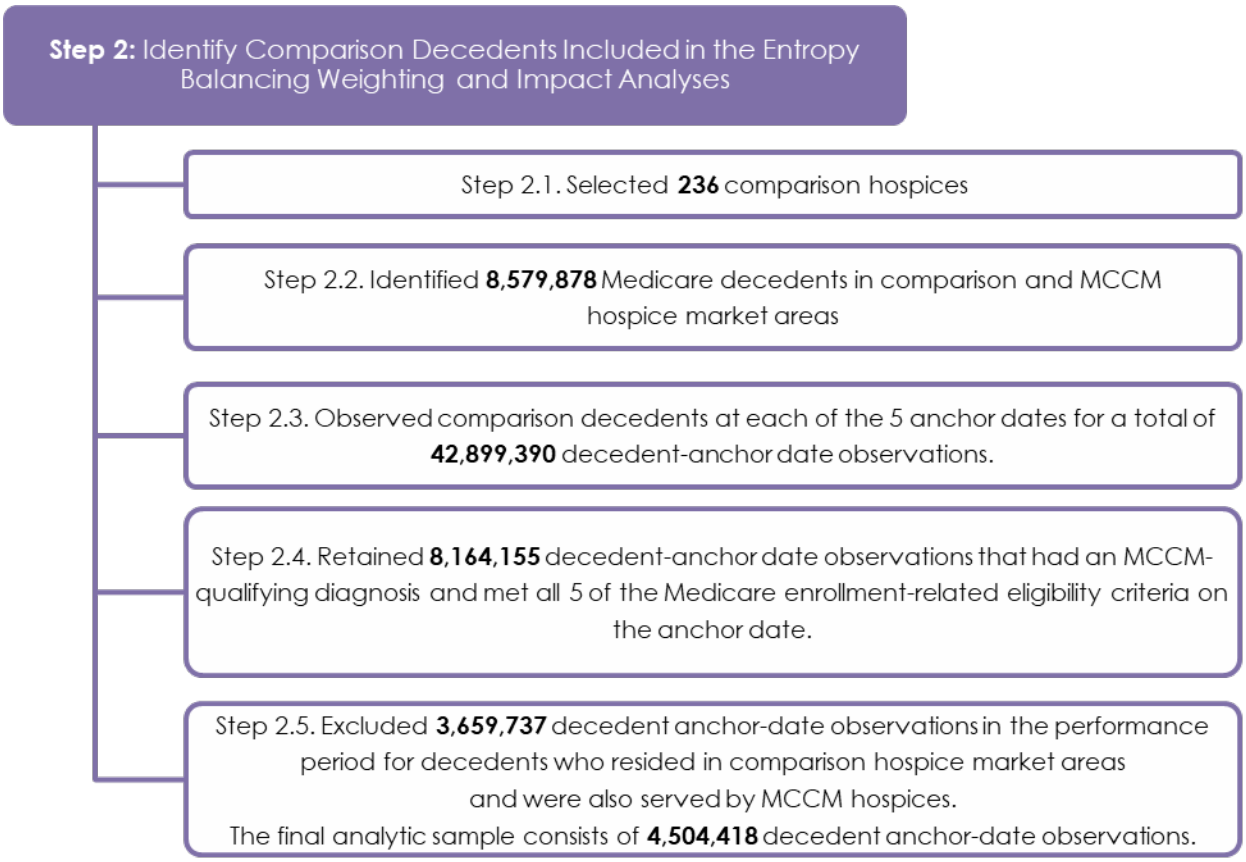
F.2.2 Identification of Comparison Decedents

To compare individuals who enrolled in the model and those who were similar to MCCM decedents, we used a five-step process to construct a group of comparison decedents, as outlined in **Exhibit F.4**.

Exhibit F.4 Identification of Comparison Decedents Included in the Impact Analyses



F.2.2.1 Step 2.1. Selected 236 comparison hospices

Hospice and market characteristics may influence end-of-life outcomes through their effect on referral patterns, beneficiary preferences for curative treatment, and the availability of qualified and experienced staff, for instance. To control for organizational and market characteristics that may confound estimates of MCCM impacts, we identified a set of comparison hospices that were as similar as possible to hospices that elected to participate in the model.[34]

[34] We discuss the process of selecting comparison hospices in detail in **MCCM Annual Report 2, Appendix F**.

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We used Medicare claims data to identify 4,221 non-MCCM hospices that operated with distinct Centers for Medicare & Medicaid Services (CMS) certification numbers and submitted at least 1 MHB claim during the year before MCCM implementation. From this group of non-MCCM hospices, we identified 236 comparison hospices that were the most similar to MCCM hospices across a wide range of hospice characteristics (e.g., ownership status, size, religious affiliation, hospice-level beneficiary characteristics, quality of care ratings) and market characteristics.

In **Exhibit F.5**, we present average hospice and market characteristics for MCCM hospices that were participating in the model as of September 30, 2019; and characteristics for the 236 matched, non-MCCM comparison hospices in columns [1] and [2], respectively. For most characteristics, the average for MCCM hospices was not statistically significantly different from those of the matched, comparison hospices. However, MCCM hospices are larger than comparison hospices on average (77.6 percent and 61.4 percent, respectively), and average non-hospice Medicare expenditures are nearly twice as high for MCCM hospices as for comparison hospices. Also, the average number of physician visits and reimbursement for physician visits per decedent were higher and Medicare Advantage penetration rates were lower in market areas of MCCM hospices relative to market areas of comparison hospices. These contrasts indicate that there may be important differences in beneficaries' preferences or characteristics across MCCM and matched comparison hospices. In **Section F.3**, we describe additional steps taken to ensure MCCM and comparison beneficiaries are observationally similar to reduce selection bias when calculating impacts.

A comparison of average characteristics for MCCM hospices and the remaining 3,985 non-matched, non-MCCM hospices in column [3] indicates that hospices participating in the model are not representative of hospices nationally. For example, about two-thirds of MCCM hospices are non-profit compared to one-fifth of all other hospices. MCCM hospices are also more likely to be large (77.6 percent vs. 27.6 percent) and established in the 1980s (51.8 percent versus 9.9 percent), compared with all other hospices nationally. Additionally, non-hospice Medicare expenditures are over four times as high for MCCM hospices compared to all other hospices.

These findings suggest that selecting a matched set of comparison hospices substantially improves the similarity between MCCM and non-MCCM hospices. However, participating hospices differ from non-MCCM hospices on a number of characteristics related to geography, size, and operational characteristics. Findings in this report may therefore not be generalizable to all hospices nationwide.

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Exhibit F.5 Average Characteristics of MCCM and Non-MCCM Hospices

Organizational and Market Characteristics of Hospices	Active MCCM Hospices (n = 85) [1]	Matched Comparison Hospices (n = 236) [2]	All Other Hospices (n = 3,985) [3]
Hospice characteristics			
Ownership†††			
Non-profit	67.1%	61.0%	20.1%
For-profit	17.6%	28.8%	66.9%
Other	14.1%	9.7%	9.5%
Government	1.2%	0.4%	3.6%
Size*, †††**			
Large	77.6%	61.4%	27.6%
Medium	18.8%	36.0%	47.3%
Small	3.5%	2.5%	19.9%
Age†††			
Founded in 1980s	51.8%	42.8%	9.9%
Founded in 1990s	34.1%	37.3%	23.2%
Founded in 2000s	9.4%	15.7%	31.6%
Founded in 2010s	4.7%	4.2%	35.3%
Census Region†††			
Midwest	36.5%	35.2%	20.9%
South	31.8%	28.0%	39.6%
Northeast	18.8%	21.2%	9.3%
West	12.9%	15.7%	29.0%
Location			
Urban	84.7%	79.7%	78.6%
Rural	15.3%	20.3%	21.3%
Type††			
Freestanding	71.8%	67.4%	82.3%
Facility-based	28.2%	32.6%	17.7%
Religious affiliation			
No	95.3%	97.5%	97.9%
Yes	4.7%	2.5%	2.1%
Chain affiliation			
No	52.9%	58.5%	56.4%
Yes	47.1%	41.5%	43.6%
Level of care (MHB)			
Days in routine home care*, †††	97.0%	97.6%	98.5%
Days in general Inpatient care**, †††	2.5%	1.9%	0.9%
Days in continuous home care	0.2%	0.1%	0.1%
Days in inpatient respite care	0.3%	0.4%	0.3%

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Organizational and Market Characteristics of Hospices	Active MCCM Hospices (n = 85) [1]	Matched Comparison Hospices (n = 236) [2]	All Other Hospices (n = 3,985) [3]
Duration of stay in hospice (MHB)			
Stays under seven days†††	33.4%	31.7%	25.2%
Stays over 180 days†††	11.6%	12.3%	17.3%
Hospice-level demographics (MHB)			
Sex: Female	37.6%	37.4%	36.0%
Race/ethnicity: White†††	90.4%	90.3%	84.2%
Race/ethnicity: Black††	5.8%	5.4%	9.6%
Race/ethnicity: Asian	0.9%	1.0%	1.6%
Race/ethnicity: Hispanic†	1.4%	1.5%	2.5%
Race/ethnicity: Other	1.5%	1.9%	2.0%
Age group: 64 and under	4.4%	4.5%	4.6%
Age group: 65-74	14.8%	14.6%	14.2%
Age group: 75-84	27.0%	27.2%	28.3%
Age group: 85+	53.3%	53.1%	52.4%
Quality of care ratings (MHB)			
Hospice team communication	79.7	80.4	80.3
Getting timely care	78.0	78.3	78.0
Overall rating	80.7	81.6	80.0
Other hospice characteristics (MHB)			
Percentage of beneficiaries enrolled in Medicare Advantage plans before enrolling in MHB	25.5%	27.4%	29.1%
Percentage of nursing home penetration	22.4%	21.8%	21.0%
Non-hospice Medicare expenditures***, †††	$1,095,317	$506,050	$238,430
Mean length of stay on MHB (days)†††	75.1	79.9	110.7
Market characteristics (by hospital referral region)			
Mortality rate among Medicare beneficiaries	4.4%	4.4%	4.3%
Percentage of deaths occurring in hospital	20.6%	20.3%	21.0%
Medicare reimbursements per decedent††	$67,606	$65,280	$71,638
Hospital/skilled nursing facility reimbursements per decedent †	$4,153	$4,102	$4,313
Hospice reimbursements per beneficiary†	$355	$347	$410
Hospice reimbursements per decedent†††	$6,430	$6,204	$6,776
Home health agency reimbursements per decedent†††	$460	$468	$601
Reimbursements for physician visits per decedent*	$5,364	$4,993	$5,494
Physician visits per decedent**	54.0	50.0	57.1
Intensive care unit days per decedent*, ††	5.1	4.6	5.8
Inpatient days per Medicare beneficiary	1.2	1.2	1.2
Hospital care intensity index*	1.0	0.9	1.0
Medicare Advantage penetration*, †††	29.4%	32.4%	33.8%

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Sources: CMS Provider of Services file, December 2016; Consumer Assessment of Healthcare Providers and Systems Hospice Survey, 2016; Dartmouth Atlas of Health Care, 2014-2015; and 2015 CMS hospice claims.

Note: This exhibit displays comparisons of 4,362 hospices that were operating in 2016 with at least 1 hospice claim in 2015: 85 hospices actively participating in MCCM as of September 30, 2019; 236 matched comparison hospices; and 3,985 non-MCCM, non-comparison group hospices. We excluded 56 hospices that withdrew from MCCM on or before September 30, 2019 from the analysis. Hospice size is defined using the number of routine home care days in fiscal year 2016. Hospices with 0-3,499 routine home care days are classified as small, 3,500-19,999 as medium, and 20,000+ as large. This classification is used by CMS for hospice payment and policy: https://www.federalregister.gov/documents/2017/08/04/2017-16294/medicare-program-fy-2018-hospice-wage-index-and-payment-rate-update-and-hospice-quality-reporting. Urban and rural classifications are defined in the CMS Provider of Services file. Hospice-level Medicare-managed care enrollment comes from the Medicare Enrollment Database and the Master Beneficiary Summary file. All market characteristics are calculated at the hospital referral region using 2014 data from the Dartmouth Atlas of Health Care. We provide further details on hospice and market variable descriptions and data sources in **Exhibits D.6** and **D.7**. Fisher's exact tests were used to identify differences across groups for categorical variables and t-tests were used for continuous variables. Stars represent statistical significance between MCCM and matched, comparison hospices at the 10% (*), 5% (**), and 1% (***) levels. Daggers represent statistical significance between MCCM and all other hospices at the 10% (†), 5% (††), and 1% (†††) levels.

MHB = Medicare hospice benefit.

F.2.2.2 Step 2.2: Identify all Medicare decedents in comparison and MCCM hospice market areas

As we discuss below in **Section F.4**, the difference-in-differences approach compared outcomes for decedents in MCCM and comparison market areas before and after the model's implementation. To understand how those who enrolled in MCCM differed from those who did not enroll, we compared the intervention group of MCCM decedents to comparison decedents as follows:

- **Medicare decedents in MCCM market areas before implementation:** Medicare beneficiaries who died between January 1, 2014 and December 31, 2015 in the market areas of MCCM hospices in the calendar year of their death,[35] This is the baseline for MCCM decedents.
- **Medicare decedents in comparison hospices' market areas after implementation:** Medicare beneficiaries who died between January 1, 2016 and September 30, 2019 and who resided in comparison hospices' market areas. This is the comparison group of non-MCCM decedents after the start of the model.
- **Medicare decedents in comparison hospices' market areas before implementation:** Medicare beneficiaries who died between January 1, 2014 and December 31, 2015 and who resided in comparison hospices' market areas. This is the baseline for the comparison group of non-MCCM decedents.

We drew comparison decedents from the market areas of comparison hospices to control for organizational and market characteristics that may confound estimates of MCCM impacts. We determined the market areas of comparison hospices using the residential mailing ZIP

[35] ZIP codes for Medicare beneficiaries' place of residence are only available for a given calendar year.

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codes of MHB enrollees served by comparison hospices during the time the model was operational (i.e., January 1, 2016 through September 30, 2019).[36] We used the same process to identify market areas of MCCM hospices and the resulting ZIP codes to define MCCM market areas in the baseline. This process yielded a comparison group of 8,579,878 Medicare beneficiaries.

F.2.2.3 Step 2.3 Observed comparison decedents at five anchor dates

Ideally, we would compare MCCM decedents at the date of enrollment to comparison decedents at a point in time when they would have enrolled in MCCM had the model been offered. However, we cannot observe if and when a comparison decedent would have enrolled in MCCM, if the model were available. It would be difficult to predict when an individual would have enrolled as there are many unobservable precursors that led to beneficiaries' participation in MCCM, such as access to health care, relationships with referring providers, and desire to receive palliative care.

To address this uncertainty, we developed a strategy to assign comparison group members to five hypothetical enrollment dates, or anchor dates. We selected these dates to reflect the wide variation in post-enrollment survival time among MCCM decedents and to align with the evaluation's outcome measurement periods.[37] Specifically, we set anchor dates at 30, 60, 90, 180, and 365 days before death. We therefore converted the level of observation for the comparison group to be the decedent's anchor date, such that we observed each comparison decedent exactly five times, at each time point, before their death. After Step 2.3, there were 42,899,390 decedent anchor-date observations.

F.2.2.4 Step 2.4 Retained decedents who had an MCCM-qualifying diagnosis and met all five Medicare enrollment-related eligibility criteria on the anchor date.

MCCM targets beneficiaries with a diagnosis of cancer, chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), or human immunodeficiency virus/acquired immunodeficiency syndrome. We imposed this requirement on the comparison group at each anchor date by retaining decedents who had at least 1 primary diagnosis code for an MCCM-qualifying diagnosis in Medicare claims data in the 12 months before the anchor date.

At each anchor date, we also excluded comparison decedents who did not meet all five of the Medicare enrollment-related eligibility criteria.[38] This restriction ensured that we were able to fully observe their use of Medicare-covered services during the year before the

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[36] For a detailed description of how we identified comparison hospices' market areas, see **Section F.2**.

[37] See **Section F.4** for a discussion of the measurement periods used to estimate MCCM's impact on end-of-life outcomes.

[38] See **Exhibit D.2** for a description of MCCM's qualifying diagnosis and Medicare enrollment-related eligibility criteria.

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anchor date, which is important for our ability to assess similarity between MCCM and comparison decedents. These restrictions resulted in 2,354,354 decedents and 8,164,155 decedent anchor-date observations.

F.2.2.5 Step 2.5 Excluded decedents in the performance period who resided in market areas also served by MCCM hospices.

Multiple hospices may serve a single ZIP code. In the final step, we excluded comparison decedents from the performance period who resided in the market areas of comparison hospices, but whose ZIP codes were also served by MCCM hospices. This restriction ensured that the group of comparison decedents observed in the performance period was composed solely of those who resided in areas where they could not have accessed MCCM.[39]

The final set of comparison decedents included in the impact analyses consisted of 1,312,394 decedents and 4,504,418 decedent anchor-date observations.[40]

F.3 ENTROPY BALANCING WEIGHTING

F.3.1 Overview

Our ability to estimate the impact of MCCM on end-of-life expenditures and utilization accurately requires a comparison group that is similar to MCCM decedents in terms of observable characteristics that are associated with enrollment in the model and end-of-life outcomes. Similarity of MCCM and comparison decedents based on observable characteristics, or "balance," mitigates potential bias in the impact estimates. The selection of comparison decedents from the market areas of comparison hospices promotes a balance between organizational and market-level characteristics.[41]

To further improve balance, we used entropy balancing to ensure that observable decedent-level characteristics associated with enrollment in the model and end-of-life outcomes are similar between MCCM and comparison decedents.[42] While common techniques to create weights rely on balancing average characteristics, entropy balancing is a new approach that aligns characteristics' distributions, not just means. Entropy balancing yields weights for

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[39] There are 7,913 ZIP codes for MCCM market areas. Initially, there were 9,748 ZIP codes for comparison markets. After we removed those also served by MCCM hospices, there were 6,434 ZIP codes. As a result, there are more comparison decedents drawn from MCCM markets than comparison markets. We separately weight comparison decedents in MCCM and comparison markets in the baseline and performance periods, such that the weights sum to the number of MCCM decedents. This weighting equalizes the effective number of comparison decedents between markets in the impact analyses.

[40] On average, comparison decedents were included at 3.4 anchor dates.

[41] **Section F.2** describes the selection of comparison hospices.

[42] Hainmueller J. (2012). Entropy balancing for causal effects: A multivariate reweighting method to produce balanced samples in observational studies. *Political Analysis*, 20:25-46.

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each comparison decedent such that those who were similar to MCCM decedents have higher weights, while those who were dissimilar to MCCM decedents have lower weights. Each MCCM decedent receives a weight equal to one.

Balancing MCCM and comparison decedents' characteristics at similar points in time before death helps to account for unobserved decedent characteristics associated with both survival time and MCCM outcomes, such as access to health care and relationships with health care providers. As described in **Section F.2.2**, we observed comparison decedents at five anchor dates before their deaths; these anchor dates are designed to reflect MCCM decedents' post-enrollment survival times and align with outcome measurement periods. To observe MCCM decedents at a similar point in time, we assigned them to 1 of 5 survival strata based on the number of days between enrollment and death: 30 days or less, 31 to 60 days, 61 to 90 days, 91 to 180 days, and 181 to 365 days.[43] We measured prior year characteristics of MCCM decedents at the upper bound of their survival strata to align with the anchor dates used to construct the comparison group. For example, if a decedent enrolled in MCCM 35 days before death, we assessed their characteristics at 60 days.[44] Using the upper bound of their survival strata in this way ensured that we measured decedents' characteristics before enrollment and not during the intervention period, which avoided inducing endogeneity.

We then calculated separate entropy balancing weights at each anchor date to account for observable differences in health status, and use of Medicare services across MCCM decedents who are associated with post-enrollment survival time and MCCM outcomes. MCCM decedents were included only once in the entropy balancing (on the anchor date corresponding to the upper bound of their survival strata). Comparison decedents were included in the entropy balancing weighting up to five times, based on the number of anchor dates where they (1) met all of the Medicare enrollment-related eligibility criteria, and (2) had an MCCM-qualifying diagnosis, as described in Step 2.4 in **Section F.2.2**.

F.3.2 Analytic Sample for Entropy Balancing Weighting

Of the 2,766 MCCM decedents identified in **Section F.2.1**, we identified 42 decedents who did not meet all 5 Medicare enrollment-related eligibility criteria on their respective anchor dates. To ensure that claims-based measures of health status and utilization used to calculate entropy balancing weights were accurate, we required decedents to meet all of the Medicare enrollment-related eligibility criteria on their anchor dates. The sample used for entropy balancing weighting therefore excluded these 42 MCCM decedents; however, they

[43] As discussed in **Section F.2.1**, we excluded MCCM decedents who enrolled more than 365 days before death from the main analytic sample.

[44] A consequence of this process is that weights for the comparison group are constructed to reflect MCCM decedents' characteristics at points in time that are not perfectly aligned with their characteristics at enrollment.

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were included in the impact analyses and calculation of net savings to Medicare due to MCCM.

Exhibit F.6 shows the analytic sample of MCCM and comparison decedents included in the entropy balancing weighting at each anchor date. After applying the exclusions described above, 75.6 percent of all MCCM decedents were included in the entropy balancing weighting.

Exhibit F.6 Sample Size for Entropy Balancing Weighting

Anchor Date	Last 30 Days of Life	Last 60 Days of Life	Last 90 Days of Life	Last 180 Days of Life	Last 365 Days of Life	Last 366 Days of Life or More[a]	Total
Total number of MCCM decedents	791	684	453	749	595	331	**3,603**
Number of MCCM decedents included in the EB weighting	656	577	374	627	490	0	**2,724**
Percent of total MCCM decedents included in the EB weighting	82.9%	84.4%	82.6%	83.7%	82.4%	0%	**75.6%**
Number of comparison decedents included in the EB weighting	940,275	947,422	935,863	886,091	794,767	Not applicable	**4,504,418**

Note: MCCM decedents were included only once in the EB weighting based on the number of days between actual enrollment and death. Comparison decedents were included in the EB weighting from one to five times, based on the number of anchor dates when they met all of the Medicare-enrollment related and MCCM-qualifying diagnosis eligibility criteria, as described in Step 2.4 in **Section F.2.2**.

[a] MCCM decedents who enrolled more than 365 days before death were not assigned to an anchor date and were not included in the EB.

EB = entropy balancing.

F.3.3 Entropy Balancing Covariates

We included covariates measuring demographics, MCCM eligibility criteria, Medicare services indicative of serious illness and frailty, and other indicators of illness and frailty in the entropy balancing weighting.[45] While the analytic sample of decedents is limited to those with dates of death on or before January 1, 2014, the specification of covariates uses data from January 1, 2012 to September 30, 2019. For example, the earliest date of death for a comparison decedent in the baseline is January 1, 2014 and the anchor date of 365 days before death for this decedent is January 1, 2013. To specify many of the covariates used in

[45] We included the following demographics in the entropy balancing weighting: age, census region, hierarchical condition category risk score, comorbidities, dual eligibility, gender, urban/rural location, and race/ethnicity. See **Exhibit D.1** for a description of these variables. See **Exhibits D.3**, **D.4**, and **D.5** for a description of the remaining covariates included in the entropy balancing.

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the entropy balancing weighting at this anchor date, such as the number of cancer claims in the prior year, we would use data from January 1, 2012 through December 31, 2012.

An important consideration in the selection of covariates to include in the entropy balancing is the MCCM enrollment criterion that a physician certified the beneficiary had a six-month or less prognosis. While the expectation that an individual is approaching death is an important selection mechanism for enrollment in the model, this requirement was not verifiable using data available to the evaluation team and was dependent on the judgement of the individual's physician. Based on input of the evaluation team's expert consultant, we included covariates associated with disease severity and functional dependency that are indicative of the likelihood a physician would make a six-month or less prognosis. Together the covariates included in the entropy balancing are intended to capture the unobserved clinical processes that generate documentation of an MCCM-qualifying diagnosis, physician certification of a six-month or less prognosis, and referral of eligible beneficiaries to the model.

Exhibit F.7 presents the average characteristics of MCCM decedents included in the entropy balancing evaluated at each anchor date. The data demonstrate the variation in the characteristics of MCCM decedents across post-enrollment survival times. Differences in the covariates related to MCCM-qualifying diagnoses are especially notable. MCCM decedents with long post-enrollment survival times had fewer claims for cancer and more claims for CHF relative to MCCM decedents with shorter post-enrollment survival times. For example, MCCM decedents who enrolled in the last month of life had an average of 7.88 claims for cancer, compared to MCCM decedents who enrolled in the last six months to a year of life had an average of 4.95 cancer claims.[46] Further, average hierarchical condition category scores increase from an average of 3.66 for MCCM decedents who enrolled between 181 to 365 days before death to 4.88 for MCCM decedents who enrolled in the last month of life. If end-of-life services and expenditures differ across patient diagnoses, it would be important to develop a comparison group that reflects the variation in the proportion of diagnoses across survival strata. By performing entropy balancing at each anchor date separately, we accounted for variation in characteristics across decedents' survival strata.

[46] See **Exhibits D.2** and **D.9** for a description of the claims data and claim codes use to identify MCCM-qualifying diagnoses.

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Exhibit F.7 Average Characteristics of MCCM Decedents Included in the Entropy Balancing at Each Anchor Date

Beneficiary Characteristics	Anchor Date				
	Last 30 Days of Life (n = 656)	Last 60 Days of Life (n = 577)	Last 90 Days of Life (n = 374)	Last 180 Days of Life (n = 627)	Last 365 Days of Life (n = 490)
Age					
0-64	0.04	0.06	0.06	0.06	0.04
65-74	0.32	0.29	0.31	0.26	0.24
74-85	0.38	0.41	0.38	0.40	0.37
Census region					
Northeast	0.21	0.21	0.22	0.21	0.20
Midwest	0.26	0.26	0.25	0.24	0.26
South	0.34	0.36	0.36	0.40	0.42
Dual eligibility					
Yes	0.06	0.06	0.11	0.07	0.11
Gender					
Male	0.56	0.51	0.47	0.46	0.50
Location					
Urban	0.90	0.90	0.90	0.90	0.89
Race/ethnicity					
White	0.89	0.91	0.90	0.91	0.87
Black	0.07	0.06	0.06	0.06	0.08
Hispanic	0.01	0.00	0.01	0.00	0.01
MCCM-qualifying diagnoses					
Number of claims for cancer	7.88	8.05	7.92	6.14	4.95
Number of claims for congestive heart failure	0.68	0.81	0.92	0.93	1.11
Number of claims for chronic obstructive pulmonary disease	1.00	0.97	1.13	0.96	0.96
Number of claims for human immunodeficiency virus/acquired immunodeficiency syndrome	0.03	0.01	0.01	0.00	0.01
Indicators of chronic illness[a]					
Acute myocardial infarction	0.04	0.04	0.04	0.03	0.04
Alzheimer's disease	0.03	0.03	0.05	0.04	0.07
Alzheimer's disease and related disorders or senile dementia	0.17	0.17	0.26	0.20	0.25
Anemia	0.73	0.69	0.70	0.63	0.60
Asthma	0.10	0.10	0.11	0.12	0.13
Atrial fibrillation	0.25	0.26	0.28	0.24	0.28
Benign prostatic hyperplasia	0.19	0.19	0.17	0.18	0.17
Cataract	0.14	0.18	0.17	0.17	0.19
Chronic kidney disease	0.58	0.56	0.58	0.54	0.57

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Beneficiary Characteristics	Anchor Date				
	Last 30 Days of Life (n = 656)	Last 60 Days of Life (n = 577)	Last 90 Days of Life (n = 374)	Last 180 Days of Life (n = 627)	Last 365 Days of Life (n = 490)
Chronic obstructive pulmonary disease and bronchiectasis	0.39	0.41	0.42	0.43	0.48
Depression	0.35	0.36	0.40	0.39	0.37
Diabetes	0.40	0.37	0.40	0.36	0.37
Glaucoma	0.09	0.10	0.10	0.10	0.10
Heart failure	0.43	0.44	0.45	0.44	0.47
Hip/pelvic fracture	0.02	0.02	0.03	0.02	0.02
Hyperlipidemia	0.68	0.71	0.70	0.58	0.70
Hypertension	0.81	0.82	0.85	0.83	0.83
Ischemic heart disease	0.54	0.58	0.59	0.52	0.61
Osteoporosis	0.11	0.12	0.12	0.11	0.14
Rheumatoid arthritis/osteoarthritis	0.45	0.43	0.50	0.46	0.52
Stroke	0.10	0.09	0.11	0.09	0.10
Breast cancer	0.09	0.11	0.10	0.11	0.10
Colorectal cancer	0.08	0.08	0.09	0.07	0.07
Lung cancer	0.23	0.26	0.21	0.18	0.15
Prostate cancer	0.11	0.12	0.11	0.11	0.13
Hierarchical condition category score	4.88	4.72	4.76	4.03	3.66
Indicators of disease severity (in days before the anchor date)					
Abnormal gait (0-30 days)	0.19	0.18	0.20	0.13	0.12
Abnormal gait (31-120 days)	0.19	0.21	0.20	0.16	0.18
Abnormal gait (121-365 days)	0.26	0.28	0.32	0.30	0.30
Acute renal failure (0-365 days)	0.35	0.32	0.34	0.30	0.27
Cerebral vascular accident/traumatic brain injury (0-30 days)	0.10	0.13	0.12	0.07	0.04
Cerebral vascular accident/traumatic brain injury (31-120 days)	0.09	0.14	0.13	0.08	0.07
Cerebral vascular accident/traumatic brain injury (121-365 days)	0.16	0.15	0.19	0.13	0.15
Cor pulmonale (0-365 days)	0.13	0.10	0.11	0.09	0.07
Deep vein thrombosis (0-365 days)	0.22	0.22	0.16	0.16	0.12
Delirium or altered mental status (0-30 days)	0.11	0.10	0.13	0.09	0.06
Delirium or altered mental status (31-120 days)	0.10	0.10	0.14	0.11	0.08
Delirium or altered mental status (121-365 days)	0.16	0.15	0.20	0.15	0.18
Depression (0-30 days)	0.16	0.14	0.17	0.14	0.11
Depression (31-120 days)	0.18	0.18	0.21	0.19	0.17
Depression (121-365 days)	0.26	0.23	0.30	0.30	0.29
Diabetes mellitus complication (0-30 days)	0.12	0.13	0.12	0.13	0.11
Diabetes mellitus complication (31-120 days)	0.15	0.15	0.15	0.16	0.16

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Beneficiary Characteristics	Anchor Date				
	Last 30 Days of Life (n = 656)	Last 60 Days of Life (n = 577)	Last 90 Days of Life (n = 374)	Last 180 Days of Life (n = 627)	Last 365 Days of Life (n = 490)
Diabetes mellitus complication (121-365 days)	0.21	0.21	0.25	0.23	0.23
Difficulty walking (0-30 days)	0.18	0.17	0.19	0.13	0.12
Difficulty walking (31-120 days)	0.17	0.20	0.19	0.16	0.17
Difficulty walking (121-365 days)	0.25	0.26	0.31	0.29	0.29
Hypercalcemia (0-365 days)	0.07	0.05	0.04	0.04	0.04
Hyponatremia (0-365 days)	0.31	0.28	0.29	0.26	0.19
Malnutrition (0-30 days)	0.14	0.13	0.12	0.06	0.03
Malnutrition (31-120 days)	0.13	0.11	0.09	0.06	0.04
Malnutrition (121-365 days)	0.15	0.10	0.12	0.10	0.09
Muscle weakness (0-30 days)	0.17	0.17	0.17	0.14	0.12
Muscle weakness (31-120 days)	0.16	0.18	0.18	0.14	0.15
Muscle weakness (121-365 days)	0.19	0.24	0.29	0.26	0.28
Obesity (0-30 days)	0.07	0.08	0.12	0.07	0.06
Obesity (31-120 days)	0.09	0.10	0.14	0.09	0.10
Obesity (121-365 days)	0.18	0.18	0.22	0.20	0.20
Paralysis (0-30 days)	0.23	0.23	0.18	0.14	0.08
Paralysis (31-120 days)	0.18	0.20	0.24	0.17	0.11
Paralysis (121-365 days)	0.23	0.23	0.28	0.22	0.18
Pericardial effusion (non-inflammatory) (0-365 days)	0.08	0.06	0.08	0.06	0.03
Pleural effusion (0-365 days)	0.48	0.46	0.42	0.38	0.30
Pneumonia (0-30 days)	0.15	0.15	0.18	0.12	0.07
Pneumonia (31-120 days)	0.18	0.16	0.17	0.13	0.13
Pneumonia (121-365 days)	0.25	0.24	0.25	0.26	0.24
Pulmonary embolism (0-365 days)	0.21	0.21	0.17	0.17	0.13
Respiratory failure (0-30 days)	0.17	0.19	0.21	0.15	0.13
Respiratory failure (31-120 days)	0.16	0.18	0.19	0.15	0.17
Respiratory failure (121-365 days)	0.20	0.20	0.21	0.22	0.23
Sepsis (0-30 days)	0.14	0.10	0.10	0.07	0.06
Sepsis (31-120 days)	0.14	0.15	0.09	0.09	0.07
Sepsis (121-365 days)	0.21	0.19	0.18	0.19	0.20
Urinary tract infection (0-30 days)	0.11	0.11	0.13	0.09	0.08
Urinary tract infection (31-120 days)	0.11	0.13	0.11	0.12	0.13
Urinary tract infection (121-365 days)	0.22	0.22	0.27	0.26	0.27
Measures of Medicare services indicative of serious illness and frailty (in days before the anchor date)					
Count of inpatient admissions (0-365 days)	2.04	1.95	2.01	1.65	1.47
Count of ED visits (0-365 days)	2.63	2.43	2.62	2.31	2.10
Count of intensive care unit visits (0-365 days)	0.30	0.27	0.28	0.26	0.18
Count of observational stays (0-365 days)	0.53	0.52	0.56	0.49	0.46

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Beneficiary Characteristics	Anchor Date				
	Last 30 Days of Life (n = 656)	Last 60 Days of Life (n = 577)	Last 90 Days of Life (n = 374)	Last 180 Days of Life (n = 627)	Last 365 Days of Life (n = 490)
Count of office visits (0-365 days)	48.92	48.73	48.35	42.72	39.73
Ambulance transport (0-30 days)	0.24	0.20	0.24	0.16	0.10
Ambulance transport (31-120 days)	0.23	0.23	0.24	0.19	0.18
Ambulance transport (121-365 days)	0.33	0.28	0.36	0.34	0.38
ED visit (0-30 days)	0.53	0.45	0.46	0.33	0.20
ED visit (31-120 days)	0.48	0.49	0.47	0.41	0.36
ED visit (121-365 days)	0.67	0.65	0.72	0.67	0.64
Inpatient admission (0-30 days)	0.43	0.38	0.42	0.25	0.16
Inpatient admission (31-120 days)	0.42	0.42	0.36	0.28	0.27
Inpatient admissions (121-365 days)	0.53	0.55	0.58	0.53	0.52
Any inpatient admission with length of stay greater than 12 days (0-365 days)	0.18	0.16	0.17	0.14	0.10
Intensive care unit stay (0-30 days)	0.05	0.05	0.05	0.04	0.03
Use of any DME (0-30 days)	0.40	0.44	0.45	0.40	0.45
Use of any DME (31-120 days)	0.43	0.45	0.46	0.46	0.51
Use of any DME (121-365 days)	0.52	0.53	0.59	0.60	0.63
Use of home oxygen use (0-30 days)	0.23	0.24	0.24	0.21	0.24
Use of home oxygen (31-120 days)	0.21	0.24	0.24	0.22	0.25
Use of home oxygen (121-365 days)	0.20	0.23	0.27	0.23	0.29
Use of hospital bed (0-30 days)	0.07	0.07	0.06	0.05	0.04
Use of hospital bed (31-120 days)	0.06	0.06	0.05	0.05	0.04
Use of hospital bed (121-365 days)	0.05	0.05	0.05	0.05	0.05
Use of wheelchair (0-30 days)	0.06	0.08	0.07	0.06	0.06
Use of wheelchair (31-120 days)	0.04	0.07	0.05	0.06	0.06
Use of wheelchair (121-365 days)	0.05	0.07	0.08	0.07	0.07

Sources: Master Beneficiary Summary file; Medicare inpatient, outpatient, and carrier claims files; and CMS Chronic Conditions Data Warehouse.

Note: This exhibit displays column percentages for average characteristics observed for MCCM decedents (n = 2,724) included in the entropy balancing at each anchor date. We define each characteristic in **Appendix D**.

[a] See codes and computation algorithms of chronic illness indicators at https://www2.ccwdata.org/web/guest/condition-categories. A detailed description of the methodology used to form and update hierarchical conditions categories can be found at https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Downloads/RTC-Dec2018.pdf.

DME = durable medical equipment, ED = emergency department.

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F.3.4 Results of Entropy Balancing Weighting

Exhibit F.8 compares average covariate values for MCCM and comparison decedents in the performance period before and after entropy balancing weighting. To assess the similarity of the two groups, we calculated standardized differences in means between the characteristics of MCCM decedents and the unweighted characteristics of comparison decedents in column [3] and those of MCCM decedents and weighted characteristics of comparison decedents in column [5]. A standardized difference less than 0.20 is a commonly accepted threshold in the literature and indicates a given characteristic is adequately balanced between the two groups. We define each characteristic in **Appendix D**.

A comparison of the average characteristics of MCCM decedents and comparison decedents' unweighted averages informs the representativeness of MCCM decedents relative to the population of MCCM-eligible, Medicare beneficiaries. We also evaluated the success of the entropy balancing to develop a comparison group that was observationally similar to MCCM decedents by comparing the average characteristics of MCCM decedents to those of the weighted comparison group.

Overall, MCCM decedents were similar to the unweighted group of comparison decedents, with 83.5 percent of the 127 covariates considered well-balanced (i.e., the absolute values of the standardized differences in means were below 0.2). However, MCCM decedents and the unweighted comparison group differed in terms of covariates related to unmeasured aspects of access to health care that may affect enrollment in MCCM and health status at the time of enrollment. Specifically, comparison decedents were older, more likely to be dually eligible for Medicare and Medicaid, live in rural areas, and used less Medicare services (i.e., office/outpatient visits, emergency department visits, and inpatient admissions) in the year before the anchor date. MCCM decedents had a higher hierarchical condition category score, were more likely to have at least one claim for a cancer diagnosis in the year before enrollment, and less likely to have a claim for CHF or COPD than comparison decedents. These findings align with the analyses in **Section 2** in the main report that show MCCM decedents increased their use of Medicare services before enrollment in the model.

To address the existing imbalance in observable characteristics between MCCM decedents and comparison decedents, we used entropy balancing to assign weights to comparison decedents. Entropy balancing weighting adequately balanced 97.6 percent of characteristics.[47] After weighting, the comparison group was similar to MCCM decedents, including their pre-enrollment use of emergency department visits and inpatient admissions, which is important given that MCCM decedents' use of these services increased before enrollment.

[47] Three covariates remained unbalanced after the entropy balancing weighting: comparison decedents were less likely to have a Medicare claim for paralysis in the 30 days, 31 to 120 days, and 121 to 365 days before enrollment.

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We also estimated standardized differences in means across the weighted and unweighting characteristics of (1) MCCM decedents and comparison decedents in comparison markets during the baseline period, (2) MCCM decedents and comparison decedents in MCCM markets during the baseline period, and (3) comparison decedents in MCCM and comparison markets during the baseline period. In each of these analyses, the results were similar to the balance shown in **Exhibit F.8**.

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Exhibit F.8 Standardized Differences in Means between MCCM Decedents and Unweighted and Weighted Comparison Decedents during the Performance Period

Beneficiary Characteristic	MCCM Decedents [1]	Comparison Decedents (unweighted) [2]	Standard Difference [1] and [2] [3]	Comparison Decedents (weighted) [4]	Standard Difference [1] and [4] [5]
Age					
0-64	0.05	0.07	0.09	0.06	0.02
65-74	0.28	0.23	0.13	0.29	0.02
74-85	0.39	0.33	0.12	0.39	0.01
85+	0.27	0.37	0.20	0.26	0.03
Census region					
Northeast	0.21	0.20	0.03	0.19	0.04
Midwest	0.26	0.28	0.06	0.26	0.01
South	0.38	0.41	0.06	0.40	0.04
West	0.16	0.12	0.12	0.15	0.02
Dual eligibility					
Yes	0.08	0.20	0.34	0.09	0.02
Gender					
Male	0.50	0.50	0.00	0.50	0.00
Location					
Urban	0.90	0.78	0.34	0.88	0.06
Race/ethnicity					
White	0.90	0.87	0.08	0.90	0.00
Black	0.07	0.09	0.08	0.07	0.00
Hispanic	0.01	0.01	0.04	0.01	0.00
Other	0.03	0.03	0.00	0.03	0.00
MCCM-qualifying diagnoses					
One or more claims for cancer	0.68	0.42	0.55	0.65	0.06
One or more claims for congestive heart failure	0.28	0.43	0.33	0.36	0.17

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Beneficiary Characteristic	MCCM Decedents [1]	Comparison Decedents (unweighted) [2]	Standard Difference [1] and [2] [3]	Comparison Decedents (weighted) [4]	Standard Difference [1] and [4] [5]
One or more claims for COPD	0.27	0.37	0.23	0.33	0.13
One or more claims for human immunodeficiency virus/acquired immunodeficiency syndrome	0.00	0.01	0.02	0.00	0.01
Number of claims for cancer	7.00	2.92	0.72	6.95	0.01
Number of claims for congestive heart failure	0.99	1.28	0.16	1.21	0.12
Number of claims for COPD	0.88	1.03	0.09	1.05	0.10
Number of claims for human immunodeficiency virus/acquired immunodeficiency syndrome	0.01	0.02	0.01	0.01	0.01
Indicators of chronic illness[a]					
Acute myocardial infarction	0.04	0.05	0.06	0.04	0.02
Alzheimer's disease	0.04	0.10	0.21	0.04	0.01
Alzheimer's disease and related disorders or senile dementia	0.20	0.30	0.22	0.23	0.06
Anemia	0.67	0.61	0.13	0.68	0.02
Asthma	0.11	0.10	0.02	0.11	0.01
Atrial fibrillation	0.26	0.30	0.08	0.27	0.01
Benign prostatic hyperplasia	0.18	0.15	0.07	0.19	0.02
Cataract	0.17	0.15	0.05	0.16	0.02
Chronic kidney disease	0.56	0.57	0.02	0.61	0.09
COPD and bronchiectasis	0.42	0.51	0.18	0.45	0.05
Depression	0.37	0.34	0.06	0.41	0.07
Diabetes	0.38	0.41	0.07	0.40	0.04
Glaucoma	0.10	0.08	0.05	0.09	0.03
Heart failure	0.44	0.59	0.29	0.47	0.05
Hip/pelvic fracture	0.02	0.03	0.05	0.02	0.01
Hyperlipidemia	0.67	0.63	0.08	0.68	0.03
Hypertension	0.83	0.85	0.07	0.84	0.04
Ischemic heart disease	0.56	0.60	0.09	0.57	0.02

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Beneficiary Characteristic	MCCM Decedents [1]	Comparison Decedents (unweighted) [2]	Standard Difference [1] and [2] [3]	Comparison Decedents (weighted) [4]	Standard Difference [1] and [4] [5]
Osteoporosis	0.12	0.11	0.02	0.12	0.00
Rheumatoid arthritis/osteoarthritis	0.47	0.46	0.02	0.50	0.07
Stroke	0.10	0.10	0.02	0.10	0.01
Breast cancer	0.10	0.08	0.09	0.10	0.02
Colorectal cancer	0.08	0.06	0.08	0.07	0.02
Lung cancer	0.21	0.10	0.30	0.20	0.01
Prostate cancer	0.12	0.09	0.07	0.11	0.03
Hierarchical condition category score	4.42	3.50	0.45	4.65	0.11
Indicators of disease severity (in days before the anchor date)					
Abnormal gait (0-30 days)	0.16	0.14	0.07	0.18	0.03
Abnormal gait (31-120 days)	0.19	0.17	0.03	0.20	0.03
Abnormal gait (121-365 days)	0.29	0.31	0.04	0.30	0.03
Acute renal failure (0-365 days)	0.32	0.30	0.04	0.34	0.05
Cerebral vascular accident/traumatic brain injury (0-30 days)	0.09	0.06	0.11	0.10	0.04
Cerebral vascular accident/traumatic brain injury (31-120 days)	0.10	0.07	0.10	0.11	0.03
Cerebral vascular accident/traumatic brain injury (121-365 days)	0.15	0.14	0.03	0.17	0.03
Cor pulmonale (0-365 days)	0.10	0.07	0.12	0.10	0.00
Deep vein thrombosis (0-365 days)	0.18	0.13	0.15	0.19	0.01
Delirium or altered mental status (0-30 days)	0.09	0.08	0.04	0.10	0.03
Delirium or altered mental status (31-120 days)	0.10	0.10	0.00	0.11	0.03
Delirium or altered mental status (121-365 days)	0.16	0.20	0.10	0.18	0.04
Depression (0-30 days)	0.14	0.13	0.06	0.14	0.00
Depression (31-120 days)	0.18	0.16	0.05	0.18	0.01
Depression (121-365 days)	0.28	0.28	0.01	0.28	0.00
Diabetes mellitus complication (0-30 days)	0.12	0.11	0.03	0.16	0.11
Diabetes mellitus complication (31-120 days)	0.15	0.15	0.00	0.20	0.12

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Beneficiary Characteristic	MCCM Decedents [1]	Comparison Decedents (unweighted) [2]	Standard Difference [1] and [2] [3]	Comparison Decedents (weighted) [4]	Standard Difference [1] and [4] [5]
Diabetes mellitus complication (121-365 days)	0.23	0.24	0.03	0.28	0.13
Difficulty walking (0-30 days)	0.16	0.14	0.06	0.15	0.01
Difficulty walking (31-120 days)	0.18	0.17	0.02	0.17	0.01
Difficulty walking (121-365 days)	0.28	0.31	0.06	0.28	0.01
Hypercalcemia (0-365 days)	0.27	0.21	0.13	0.29	0.04
Hyponatremia (0-365 days)	0.05	0.03	0.08	0.05	0.02
Malnutrition (0-30 days)	0.10	0.05	0.16	0.11	0.06
Malnutrition (31-120 days)	0.09	0.06	0.11	0.10	0.05
Malnutrition (121-365 days)	0.11	0.09	0.06	0.13	0.05
Muscle weakness (0-30 days)	0.15	0.15	0.02	0.16	0.03
Muscle weakness (31-120 days)	0.16	0.17	0.03	0.17	0.03
Muscle weakness (121-365 days)	0.25	0.29	0.08	0.26	0.04
Obesity (0-30 days)	0.08	0.07	0.03	0.09	0.06
Obesity (31-120 days)	0.10	0.10	0.01	0.12	0.07
Obesity (121-365 days)	0.19	0.19	0.01	0.23	0.09
Paralysis (0-30 days)	0.18	0.10	0.22	0.27	0.22
Paralysis (31-120 days)	0.18	0.12	0.17	0.27	0.23
Paralysis (121-365 days)	0.23	0.18	0.11	0.34	0.26
Pericardial effusion (non-inflammatory) (0-365 days)	0.06	0.04	0.12	0.07	0.02
Pleural effusion (0-365 days)	0.41	0.32	0.20	0.43	0.03
Pneumonia (0-30 days)	0.13	0.11	0.08	0.14	0.03
Pneumonia (31-120 days)	0.15	0.13	0.07	0.16	0.03
Pneumonia (121-365 days)	0.25	0.25	0.01	0.26	0.03
Pulmonary embolism (0-365 days)	0.18	0.13	0.14	0.19	0.03
Respiratory failure (0-30 days)	0.17	0.12	0.12	0.20	0.09
Respiratory failure (31-120 days)	0.17	0.14	0.08	0.20	0.09

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Beneficiary Characteristic	MCCM Decedents [1]	Comparison Decedents (unweighted) [2]	Standard Difference [1] and [2] [3]	Comparison Decedents (weighted) [4]	Standard Difference [1] and [4] [5]
Respiratory failure (121-365 days)	0.21	0.22	0.03	0.25	0.09
Sepsis (0-30 days)	0.10	0.08	0.04	0.09	0.00
Sepsis (31-120 days)	0.11	0.10	0.03	0.11	0.02
Sepsis (121-365 days)	0.20	0.21	0.04	0.18	0.03
Urinary tract infection (0-30 days)	0.10	0.10	0.00	0.10	0.02
Urinary tract infection (31-120 days)	0.12	0.14	0.04	0.11	0.03
Urinary tract infection (121-365 days)	0.25	0.28	0.08	0.23	0.05
Measures of Medicare services indicative of serious illness and frailty (in days before the anchor date)					
Count of inpatient admissions (0-365 days)	1.83	1.47	0.23	1.92	0.06
Count of ED visits (0-365 days)	2.42	2.05	0.22	2.60	0.10
Count of intensive care unit visits (0-365 days)	0.26	0.24	0.03	0.27	0.02
Count of observational stays (0-365 days)	0.51	0.38	0.15	0.58	0.08
Count of office visits (0-365 days)	45.74	35.16	0.41	47.15	0.05
Ambulance transport (0-30 days)	0.19	0.17	0.04	0.21	0.04
Ambulance transport (31-120 days)	0.21	0.22	0.01	0.23	0.05
Ambulance transport (121-365 days)	0.34	0.41	0.15	0.36	0.06
ED visit (0-30 days)	0.40	0.25	0.31	0.42	0.05
ED visit (31-120 days)	0.44	0.34	0.22	0.47	0.06
ED visit (121-365 days)	0.67	0.62	0.09	0.70	0.07
Inpatient admission (0-30 days)	0.33	0.20	0.29	0.34	0.04
Inpatient admission (31-120 days)	0.35	0.26	0.21	0.37	0.03
Inpatient admission (121-365 days)	0.54	0.50	0.08	0.56	0.04
Any inpatient admission with length of stay greater than 12 days	0.15	0.14	0.03	0.16	0.02
Intensive care unit stay (0-30 days)	0.04	0.04	0.02	0.05	0.01
Use of any DME (0-30 days)	0.43	0.36	0.13	0.43	0.01
Use of any DME (31-120 days)	0.46	0.41	0.11	0.47	0.01

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Beneficiary Characteristic	MCCM Decedents [1]	Comparison Decedents (unweighted) [2]	Standard Difference [1] and [2] [3]	Comparison Decedents (weighted) [4]	Standard Difference [1] and [4] [5]
Use of any DME (121-365 days)	0.57	0.54	0.06	0.58	0.02
Use of home oxygen use (0-30 days)	0.23	0.22	0.03	0.25	0.04
Use of home oxygen (31-120 days)	0.23	0.23	0.01	0.25	0.04
Use of home oxygen (121-365 days)	0.24	0.27	0.07	0.26	0.05
Use of hospital bed (0-30 days)	0.06	0.04	0.08	0.06	0.01
Use of hospital bed (31-120 days)	0.05	0.04	0.03	0.05	0.01
Use of hospital bed (121-365 days)	0.05	0.06	0.07	0.05	0.01
Use of wheelchair (0-30 days)	0.07	0.05	0.10	0.07	0.01
Use of wheelchair (31-120 days)	0.06	0.05	0.05	0.06	0.01
Use of wheelchair (121-365 days)	0.07	0.07	0.00	0.07	0.02

Sources: Master Beneficiary Summary file; Medicare inpatient, outpatient, and carrier claims files; and CMS Chronic Conditions Data Warehouse.

Note: Exhibit D displays column percentages for pre-enrollment characteristics for MCCM decedents (n = 2,724) and comparison decedents in comparison markets during the performance period (n = 2,034,242) who were included in the entropy balancing weighting. For both MCCM and comparison decedents, we evaluated characteristics at decedents' respective anchor dates. We present the unweighted characteristics of the comparison group in column [2] and their weighted characteristics in column [4]. The analysis included comparison decedents who resided in market areas of comparison hospices that were not also served by MCCM hospices and that met Medicare-related enrollment and diagnostic criteria on their anchor date. To assess the similarity of average characteristics, we calculated standardized differences in means between the characteristics of MCCM decedents and the unweighted characteristics of comparison decedents in column [3] and those of MCCM decedents and weighted characteristics of comparison decedents in column [5]. A standardized difference less than 0.20 is a commonly accepted threshold in the literature and indicates a given characteristic is adequately balanced between the two groups. We define each characteristic in **Appendix D**.

[a] See codes and computation algorithms of chronic illness indicators at: https://www2.ccwdata.org/web/guest/condition-categories. A detailed description of the methodology used to form and update hierarchical conditions categories can be found at: https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Downloads/RTC-Dec2018.pdf.

COPD = chronic obstructive pulmonary disease, DME = durable medical equipment, ED = emergency department.

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F.4 DIFFERENCE-IN-DIFFERENCES REGRESSION ANALYSIS

We estimated the average effect of participation in MCCM using a difference-in-differences approach that compares average end-of-life expenditures and utilization between MCCM and comparison decedents before and after the implementation of the model on January 1, 2016. We defined the baseline as the two-year period before the start of MCCM from January 1, 2014 to December 31, 2015. The MCCM performance period started January 1, 2016 and ended September 30, 2019. We assigned MCCM and comparison decedents to the performance or baseline period based on their year of death.

Potential bias in the estimated impact of MCCM may occur if there are relative changes in observable characteristics correlated with end-of-life outcomes between MCCM and comparison decedents over time. As discussed in **Section F.3**, we applied entropy balancing weights to align average covariate values associated with enrollment in MCCM and end-of-life outcomes between MCCM decedents and the comparison group. We also included a set of demographic and market-level covariates in the difference-in-differences specification to account for changes in average, observable characteristics between MCCM and comparison decedents, and their markets over time. We evaluated covariates included in the difference-in-differences approach for MCCM and comparison decedents on their respective anchor dates. Lastly, this approach accounts for any pre-existing differences in the outcomes between the two groups in the baseline period that remain after controlling for covariates included in the difference-in-differences regression and entropy balancing weighting.

To estimate the impact of MCCM on end-of-life outcomes, we used the following model:

$$y_{ijt} = a_0 + a_1 MCCM_{ij} + a_2 Perform_{it} + a_3 MCCM_{ij} * Perform_{it} + a_4 \mathbf{Z}_{ijt} + \varepsilon_{ijt}$$

where:

y_{ijt}: is the outcome of interest, such as total Medicare expenditure in the last 30 days of life, for decedents *i* who resided in market *j* and died in year *t.*

$MCCM_{ij}$: represents decedents who resided in the market areas of hospices participating in MCCM. In the baseline, it takes on the value of one for all MCCM-eligible decedents *i* who resided in market *j*. In the performance period, it takes on the value of one for all decedents *i* enrolled in MCCM.

$Perform_{it}$: represents the performance period. It takes on the value of one for decedents who died between January 1, 2016 and September 30, 2019.

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Z_{ijt}: is a set of beneficiary and market characteristics for decedents *i* who resided in market *j* and died in year *t.*[48]

$MCCM_{ij} * Perform_{it}$: takes on the value of one for all decedents enrolled in MCCM who died between January 1, 2016 and September 30, 2019.

ε_{ijt}: sum of unobserved factors that are unaccounted for by Z_{ijt} and that influence the outcome for decedents *i* who resided in market *j* and died in year *t*.

We use all available performance years to estimate the impact of MCCM, so that α_3 represents the cumulative impacts of the model since implementation. We estimate the model using ordinary least squares and cluster standard errors by state to account for geographic correlations in the outcomes (e.g., state certificate of need laws).

Medicare beneficiaries enrolled in MCCM at varying points in time, ranging from 2 to 1,304 days before death. To understand the timing of MCCM's impact on end-of-life outcomes, we examined the effect of MCCM participation on health expenditures and utilization outcomes for 5 measurement periods: in the last 7, 30, 60, 90, and 180 days of life. We also estimated the effect of MCCM participation on transitions to MHB. We describe each outcome measure in **Exhibit D.8**.

For each measurement period, we limited the analytic sample used to estimate MCCM impacts on end-of-life expenditures and utilization to MCCM decedents who enrolled in the model before the measurement period.[49] For example, the subset of MCCM decedents who lived more than 30 days after enrollment contributed to the estimate of the model's impact on total Medicare expenditures during the last 30 days of life. By contrast, decedents who died within 30 days of enrollment did not contribute to impact estimates for outcomes within the last 30 days of life, but did contribute to estimates for outcomes in the last 7 days of life. The requirement that an MCCM decedent enrolled before the beginning of the measurement period ensures that we are capturing the full effect of MCCM on end-of-life health expenditures and outcomes. For outcomes related to transitions to MHB, we included decedents regardless of their post-enrollment survival time as transitions to hospice can occur at any point in time before death. To understand the timing of hospice transitions, we

[48] We included the following demographics in the difference-in-differences regression: age, census region, hierarchical condition category risk score, comorbidities, dual eligibility, gender, urban/rural location, and race/ethnicity. See **Exhibit D.1** for a description of these demographic variables. We also included following market-level variables: hospital care intensity index, percent of Medicare beneficiaries transitioning to MHB in the last three days of life, and the percent of Medicare beneficiaries that did not transition to MHB before death. See **Exhibit D.7** for descriptions of these market-level variables.

[49] In each measurement period, we included decedents who transitioned to MHB from MCCM and those who did not.

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also estimated impacts on the number of days between transitions to MHB and death, as well as the likelihood a decedent transitioned to hospice in the last two days of life.

We included comparison decedents in each measurement period following a similar method, but used the anchor date, rather than the enrollment date, to determine their inclusion. For example, comparison decedents observed at the 30-day anchor date are included in outcomes measured in the last 7 and 30 days of life, but not for outcomes measured in the last 60, 90, or 180 days of life.

The number of MCCM decedents included in the difference-in-differences regressions varies across the outcome measurement periods. **Exhibit F.9** reports the sample size of MCCM and comparison decedents for each outcome measurement period.

Exhibit F.9 Number of MCCM and Comparison Decedents Included in the Impact Analyses by Outcome Measurement Period

Outcome Measurement Period	MCCM Decedents[a]	Comparison Decedents[a]	Included Post-Enrollment Survival Stratum of MCCM Decedents				
			Last 0-30 Days of Life	Last 31-60 Days of Life	Last 61-90 Days of Life	Last 91-180 Days of Life	Last 181-365 Days of Life
End-of-life expenditures and utilization							
Last seven days of life	2,682	4,504,091	✓	✓	✓	✓	✓
Last 30 days of life	2,120	4,434,975		✓	✓	✓	✓
Last 60 days of life	1,531	3,563,886			✓	✓	✓
Last 90 days of life	1,156	2,616,531				✓	✓
Last 180 days of life	502	1,680,735					✓
Transitions to hospice							
Likelihood of MHB conversion	2,765	4,504,091	✓	✓	✓	✓	✓
Transition to hospice in the last two days of life	2,765	4,504,091	✓	✓	✓	✓	✓
Number of days from MHB enrollment to death[b]	2,325	2,318,578	✓	✓	✓	✓	✓

Note: This exhibit shows the number of MCCM and comparison decedents included in the impact analyses of end-of-life expenditures and utilization for groups of outcomes observed at a given number of days before death, and for outcomes related to transitions to hospice. MCCM decedents included in the DID regressions are those who met all MCCM administratively verifiable eligibility criteria on their enrollment date and enrolled 365 days or less before death. Comparison decedents included in the DID regressions included Medicare beneficiaries that met all Medicare enrollment-related eligibility criteria on their anchor date and had an International Classification of Disease code for an MCCM-qualifying diagnosis on the anchor date.

[a] We excluded 1 MCCM decedent and 327 comparison decedents from the DID analyses due to missing market-level data.

[b] This analysis is limited to MCCM and comparison decedents who transitioned to MHB.

DID = difference-in-differences, MHB = Medicare hospice benefit.

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F.4.1 Limitations

Four key limitations in our method to identify a comparison group affected our ability to estimate the impact of MCCM on end-of-life outcomes. In this section, we discuss these limitations and the steps taken to address each challenge provided by the evaluation.

1. **Lack of a counterfactual enrollment date for comparison decedents.** A well-constructed comparison group would select decedents at points in time when they would have enrolled in MCCM, if given the opportunity. This is particularly important given the relationship between post-enrollment survival time and MCCM decedents' end-of-life outcomes and characteristics, as shown in **Exhibits F.1** and **F.7**, respectively. To address this limitation, we selected five hypothetical enrollment dates that reflect the distribution of the number of days between enrollment and death among MCCM decedents. See **Section F.2.2** for a discussion of the process used to select hypothetical enrollment dates for comparison decedents. This process assumes there was no "survival effect" from enrolling in MCCM, such that participation in the model changed when a beneficiary died.
2. **We lacked an observed indicator of a physician-certified, six-month or less prognosis for comparison decedents.** An important criterion for participation in MCCM is a physician-certified, six-month or less prognosis, which we could not credibly verify for comparison decedents using Medicare administrative data alone. A six-month or less prognosis is not only important to determine if a comparison decedent would have been eligible for the model, but would also ensure that comparison decedents had similar disease trajectories and functional dependencies, and access to a referring physician as did MCCM decedents. To address this limitation, we identified a large set of characteristics that indicate a level of disease severity and functional dependency of someone close to the end of life based on guidance of the evaluation's clinical consultant. We describe these variables in **Exhibits D.4** and **D.5**. We included these covariates in the entropy balancing such that, on average, comparison decedents were similar to MCCM decedents for these characteristics. **Section F.3** discusses the inclusion of these variables in the entropy balancing.
3. **We cannot control for all unobservable characteristics related to enrollment in MCCM.** Our approach assumes that observable characteristics included in the difference-in-differences regression are correlated with unobservable characteristics influencing MCCM participation and end-of-life outcomes. The biggest limitations of our evaluation are the potential for unobserved differences in (1) beneficiaries' preferences for palliative care, life-prolonging treatment, and the balance between the two; (2) clinical data that inform referring providers' assessment of whether beneficiaries are eligible for the model based on having an MCCM-qualifying diagnosis and the length of time they

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may live; and (3) beneficiaries' access to care necessary to meet the model's eligibility criteria.[50]

To this end, we used a stratified approach to account for the wide variation in MCCM decedent's post-enrollment survival time to identify points in time when comparison decedents may have enrolled in the model and to assign weights to the comparison group. This process allowed us to account for important, but unobserved, decedent-level characteristics associated with both disease trajectory and end-of-life outcomes when identifying the comparison group. Because this method assesses health status at similar points in time relative to the date of death for MCCM and comparison decedents, our method represents an improvement over methods that randomly assign pseudo enrollment dates to comparison group members. Even so, the predictive power of the detailed set of health status measures used to weight comparison decedents may not fully control for unobserved differences between MCCM and comparison decedents who affect end-of-life outcomes. These unobserved differences may still complicate the causal interpretation of impacts.

4. **We do not estimate impacts on expenditures and utilization in the last 365 days of life.** We restricted the analytic sample to MCCM decedents who enrolled in the last year of life and met the model's administratively verifiable eligibility criteria at enrollment to estimate impacts for decedents directly targeted by the model. Additionally, we required decedents included in the analytic sample to have enrolled before the start of the measurement period. We would therefore need to use decedents who enrolled more than 365 days before death to estimate impacts in the last 365 days of life. Among MCCM decedents, 330 decedents enrolled more than a year before death and only 270 of these beneficiaries met the model's administratively verifiable eligibility criteria at enrollment. Generating impact estimates in the last 365 days of life using this small number of MCCM decedents may lead to unreliable results.

Additional complications are identifying an appropriate anchor date to assess eligibility, and specifying covariates used in the entropy balancing weighting and impact analyses. For decedents who enrolled more than a year before death, the range of post-enrollment survival time is 366 days to 1,304 days. A pre-enrollment anchor date for this subset of MCCM decedents would therefore be more than 3.5 years before death. It is very possible that for decedents who enrolled a little more than a year before death, their characteristics observed at more than three years before death would not reflect their characteristics in the year before enrollment. This may lead us to develop a comparison group that is healthier than MCCM decedents at enrollment and potentially lead to significant bias in the impact estimates. As a result, we do not estimate the model's impacts on utilization and expenditures in the last year of life.

[50] Approximately one-quarter of MCCM decedents lived longer than their physician-certified, six-month or less prognosis. Claims data did not reliably predict which beneficiaries lived longer than six months.

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F.4.2 Parallel Trends

For our difference-in-differences approach, a key assumption is the similarity of trends in outcome measures in the baseline period. The validity of this assumption provides confidence that unobservable factors that differ across MCCM and comparison decedents are not correlated with outcomes in a way that would bias our impact estimates.

For each end-of-life outcome, we used the following approach to test this "parallel trend" assumption[51]:

- We restricted the analysis to beneficiaries who died in the baseline period (January 1, 2014 to December 31, 2015).
- We created indicator variables to reflect a decedent's time of death in each quarter of 2014 and 2015.
- We fit linear regression models for each outcome measure using the following covariates: interaction terms between an indicator for having resided in an MCCM market area, eight quarterly indicators to reflect a decedent's date of death, and all the characteristics included in the difference-in-differences regression described in **Section F.4**.
- We estimated quarter-to-quarter differences in outcomes between decedents in MCCM and comparison markets for a total of seven difference-in-differences estimates.

[51] See **Exhibit D.8** for a description of end-of-life outcomes included in the analysis.

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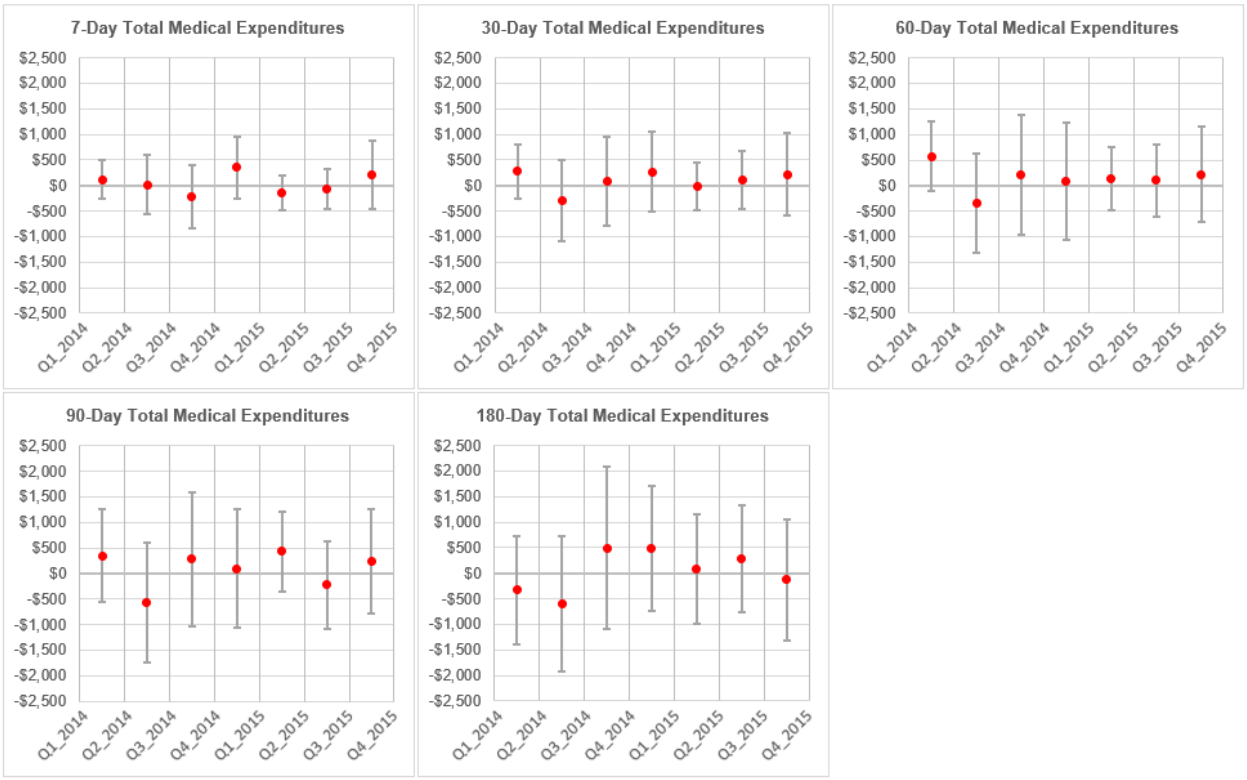
Exhibit F.10 Quarter-to-Quarter Differentials in Total Medicare Expenditures in the Baseline across Measurement Periods



Note: This exhibit displays difference-in-differences estimates of the average quarter-to-quarter effect of residing in an MCCM market area on total Medicare expenditures (red dots) and their 95% confidence intervals for each quarter between January 1, 2014 and September 30, 2015. Separate analyses are performed across the five outcome measurement periods. A confidence interval that does not span zero suggests pre-existing trends in these outcomes that may bias the results.

For each measurement period, **Exhibit F.10** shows the estimated difference in total Medicare expenditures from one quarter to the next between decedents who resided in MCCM and comparison markets during the baseline period. The exhibit also shows the 95 percent confidence intervals surrounding each estimate.

The graphs in **Exhibit F.10** inform the validity of the parallel trends assumption in two ways. First, if the confidence interval for a given quarter does not span zero, then the differential in total Medicare expenditures during that quarter and the following quarter is statistically significant at the five-percent level. Statistically significant differentials in one or more quarters suggest more divergence in outcomes and weakens the evidence in favor of the assumption. Second, estimates that are consistently above or below zero indicate an upward (or downward) trend in the differentials. This suggests that the parallel trends assumption may not hold, even if the estimates are not significantly different from zero.

Based on these criteria, the differential outcome trends shown in **Exhibit F.10** offer strong evidence that the parallel trend assumption holds for total Medicare expenditures. The

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confidence intervals consistently span zero across all quarters for each measurement period. Additionally, the difference-in-differences estimates are not consistently above or below zero before the implementation of MCCM.

We conducted similar tests of the parallel trends assumption across each outcome and measurement period, and summarize our results in **Exhibits F.11** and **F.12**. Our findings imply that for all outcome and measurement periods, few, if any, difference-in-differences estimates were statistically significant at $p < 0.05$. These results support the difference-in-differences methodology.

While the quarter-specific difference-in-differences estimates may not be statistically significantly different from zero when considered individually, they may be statistically significant as a group. In this case, bias may arise from divergent, but offsetting, differentials in the baseline period. We therefore tested whether all seven quarter-specific estimates equaled zero for each outcome. Overall, we found little evidence of bias based on tests of joint significance; however, for the number of physician visits, the quarter-specific estimates were jointly significant in four out of five measurement periods. Pre-trend differences in the number of office/outpatient visits align with the results in **Exhibit F.5** that show there is a statistically significant difference in the average number of office/outpatient visits per decedent between the market areas of MCCM and matched comparison hospices. We therefore add the caveat that pre-existing trends may influence the estimated impact of MCCM on these outcomes.

Exhibit F.11 Number of Quarter-Year Time Periods with Statistically Significant Differences in Trends for Medical Expenditures and Utilization between Decedents in MCCM and Comparison Markets during the Baseline Period

MCCM Impacts	Number of Time Periods with Statistically Significant Trend Differences				
	Last 7 Days of Life	Last 30 Days of Life	Last 60 Days of Life	Last 90 Days of Life	Last 180 Days of Life
Medical expenditures					
Total	0	0	0	0	0
Inpatient	0	0	0*	0	0
Home health	0	0	1	0	0
Hospice (non-MCCM)	0	0	0	0	0
Skilled nursing facility	0	0	0	0	1
Outpatient	1*	0	0	0	0
Durable medical equipment	1	1	1	0	0
Physician/supplier	1	0	0	0	1
Utilization per 1,000 decedents					
Inpatient admissions	1	0	1	1	0
Home health episodes	0	0*	0	0	0
Emergency department visits	0	0	0	0	1

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MCCM Impacts	Number of Time Periods with Statistically Significant Trend Differences				
	Last 7 Days of Life	Last 30 Days of Life	Last 60 Days of Life	Last 90 Days of Life	Last 180 Days of Life
Observational stays	0	0	1*	0	0*
Intensive care unit stays	1	0	0	0	0
Office/outpatient visits	0	0*	0*	0*	0*
Ambulance services	0	0	0	0	0
Inpatient 30-day readmissions	0	0	0	0	1

Note: This exhibit reports the number of quarter-year time periods from 2014 to 2015 where the difference in outcomes between decedents who resided in MCCM and comparison markets is statistically significantly different from the prior quarter. As a result, seven difference-in-differences estimates were tested for each outcome. A large number of statistically significantly estimates suggests a departure from the parallel trends assumption of the difference-in-differences approach. For each outcome and outcome time interval, we reported the number of trends that were statistically significant at $p < 0.05$ out of seven total trends. We also tested the joint significance of the seven difference-in-differences estimates. An asterisk (*) represents statistical significance at the 5% level.

Exhibit F.12 Number of Quarter-Year Time Periods with Statistically Significant Differences in Trends for Patterns of Medicare Hospice Benefit Enrollment between Decedents in MCCM and Comparison Markets during the Baseline

Patterns of Medicare Hospice Benefit Enrollment	Number of Time Periods with Statistically Significant Trend Differences
Transition to hospice	0
Transition to hospice in the last two days of life	1
Number of days from Medicare hospice benefit enrollment to death	0

Note: This exhibit reports the number of quarter-year time periods from 2014 to 2015 where the difference in outcomes between decedents who resided in MCCM and comparison markets is statistically significantly different from the prior quarter. As a result, seven difference-in-differences estimates were tested for each outcome. A large number of statistically significantly estimates suggests a departure from the parallel trends assumption of the difference-in-differences approach. For each outcome and outcome time interval, we reported the number of trends that were statistically significant at $p < 0.05$ out of seven total trends. We also tested the joint significance of the seven difference-in-differences estimates.

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F.5 NET SAVINGS TO MEDICARE DUE TO MCCM

We identified MCCM's net savings to Medicare as the total cumulative impact of the model on Medicare expenditures ("total gross savings") less total monthly, per-beneficiary, per-month payments made by Medicare to MCCM hospices for services provided to MCCM decedents ("total costs"). We estimated $21,479,449 in net savings generated by 3,603 MCCM decedents who died between January 1, 2016 and September 30, 2019. We describe how we calculated total gross savings in **Section F.5.1** and total model costs in **Section F.5.2**. **Section F.5.3** explains the calculation of total net savings from the model and **Section F.5.4** describes how we estimate the percent change in total Medicare expenditures per decedent.

F.5.1 Total Gross Savings to Medicare

In order to determine gross savings, we first assigned MCCM decedents to one of six mutually exclusive outcome measure groups based on their survival strata, as shown in **Exhibit F.13**. While decedents could be included in more than one outcome measurement period in the difference-in-differences estimate, to estimate gross savings we assigned them to a unique measurement period to avoid double-counting savings. For example, an MCCM decedent who lived 35 days after enrollment contributed to the difference-in-differences estimate of MCCM impacts on total Medicare expenditures during the last 7 and 30 days of life. However, if we included this individual in both the 7- and 30-day measurement periods to estimate net savings, we would count their savings in the last 7 days of life twice. We therefore assigned MCCM decedents to the outcome measure period immediately before the start of their post-enrollment survival stratum.

Exhibit F.13 Allocation of Beneficiary-Level Cost Impact Estimates to Gross Saving Calculations by Survival Stratum Assignments

Outcome Measurement Period	Number of MCCM Decedents	Post-Enrollment Survival Strata of MCCM Decedents					
		Last 0-30 Days of Life	Last 3-60 Days of Life	Last 61-90 Days of Life	Last 91-180 Days of Life	Last 181-365 Days of Life	Last 366 Days of Life or More
Enrolled less than seven days before death	94						
Last seven days of life	676	✓					
Last 30 days of life	691		✓				
Last 60 days of life	453			✓			
Last 90 days of life	760				✓		
Last 180 days of life	929					✓	✓
Total decedents contributing to the gross cost estimate	**3,603**						

Note: This exhibit displays the number of MCCM decedents included in the estimate of gross savings across each outcome measurement period who were enrolled for the entire measurement period. We excluded 94 MCCM decedents who enrolled less than 7 days before death as they were not included in the estimate of total Medicare savings in any of the 5 measurement periods.

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This method yields a conservative estimate of gross savings to Medicare, as we do not account for potential savings generated by MCCM after the decedent's enrollment date but before the start of the measurement period. For example, if a beneficiary enrolled in MCCM 35 days before death, they were assigned to the outcome measurement period for total Medicare expenditures in the last 30 days of life. As a result, savings accrued by this beneficiary in the 31 to 35 days before death were not included in the estimate of gross savings.

As described in **Section 3** in the main report, we estimated the impact of participation in MCCM on total Medicare expenditures beginning in the last seven days before death. To present the most conservative estimate of net savings, we assumed $0 in gross savings for 94 MCCM decedents who enrolled less than 1 week before death. This method assumes that these individuals were not enrolled in MCCM long enough for their end-of-life cost savings to be substantially impacted by the model.[52] Total gross savings therefore reflect reductions in expenditures for the 3,509 MCCM decedents who enrolled in the model at least 7 days before death.

We show the components of total gross savings aggregated across each outcome measurement period in **Exhibit F.14**. Column [1] contains the outcome measurement periods and Column [2] contains the number of MCCM decedents assigned to each measurement period, as shown in **Exhibit F.13**. The average, per-decedent impact estimates for total Medicare expenditures in each measurement period are reported in column [3].[53] We calculated gross savings for each measurement period in column [4]. Gross savings are approximately equal to the estimated change in total Medicare expenditures shown in column [2] multiplied by the number of MCCM decedents shown in column [3].[54] We estimated $26,034,489 in total gross savings, or an average of $7,226 per decedent, which is the sum of the column [4] entries for each measurement period.

[52] Of the 94 individuals who enrolled less than 7 days before death, 60 percent (56 decedents) were enrolled for 3 days or less and 55 percent (52 decedents) transitioned to MHB before death.

[53] To align with MCCM decedents included in the estimate of total net savings, we used difference-in-differences impact estimates from the analysis estimating the impact of MCCM on end-of-life expenditures using 3,597 of all 3,603 MCCM enrollees who died on or before September 30, 2019. We excluded six MCCM decedents from this analysis due to missing market-level data. See **Section F.6** for a discussion of this analysis.

[54] In **Exhibit F.14** we present rounded impact estimates in column [3]. As a result, gross savings do not reflect column [2] multiplied by column [3] exactly due to this rounding.

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Exhibit F.14 MCCM Yielded an Estimated $26.0 Million in Gross Savings

Outcome Measurement Period	Number of Decedents	Estimated Impact of MCCM on Medicare Expenditures per Decedent	Gross Savings
Enrolled less than seven days before death	94	$0	$0
Last seven days of life	676	-$4,520	-$3,055,655
Last 30 days of life	691	-$7,699	-$5,319,731
Last 60 days of life	453	-$9,409	-$4,262,324
Last 90 days of life	760	-$9,273	-$7,047,179
Last 180 days of life	929	-$6,835	-$6,349,599
Total	**3,603**	**-**	**-$26,034,489**

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, and Medicare claims data, January 1, 2012-September 30, 2019.

Note: This exhibit displays the components of total gross savings aggregated across each outcome measurement period using 3,603 MCCM enrollees who died on or before September 30, 2019. We assigned $0 in gross savings to 94 MCCM decedents who enrolled less than 7 days before death as they were not included in the estimate of total Medicare savings in any of the 5 measurement periods. As we present rounded impact estimates in column [3], gross savings do not reflect column [2] multiplied by column [3] exactly due to this rounding.

F.5.2 Total Costs to Medicare Using MCCM per-Beneficiary, per-Month Payments

We used data from paid per-beneficiary, per-month claims submitted to Medicare by MCCM hospices between January 1, 2016 and September 30, 2019 to calculate the model's costs. CMS paid monthly per-beneficiary, per-month claims to MCCM hospices for MCCM enrollees who received an MCCM service during the month and, at that time, had Medicare Parts A and B as their primary payer. MCCM hospices receive $400 for each month an enrollee receives MCCM services. The exception is the first month of enrollment in the model. A hospice receives $200 for the beneficiary's first calendar month of enrollment if the beneficiary was enrolled for fewer than 15 days and was enrolled on the last day of the month.[55] MCCM hospices receive the full $400 payment for an enrollee's final month in MCCM, regardless of their reason for leaving the model.[56] MCCM hospices do not receive a monthly payment for beneficiaries enrolled in MCCM, but who did not receive services in that month.

We used hospice claims that included demonstration code "73" to identify per-beneficiary, per-month payments. To calculate total payments per MCCM decedent, we summed all per-beneficiary, per-month payments received by the hospice during the time that each

[55] MCCM hospices actually received $392 or $196 in per-beneficiary, per-month payments, or 98 percent of the total claim amount, due to the Mandatory Payment Reductions in Medicare's fee-for-service program.

[56] See Table III-B-1 in *The Medicare Care Choices Model Resource Manual* for a discussion of payment for services covered under MCCM per-beneficiary, per-month payments.

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decedent was enrolled. We then aggregated per-beneficiary, per-month payments across all MCCM decedents in each outcome measurement period, as shown in column [3] in **Exhibit F.16**.[57] Total costs are the sum of column [3] entries for each measurement period and equal $4,555,040, or an average of $1,264 per MCCM decedent.[58]

To better understand patterns of per-beneficiary, per-month payments (and therefore use of services), we report the average percent of enrolled months in which an MCCM hospice received an MCCM per-beneficiary, per-month payment by calendar year and enrollment duration for all MCCM enrollees in **Exhibit F.15**. To calculate the percent of enrolled months with a per-beneficiary, per-month payment, we summed the number of months an MCCM hospice received a per-beneficiary, per-month for a given enrollee and divided that number by the total number of months the beneficiary was enrolled in the model. On average, we found that MCCM hospices received a per-beneficiary, per-month payment for 80 percent of enrolled months.[59]

Hospices, on average, received a per-beneficiary, per-month payment for a larger percent of months the longer the beneficiary was enrolled in the model. For example, for beneficiaries enrolled in the model for 30 days or less, MCCM hospices received a per-beneficiary, per-month payment 75 percent of the time, on average; compared to 86 percent for beneficiaries enrolled in the model for over 1 year, on average. As a requirement for payment is the provision of MCCM services, these findings suggest that even long-time enrollees in the model routinely receive MCCM services.

We also assessed the average percent of enrolled months a hospice received a per-beneficiary, per-month payment by the calendar year a beneficiary enrolled in MCCM. On average, MCCM hospices received a per-beneficiary, per-month payment for 51 percent of enrolled months for beneficiaries who entered the model in 2016, compared to 81-85 percent of enrolled months for those who enrolled in 2017 or later. This increased rate may reflect that as hospices gained experience with MCCM, they better understood the model's requirements and how to meet the needs of a population receiving concurrent palliative and life-prolonging treatments.

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57 While we excluded 94 MCCM decedents who enrolled less than 7 days before death in the calculation of total gross savings, we included payments made to MCCM hospices on their behalf. Hospices received payments for 72 MCCM decedents who enrolled less than 7 days before death (77 percent).

58 MCCM hospices received at least 1 per-beneficiary, per-month payment for 3,019 decedents, or 83.8 percent. The average total cost per decedent for whom at least one payment was received is $1,509.

59 MCCM enrollees may be discharged from the model before death (e.g., if they transitioned to hospice). At this point, the hospice would no longer be providing MCCM services and would not receive a per-beneficiary, per-month payment in the months following the enrollee's discharge.

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Exhibit F.15 MCCM Hospices Received Payments for a Lower Percent of Enrolled Months for MCCM Enrollees Who Enrolled in 2016, the First Year of MCCM

	Number of Enrollees	Average Percent of Enrolled Months an MCCM Hospice Received an MCCM PBPM Payment
Enrollment duration		
1-30 days	1,562	75.3%
31-60 days	815	77.8%
61-90 days	519	80.2%
91-180 days	824	82.8%
181-365 days	735	84.1%
Greater than 365 days	533	85.8%
Year of enrollment		
2016	634	51.3%
2017	935	81.3%
2018	2,036	84.5%
2019	1,383	85.3%
Total	**4,988**	**79.9%**

Sources: Medicare claims data, Master Beneficiary Summary file, and MCCM portal data, January 1, 2016-September 30, 2019.

Note: This exhibit shows the average percent of enrolled months in which an MCCM hospice received a PBPM payment for an MCCM enrollee. This analysis included Medicare beneficiaries enrolled in MCCM on or before September 30, 2019. The average percent of enrolled months in which an MCCM hospice received a PBPM payment is calculated as the number of months in which the hospice received a payment for the MCCM enrollee, divided by the total number of months for which the beneficiary was enrolled in MCCM and averaged across the relevant sample of MCCM enrollees. The month in which a beneficiary enrolled in MCCM and the month of discharge from MCCM are included in our calculations.

PBPM = per-beneficiary, per-month.

As a robustness check, we also estimated total costs as the sum of per-beneficiary, per-month payments if hospices received a payment for every month a beneficiary was enrolled in MCCM. This alternative calculation provides a conservative estimate of total costs. To estimate total costs with per-beneficiary, per-month payments for 100 percent of enrolled months, we used the total number of months a beneficiary was enrolled in MCCM, inclusive of the first and last calendar month. For each decedent, we calculated total per-beneficiary, per-month payments as $400 multiplied by the number of enrolled months. The exception is for decedents who were enrolled for less than 15 days and were not discharged in the first calendar month. In this case, total per-beneficiary, per-month payments were calculated as $200 for the first month and $400 for all subsequent enrolled months. We then multiplied total per-beneficiary, per-month payments by 0.98 to reflect reductions to per-beneficiary, per-month payments due to the Mandatory Payment Reductions in Medicare's Fee-for-Service program. In **Exhibit F.17**, we aggregated per-beneficiary, per-month payments across all MCCM decedents in each outcome measurement period based on hospices receiving payments for 100 percent of enrolled months. Total costs are the sum of column [3] entries for each measurement period, or $5,698,112 (an average of $1,581 per MCCM

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decedent). Total costs based on actual payments received by hospices, reported in **Exhibit F.16**, are 79.9 percent of total costs in **Exhibit F.17**.

F.5.3 Net Savings

We report components of total net savings and net savings for each outcome measurement period in **Exhibit F.16**. Net savings are shown in column [4] and are the difference between gross savings in column [2] and costs in column [3]. We estimated $21,479,449 in total net savings to Medicare as the sum of the column [4] entries for each measurement period. Equivalently, total net savings is the difference of $26,034,489 in total gross savings and $4,555,040 in total costs.

In **Exhibit F.17**, we report components of total net savings when total costs are calculated with per-beneficiary, per-month payments for 100 percent of enrolled months. We show this alternative estimate of total costs in column [3]. Gross savings estimates are unchanged from **Exhibit F.16** and are reported in column [2]. We estimate $20,336,376 in total net savings to Medicare if hospices had received a per-beneficiary, per-month payment for all enrolled months. This is a $1,143,073, or 5.3 percent, decrease from net savings generated using actual per-beneficiary, per-month payments made to MCCM hospices. Thus, even if hospices had received payments for all enrolled months, the model would generate significant savings.

Exhibit F.16 MCCM Yielded an Estimated $21.5 Million in Net Savings

Outcome Measurement Period [1]	Gross Savings [2]	Costs with Actual PBPM Payments [3]	Net Savings [4]
Enrolled less than seven days before death	$0	$26,264	$26,264
Last seven days of life	-$3,055,655	$232,456	-$2,823,199
Last 30 days of life	-$5,319,731	$353,584	-$4,966,147
Last 60 days of life	-$4,262,324	$337,316	-$3,925,008
Last 90 days of life	-$7,047,179	$869,064	-$6,178,115
Last 180 days of life	-$6,349,599	$2,736,356	-$3,613,243
Total	**-$26,034,489**	**$4,555,040**	**-$21,479,449**

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, and Medicare claims data, January 1, 2012-September 30, 2019.

Note: This exhibit displays the components of total net savings aggregated across each outcome measurement period using 3,603 MCCM enrollees who died on or before September 30, 2019. We present gross savings in column [2] and costs in column [3]. Net savings are shown in column [4] and are the difference in gross savings and costs. We assigned $0 in gross savings to 94 MCCM decedents who enrolled less than 7 days before death as they were not included in the estimate of total Medicare savings in any of the 5 measurement periods. Costs reflect total per-decedent, per-month payments received by MCCM hospices from Medicare for the provision of MCCM-qualifying services. Totals may not sum due to rounding.

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Exhibit F.17 MCCM Would Yield an Estimated $20.3 Million in Net Savings with MCCM Payments for All Enrolled Months

Outcome Measurement Period [1]	Gross Savings [2]	Costs with Per-Beneficiary, Per-Month Payments in All Enrolled Months [3]	Net Savings [4]
Enrolled less than seven days before death	$0	$46,452	$46,452
Last seven days of life	-$3,055,655	$367,696	-$2,687,959
Last 30 days of life	-$5,319,731	$489,608	-$4,830,123
Last 60 days of life	-$4,262,324	$441,588	-$3,820,736
Last 90 days of life	-$7,047,179	$1,120,140	-$5,927,039
Last 180 days of life	-$6,349,599	$3,232,628	-$3,116,971
Total	**-$26,034,489**	**$5,698,112**	**-$20,336,376**

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, and Medicare claims data, January 1, 2012-September 30, 2019.

Note: This exhibit displays the components of total net savings aggregated across each outcome measurement period using 3,603 MCCM enrollees who died on or before September 30, 2019. We present gross savings in column [2] and costs in column [3]. Net savings are shown in column [4] and are the difference in gross savings and costs. We assigned $0 in gross savings to 94 MCCM decedents who enrolled less than 7 days before death as they were not included in the estimate of total Medicare savings in any of the 5 measurement periods. Costs reflect per-decedent, per-month payments that would be received by MCCM hospices from Medicare if they received a payment for all months beneficiaries were enrolled in the program.

F.5.4 Percent Change in Total Medicare Expenditures

To understand the proportional change in expenditures generated by MCCM, we estimated the average per-decedent percent change in total Medicare expenditures. In **Section F.5.3**, we show that savings generated by the model varied across outcome measurement periods. We therefore calculated a weighted average of net savings by assigning MCCM decedents to a given outcome measurement period based on their post-enrollment survival time.

Exhibit F.18 presents the components we used to calculate the weighted, average percent change in total Medicare expenditures per decedent. In column [2], we assigned MCCM decedents to a singular outcome measurement period based on their post-enrollment survival time, as described in **Section F.5.1**. In column [3], we report the net savings for each outcome measurement period drawn from **Exhibit F.16**, which uses actual per-beneficiary, per-month payments to MCCM hospices to calculate total costs. Column [4] contains net savings per decedent for each outcome measurement period, or column [3] divided by column [2]. The average percent change in total Medicare expenditures per decedent is presented in column [6] and is calculated as net savings per decedent, shown in column [4], divided by total Medicare expenditures per decedent during the baseline, shown in column [5]. Per-decedent baseline expenditures are the average total Medicare expenditures for comparison decedents who resided in MCCM market areas during the

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baseline period, adjusted by beneficiary and market-level characteristics.[60] The percent change in total Medicare expenditures ranges from an increase of 2.5 percent for MCCM decedents who enrolled less than 7 days before death to a 37.3 percent decrease for MCCM decedents who enrolled in the last 7 to 29 days before death.[61] For decedents who enrolled more than six months before death, the percent reduction in total Medicare expenditures is 6.7 percent.

Given the uneven distribution of MCCM decedents assigned to each outcome measurement period, we calculated a weighted average of the percent change in total Medicare expenditures per decedent in column [8]. The weighted average is the percent change in total Medicare expenditures for each outcome period, shown in column [6], multiplied by the percent of MCCM decedents assigned to the respective period, shown in column [7]. The overall weighted percent change in expenditures is the sum of the weighted percent change for all outcome measurement periods. We estimate MCCM led to an average decrease of 24.6 percent in total Medicare expenditures relative to baseline expenditures.

In **Exhibit F.19**, we show the estimated weighted percent change in total Medicare expenditures when net savings are calculated based on hospices receiving a per-beneficiary, per-month payment for all enrolled months, as reported in **Exhibit F.17**. Using this more conservative calculation of net savings, total Medicare expenditures decrease by an average of 23.4 percent per decedent. Compared to net savings using actual per-beneficiary, per-month payments received by hospices, the more conservative approach diminishes the estimated percent change in expenditures by 1.2 percentage points, or 4.8 percent.

60 Per-decedent baseline expenditures are drawn from **Exhibits G.1** through **G.5**.

61 The increase in total Medicare expenditures is a result of our assumption that decedents who enroll in their last six days of life do not have time to generate savings through their participation in MCCM. We discuss this assumption in **Section F.5.1**.

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Exhibit F.18 Weighted Percent Change in Medicare Expenditures per Decedent with MCCM Payments

Outcome Measurement Period [1]	Number of Decedents [2]	Net Savings with Actual per-Beneficiary, per-Month Payments [3]	Net Savings per Decedent [4] = [3]/[2]	Per-Decedent Baseline Expenditures (adjusted) [5]	Percent Change in Total Medicare Expenditures per Decedent [6] = [4]/[5]	Percentage of MCCM Decedents [7] = [2]/3,603	Weighted Percent Change in Total Medicare Expenditures per Decedent [8] = [6]*[7]
Less than seven days of life	94	$26,264	$279	$11,195	2.5%	2.6%	0.1%
Last seven days of life	676	-$2,823,199	-$4,176	$11,195	-37.3%	18.8%	-7.0%
Last 30 days of life	691	-$4,966,147	-$7,187	$20,219	-35.5%	19.2%	-6.8%
Last 60 days of life	453	-$3,925,008	-$8,664	$28,322	-30.6%	12.6%	-3.8%
Last 90 days of life	760	-$6,178,115	-$8,129	$34,368	-23.7%	21.1%	-5.0%
Last 180 days of life	929	-$3,613,243	-$3,890	$49,863	-7.8%	25.8%	-2.0%
Total	**3,603**					**100.0%**	**-24.6%**

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, and Medicare claims data, January 1, 2012-September 30, 2019.

Note: This exhibit displays the components of the percent change in total net savings per decedent as a weighted average of estimated net savings for each outcome measurement period. We present the number of decedents assigned to each outcome measurement period in column [2]. Net savings are estimated using total per-decedent, per-month payments received by MCCM hospices from Medicare and net savings per decedent are reported in columns [3] and [4], respectively. Per-decedent baseline expenditures from **Exhibits G.1** through **G.5** are in column [5] and are adjusted by beneficiary and market characteristics. Column [6] shows the percent change in total Medicare expenditures per decedent and are the net savings per decedent divided by per-decedent baseline expenditures. For each outcome measurement period, the weighted percent change in total Medicare expenditures per decedent is the percent change in expenditures per decedent times the percentage of MCCM decedents in the respective measurement period, as shown in column [7], and is reported in column [8]. The total weighted percent change in total Medicare expenditures per decedent is the sum across all outcome measurement periods.

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Exhibit F.19 Weighted Percent Change in Total Medicare Expenditures per Decedent with MCCM Payments for All Enrolled Months

Outcome Measurement Period [1]	Number of Decedents [2]	Net Savings with 100% per-Beneficiary, per-Month Payments [3]	Net Savings per Decedent [4] = [3]/[2]	Per-Decedent Baseline Expenditures (adjusted) [5]	Percent Change in Total Medicare Expenditures per Decedent [6] = [4]/[5]	Percentage of MCCM Decedents [7] = [2]/3,603	Weighted Percent Change in Total Medicare Expenditures per Decedent [8] = [6]*[7]
Less than seven days of life	94	$46,452	$494	$11,195	4.4%	2.6%	0.1%
Last seven days of life	676	-$2,687,959	-$3,976	$11,195	-35.5%	18.8%	-6.7%
Last 30 days of life	691	-$4,830,123	-$6,990	$20,219	-34.6%	19.2%	-6.6%
Last 60 days of life	453	-$3,820,736	-$8,434	$28,322	-29.8%	12.6%	-3.7%
Last 90 days of life	760	-$5,927,039	-$7,799	$34,368	-22.7%	21.1%	-4.8%
Last 180 days of life	929	-$3,116,971	-$3,355	$49,863	-6.7%	25.8%	-1.7%
Total	**3,603**						**-23.4%**

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, and Medicare claims data, January 1, 2012-September 30, 2019.

Note: This exhibit displays the components of the percent change in total net savings per decedent as a weighted average of estimated net savings for each outcome measurement period. We present the number of decedents assigned to each outcome measurement period in column [2]. Net savings and net savings per decedent, shown in columns [3] and [4], respectively, are based on total costs defined as the sum of per decedent, per month payments if hospices received a payment for 100 percent of enrolled months. Per-decedent baseline expenditures from **Exhibits G.1** through **G.5** are in column [5] and are adjusted by beneficiary and market characteristics. Column [6] shows the percent change in total Medicare Expenditures per decedent and are the net savings per decedent divided by per-decedent baseline expenditures. For each outcome measurement period, the weighted percent change in total Medicare expenditures per decedent is the percent change in expenditures per decedent times the percentage of MCCM decedents in the respective measurement period, as shown in column [7], and is reported in column [8]. The total weighted percent change in total Medicare expenditures per decedent is the sum across all outcome measurement periods.

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F.6 SENSITIVITY ANALYSIS

A non-negligible number of MCCM decedents did not meet the model's administrative eligibility criteria or lived substantially longer than the physician-certified, six-month or less prognosis. In this section, we describe three sensitivity analyses that we conducted to test the robustness of the impact estimates to the inclusion of decedents who CMS did not intend the model to serve in difference-in-differences regressions.

As described above in **Section F.2**, we limited our core analyses to 2,766 MCCM decedents explicitly targeted by the model, and thus excluded MCCM decedents who[62]:

- Did not meet MCCM's eligibility criteria on the documented date of enrollment based on administrative data. Of the 3,603 MCCM decedents, 567 decedents were administratively ineligible (15.7 percent).[63]
- Enrolled more than 365 days before death as these beneficiaries lived significantly longer than the 6-month or less prognosis eligibility criteria for MCCM. Of the 3,603 MCCM decedents, 331 decedents enrolled more than 1 year before death (9.2 percent).

We performed three analyses to isolate the separate and joint effects of these two exclusions on estimates of MCCM's impact on utilization and expenditure outcomes. The specification of these tests are described below and summarized in **Exhibit F.20**.

[62] Of the 2,766 MCCM decedents identified in **Section F.2**, we excluded 1 decedent from the difference-in-differences regressions due to missing market-level data.

[63] **Section F.2** lists MCCM's eligibility criteria and presents an analysis of ineligible decedents based on each of the model's criterion. The reason for the majority of ineligible MCCM decedents not meeting the model's requirements was related to enrollment in Medicare's fee-for-service programs.

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Exhibit F.20 Specification of Analytic Samples for Core and Sensitivity Analyses

Administrative Eligibility Status	Post-Enrollment Survival Time of MCCM Decedents		Total MCCM Decedents
	Last 365 Days or Less before Death	Last 366 Days or More before Death	
Ineligible	506	61	567
Eligible	2,766 (core analyses: MCCM targeted beneficiaries)	270	3,036 (sensitivity analysis #2)
Total decedents	3,272 (sensitivity analysis #1)	331	3,603 (sensitivity analysis #3)

Note: The core analytic sample contains 2,766 MCCM decedents identified in **Section F.2**. Sensitivity test #1 includes MCCM decedents from the core analytic sample and 506 MCCM decedents who enrolled 365 days or less before death, but were determined to be administratively ineligible. Sensitivity test #2 includes MCCM decedents from the core analytic sample and 270 administratively eligible decedents who enrolled more than 365 days before death. Sensitivity test #3 includes 3,603 MCCM decedents regardless of when they enrolled or their eligibility status. See **Section F.2** for a discussion of administratively ineligible decedents.

F.6.1 Sensitivity Test #1: Addition of Ineligible MCCM Decedents

We explored the effect of adding MCCM decedents who were administratively ineligible at enrollment to the core analysis to assess the effect of the model's administratively verifiable eligibility criteria on end-of-life outcomes. To isolate the incremental effect of the administrative eligibility criteria on MCCM's impacts on end-of-life outcomes, we maintained the criterion that MCCM decedents enrolled 365 days or less before death. We therefore included 506 decedents (89.2 percent) of the 567 administratively ineligible MCCM decedents, for a total of 3,272 MCCM decedents, as shown in **Exhibit F.20**.

We did not include administratively ineligible decedents in the entropy balancing weighting as a primary reason for ineligibility is that decedents were not continuously enrolled in Medicare fee-for-service in the 12 months before enrollment.[64] As a result, we may not observe their full utilization history, which would artificially censor many of the covariates in the entropy balancing weighting.[65]

In **Exhibit F.21** we show the additional number of MCCM decedents included in the analysis for each outcome measurement period. For outcomes related to transitions to MHB, we included decedents regardless of their post-enrollment survival time.

[64] See **Section F.2.1** for a discussion of the exclusion of MCCM decedents based on the model's administrative eligibility criteria.

[65] See **Section F.3** for a discussion of covariates included in the entropy balancing.

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Exhibit F.21 Number of MCCM Decedents in Difference-in-Differences Regressions with the Addition of Ineligible MCCM Decedents

Outcome Measurement Period	Eligible MCCM Decedents	Ineligible MCCM Decedents	Total MCCM Decedents	Post-Enrollment Survival Stratum of MCCM Decedents				
				Last 0-30 Days of Life	Last 31-60 Days of Life	Last 61-90 Days of Life	Last 91-180 Days of Life	Last 181-365 Days of Life
End-of-life expenditures and utilization								
Last seven days of life	2,682	495	3,177	✓	✓	✓	✓	✓
Last 30 days of life	2,120	381	2,501		✓	✓	✓	✓
Last 60 days of life	1,531	278	1,809			✓	✓	✓
Last 90 days of life	1,156	200	1,356				✓	✓
Last 180 days of life	502	95	597					✓
Transitions to hospice								
Likelihood of MHB conversion	2,761	506	3,271	✓	✓	✓	✓	✓
Transition to hospice in the last two days of life	2,761	506	3,271	✓	✓	✓	✓	✓
Number of days from MHB enrollment to death[a]	2,325	417	2,742	✓	✓	✓	✓	✓

Note: This exhibit shows the number of eligible and ineligible MCCM decedents included in the impact analyses of end-of-life expenditures and utilization for groups of outcomes observed at a given number of days before death and for outcomes related to transitions to hospice. MCCM decedents included in the difference-in-differences regressions are those who enrolled 365 days or less before death. Comparison decedents included in the difference-in-differences regressions include Medicare beneficiaries that met all Medicare enrollment-related eligibility criteria on the anchor date and had an International Classification of Disease code for an MCCM-qualifying diagnosis on the anchor date. We excluded one MCCM decedent due to missing market-level data.

[a] This analysis is limited to MCCM and comparison decedents who transitioned to MHB.

MHB = Medicare hospice benefit.

F.6.2 Sensitivity Test #2: Addition of Long-Surviving MCCM Decedents

We explored the implication of requiring a six-month prognosis on the effect of the model on end-of-life outcomes by adding MCCM decedents who enrolled more than one year before death to the core analysis. To isolate the incremental effect of the six-month prognosis criterion on the model's impacts on end-of-life outcomes, we maintained the criteria that MCCM decedents met all administrative eligibility criteria at the time of enrollment. We therefore included 267 of the 331 MCCM decedents who enrolled more than 1 year before death (80.7 percent).[66] A total of 3,032 MCCM decedents were included in the difference-in-differences regressions, with a range of post-enrollment survival times from 2 to 1,304 days.

[66] An additional three MCCM decedents were excluded due to missing market-level data.

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Exhibit F.7 indicates that average characteristics varied across MCCM decedents' survival strata. For this analysis, we therefore included the 270 administratively eligible decedents who enrolled more than 1 year before death in the entropy balancing. These decedents were balanced to comparison decedents on the anchor date 365 days before death and we applied the new weights to comparison decedents in the difference-in-differences estimate.[67] Their inclusion led to 2,994 MCCM decedents represented in the entropy balancing weighting.

In the main analyses, we measured covariates on decedents' respective anchor dates to evaluate MCCM and comparison decedents at similar points in time. However, the farthest anchor date is 365 days before death and occurs *after* enrollment for the additional 270 MCCM decedents included in the entropy balancing. Using covariates on the 365 anchor date for these decedents would potentially bias the impact estimates as decedents' characteristics, such as hospitalizations in the past year, may be influenced by their participation in MCCM. We therefore measured covariates on enrollment dates, rather than on anchor dates, for the 270 MCCM decedents who enrolled more than 1 year before death in both the entropy balancing and difference-in-differences regressions. For the remaining MCCM and comparison decedents, we continued to evaluate characteristics on their respective anchor dates.

F.6.3 Sensitivity Test #3: Addition of Ineligible and/or Long-Surviving MCCM Decedents

The sensitivity analyses described above separately identify the effect of imposing two sets of restrictions on the analytic sample of MCCM decedents: The requirements were that MCCM decedents met all administratively verifiable eligibility criteria at enrollment and they enrolled 365 days or less before death. In this analysis, we included 3,597 MCCM decedents identified in the MCCM portal data in the difference-in-differences regressions to understand the joint effect of these restrictions.[68,69] The results of these analyses indicate the effect on end-of-life outcomes accounting for beneficiaries who left the model who did not reflect the population specifically targeted by MCCM.

In **Exhibit F.22**, we show the number of MCCM decedents included in the analysis for each outcome measurement period. For outcomes related to transitions to MHB, we included decedents regardless of their post-enrollment survival time.

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67 MCCM decedents receive a weight equal to one.

68 In the difference-in-differences regressions, comparison decedents were assigned weights from the entropy balancing process that included MCCM decedents who enrolled more than 365 days before death, as described in **Section F.6.2**.

69 We excluded six MCCM decedents with missing market-level data.

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Exhibit F.22 Number of MCCM Decedents in Difference-in-Differences Regressions with the Addition of Ineligible and Long-Surviving MCCM Decedents

Outcome Measurement Period	Total MCCM Decedents	Post-Enrollment Survival Stratum of MCCM Decedents					
		Last 0-30 Days of Life	Last 31-60 Days of Life	Last 61-90 Days of Life	Last 91-180 Days of Life	Last 181-365 Days of Life	Last 366 Days or More of Life
Last seven days of life	3,503	✓	✓	✓	✓	✓	✓
Last 30 days of life	2,827		✓	✓	✓	✓	✓
Last 60 days of life	2,135			✓	✓	✓	✓
Last 90 days of life	1,682				✓	✓	✓
Last 180 days of life	923					✓	✓
Transitions to hospice							
Likelihood of MHB conversion	3,597	✓	✓	✓	✓	✓	✓
Transition to hospice in the last two days of life	3,597	✓	✓	✓	✓	✓	✓
Number of days from MHB enrollment to death[a]	3,005	✓	✓	✓	✓	✓	✓

Note: This exhibit shows the number of MCCM decedents included in the impact analyses of end-of-life expenditures, and utilization for groups of outcomes observed at a given number of days before death and for outcomes related to transitions to hospice. MCCM decedents included in the difference-in-differences regressions are those who enrolled in MCCM and died on or before September 30, 2019. Comparison decedents included in the difference-in-differences regressions include Medicare beneficiaries that met all Medicare enrollment-related eligibility criteria on the anchor date and had an International Classification of Disease code for an MCCM-qualifying diagnosis on the anchor date. We excluded 6 MCCM decedents and 327 comparison decedents from the analyses due to incomplete market-level data.

[a] This analysis is limited to MCCM and comparison decedents who transitioned to MHB.

MHB = Medicare hospice benefit.

F.7 SUBGROUP ANALYSES

In the subgroup analyses, we estimated the effect of MCCM participation for key populations. These analyses explored differential impacts of MCCM across beneficiary types, and identified beneficiary- and hospice-level characteristics associated with larger savings. For all of the subgroup analyses, we maintained the restrictions on MCCM decedents included in the difference-in-differences regressions from the core analyses.[70]

F.7.1 MHB Enrollees and Non-MHB Enrollees

We estimated the heterogeneous impacts of MCCM on end-of-life expenditures and utilization across decedents who transitioned to MHB and those who did not. We ran the difference-in-differences regression with the core analytic sample, but with two separate indicators for MCCM decedents: an indicator for the 2,325 MCCM decedents who transitioned to hospice (84.1 percent) and an indicator for the 440 MCCM decedents who did

[70] We required MCCM decedents to have enrolled in MCCM 365 days or less before death and to have met all of the administrative eligibility criteria at enrollment.

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not transition (15.9 percent). Given the post-enrollment impact of the model on transitions to hospice[71] and the small number of MCCM decedents who did not transition, the results can only be interpreted as associations and are not causal (i.e., this analysis shows whether impacts were greater among those who did or did not transition to hospice, but not whether MCCM was more effective in reducing spending among one group versus the other). We present results from these analyses in **Exhibits G.25** through **G.35.**[72]

F.7.2 Cancer and Non-Cancer

This analysis explored differential effects of MCCM across decedents based on their diagnoses on their respective anchor date. For each of the four MCCM-qualifying diagnoses, we defined the presence of a diagnosis as having at least one claim in the year before the anchor date.[73] The groups are not mutually exclusive, such that a decedent with a cancer diagnosis may also have had a COPD diagnosis. We ran separate difference-in-differences regressions for MCCM and comparison decedents who had at least one claim for cancer in the year before enrollment and decedents who had no claims for cancer.[74] Among the 2,765 MCCM decedents included in the main analyses, 1,890 had at least 1 claim for cancer (68.4 percent) and 875 had no claims for cancer (31.6 percent). We present results from these analyses in **Exhibits G.36** through **G.47.**

F.7.3 MCCM Decedents in Top Nine Enrolling MCCM Hospices and All Others

Among the 141 hospices that initially participated in the model, 9 hospices enrolled 54 percent of all MCCM participants.[75] We refer to these hospices as the "top 9" enrolling hospices. Given the disproportionate enrollment, we conducted sub-analyses of MCCM's impact on the 1,540 decedents (55.7 percent) who enrolled in 1 of the top 9 hospices and the 1,225 decedents (44.3 percent) who enrolled in all other hospices.[76] Comparison decedents in comparison markets cannot be separately assigned to these subgroups. We therefore ran the entropy balancing twice: once to assign weights to all

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71 In **Exhibit G.6**, we estimate that MCCM increases transitions to hospice by 32.2 percent.

72 In **Exhibits G.25** through **G.35**, the adjusted means for the comparison groups shown in exhibits for MHB and non-MHB enrollees are the same as these averages are estimated from the same regression.

73 See **Exhibit D.2** for more information on how we determined MCCM-qualifying diagnoses.

74 Due to the differences in time between the enrollment date and the anchor date, there were also 168 MCCM decedents with no claims for cancer, human immunodeficiency virus/acquired immunodeficiency syndrome, COPD, or CHF in the year before the anchor date. These individuals are included in the non-cancer analysis.

75 See **Section 1** in the main report for a discussion of cumulative enrollment across participating MCCM hospices.

76 We identified the "top 9" enrolling hospices based on cumulative enrollment from January 1, 2016 to September 30, 2019, inclusive of enrollees who were living at the end of the period. While the "top 9" hospices enrolled 54 percent of MCCM enrollees, 56 percent of decedents included in the analytic sample enrolled in a "top 9" hospice.

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4,504,415 comparison decedents based on the characteristics of MCCM decedents enrolled in a "top 9" hospice and again to assign weights based on the characteristics of MCCM decedents enrolled in all other hospices. The difference-in-differences regressions for these two sub-analyses therefore included a comparison group that reflected the average characteristics of each respective subgroup of MCCM decedents. We present results from these analyses in **Exhibits G.48** through **G.59.**

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Appendix G. Detailed Results on MCCM Impacts

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Exhibit G.1 Estimates of MCCM Impacts on Utilization and Costs in the Last Seven Days of Life (Core Model)

Outcome	Intervention Group		Comparison Group		Impacts – Last 7 Days of Life				
	Baseline Period (n = 1,595,051)	Performance Period (n = 2,682)	Baseline Period (n = 875,121)	Performance Period (n = 2,033,919)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$11,195	$7,255	$10,831	$11,476	**-$4,586**	-$4,996	-$4,176	0.00	-41.0%
Inpatient expenditures	$7,548	$3,219	$7,373	$7,730	**-$4,686**	-$5,118	-$4,253	0.00	-62.1%
Skilled nursing facility expenditures	$551	$215	$501	$492	**-$328**	-$380	-$275	0.00	-59.5%
Home health expenditures	$260	$285	$264	$259	**$31**	-$7	$68	0.18	11.8%
Hospice expenditures[a]	$1,801	$2,867	$1,687	$1,925	**$828**	$652	$1,005	0.00	46.0%
Durable medical equipment expenditures	$28	$39	$26	$21	**$16**	$5	$28	0.02	58.5%
Outpatient expenditures	$191	$199	$191	$222	**-$23**	-$57	$12	0.28	-11.8%
Physician/supplier Part B expenditures	$816	$430	$789	$827	**-$425**	-$469	-$381	0.00	-52.1%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	450.5	239.1	452.5	449.6	**-208.6**	-225.5	-191.6	0.00	-46.3%
Intensive care unit admissions	164.7	67.1	169.2	170.8	**-99.2**	-109.4	-89.0	0.00	-60.2%
Emergency department visits	440.7	263.8	439.8	448.2	**-185.2**	-203.8	-166.7	0.00	-42.0%
Observational stays	36.0	28.7	37.2	44.3	**-14.3**	-22.5	-6.2	0.00	-39.8%
Office/outpatient visits	4,180.4	2,453.3	3,976.2	4,259.3	**-2,010.2**	-2,233.7	-1,786.8	0.00	-48.1%
Ambulance services	357.1	261.1	375.3	378.3	**-99.0**	-125.4	-72.5	0.00	-27.7%
Inpatient 30-day readmissions	179.7	94.0	174.6	182.6	**-93.7**	-106.1	-81.3	0.00	-52.1%
Home health episodes	122.6	124.0	130.4	130.2	**1.6**	-12.0	15.1	0.85	1.3%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, and Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per- beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.2 Estimates of MCCM Impacts on Utilization and Costs in the Last 30 Days of Life (Core Model)

Outcome	Intervention Group		Comparison Group		Impacts – Last 30 Days of Life				
	Baseline Period (n = 1,568,440)	Performance Period (n = 2,120)	Baseline Period (n = 860,398)	Performance Period (n = 2,006,137)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$20,219	$13,837	$19,576	$21,206	**-$8,014**	-$8,701	-$7,326	0.00	-39.6%
Inpatient expenditures	$12,124	$5,336	$11,896	$12,839	**-$7,730**	-$8,372	-$7,088	0.00	-63.8%
Skilled nursing facility expenditures	$1,548	$768	$1,418	$1,454	**-$817**	-$969	-$664	0.00	-52.7%
Home health expenditures	$696	$684	$672	$676	**-$16**	-$103	$71	0.77	-2.3%
Hospice expenditures[a]	$2,395	$4,540	$2,245	$2,540	**$1,850**	$1,563	$2,137	0.00	77.2%
Durable medical equipment expenditures	$103	$152	$101	$83	**$66**	$27	$104	0.01	63.7%
Outpatient expenditures	$920	$967	$907	$1,095	**-$141**	-$233	-$49	0.01	-15.3%
Physician/supplier Part B expenditures	$2,434	$1,389	$2,338	$2,519	**-$1,226**	-$1,358	-$1,094	0.00	-50.4%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	824.6	433.5	830.1	844.5	**-405.5**	-440.8	-370.1	0.00	-49.2%
Intensive care unit admissions	221.9	91.9	228.4	232.4	**-134.0**	-148.2	-119.9	0.00	-60.4%
Emergency department visits	883.4	562.5	890.2	930.0	**-360.6**	-396.6	-324.7	0.00	-40.8%
Observational stays	93.2	83.5	97.1	120.7	**-33.4**	-46.5	-20.3	0.00	-35.8%
Office/outpatient visits	11,761.3	7,301.2	11,386.7	12,376.4	**-5,449.8**	-6,025.7	-4,873.9	0.00	-46.3%
Ambulance services	940.7	651.7	957.3	993.7	**-325.5**	-398.2	-252.7	0.00	-34.6%
Inpatient 30-day readmissions	325.1	162.9	322.5	344.0	**-183.7**	-206.8	-160.6	0.00	-56.5%
Home health episodes	306.9	272.3	310.7	312.3	**-36.2**	-67.5	-4.9	0.06	-11.8%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.3 Estimates of MCCM Impacts on Utilization and Costs in the Last 60 Days of Life (Core Model)

Outcome	Intervention Group		Comparison Group		Impacts – Last 60 Days of Life				
	Baseline Period (n = 1,261,809)	Performance Period (n = 1,531)	Baseline Period (n = 691,775)	Performance Period (n = 1,610,302)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$28,322	$21,148	$27,485	$30,155	**-$9,844**	-$11,056	-$8,631	0.00	-34.8%
Inpatient expenditures	$15,661	$7,712	$15,430	$16,874	**-$9,393**	-$10,389	-$8,396	0.00	-60.0%
Skilled nursing facility expenditures	$2,458	$1,327	$2,276	$2,381	**-$1,236**	-$1,438	-$1,033	0.00	-50.3%
Home health expenditures	$1,052	$898	$1,013	$1,055	**-$197**	-$295	-$98	0.00	-18.7%
Hospice expenditures[a]	$3,078	$6,219	$2,872	$3,211	**$2,802**	$2,402	$3,202	0.00	91.1%
Durable medical equipment expenditures	$219	$319	$201	$168	$133	$35	$231	0.03	60.8%
Outpatient expenditures	$1,904	$2,088	$1,880	$2,299	**-$234**	-$438	-$30	0.06	-12.3%
Physician/supplier Part B expenditures	$3,952	$2,585	$3,813	$4,165	**-$1,719**	-$2,034	-$1,405	0.00	-43.5%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,123.6	639.0	1,136.5	1,158.9	**-507.1**	-572.7	-441.6	0.00	-45.1%
Intensive care unit admissions	264.6	120.3	271.4	277.7	**-150.5**	-175.5	-125.6	0.00	-56.9%
Emergency department visits	1,269.4	887.4	1,291.2	1,361.6	**-452.3**	-519.2	-385.4	0.00	-35.6%
Observational stays	145.6	147.7	157.0	193.0	**-33.9**	-56.1	-11.8	0.01	-23.3%
Office/outpatient visits	18,095.8	12,159.5	17,626.5	19,263.7	**-7,573.5**	-8,679.1	-6,467.8	0.00	-41.9%
Ambulance services	1,387.0	1,025.6	1,417.6	1,483.3	**-427.1**	-556.4	-297.7	0.00	-30.8%
Inpatient 30-day readmissions	426.5	226.2	422.1	448.9	**-227.1**	-263.2	-191.0	0.00	-53.3%
Home health episodes	438.7	361.9	445.0	454.3	**-86.2**	-126.0	-46.4	0.00	-19.6%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.4 Estimates of MCCM Impacts on Utilization and Costs in the Last 90 Days of Life (Core Model)

Outcome	Intervention Group		Comparison Group		Impacts – Last 90 Days of Life				
	Baseline Period (n = 927,090)	Performance Period (n = 1,156)	Baseline Period (n = 508,087)	Performance Period (n = 1,181,354)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$34,368	$27,880	$33,190	$36,576	**-$9,874**	-$11,569	-$8,180	0.00	-28.7%
Inpatient expenditures	$18,016	$9,707	$17,658	$19,419	**-$10,071**	-$11,374	-$8,768	0.00	-55.9%
Skilled nursing facility expenditures	$3,096	$1,906	$2,860	$3,036	**-$1,366**	-$1,661	-$1,071	0.00	-44.1%
Home health expenditures	$1,287	$1,215	$1,269	$1,349	**-$152**	-$332	$27	0.16	-11.8%
Hospice expenditures[a]	$3,654	$7,716	$3,415	$3,745	**$3,733**	$3,170	$4,297	0.00	102.2%
Durable medical equipment expenditures	$318	$474	$290	$252	$193	$55	$331	0.02	60.6%
Outpatient expenditures	$2,819	$3,158	$2,745	$3,347	**-$263**	-$555	$29	0.14	-9.3%
Physician/supplier Part B expenditures	$5,179	$3,704	$4,953	$5,428	**-$1,949**	-$2,410	-$1,488	0.00	-37.6%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,337.3	825.2	1,351.8	1,384.1	**-544.4**	-637.5	-451.4	0.00	-40.7%
Intensive care unit admissions	294.0	140.9	301.1	310.7	**-162.7**	-191.2	-134.2	0.00	-55.4%
Emergency department visits	1,575.0	1,201.8	1,596.0	1,694.6	**-471.7**	-568.2	-375.2	0.00	-30.0%
Observational stays	188.8	192.1	202.0	248.5	**-43.2**	-69.5	-16.8	0.01	-22.9%
Office/outpatient visits	22,719.8	16,767.6	22,105.1	24,173.9	**-8,021.0**	-9,567.8	-6,474.2	0.00	-35.3%
Ambulance services	1,756.1	1,450.0	1,774.9	1,864.1	**-395.3**	-660.9	-129.7	0.01	-22.5%
Inpatient 30-day readmissions	485.7	284.3	485.5	518.5	**-234.5**	-281.9	-187.1	0.00	-48.3%
Home health episodes	524.9	471.0	542.4	561.1	**-72.6**	-141.5	-3.8	0.08	-13.8%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.5 Estimates of MCCM Impacts on Utilization and Costs in the Last 180 Days of Life (Core Model)

Outcome	Intervention Group		Comparison Group		Impacts – Last 180 Days of Life				
	Baseline Period (n = 597,141)	Performance Period (n = 502)	Baseline Period (n = 326,921)	Performance Period (n = 756,673)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$49,863	$46,723	$48,216	$53,137	**-$8,061**	-$11,324	-$4,798	0.00	-16.2%
Inpatient expenditures	$23,739	$14,557	$23,224	$25,510	**-$11,468**	-$13,673	-$9,263	0.00	-48.3%
Skilled nursing facility expenditures	$4,583	$3,730	$4,242	$4,536	-$1,146	-$1,722	-$571	0.00	-25.0%
Home health expenditures	$2,113	$2,127	$2,082	$2,243	**-$147**	-$443	$149	0.41	-7.0%
Hospice expenditures[a]	$4,313	$10,595	$4,114	$4,489	**$5,906**	$4,987	$6,826	0.00	136.9%
Durable medical equipment expenditures	$609	$973	$617	$566	**$415**	$116	$714	0.02	68.1%
Outpatient expenditures	$5,741	$7,044	$5,599	$6,753	**$149**	-$817	$1,115	0.80	2.6%
Physician/supplier Part B expenditures	$8,766	$7,698	$8,338	$9,041	**-$1,770**	-$2,829	-$711	0.01	-20.2%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,856.0	1,229.5	1,864.0	1,910.1	**-672.7**	-810.5	-534.9	0.00	-36.2%
Intensive care unit admissions	365.0	164.9	377.1	386.5	**-209.5**	-248.0	-171.0	0.00	-57.4%
Emergency department visits	2,347.4	1,860.7	2,354.6	2,517.6	**-649.7**	-818.4	-481.0	0.00	-27.7%
Observational stays	302.1	304.3	320.3	384.2	**-61.8**	-107.0	-16.7	0.02	-20.5%
Office/outpatient visits	35,058.7	27,991.6	34,004.2	36,858.8	**-9,921.6**	-12,423.8	-7,419.4	0.00	-28.3%
Ambulance services	2,524.8	2,335.5	2,580.2	2,711.3	**-320.4**	-963.1	322.2	0.41	-12.7%
Inpatient 30-day readmissions	626.0	373.4	628.8	669.2	**-292.9**	-358.7	-227.1	0.00	-46.8%
Home health episodes	818.4	800.5	840.2	877.3	**-55.0**	-158.2	48.2	0.38	-6.7%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.6 Estimates of MCCM Impacts on Transitions to Hospice (Core Model)

Outcome	Intervention Group		Comparison Group		Impacts – Last 365 Days of Life				
	Baseline Period	Performance Period	Baseline Period	Performance Period	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Full sample	**(n = 1,595,051)**	**(n = 2,765)**	**(n = 875,121)**	**(n = 2,033,919)**					
Transition to hospice	61.9%	83.4%	60.6%	62.2%	**19.9%**	18.0%	21.9%	0.00	32.2%
Transition to MHB during the last two days of life	7.3%	8.2%	7.2%	7.7%	**0.4%**	-0.8%	1.7%	0.56	6.1%
MHB sample	**(n = 834,770)**	**(n = 2,325)**	**(n = 443,605)**	**(n = 1,040,485)**					
Number of days from MHB enrollment to death	26.6	33.8	26.1	26.5	**6.9**	5.0	8.7	0.00	25.8%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on transitions to MHB. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes equal the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

MHB = Medicare hospice benefit.

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Exhibit G.7 Estimates of MCCM Impacts on Utilization and Costs in the Last Seven Days of Life (Sensitivity Analysis: Adds MCCM Decedents Administratively Ineligible at Enrollment)

Outcome	Intervention Group		Comparison Group		Impacts – Last 7 Days of Life				
	Baseline Period (n = 1,595,051)	Performance Period (n = 3,177)	Baseline Period (n = 875,121)	Performance Period (n = 2,033,919)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$11,200	$7,179	$10,821	$11,464	**-$4,664**	-$5,073	-$4,254	0.00	-41.6%
Inpatient expenditures	$7,565	$3,154	$7,361	$7,719	**-$4,770**	-$5,190	-$4,349	0.00	-63.0%
Skilled nursing facility expenditures	$548	$205	$502	$494	**-$335**	-$381	-$290	0.00	-61.2%
Home health expenditures	$258	$287	$262	$258	**$33**	$0	$66	0.10	12.8%
Hospice expenditures[a]	$1,793	$2,881	$1,692	$1,926	**$854**	$681	$1,028	0.00	47.7%
Durable medical equipment expenditures	$27	$36	$26	$21	**$13**	$3	$24	0.03	48.8%
Outpatient expenditures	$191	$194	$189	$219	**-$28**	-$59	$2	0.13	-14.6%
Physician/supplier Part B expenditures	$816	$424	$788	$827	**-$431**	-$474	-$389	0.00	-52.8%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	449.3	236.9	452.2	449.3	**-209.5**	-225.4	-193.5	0.00	-46.6%
Intensive care unit admissions	165.1	67.4	169.2	171.1	**-99.6**	-109.1	-90.0	0.00	-60.3%
Emergency department visits	439.5	262.4	439.7	448.0	**-185.4**	-204.0	-166.8	0.00	-42.2%
Observational stays	35.4	28.4	37.3	44.5	**-14.2**	-21.5	-6.8	0.00	-40.0%
Office/outpatient visits	4,173.0	2,445.1	3,965.4	4,250.3	**-2,012.7**	-2,237.2	-1,788.3	0.00	-48.2%
Ambulance services	356.4	255.1	374.0	376.9	**-104.2**	-128.1	-80.3	0.00	-29.2%
Inpatient 30-day readmissions	178.6	93.7	174.4	182.7	**-93.1**	-103.6	-82.5	0.00	-52.1%
Home health episodes	122.6	123.7	129.9	129.4	**1.5**	-10.7	13.6	0.84	1.2%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.8 Estimates of MCCM Impacts on Utilization and Costs in the Last 30 Days of Life (Sensitivity Analysis: Adds MCCM Decedents Administratively Ineligible at Enrollment)

Outcome	Intervention Group		Comparison Group		Impacts – Last 30 Days of Life				
	Baseline Period (n = 1,568,440)	Performance Period (n = 2,501)	Baseline Period (n = 860,398)	Performance Period (n = 2,006,137)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$20,190	$13,762	$19,530	$21,171	**-$8,068**	-$8,765	-$7,372	0.00	-40.0%
Inpatient expenditures	$12,126	$5,318	$11,867	$12,825	**-$7,766**	-$8,390	-$7,141	0.00	-64.0%
Skilled nursing facility expenditures	$1,535	$742	$1,414	$1,451	**-$831**	-$958	-$704	0.00	-54.1%
Home health expenditures	$694	$672	$667	$671	**-$25**	-$110	$61	0.64	-3.5%
Hospice expenditures[a]	$2,386	$4,554	$2,253	$2,542	**$1,880**	$1,597	$2,163	0.00	78.8%
Durable medical equipment expenditures	$104	$142	$99	$82	**$55**	$21	$90	0.01	53.3%
Outpatient expenditures	$915	$946	$899	$1,087	**-$156**	-$246	-$67	0.00	-17.1%
Physician/supplier Part B expenditures	$2,429	$1,387	$2,331	$2,513	**-$1,225**	-$1,355	-$1,095	0.00	-50.4%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	823.0	434.9	829.5	844.4	**-403.0**	-438.0	-367.9	0.00	-49.0%
Intensive care unit admissions	222.1	95.0	228.7	233.0	**-131.4**	-145.0	-117.7	0.00	-59.2%
Emergency department visits	882.3	557.7	889.8	929.2	**-364.0**	-401.3	-326.7	0.00	-41.3%
Observational stays	92.6	83.2	97.1	120.9	**-33.1**	-47.6	-18.6	0.00	-35.8%
Office/outpatient visits	11,735.6	7,285.5	11,343.7	12,329.8	**-5,436.2**	-6,000.1	-4,872.2	0.00	-46.3%
Ambulance services	938.6	646.8	955.3	992.7	**-329.3**	-401.1	-257.5	0.00	-35.1%
Inpatient 30-day readmiszsions	324.2	161.0	321.2	343.3	**-185.3**	-207.7	-162.9	0.00	-57.2%
Home health episodes	305.9	265.6	308.9	310.6	**-42.1**	-72.3	-11.8	0.02	-13.7%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.9 Estimates of MCCM Impacts on Utilization and Costs in the Last 60 Days of Life (Sensitivity Analysis: Adds MCCM Decedents Administratively Ineligible at Enrollment)

Outcome	Intervention Group		Comparison Group		Impacts – Last 60 Days of Life				
	Baseline Period (n = 1,261,809)	Performance Period (n = 1,809)	Baseline Period (n = 691,775)	Performance Period (n = 1,610,302)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$28,268	$20,988	$27,414	$30,113	**-$9,979**	-$11,201	-$8,758	0.00	-35.3%
Inpatient expenditures	$15,664	$7,630	$15,384	$16,850	**-$9,499**	-$10,424	-$8,573	0.00	-60.6%
Skilled nursing facility expenditures	$2,440	$1,316	$2,267	$2,376	**-$1,233**	-$1,424	-$1,043	0.00	-50.5%
Home health expenditures	$1,051	$893	$1,007	$1,050	**-$202**	-$292	-$112	0.00	-19.2%
Hospice expenditures[a]	$3,067	$6,238	$2,879	$3,220	**$2,831**	$2,467	$3,194	0.00	92.3%
Durable medical equipment expenditures	$217	$287	$202	$168	**$104**	$19	$188	0.04	47.7%
Outpatient expenditures	$1,883	$2,043	$1,873	$2,288	**-$254**	-$449	-$59	0.03	-13.5%
Physician/supplier Part B expenditures	$3,946	$2,581	$3,802	$4,161	**-$1,725**	-$2,039	-$1,411	0.00	-43.7%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,121.6	631.2	1,134.5	1,158.3	**-514.2**	-576.7	-451.7	0.00	-45.8%
Intensive care unit admissions	264.8	124.1	271.7	278.1	**-147.1**	-170.9	-123.3	0.00	-55.6%
Emergency department visits	1,267.5	876.0	1,290.3	1,360.2	**-461.3**	-532.3	-390.4	0.00	-36.4%
Observational stays	144.5	148.6	156.8	193.1	**-32.2**	-57.0	-7.4	0.03	-22.3%
Office/outpatient visits	18,072.1	12,050.0	17,556.3	19,200.7	**-7,666.4**	-8,746.1	-6,586.7	0.00	-42.4%
Ambulance services	1,382.6	1,009.5	1,413.4	1,484.8	**-444.5**	-566.1	-322.9	0.00	-32.1%
Inpatient 30-day readmissions	424.6	222.7	420.2	448.2	**-229.9**	-265.2	-194.6	0.00	-54.1%
Home health episodes	438.7	358.4	443.3	452.9	**-89.9**	-126.5	-53.4	0.00	-20.5%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.10 Estimates of MCCM Impacts on Utilization and Costs in the Last 90 Days of Life (Sensitivity Analysis: Adds MCCM Decedents Administratively Ineligible at Enrollment)

Outcome	Intervention Group		Comparison Group		Impacts – Last 90 Days of Life				
	Baseline Period (n = 927,090)	Performance Period (n = 1,356)	Baseline Period (n = 508,087)	Performance Period (n = 1,181,354)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$34,312	$27,830	$33,110	$36,514	**-$9,886**	-$11,574	-$8,199	0.00	-28.8%
Inpatient expenditures	$18,031	$9,788	$17,606	$19,377	**-$10,014**	-$11,252	-$8,776	0.00	-55.5%
Skilled nursing facility expenditures	$3,068	$1,943	$2,854	$3,031	**-$1,303**	-$1,592	-$1,013	0.00	-42.5%
Home health expenditures	$1,289	$1,198	$1,263	$1,342	**-$170**	-$321	-$20	0.06	-13.2%
Hospice expenditures[a]	$3,647	$7,708	$3,426	$3,760	**$3,728**	$3,231	$4,224	0.00	102.2%
Durable medical equipment expenditures	$317	$429	$291	$251	**$151**	$31	$271	0.04	47.7%
Outpatient expenditures	$2,789	$3,109	$2,733	$3,330	**-$277**	-$549	-$5	0.09	-9.9%
Physician/supplier Part B expenditures	$5,171	$3,655	$4,937	$5,423	**-$2,002**	-$2,459	-$1,544	0.00	-38.7%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,335.9	826.0	1,348.8	1,381.9	**-543.0**	-630.9	-455.1	0.00	-40.6%
Intensive care unit admissions	294.7	148.2	301.9	311.1	**-155.9**	-184.5	-127.3	0.00	-52.9%
Emergency department visits	1,570.1	1,197.9	1,595.0	1,691.4	**-468.7**	-566.0	-371.4	0.00	-29.9%
Observational stays	186.9	194.3	202.0	247.8	**-38.5**	-68.2	-8.7	0.03	-20.6%
Office/outpatient visits	22,665.0	16,782.9	22,027.8	24,105.3	**-7,959.6**	-9,478.1	-6,441.0	0.00	-35.1%
Ambulance services	1,748.0	1,415.1	1,772.7	1,863.2	**-423.3**	-652.9	-193.7	0.00	-24.2%
Inpatient 30-day readmissions	484.5	287.2	483.6	517.4	**-231.0**	-276.1	-185.9	0.00	-47.7%
Home health episodes	526.1	462.3	540.0	558.3	**-82.2**	-140.9	-23.6	0.02	-15.6%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.11 Estimates of MCCM Impacts on Utilization and Costs in the Last 180 Days of Life (Sensitivity Analysis: Adds MCCM Decedents Administratively Ineligible at Enrollment)

Outcome	Intervention Group		Comparison Group		Impacts – Last 180 Days of Life				
	Baseline Period (n = 597,141)	Performance Period (n = 597)	Baseline Period (n = 326,921)	Performance Period (n = 756,673)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$49,639	$46,561	$48,019	$52,975	**-$8,033**	-$11,255	-$4,812	0.00	-16.2%
Inpatient expenditures	$23,651	$14,673	$23,133	$25,426	**-$11,271**	-$13,423	-$9,118	0.00	-47.7%
Skilled nursing facility expenditures	$4,524	$3,615	$4,236	$4,526	**-$1,199**	-$1,750	-$648	0.00	-26.5%
Home health expenditures	$2,096	$2,059	$2,072	$2,234	**-$198**	-$458	$62	0.21	-9.4%
Hospice expenditures[a]	$4,368	$10,735	$4,097	$4,478	**$5,986**	$5,178	$6,795	0.00	137.1%
Durable medical equipment expenditures	$608	$888	$618	$565	**$333**	$88	$578	0.03	54.8%
Outpatient expenditures	$5,701	$6,822	$5,560	$6,691	**-$10**	-$874	$854	0.98	-0.2%
Physician/supplier Part B expenditures	$8,693	$7,770	$8,304	$9,056	**-$1,675**	-$2,759	-$592	0.01	-19.3%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,846.5	1,240.1	1,860.0	1,907.9	**-654.3**	-790.0	-518.6	0.00	-35.4%
Intensive care unit admissions	362.5	184.2	377.1	387.5	**-188.7**	-225.1	-152.2	0.00	-52.0%
Emergency department visits	2,332.4	1,838.5	2,355.2	2,516.5	**-655.1**	-808.3	-501.9	0.00	-28.1%
Observational stays	296.1	308.5	321.3	384.8	**-51.0**	-93.0	-9.1	0.05	-17.2%
Office/outpatient visits	34,829.8	28,307.6	33,868.4	36,765.1	**-9,418.9**	-11,987.8	-6,850.0	0.00	-27.0%
Ambulance services	2,497.1	2,273.1	2,569.1	2,705.4	**-360.4**	-922.4	201.6	0.29	-14.4%
Inpatient 30-day readmissions	619.0	379.1	627.5	670.2	**-282.7**	-351.2	-214.2	0.00	-45.7%
Home health episodes	811.4	770.4	838.0	874.9	**-77.9**	-173.3	17.4	0.18	-9.6%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.12 Estimates of MCCM Impacts on Transitions to Hospice (Sensitivity Analysis: Adds MCCM Decedents Administratively Ineligible at Enrollment)

Outcome	Intervention Group		Comparison Group		Impacts – Last 365 Days of Life				
	Baseline Period	Performance Period	Baseline Period	Performance Period	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Full sample	**(n = 1,595,051)**	**(n = 3,271)**	**(n = 875,121)**	**(n = 2,033,919)**					
Transition to hospice	61.9%	83.3%	60.5%	62.1%	**19.9%**	18.0%	21.8%	0.00	32.1%
Likelihood of length of stay in MHB of one or two days	7.3%	7.9%	7.2%	7.7%	**0.1%**	-1.2%	1.4%	0.89	1.5%
MHB sample	**(n = 834,770)**	**(n = 2,742)**	**(n = 443,605)**	**(n = 1,040,485)**					
Number of days from MHB enrollment to death	26.9	34.3	26.3	26.6	**7.1**	5.4	8.8	0.00	26.3%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file and Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on transitions to MHB. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes equal the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

MHB = Medicare hospice benefit.

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Exhibit G.13 Estimates of MCCM Impacts on Utilization and Costs in the Last Seven Days of Life (Sensitivity Analysis: Adds MCCM Decedents Enrolling More than One Year Before Death)

Outcome	Intervention Group		Comparison Group		Impacts – Last 7 Days of Life				
	Baseline Period (n = 1,595,051)	Performance Period (n = 2,949)	Baseline Period (n = 875,121)	Performance Period (n = 2,033,919)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$11,132	$7,283	$10,769	$11,390	**-$4,470**	-$4,884	-$4,056	0.00	-40.2%
Inpatient expenditures	$7,493	$3,253	$7,315	$7,655	**-$4,580**	-$5,016	-$4,143	0.00	-61.1%
Skilled nursing facility expenditures	$551	$219	$500	$491	**-$323**	-$379	-$267	0.00	-58.5%
Home health expenditures	$256	$276	$262	$256	**$26**	-$9	$62	0.22	10.3%
Hospice expenditures[a]	$1,800	$2,869	$1,688	$1,924	**$832**	$657	$1,008	0.00	46.2%
Durable medical equipment expenditures	$28	$39	$26	$21	**$16**	$6	$26	0.01	56.3%
Outpatient expenditures	$192	$195	$193	$221	**-$26**	-$65	$13	0.28	-13.4%
Physician/supplier Part B expenditures	$812	$433	$785	$823	**-$417**	-$459	-$374	0.00	-51.3%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	448.5	241.2	450.9	447.5	**-203.8**	-220.1	-187.5	0.00	-45.4%
Intensive care unit admissions	164.2	67.3	168.9	170.5	**-98.5**	-107.9	-89.0	0.00	-60.0%
Emergency department visits	440.4	264.9	440.0	447.3	**-182.8**	-199.6	-165.9	0.00	-41.5%
Observational stays	35.5	29.4	37.2	44.1	**-13.1**	-20.5	-5.7	0.00	-36.8%
Office/outpatient visits	4,154.6	2,485.5	3,956.2	4,234.9	**-1,947.8**	-2,157.4	-1,738.1	0.00	-46.9%
Ambulance services	360.0	260.9	378.2	380.1	**-101.0**	-125.9	-76.2	0.00	-28.1%
Inpatient 30-day readmissions	178.9	97.3	173.7	181.4	**-89.3**	-101.3	-77.2	0.00	-49.9%
Home health episodes	121.7	120.5	129.6	129.0	**-0.6**	-13.7	12.5	0.94	-0.5%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.14 Estimates of MCCM Impacts on Utilization and Costs in the Last 30 Days of Life (Sensitivity Analysis: Adds MCCM Decedents Enrolling More than 1 Year Before Death)

Outcome	Intervention Group		Comparison Group		Impacts – Last 30 Days of Life				
	Baseline Period (n = 1,568,440)	Performance Period (n = 2,387)	Baseline Period (n = 860,398)	Performance Period (n = 2,006,137)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$20,102	$13,897	$19,417	$20,976	**-$7,764**	-$8,482	-$7,046	0.00	-38.6%
Inpatient expenditures	$12,036	$5,443	$11,777	$12,672	**-$7,487**	-$8,164	-$6,810	0.00	-62.2%
Skilled nursing facility expenditures	$1,546	$804	$1,411	$1,444	**-$774**	-$924	-$624	0.00	-50.1%
Home health expenditures	$686	$652	$662	$663	**-$35**	-$109	$38	0.43	-5.1%
Hospice expenditures[a]	$2,417	$4,551	$2,267	$2,565	**$1,835**	$1,556	$2,115	0.00	75.9%
Durable medical equipment expenditures	$105	$153	$101	$83	**$66**	$32	$100	0.00	63.0%
Outpatient expenditures	$905	$915	$890	$1,068	**-$168**	-$265	-$71	0.00	-18.5%
Physician/supplier Part B expenditures	$2,408	$1,379	$2,308	$2,481	**-$1,202**	-$1,333	-$1,071	0.00	-49.9%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	820.9	446.6	825.0	836.3	**-385.6**	-420.1	-351.0	0.00	-47.0%
Intensive care unit admissions	222.0	94.8	228.4	232.1	**-131.0**	-144.1	-117.9	0.00	-59.0%
Emergency department visits	881.5	569.3	887.4	924.0	**-348.9**	-383.3	-314.4	0.00	-39.6%
Observational stays	92.5	86.6	96.4	119.6	**-29.1**	-42.0	-16.2	0.00	-31.4%
Office/outpatient visits	11,684.7	7,384.1	11,287.7	12,248.0	**-5,261.0**	-5,831.4	-4,690.7	0.00	-45.0%
Ambulance services	955.4	654.8	971.6	1,002.5	**-331.6**	-404.3	-258.9	0.00	-34.7%
Inpatient 30-day readmissions	324.1	172.3	319.8	339.8	**-171.7**	-193.6	-149.8	0.00	-53.0%
Home health episodes	303.6	261.6	306.3	306.7	**-42.3**	-69.9	-14.7	0.01	-13.9%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.15 Estimates of MCCM Impacts on Utilization and Costs in the Last 60 Days of Life (Sensitivity Analysis: Adds MCCM Decedents Enrolling More than 1 Year Before Death)

Outcome	Intervention Group		Comparison Group		Impacts – Last 60 Days of Life				
	Baseline Period (n = 1,261,809)	Performance Period (n = 1,798)	Baseline Period (n = 691,775)	Performance Period (n = 1,610,302)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$28,169	$21,116	$27,229	$29,767	**-$9,592**	-$10,725	-$8,459	0.00	-34.1%
Inpatient expenditures	$15,573	$7,816	$15,270	$16,633	**-$9,121**	-$10,077	-$8,164	0.00	-58.6%
Skilled nursing facility expenditures	$2,455	$1,392	$2,268	$2,362	**-$1,157**	-$1,380	-$935	0.00	-47.1%
Home health expenditures	$1,037	$844	$998	$1,037	**-$232**	-$316	-$147	0.00	-22.4%
Hospice expenditures[a]	$3,112	$6,273	$2,907	$3,256	**$2,811**	$2,421	$3,201	0.00	90.3%
Durable medical equipment expenditures	$223	$322	$205	$169	**$135**	$50	$220	0.01	60.7%
Outpatient expenditures	$1,866	$1,940	$1,830	$2,228	**-$324**	-$516	-$133	0.01	-17.4%
Physician/supplier Part B expenditures	$3,903	$2,529	$3,752	$4,082	**-$1,704**	-$1,990	-$1,418	0.00	-43.7%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,122.7	661.1	1,131.8	1,148.9	**-478.7**	-539.0	-418.3	0.00	-42.6%
Intensive care unit admissions	265.6	123.1	272.5	278.1	**-148.1**	-170.6	-125.7	0.00	-55.8%
Emergency department visits	1,272.8	901.9	1,291.0	1,355.3	**-435.2**	-494.9	-375.5	0.00	-34.2%
Observational stays	145.8	153.4	156.3	191.3	**-27.4**	-49.9	-4.9	0.05	-18.8%
Office/outpatient visits	18,005.7	12,286.8	17,464.2	19,041.4	**-7,296.1**	-8,337.5	-6,254.6	0.00	-40.5%
Ambulance services	1,426.2	1,029.3	1,453.3	1,510.2	**-453.9**	-578.5	-329.3	0.00	-31.8%
Inpatient 30-day readmissions	427.8	241.5	420.2	445.1	**-211.2**	-243.5	-179.0	0.00	-49.4%
Home health episodes	435.1	345.3	440.1	447.4	**-97.1**	-132.8	-61.4	0.00	-22.3%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.16 Estimates of MCCM Impacts on Utilization and Costs in the Last 90 Days of Life (Sensitivity Analysis: Adds MCCM Decedents Enrolling More than 1 Year Before Death)

Outcome	Intervention Group		Comparison Group		Impacts – Last 90 Days of Life				
	Baseline Period (n = 927,090)	Performance Period (n = 1,423)	Baseline Period (n = 508,087)	Performance Period (n = 1,181,354)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$34,277	$27,637	$32,958	$36,149	**-$9,831**	-$11,348	-$8,314	0.00	-28.7%
Inpatient expenditures	$17,990	$9,767	$17,533	$19,189	**-$9,879**	-$11,038	-$8,720	0.00	-54.9%
Skilled nursing facility expenditures	$3,101	$1,945	$2,869	$3,016	**-$1,303**	-$1,653	-$954	0.00	-42.0%
Home health expenditures	$1,281	$1,134	$1,257	$1,331	**-$221**	-$374	-$69	0.02	-17.3%
Hospice expenditures[a]	$3,689	$7,803	$3,451	$3,807	**$3,758**	$3,238	$4,277	0.00	101.8%
Durable medical equipment expenditures	$331	$482	$301	$255	**$196**	$79	$313	0.01	59.2%
Outpatient expenditures	$2,765	$2,917	$2,672	$3,239	**-$416**	-$684	-$147	0.01	-15.0%
Physician/supplier Part B expenditures	$5,119	$3,590	$4,876	$5,313	**-$1,966**	-$2,366	-$1,565	0.00	-38.4%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,344.9	847.7	1,352.0	1,377.1	**-522.2**	-601.6	-442.8	0.00	-38.8%
Intensive care unit admissions	296.4	142.5	303.5	312.2	**-162.6**	-187.3	-137.8	0.00	-54.9%
Emergency department visits	1,592.1	1,214.9	1,605.7	1,693.7	**-465.1**	-545.0	-385.2	0.00	-29.2%
Observational stays	191.4	203.0	202.1	246.7	**-33.1**	-62.3	-3.9	0.06	-17.3%
Office/outpatient visits	22,687.9	16,787.9	21,966.9	23,951.2	**-7,884.4**	-9,286.9	-6,481.9	0.00	-34.8%
Ambulance services	1,831.5	1,424.8	1,842.0	1,919.3	**-484.1**	-709.8	-258.3	0.00	-26.4%
Inpatient 30-day readmissions	492.3	299.7	487.2	517.7	**-223.1**	-260.9	-185.3	0.00	-45.3%
Home health episodes	525.4	446.8	539.4	555.7	**-94.8**	-153.2	-36.5	0.01	-18.1%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.17 Estimates of MCCM Impacts on Utilization and Costs in the Last 180 Days of Life (Sensitivity Analysis: Adds MCCM Decedents Enrolling More than 1 Year Before Death)

Outcome	Intervention Group		Comparison Group		Impacts – Last 180 Days of Life				
	Baseline Period (n = 597,141)	Performance Period (n = 769)	Baseline Period (n = 326,921)	Performance Period (n = 756,673)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$50,016	$45,119	$48,114	$52,786	**-$9,568**	-$12,525	-$6,612	0.00	-19.1%
Inpatient expenditures	$23,936	$14,450	$23,272	$25,407	**-$11,621**	-$13,561	-$9,681	0.00	-48.5%
Skilled nursing facility expenditures	$4,605	$3,562	$4,289	$4,538	**-$1,291**	-$1,857	-$726	0.00	-28.0%
Home health expenditures	$2,128	$1,833	$2,084	$2,242	**-$453**	-$675	-$232	0.00	-21.3%
Hospice expenditures[a]	$4,416	$11,110	$4,175	$4,626	**$6,242**	$5,360	$7,125	0.00	141.3%
Durable medical equipment expenditures	$654	$982	$644	$574	**$398**	$139	$656	0.01	60.8%
Outpatient expenditures	$5,614	$6,248	$5,433	$6,558	**-$491**	-$1,355	$374	0.35	-8.7%
Physician/supplier Part B expenditures	$8,662	$6,935	$8,216	$8,840	**-$2,352**	-$3,167	-$1,537	0.00	-27.2%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,891.7	1,258.5	1,890.1	1,925.2	**-668.3**	-791.8	-544.9	0.00	-35.3%
Intensive care unit admissions	374.4	184.5	382.9	390.8	**-197.8**	-237.0	-158.6	0.00	-52.8%
Emergency department visits	2,402.2	1,858.1	2,407.3	2,558.8	**-695.7**	-834.2	-557.2	0.00	-29.0%
Observational stays	309.0	326.4	326.2	391.3	**-47.7**	-98.3	3.0	0.12	-15.4%
Office/outpatient visits	35,165.1	27,568.0	34,027.7	36,721.4	**-10,290.8**	-12,795.6	-7,786.0	0.00	-29.3%
Ambulance services	2,730.1	2,158.9	2,749.4	2,874.9	**-696.8**	-1,179.0	-214.6	0.02	-25.5%
Inpatient 30-day readmissions	651.1	407.5	645.6	680.8	**-278.8**	-344.1	-213.5	0.00	-42.8%
Home health episodes	830.3	705.1	847.0	882.3	**-160.5**	-240.8	-80.2	0.00	-19.3%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.18 Estimates of MCCM Impacts on Transitions to Hospice (Sensitivity Analysis: Adds MCCM Decedents Enrolling More than One Year Before Death)

Outcome	Intervention Group		Comparison Group		Impacts – Last 365 Days of Life				
	Baseline Period	Performance Period	Baseline Period	Performance Period	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Full sample	**(n = 1,595,051)**	**(n = 3,032)**	**(n = 875,121)**	**(n = 2,033,919)**					
Transition to hospice	61.8%	83.1%	60.6%	62.1%	**19.7%**	17.7%	21.7%	0.00	31.9%
Likelihood of length of stay in MHB of one or two days	7.2%	7.9%	7.2%	7.7%	**0.3%**	-0.8%	1.4%	0.68	4.0%
MHB sample	**(n = 834,770)**	**(n = 2,539)**	**(n = 443,605)**	**(n = 1,040,485)**					
Number of days from MHB enrollment to death	29.2	44.5	28.0	29.2	**14.2**	11.3	17.1	0.00	48.6%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file and Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on transitions to MHB. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes equal the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

MHB = Medicare hospice benefit.

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Exhibit G.19 Estimates of MCCM Impacts on Utilization and Costs in the Last Seven Days of Life (Sensitivity Analysis: Adds Administratively Ineligible Decedents and Decedents Enrolling One+ Years Before Death)

Outcome	Intervention Group		Comparison Group		Impacts – Last 7 Days of Life				
	Baseline Period (n = 1,595,051)	Performance Period (n = 3,503)	Baseline Period (n = 875,121)	Performance Period (n = 2,033,919)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$11,101	$7,203	$10,727	$11,348	**-$4,520**	-$4,922	-$4,119	0.00	-40.7%
Inpatient expenditures	$7,482	$3,173	$7,277	$7,617	**-$4,650**	-$5,068	-$4,231	0.00	-62.1%
Skilled nursing facility expenditures	$546	$215	$499	$492	**-$323**	-$371	-$276	0.00	-59.2%
Home health expenditures	$253	$279	$258	$252	**$32**	$0	$64	0.10	12.7%
Hospice expenditures[a]	$1,794	$2,884	$1,696	$1,931	**$855**	$679	$1,031	0.00	47.7%
Durable medical equipment expenditures	$27	$36	$26	$21	**$13**	$4	$22	0.01	49.5%
Outpatient expenditures	$190	$192	$188	$216	**-$26**	-$59	$8	0.20	-13.6%
Physician/supplier Part B expenditures	$809	$424	$782	$819	**-$422**	-$462	-$382	0.00	-52.2%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	445.9	238.0	449.3	445.7	**-204.3**	-219.5	-189.1	0.00	-45.8%
Intensive care unit admissions	164.5	67.5	168.9	170.1	**-98.1**	-107.0	-89.3	0.00	-59.7%
Emergency department visits	438.5	263.1	439.0	445.6	**-182.0**	-198.2	-165.7	0.00	-41.5%
Observational stays	34.7	29.3	37.0	44.1	**-12.6**	-19.4	-5.7	0.00	-36.2%
Office/outpatient visits	4,133.0	2,473.1	3,931.0	4,210.4	**-1,939.3**	-2,147.6	-1,731.0	0.00	-46.9%
Ambulance services	358.9	259.9	375.7	376.3	**-99.5**	-123.1	-76.0	0.00	-27.7%
Inpatient 30-day readmissions	176.5	96.2	172.3	180.6	**-88.6**	-98.8	-78.4	0.00	-50.2%
Home health episodes	120.8	120.5	128.2	127.2	**0.7**	-11.3	12.6	0.93	0.5%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.20 Estimates of MCCM Impacts on Utilization and Costs in the Last 30 Days of Life (Sensitivity Analysis: Adds Administratively Ineligible Decedents and Decedents Enrolling 1+ Years Before Death)

Outcome	Intervention Group		Comparison Group		Impacts – Last 30 Days of Life				
	Baseline Period (n = 1,568,440)	Performance Period (n = 2,827)	Baseline Period (n = 860,398)	Performance Period (n = 2,006,137)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$19,970	$13,851	$19,279	$20,858	**-$7,699**	-$8,398	-$7,000	0.00	-38.6%
Inpatient expenditures	$11,975	$5,400	$11,688	$12,608	**-$7,494**	-$8,128	-$6,860	0.00	-62.6%
Skilled nursing facility expenditures	$1,523	$792	$1,399	$1,434	**-$765**	-$890	-$641	0.00	-50.2%
Home health expenditures	$677	$652	$650	$650	**-$25**	-$101	$50	0.58	-3.8%
Hospice expenditures[a]	$2,413	$4,575	$2,282	$2,575	**$1,869**	$1,593	$2,145	0.00	77.5%
Durable medical equipment expenditures	$104	$143	$99	$82	**$56**	$25	$86	0.00	53.5%
Outpatient expenditures	$888	$911	$872	$1,046	**-$150**	-$243	-$57	0.01	-16.9%
Physician/supplier Part B expenditures	$2,391	$1,376	$2,289	$2,464	**-$1,189**	-$1,313	-$1,064	0.00	-49.7%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	815.5	443.8	820.9	834.4	**-385.2**	-417.6	-352.8	0.00	-47.2%
Intensive care unit admissions	221.8	97.1	228.3	231.6	**-128.0**	-140.6	-115.5	0.00	-57.7%
Emergency department visits	876.9	562.4	883.7	920.6	**-351.3**	-385.2	-317.4	0.00	-40.1%
Observational stays	91.2	85.7	95.6	119.5	**-29.4**	-42.7	-16.0	0.00	-32.2%
Office/outpatient visits	11,582.7	7,379.7	11,173.1	12,144.5	**-5,174.5**	-5,702.8	-4,646.2	0.00	-44.7%
Ambulance services	950.4	666.7	964.0	994.5	**-314.2**	-388.4	-240.0	0.00	-33.1%
Inpatient 30-day readmissions	320.2	168.9	315.8	337.7	**-173.3**	-193.7	-152.8	0.00	-54.1%
Home health episodes	299.9	259.1	301.9	302.4	**-41.3**	-69.2	-13.4	0.02	-13.8%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, p < 0.05 at the 95% level, and p< 0.01 at the 99% level.

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Exhibit G.21 Estimates of MCCM Impacts on Utilization and Costs in the Last 60 Days of Life (Sensitivity Analysis: Adds Administratively Ineligible Decedents and Decedents Enrolling 1+ Years Before Death)

Outcome	Intervention Group		Comparison Group		Impacts – Last 60 Days of Life				
	Baseline Period (n = 1,261,809)	Performance Period (n = 2,135)	Baseline Period (n = 691,775)	Performance Period (n = 1,610,302)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$27,898	$21,061	$26,963	$29,535	**-$9,409**	-$10,547	-$8,271	0.00	-33.7%
Inpatient expenditures	$15,447	$7,734	$15,107	$16,497	**-$9,103**	-$9,978	-$8,229	0.00	-58.9%
Skilled nursing facility expenditures	$2,419	$1,407	$2,240	$2,342	**-$1,114**	-$1,319	-$909	0.00	-46.1%
Home health expenditures	$1,025	$852	$981	$1,020	**-$211**	-$291	-$132	0.00	-20.6%
Hospice expenditures[a]	$3,111	$6,304	$2,926	$3,281	**$2,837**	$2,480	$3,195	0.00	91.2%
Durable medical equipment expenditures	$218	$291	$203	$169	**$106**	$33	$179	0.02	48.7%
Outpatient expenditures	$1,813	$1,938	$1,791	$2,175	**-$259**	-$444	-$73	0.02	-14.3%
Physician/supplier Part B expenditures	$3,865	$2,536	$3,715	$4,051	**-$1,665**	-$1,957	-$1,374	0.00	-43.1%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,111.8	649.3	1,122.0	1,143.4	**-483.9**	-540.5	-427.4	0.00	-43.5%
Intensive care unit admissions	264.3	126.0	271.6	276.3	**-143.0**	-164.3	-121.8	0.00	-54.1%
Emergency department visits	1,261.7	889.3	1,281.6	1,348.0	**-438.7**	-500.9	-376.6	0.00	-34.8%
Observational stays	143.5	153.3	154.4	190.6	**-26.3**	-49.9	-2.6	0.07	-18.3%
Office/outpatient visits	17,804.6	12,241.5	17,234.3	18,843.7	**-7,172.6**	-8,162.2	-6,182.9	0.00	-40.3%
Ambulance services	1,410.8	1,059.2	1,433.8	1,494.6	**-412.5**	-542.7	-282.3	0.00	-29.2%
Inpatient 30-day readmissions	419.8	236.8	412.7	440.8	**-211.1**	-242.7	-179.5	0.00	-50.3%
Home health episodes	430.1	346.3	433.7	441.4	**-91.4**	-125.8	-57.0	0.00	-21.3%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.22 Estimates of MCCM Impacts on Utilization and Costs in the Last 90 Days of Life (Sensitivity Analysis: Adds Administratively Ineligible Decedents and Decedents Enrolling 1+ Years Before Death)

Outcome	Intervention Group		Comparison Group		Impacts – Last 90 Days of Life				
	Baseline Period (n = 927,090)	Performance Period (n = 1,682)	Baseline Period (n = 508,087)	Performance Period (n = 1,181,354)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$33,843	$27,779	$32,532	$35,741	**-$9,273**	-$10,791	-$7,754	0.00	-27.4%
Inpatient expenditures	$17,781	$9,859	$17,278	$18,950	**-$9,593**	-$10,692	-$8,495	0.00	-54.0%
Skilled nursing facility expenditures	$3,050	$2,023	$2,829	$2,981	**-$1,180**	-$1,512	-$848	0.00	-38.7%
Home health expenditures	$1,263	$1,135	$1,231	$1,304	**-$201**	-$332	-$70	0.01	-15.9%
Hospice expenditures[a]	$3,701	$7,811	$3,482	$3,846	**$3,746**	$3,282	$4,209	0.00	101.2%
Durable medical equipment expenditures	$323	$437	$295	$255	**$153**	$53	$254	0.01	47.4%
Outpatient expenditures	$2,673	$2,947	$2,604	$3,141	**-$263**	-$527	$0	0.10	-9.9%
Physician/supplier Part B expenditures	$5,052	$3,569	$4,814	$5,264	**-$1,934**	-$2,336	-$1,532	0.00	-38.3%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,327.9	844.1	1,335.3	1,365.0	**-513.4**	-589.1	-437.7	0.00	-38.7%
Intensive care unit admissions	294.6	148.3	302.2	309.1	**-153.1**	-177.6	-128.6	0.00	-52.0%
Emergency department visits	1,569.0	1,210.9	1,587.8	1,679.6	**-449.9**	-530.1	-369.7	0.00	-28.7%
Observational stays	187.0	204.8	198.4	244.8	**-28.6**	-58.3	1.1	0.11	-15.3%
Office/outpatient visits	22,313.9	16,932.0	21,598.2	23,629.6	**-7,413.3**	-8,760.2	-6,066.3	0.00	-33.2%
Ambulance services	1,797.9	1,477.5	1,807.3	1,881.7	**-394.8**	-621.3	-168.2	0.00	-22.0%
Inpatient 30-day readmissions	481.1	301.1	476.4	510.0	**-213.6**	-250.2	-177.0	0.00	-44.4%
Home health episodes	517.9	445.6	529.3	545.7	**-88.7**	-141.5	-35.8	0.01	-17.1%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.23 Estimates of MCCM Impacts on Utilization and Costs in the Last 180 Days of Life (Sensitivity Analysis: Includes Administratively Ineligible Decedents and Decedents Enrolling 1+ Years Before Death)

Outcome	Intervention Group		Comparison Group		Impacts – Last 180 Days of Life				
	Baseline Period (n = 597,141)	Performance Period (n = 923)	Baseline Period (n = 326,921)	Performance Period (n = 756,673)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$48,689	$46,525	$46,946	$51,616	**-$6,835**	-$10,080	-$3,590	0.00	-14.0%
Inpatient expenditures	$23,293	$15,198	$22,669	$24,786	**-$10,212**	-$12,267	-$8,157	0.00	-43.8%
Skilled nursing facility expenditures	$4,459	$3,707	$4,181	$4,419	**-$990**	-$1,611	-$369	0.01	-22.2%
Home health expenditures	$2,054	$1,887	$2,023	$2,180	**-$323**	-$546	-$101	0.02	-15.7%
Hospice expenditures[a]	$4,497	$11,207	$4,206	$4,669	**$6,246**	$5,442	$7,050	0.00	138.9%
Durable medical equipment expenditures	$642	$891	$637	$575	**$311**	$112	$510	0.01	48.5%
Outpatient expenditures	$5,361	$6,393	$5,219	$6,289	**-$39**	-$814	$737	0.94	-0.7%
Physician/supplier Part B expenditures	$8,383	$7,242	$8,010	$8,698	**-$1,828**	-$2,713	-$943	0.00	-21.8%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,840.6	1,298.2	1,848.6	1,889.7	**-583.5**	-707.0	-459.9	0.00	-31.7%
Intensive care unit admissions	365.5	204.0	377.3	382.8	**-167.0**	-201.3	-132.8	0.00	-45.7%
Emergency department visits	2,334.4	1,908.2	2,356.3	2,516.2	**-586.1**	-711.8	-460.5	0.00	-25.1%
Observational stays	293.8	343.1	316.6	385.3	**-19.4**	-66.1	27.3	0.49	-6.6%
Office/outpatient visits	34,026.8	28,904.1	33,066.1	35,881.4	**-7,938.0**	-10,393.6	-5,482.3	0.00	-23.3%
Ambulance services	2,605.8	2,488.9	2,624.8	2,740.3	**-232.5**	-803.2	338.2	0.50	-8.9%
Inpatient 30-day readmissions	623.0	429.3	623.4	663.0	**-233.4**	-300.5	-166.3	0.00	-37.5%
Home health episodes	802.1	721.1	824.7	860.0	**-116.2**	-200.0	-32.5	0.02	-14.5%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, p < 0.05 at the 95% level, and p< 0.01 at the 99% level.

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Exhibit G.24 Estimates of MCCM Impacts on Transitions to Hospice (Sensitivity Analysis: Adds Administratively Ineligible Decedents and Decedents Enrolling One+ Years before Death)

Outcome	Intervention Group		Comparison Group		Impacts – Last 365 Days of Life				
	Baseline Period	Performance Period	Baseline Period	Performance Period	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Full sample	**(n = 1,595,051)**	**(n = 3,597)**	**(n = 875,121)**	**(n = 2,033,919)**					
Transition to hospice	61.8%	83.1%	60.5%	62.0%	**19.7%**	17.8%	21.6%	0.00	31.9%
Likelihood of length of stay in MHB of one or two days	7.2%	7.6%	7.1%	7.6%	**0.0%**	-1.2%	1.2%	0.99	-0.2%
MHB sample	**(n = 834,770)**	**(n = 3,005)**	**(n = 443,605)**	**(n = 1,040,485)**					
Number of days from MHB enrollment to death	29.9	45.0	28.7	30.3	**13.5**	10.8	16.2	0.00	45.0%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on transitions to MHB. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes equal the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

MHB = Medicare hospice benefit.

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Exhibit G.25 Estimates of MCCM Impacts on Utilization and Costs in the Last Seven Days of Life (Subgroup Analysis: Medicare Hospice Benefit Decedents)

Outcome	Intervention Group		Comparison Group		Impacts – Last 7 Days of Life				
	Baseline Period (n = 1,595,051)	Performance Period (n = 2,281)	Baseline Period (n = 875,121)	Performance Period (n = 2,033,919)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$11,173	$6,209	$10,841	$11,505	**-$5,629**	-$6,049	-$5,208	0.00	-50.4%
Inpatient expenditures	$7,522	$2,031	$7,384	$7,764	**-$5,871**	-$6,304	-$5,438	0.00	-78.0%
Skilled nursing facility expenditures	$549	$127	$501	$495	**-$416**	-$468	-$364	0.00	-75.6%
Home health expenditures	$258	$221	$265	$261	**-$34**	-$70	$2	0.12	-13.1%
Hospice expenditures[a]	$1,812	$3,364	$1,682	$1,911	**$1,323**	$1,143	$1,504	0.00	73.0%
Durable medical equipment expenditures	$28	$33	$26	$21	**$11**	-$1	$22	0.13	38.6%
Outpatient expenditures	$190	$147	$192	$223	**-$75**	-$110	-$41	0.00	-39.6%
Physician/supplier Part B expenditures	$813	$287	$790	$831	**-$567**	-$612	-$522	0.00	-69.7%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	449.0	167.7	453.2	451.6	**-279.7**	-293.6	-265.8	0.00	-62.3%
Intensive care unit admissions	163.9	33.1	169.5	171.7	**-133.1**	-143.1	-123.1	0.00	-81.2%
Emergency department visits	439.2	194.0	440.5	450.1	**-254.8**	-271.6	-238.0	0.00	-58.0%
Observational stays	35.8	22.8	37.2	44.5	**-20.3**	-27.6	-12.9	0.00	-56.5%
Office/outpatient visits	4,167.8	1,873.0	3,981.6	4,275.5	**-2,588.7**	-2,787.4	-2,389.9	0.00	-62.1%
Ambulance services	356.2	217.8	375.8	379.5	**-142.2**	-171.0	-113.3	0.00	-39.9%
Inpatient 30-day readmissions	179.1	67.3	174.8	183.3	**-120.3**	-130.5	-110.1	0.00	-67.2%
Home health episodes	122.1	100.1	130.6	130.8	**-22.2**	-35.6	-8.8	0.01	-18.2%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.26 Estimates of MCCM Impacts on Utilization and Costs in the Last 30 Days of Life (Subgroup Analysis: Medicare Hospice Benefit Decedents)

Outcome	Intervention Group		Comparison Group		Impacts – Last 30 Days of Life				
	Baseline Period (n = 1,568,440)	Performance Period (n = 1,825)	Baseline Period (n = 860,398)	Performance Period (n = 2,006,137)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$20,200	$12,580	$19,585	$21,234	**-$9,268**	-$9,934	-$8,603	0.00	-45.9%
Inpatient expenditures	$12,102	$3,923	$11,907	$12,870	**-$9,142**	-$9,779	-$8,505	0.00	-75.5%
Skilled nursing facility expenditures	$1,546	$604	$1,419	$1,457	**-$981**	-$1,140	-$821	0.00	-63.4%
Home health expenditures	$695	$633	$672	$677	**-$67**	-$149	$15	0.18	-9.7%
Hospice expenditures[a]	$2,406	$5,269	$2,239	$2,524	**$2,578**	$2,303	$2,852	0.00	107.1%
Durable medical equipment expenditures	$103	$133	$101	$84	**$47**	$10	$84	0.04	45.8%
Outpatient expenditures	$919	$893	$907	$1,097	**-$215**	-$310	-$121	0.00	-23.5%
Physician/supplier Part B expenditures	$2,429	$1,126	$2,339	$2,525	**-$1,489**	-$1,624	-$1,353	0.00	-61.3%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	823.3	349.8	830.8	846.4	**-489.1**	-519.9	-458.4	0.00	-59.4%
Intensive care unit admissions	221.3	54.3	228.6	233.2	**-171.6**	-183.2	-160.0	0.00	-77.5%
Emergency department visits	882.2	484.2	890.8	931.7	**-438.9**	-475.9	-401.9	0.00	-49.8%
Observational stays	93.2	79.8	97.1	120.8	**-37.0**	-50.5	-23.5	0.00	-39.7%
Office/outpatient visits	11,745.3	6,260.1	11,394.5	12,399.1	**-6,489.8**	-7,020.2	-5,959.4	0.00	-55.3%
Ambulance services	939.1	544.2	958.2	996.1	**-432.8**	-503.2	-362.4	0.00	-46.1%
Inpatient 30-day readmissions	324.6	133.0	322.8	344.7	**-213.6**	-235.0	-192.1	0.00	-65.8%
Home health episodes	306.6	254.0	310.9	312.7	**-54.4**	-85.0	-23.9	0.00	-17.8%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.27 Estimates of MCCM Impacts on Utilization and Costs in the Last 60 Days of Life (Subgroup Analysis: Medicare Hospice Benefit Decedents)

Outcome	Intervention Group		Comparison Group		Impacts – Last 60 Days of Life				
	Baseline Period (n = 1,261,809)	Performance Period (n = 1,318)	Baseline Period (n = 691,775)	Performance Period (n = 1,610,302)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$28,295	$19,478	$27,486	$30,193	**-$11,523**	-$12,629	-$10,417	0.00	-40.7%
Inpatient expenditures	$15,629	$5,807	$15,432	$16,918	**-$11,309**	-$12,252	-$10,365	0.00	-72.4%
Skilled nursing facility expenditures	$2,455	$1,157	$2,276	$2,385	**-$1,407**	-$1,645	-$1,169	0.00	-57.3%
Home health expenditures	$1,051	$828	$1,013	$1,057	**-$267**	-$362	-$171	0.00	-25.4%
Hospice expenditures[a]	$3,094	$7,233	$2,872	$3,188	**$3,822**	$3,420	$4,224	0.00	123.5%
Durable medical equipment expenditures	$218	$274	$201	$169	**$88**	-$3	$179	0.11	40.4%
Outpatient expenditures	$1,902	$1,993	$1,880	$2,301	**-$329**	-$558	-$101	0.02	-17.3%
Physician/supplier Part B expenditures	$3,945	$2,186	$3,813	$4,175	**-$2,121**	-$2,427	-$1,814	0.00	-53.8%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,121.8	530.9	1,136.6	1,161.4	**-615.7**	-675.4	-556.1	0.00	-54.9%
Intensive care unit admissions	263.8	70.6	271.4	278.8	**-200.6**	-220.1	-181.1	0.00	-76.0%
Emergency department visits	1,267.7	786.9	1,291.3	1,363.9	**-553.4**	-617.1	-489.8	0.00	-43.7%
Observational stays	145.5	138.0	157.1	193.3	**-43.7**	-66.2	-21.2	0.00	-30.0%
Office/outpatient visits	18,070.3	10,622.2	17,627.6	19,298.6	**-9,119.2**	-10,121.1	-8,117.2	0.00	-50.5%
Ambulance services	1,383.7	830.1	1,417.8	1,487.7	**-623.6**	-725.6	-521.7	0.00	-45.1%
Inpatient 30-day readmissions	425.9	189.1	422.1	449.8	**-264.5**	-295.5	-233.5	0.00	-62.1%
Home health episodes	438.3	335.0	445.0	455.0	**-113.3**	-153.9	-72.7	0.00	-25.8%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.28 Estimates of MCCM Impacts on Utilization and Costs in the Last 90 Days of Life (Subgroup Analysis: Medicare Hospice Benefit Decedents)

Outcome	Intervention Group		Comparison Group		Impacts – Last 90 Days of Life				
	Baseline Period (n = 927,090)	Performance Period (n = 996)	Baseline Period (n = 508,087)	Performance Period (n = 1,181,354)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$34,338	$26,111	$33,199	$36,615	**-$11,643**	-$13,263	-$10,022	0.00	-33.9%
Inpatient expenditures	$17,980	$7,556	$17,670	$19,467	**-$12,221**	-$13,522	-$10,919	0.00	-68.0%
Skilled nursing facility expenditures	$3,093	$1,725	$2,861	$3,040	**-$1,546**	-$1,837	-$1,255	0.00	-50.0%
Home health expenditures	$1,286	$1,164	$1,269	$1,350	**-$203**	-$383	-$23	0.06	-15.8%
Hospice expenditures[a]	$3,675	$8,974	$3,408	$3,717	**$4,990**	$4,380	$5,599	0.00	135.8%
Durable medical equipment expenditures	$317	$397	$291	$254	**$116**	$7	$226	0.08	36.6%
Outpatient expenditures	$2,816	$2,992	$2,745	$3,351	**-$429**	-$721	-$136	0.02	-15.2%
Physician/supplier Part B expenditures	$5,172	$3,303	$4,955	$5,437	**-$2,350**	-$2,816	-$1,884	0.00	-45.4%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,335.1	700.8	1,352.5	1,386.8	**-668.7**	-758.6	-578.8	0.00	-50.1%
Intensive care unit admissions	293.1	89.4	301.3	311.8	**-214.2**	-239.5	-188.9	0.00	-73.1%
Emergency department visits	1,573.0	1087.1	1,596.7	1,697.1	**-586.3**	-679.8	-492.9	0.00	-37.3%
Observational stays	188.5	174.4	202.1	248.9	**-60.9**	-86.1	-35.7	0.00	-32.3%
Office/outpatient visits	22,687.2	14864.7	22,115.5	24,215.6	**-9,922.6**	-11,428.9	-8,416.3	0.00	-43.7%
Ambulance services	1,749.9	1085.9	1,776.9	1,872.1	**-759.2**	-929.2	-589.2	0.00	-43.4%
Inpatient 30-day readmissions	484.9	235.1	485.8	519.6	**-283.6**	-326.0	-241.2	0.00	-58.5%
Home health episodes	524.4	444.5	542.5	561.7	**-99.1**	-171.0	-27.2	0.02	-18.9%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.29 Estimates of MCCM Impacts on Utilization and Costs in the Last 180 Days of Life (Subgroup Analysis: Medicare Hospice Benefit Decedents)

Outcome	Intervention Group		Comparison Group		Impacts – Last 180 Days of Life				
	Baseline Period (n = 597,141)	Performance Period (n = 428)	Baseline Period (n = 326,921)	Performance Period (n = 756,673)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$49,841	$45,365	$48,222	$53,153	**-$9,406**	-$12,275	-$6,537	0.00	-18.9%
Inpatient expenditures	$23,701	$12,305	$23,234	$25,535	**-$13,698**	-$15,646	-$11,750	0.00	-57.8%
Skilled nursing facility expenditures	$4,580	$3,538	$4,243	$4,538	**-$1,336**	-$1,978	-$695	0.00	-29.2%
Home health expenditures	$2,112	$2,070	$2,083	$2,244	**-$204**	-$517	$110	0.29	-9.6%
Hospice expenditures[a]	$4,344	$12,451	$4,106	$4,468	**$7,745**	$6,809	$8,681	0.00	178.3%
Durable medical equipment expenditures	$609	$976	$617	$566	**$417**	$77	$757	0.04	68.4%
Outpatient expenditures	$5,731	$6,452	$5,602	$6,760	**-$437**	-$1,281	$406	0.39	-7.6%
Physician/supplier Part B expenditures	$8,763	$7,574	$8,339	$9,042	**-$1,892**	-$3,048	-$737	0.01	-21.6%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,854.6	1,142.0	1,864.3	1,911.1	**-759.4**	-900.5	-618.2	0.00	-40.9%
Intensive care unit admissions	364.0	109.1	377.3	387.1	**-264.7**	-295.7	-233.7	0.00	-72.7%
Emergency department visits	2,346.9	1,828.5	2,354.7	2,518.0	**-681.6**	-864.8	-498.4	0.00	-29.0%
Observational stays	302.2	312.3	320.2	384.2	**-53.9**	-111.2	3.5	0.12	-17.8%
Office/outpatient visits	35,038.7	26,791.0	34,009.4	36,872.3	**-11,110.7**	-14,022.1	-8,199.2	0.00	-31.7%
Ambulance services	2,517.0	1,870.1	2,582.2	2,716.6	**-781.3**	-1,154.5	-408.2	0.00	-31.0%
Inpatient 30-day readmissions	625.7	359.3	628.9	669.3	**-306.8**	-362.3	-251.4	0.00	-49.0%
Home health episodes	818.1	784.1	840.3	877.4	**-71.2**	-182.7	40.4	0.29	-8.7%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.30 Estimates of MCCM Impacts on Transitions to Hospice (Subgroup Analysis: Medicare Hospice Benefit Decedents)

Outcome	Intervention Group		Comparison Group		Impacts – Last 365 Days of Life				
	Baseline Period (n = 834,711)	Performance Period (n = 2,325)	Baseline Period (n = 443,561)	Performance Period (n = 1,040,306)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Transition to hospicein the last two days of life	7.3%	9.8%	7.2%	7.7%	**2.0%**	0.5%	3.5%	0.03	27.5%
Number of days from MHB enrollment to death	26.6	33.8	26.1	26.5	**6.9**	5.0	8.7	0.00	25.8%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019,

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on transitions to MHB. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes equal the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

MHB = Medicare hospice benefit.

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Exhibit G.31 Estimates of MCCM Impacts on Utilization and Costs in the Last Seven Days of Life (Subgroup Analysis: Non-Medicare Hospice Benefit Decedents)

Outcome	Intervention Group		Comparison Group		Impacts – Last 7 Days of Life				
	Baseline Period (n = 1,595,051)	Performance Period (n = 401)	Baseline Period (n = 875,121)	Performance Period (n = 2,033,919)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$11,173	$13,129	$10,841	$11,505	**$1,291**	-$418	$3,000	0.21	11.6%
Inpatient expenditures	$7,522	$9,895	$7,384	$7,764	**$1,994**	$226	$3,761	0.06	26.5%
Skilled nursing facility expenditures	$549	$710	$501	$495	**$167**	-$74	$408	0.25	30.4%
Home health expenditures	$258	$648	$265	$261	**$394**	$242	$546	0.00	152.7%
Hospice expenditures[a]	$1,812	$79	$1,682	$1,911	**-$1,962**	-$2,104	-$1,819	0.00	-108.3%
Durable medical equipment expenditures	$28	$70	$26	$21	**$48**	$3	$92	0.08	172.3%
Outpatient expenditures	$190	$496	$192	$223	**$274**	$120	$428	0.00	144.2%
Physician/supplier Part B expenditures	$813	$1,230	$790	$831	**$376**	$275	$477	0.00	46.2%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	449.0	639.9	453.2	451.6	**192.5**	134.3	250.7	0.00	42.9%
Intensive care unit admissions	163.9	258.0	169.5	171.7	**91.8**	47.4	136.3	0.00	56.0%
Emergency department visits	439.2	655.5	440.5	450.1	**206.7**	158.4	254.9	0.00	47.1%
Observational stays	35.8	62.2	37.2	44.5	**19.1**	-1.4	39.6	0.13	53.4%
Office/outpatient visits	4,167.8	5,712.1	3,981.6	4,275.5	**1,250.5**	631.5	1,869.4	0.00	30.0%
Ambulance services	356.2	504.6	375.8	379.5	**144.7**	89.0	200.3	0.00	40.6%
Inpatient 30-day readmissions	179.1	243.9	174.8	183.3	**56.2**	8.1	104.3	0.05	31.4%
Home health episodes	122.1	258.0	130.6	130.8	**135.7**	85.9	185.5	0.00	111.1%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.32 Estimates of MCCM Impacts on Utilization and Costs in the Last 30 Days of Life (Subgroup Analysis: Non-Medicare Hospice Benefit Decedents)

Outcome	Intervention Group		Comparison Group		Impacts – Last 30 Days of Life				
	Baseline Period (n = 1,568,440)	Performance Period (n = 295)	Baseline Period (n = 860,398)	Performance Period (n = 2,006,137)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$20,200	$21,503	$19,585	$21,234	**-$346**	-$2,782	$2,090	0.82	-1.7%
Inpatient expenditures	$12,102	$13,962	$11,907	$12,870	**$897**	-$1,367	$3,161	0.52	7.4%
Skilled nursing facility expenditures	$1,546	$1,770	$1,419	$1,457	**$186**	-$359	$730	0.57	12.0%
Home health expenditures	$695	$998	$672	$677	**$298**	$92	$505	0.02	42.9%
Hospice expenditures[a]	$2,406	$91	$2,239	$2,524	**-$2,600**	-$2,772	-$2,429	0.00	-108.1%
Durable medical equipment expenditures	$103	$265	$101	$84	**$180**	$59	$300	0.01	174.3%
Outpatient expenditures	$919	$1,423	$907	$1,097	**$315**	$82	$547	0.03	34.3%
Physician/supplier Part B expenditures	$2,429	$2,995	$2,339	$2,525	**$380**	$70	$690	0.04	15.6%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	823.3	944.9	830.8	846.4	**106.0**	35.0	176.9	0.01	12.9%
Intensive care unit admissions	221.3	321.4	228.6	233.2	**95.6**	42.5	148.6	0.00	43.2%
Emergency department visits	882.2	1,040.5	890.8	931.7	**117.4**	54.5	180.3	0.00	13.3%
Observational stays	93.2	105.8	97.1	120.8	**-11.0**	-43.0	21.0	0.57	-11.8%
Office/outpatient visits	11,745.3	13,654.8	11,394.5	12,399.1	**904.9**	-191.5	2,001.4	0.18	7.7%
Ambulance services	939.1	1,307.4	958.2	996.1	**330.4**	56.1	604.7	0.05	35.2%
Inpatient 30-day readmissions	324.6	345.6	322.8	344.7	**-0.9**	-52.4	50.5	0.98	-0.3%
Home health episodes	306.6	383.9	310.9	312.7	**75.5**	8.8	142.2	0.06	24.6%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014–December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.33 Estimates of MCCM Impacts on Utilization and Costs in the Last 60 Days of Life (Subgroup Analysis: Non-Medicare Hospice Benefit Decedents)

Outcome	Intervention Group		Comparison Group		Impacts – Last 60 Days of Life				
	Baseline Period (n = 1,261,809)	Performance Period (n = 213)	Baseline Period (n = 691,775)	Performance Period (n = 1,610,302)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$28,295	$31,346	$27,486	$30,193	**$345**	-$3,144	$3,833	0.87	1.2%
Inpatient expenditures	$15,629	$19,349	$15,432	$16,918	**$2,233**	-$875	$5,342	0.24	14.3%
Skilled nursing facility expenditures	$2,455	$2,367	$2,276	$2,385	**-$197**	-$800	$405	0.59	-8.0%
Home health expenditures	$1,051	$1,324	$1,013	$1,057	**$230**	-$19	$478	0.13	21.9%
Hospice expenditures[a]	$3,094	$27	$2,872	$3,188	**-$3,384**	-$3,576	-$3,193	0.00	-109.4%
Durable medical equipment expenditures	$218	$591	$201	$169	**$405**	$109	$700	0.03	185.7%
Outpatient expenditures	$1,902	$2,666	$1,880	$2,301	**$344**	-$95	$782	0.20	18.1%
Physician/supplier Part B expenditures	$3,945	$5,022	$3,813	$4,175	**$715**	$53	$1,377	0.08	18.1%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,121.8	1,298.6	1,136.6	1,161.4	**152.0**	39.4	264.5	0.03	13.5%
Intensive care unit admissions	263.8	424.2	271.4	278.8	**153.0**	81.3	224.7	0.00	58.0%
Emergency department visits	1,267.7	1,501.5	1,291.3	1,363.9	**161.2**	55.0	267.3	0.01	12.7%
Observational stays	145.5	206.9	157.1	193.3	**25.2**	-18.7	69.1	0.35	17.3%
Office/outpatient visits	18,070.3	21,546.2	17,627.6	19,298.6	**1,804.8**	-145.1	3,754.8	0.13	10.0%
Ambulance services	1,383.7	2,219.3	1,417.8	1,487.7	**765.7**	-46.6	1,577.9	0.12	55.3%
Inpatient 30-day readmissions	425.9	453.2	422.1	449.8	**-0.3**	-84.5	83.8	1.00	-0.1%
Home health episodes	438.3	526.2	445.0	455.0	**78.0**	-0.9	156.9	0.10	17.8%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.34 Estimates of MCCM Impacts on Utilization and Costs in the Last 90 Days of Life (Subgroup Analysis: Non-Medicare Hospice Benefit Decedents)

Outcome	Intervention Group		Comparison Group		Impacts – Last 90 Days of Life				
	Baseline Period (n = 927,090)	Performance Period (n = 160)	Baseline Period (n = 508,087)	Performance Period (n = 1,181,354)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$34,338	$38,758	$33,199	$36,615	**$1,005**	-$3,505	$5,514	0.71	2.9%
Inpatient expenditures	$17,980	$22,930	$17,670	$19,467	**$3,154**	-$270	$6,578	0.13	17.5%
Skilled nursing facility expenditures	$3,093	$3,015	$2,861	$3,040	**-$256**	-$1,001	$489	0.57	-8.3%
Home health expenditures	$1,286	$1,528	$1,269	$1,350	**$162**	-$140	$463	0.38	12.6%
Hospice expenditures[a]	$3,675	-$11	$3,408	$3,717	**-$3,995**	-$4,203	-$3,787	0.00	-108.7%
Durable medical equipment expenditures	$317	$946	$291	$254	**$666**	$140	$1,192	0.04	210.0%
Outpatient expenditures	$2,816	$4,179	$2,745	$3,351	**$758**	-$223	$1,738	0.20	26.9%
Physician/supplier Part B expenditures	$5,172	$6,170	$4,955	$5,437	**$517**	-$342	$1,376	0.32	10.0%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,335.1	1,589.6	1,352.5	1,386.8	**220.1**	59.1	381.1	0.02	16.5%
Intensive care unit admissions	293.1	457.3	301.3	311.8	**153.8**	57.8	249.7	0.01	52.5%
Emergency department visits	1,573.0	1,906.9	1,596.7	1,697.1	**233.4**	72.2	394.7	0.02	14.8%
Observational stays	188.5	301.3	202.1	248.9	**66.1**	16.2	115.9	0.03	35.1%
Office/outpatient visits	22,687.2	28,463.8	22,115.5	24,215.6	**3,676.5**	-22.0	7,374.9	0.10	16.2%
Ambulance services	1,749.9	3,688.1	1,776.9	1,872.1	**1,843.1**	68.4	3,617.8	0.09	105.3%
Inpatient 30-day readmissions	484.9	586.5	485.8	519.6	**67.8**	-51.4	186.9	0.35	14.0%
Home health episodes	524.4	634.0	542.5	561.7	**90.4**	-21.6	202.3	0.18	17.2%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, p < 0.05 at the 95% level, and p< 0.01 at the 99% level.

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Exhibit G.35 Estimates of MCCM Impacts on Utilization and Costs in the Last 180 Days of Life (Subgroup Analysis: Non-Medicare Hospice Benefit Decedents)

Outcome	Intervention Group		Comparison Group		Impacts – Last 180 Days of Life				
	Baseline Period (n = 597,141)	Performance Period (n = 74)	Baseline Period (n = 326,921)	Performance Period (n = 756,673)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$49,841	$54,536	$48,222	$53,153	**-$235**	-$9,757	$9,287	0.97	-0.5%
Inpatient expenditures	$23,701	$27,512	$23,234	$25,535	**$1,510**	-$5,993	$9,012	0.74	6.4%
Skilled nursing facility expenditures	$4,580	$4,834	$4,243	$4,538	**-$41**	-$1,289	$1,207	0.96	-0.9%
Home health expenditures	$2,112	$2,455	$2,083	$2,244	**$181**	-$265	$628	0.50	8.6%
Hospice expenditures[a]	$4,344	-$85	$4,106	$4,468	**-$4,791**	-$5,004	-$4,578	0.00	-110.3%
Durable medical equipment expenditures	$609	$960	$617	$566	**$402**	$9	$794	0.09	66.0%
Outpatient expenditures	$5,731	$10,452	$5,602	$6,760	**$3,563**	$37	$7,090	0.10	62.2%
Physician/supplier Part B expenditures	$8,763	$8,407	$8,339	$9,042	**-$1,059**	-$2,678	$560	0.28	-12.1%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,854.6	1,732.7	1,864.3	1,911.1	**-168.7**	-470.7	133.4	0.36	-9.1%
Intensive care unit admissions	364.0	485.5	377.3	387.1	**111.7**	-48.1	271.5	0.25	30.7%
Emergency department visits	2,346.9	2,046.0	2,354.7	2,518.0	**-464.1**	-663.6	-264.7	0.00	-19.8%
Observational stays	302.2	257.9	320.2	384.2	**-108.2**	-217.8	1.3	0.10	-35.8%
Office/outpatient visits	35,038.7	34,898.6	34,009.4	36,872.3	**-3,003.0**	-6,706.3	700.3	0.18	-8.6%
Ambulance services	2,517.0	5,012.7	2,582.2	2,716.6	**2,361.2**	-1,564.6	6,287.1	0.32	93.8%
Inpatient 30-day readmissions	625.7	454.5	628.9	669.3	**-211.7**	-400.3	-23.2	0.07	-33.8%
Home health episodes	818.1	894.5	840.3	877.4	**39.3**	-138.5	217.1	0.72	4.8%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.36 Estimates of MCCM Impacts on Utilization and Costs in the Last Seven Days of Life (Subgroup Analysis: Decedents with Cancer Diagnoses)

Outcome	Intervention Group		Comparison Group		Impacts – Last 7 Days of Life				
	Baseline Period (n = 879,355)	Performance Period (n = 1,835)	Baseline Period (n = 466,217)	Performance Period (n = 855,926)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$10,622	$7,030	$10,227	$10,843	**-$4,209**	-$4,598	-$3,820	0.00	-39.6%
Inpatient expenditures	$6,924	$2,950	$6,705	$6,970	**-$4,239**	-$4,669	-$3,810	0.00	-61.2%
Skilled nursing facility expenditures	$488	$172	$449	$426	**-$293**	-$350	-$236	0.00	-60.0%
Home health expenditures	$247	$274	$252	$248	**$31**	-$9	$70	0.20	12.4%
Hospice expenditures[a]	$2,017	$3,026	$1,914	$2,238	**$685**	$479	$891	0.00	33.9%
Durable medical equipment expenditures	$25	$33	$24	$19	**$12**	-$1	$26	0.13	47.9%
Outpatient expenditures	$175	$188	$172	$203	**-$18**	-$54	$17	0.40	-10.4%
Physician/supplier Part B expenditures	$746	$388	$711	$738	**-$386**	-$428	-$344	0.00	-51.7%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	420.0	222.3	419.6	415.2	**-193.3**	-212.2	-174.4	0.00	-46.0%
Intensive care unit admissions	142.8	56.3	145.7	143.9	**-84.7**	-95.1	-74.3	0.00	-59.3%
Emergency department visits	403.6	242.8	401.6	403.5	**-162.7**	-184.0	-141.3	0.00	-40.3%
Observational stays	35.2	30.0	36.0	42.6	**-11.8**	-21.4	-2.3	0.04	-33.6%
Office/outpatient visits	3,888.1	2,279.3	3,674.5	3,880.0	**-1,814.3**	-2,042.9	-1,585.8	0.00	-46.7%
Ambulance services	330.2	235.3	344.6	340.7	**-91.0**	-110.2	-71.8	0.00	-27.6%
Inpatient 30-day readmissions	168.2	85.3	162.0	173.1	**-94.1**	-105.5	-82.6	0.00	-55.9%
Home health episodes	117.0	115.1	124.6	125.4	**-2.6**	-18.8	13.5	0.79	-2.2%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, p < 0.05 at the 95% level, and p< 0.01 at the 99% level.

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Exhibit G.37 Estimates of MCCM Impacts on Utilization and Costs in the Last 30 Days of Life (Subgroup Analysis: Decedents with Cancer Diagnoses)

Outcome	Intervention Group		Comparison Group		Impacts – Last 30 Days of Life				
	Baseline Period (n = 865,357)	Performance Period (n = 1,412)	Baseline Period (n = 458,735)	Performance Period (n = 845,027)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$19,749	$13,528	$19,044	$20,922	**-$8,099**	-$8,712	-$7,486	0.00	-41.0%
Inpatient expenditures	$11,494	$4,857	$11,184	$12,186	**-$7,638**	-$8,276	-$7,001	0.00	-66.5%
Skilled nursing facility expenditures	$1,368	$642	$1,271	$1,266	**-$721**	-$876	-$566	0.00	-52.7%
Home health expenditures	$690	$667	$661	$671	**-$33**	-$134	$67	0.59	-4.8%
Hospice expenditures[a]	$2,671	$4,787	$2,538	$2,930	**$1,724**	$1,368	$2,080	0.00	64.5%
Durable medical equipment expenditures	$98	$121	$96	$74	**$46**	-$1	$93	0.11	46.9%
Outpatient expenditures	$1,022	$1,101	$1,007	$1,286	**-$201**	-$310	-$91	0.00	-19.6%
Physician/supplier Part B expenditures	$2,406	$1,353	$2,287	$2,509	**-$1,275**	-$1,439	-$1,112	0.00	-53.0%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	794.4	395.3	795.0	817.8	**-421.8**	-459.4	-384.1	0.00	-53.1%
Intensive care unit admissions	193.8	78.4	196.3	196.3	**-115.4**	-130.4	-100.3	0.00	-59.5%
Emergency department visits	843.6	527.3	848.4	889.0	**-356.8**	-395.5	-318.1	0.00	-42.3%
Observational stays	94.9	88.7	95.8	121.4	**-31.8**	-48.1	-15.6	0.00	-33.5%
Office/outpatient visits	11,275.4	6,828.2	10,841.6	11,775.2	**-5,380.8**	-6,014.5	-4,747.1	0.00	-47.7%
Ambulance services	853.6	533.3	865.1	883.7	**-338.9**	-397.6	-280.2	0.00	-39.7%
Inpatient 30-day readmissions	313.1	136.1	308.3	339.6	**-208.3**	-232.8	-183.8	0.00	-66.5%
Home health episodes	307.3	260.8	308.4	314.7	**-52.8**	-90.2	-15.4	0.02	-17.2%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.38 Estimates of MCCM Impacts on Utilization and Costs in the Last 60 Days of Life (Subgroup Analysis: Decedents with Cancer Diagnoses)

Outcome	Intervention Group		Comparison Group		Impacts – Last 60 Days of Life				
	Baseline Period (n = 700,695)	Performance Period	Baseline Period (n = 371,131)	Performance Period (n = 679,464)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$28,110	$20,449	$27,198	$30,351	**-$10,814**	-$11,947	-$9,682	0.00	-38.5%
Inpatient expenditures	$14,964	$6,706	$14,651	$16,179	**-$9,785**	-$10,839	-$8,732	0.00	-65.4%
Skilled nursing facility expenditures	$2,193	$1,110	$2,019	$2,021	**-$1,085**	-$1,249	-$920	0.00	-49.5%
Home health expenditures	$1,039	$838	$994	$1,038	**-$245**	-$346	-$143	0.00	-23.5%
Hospice expenditures[a]	$3,408	$6,513	$3,256	$3,695	**$2,666**	$2,137	$3,194	0.00	78.2%
Durable medical equipment expenditures	$204	$236	$187	$148	**$70**	-$43	$183	0.31	34.4%
Outpatient expenditures	$2,231	$2,478	$2,205	$2,881	**-$428**	-$686	-$171	0.01	-19.2%
Physician/supplier Part B expenditures	$4,070	$2,568	$3,884	$4,390	**-$2,007**	-$2,422	-$1,593	0.00	-49.3%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,084.1	555.5	1,088.7	1,123.1	**-563.0**	-633.9	-492.1	0.00	-51.9%
Intensive care unit admissions	231.2	103.0	232.2	232.4	**-128.3**	-155.6	-101.0	0.00	-55.5%
Emergency department visits	1,215.8	807.1	1,231.5	1,309.6	**-486.8**	-560.4	-413.1	0.00	-40.0%
Observational stays	147.4	147.0	152.2	193.6	**-41.8**	-65.4	-18.1	0.00	-28.3%
Office/outpatient visits	17,585.3	11,222.3	16,979.5	18,519.5	**-7,903.0**	-9,090.5	-6,715.5	0.00	-44.9%
Ambulance services	1,223.0	774.9	1,234.3	1,265.7	**-479.5**	-585.9	-373.0	0.00	-39.2%
Inpatient 30-day readmissions	407.9	172.6	402.7	438.1	**-270.8**	-307.6	-234.0	0.00	-66.4%
Home health episodes	435.9	337.4	439.8	453.6	**-112.4**	-160.2	-64.6	0.00	-25.8%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, p < 0.05 at the 95% level, and p< 0.01 at the 99% level.

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Exhibit G.39 Estimates of MCCM Impacts on Utilization and Costs in the Last 90 Days of Life (Subgroup Analysis: Decedents with Cancer Diagnoses)

Outcome	Intervention Group		Comparison Group		Impacts – Last 90 Days of Life				
	Baseline Period (n = 516,254)	Performance Period (n = 684)	Baseline Period (n = 273,138)	Performance Period (n = 498,417)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$34,439	$27,073	$33,247	$37,415	**-$11,533**	-$13,262	-$9,805	0.00	-33.5%
Inpatient expenditures	$17,264	$8,493	$16,835	$18,740	**-$10,675**	-$12,196	-$9,155	0.00	-61.8%
Skilled nursing facility expenditures	$2,702	$1,575	$2,487	$2,544	**-$1,183**	-$1,464	-$903	0.00	-43.8%
Home health expenditures	$1,256	$1,178	$1,214	$1,297	**-$162**	-$349	$26	0.16	-12.9%
Hospice expenditures[a]	$4,034	$8,029	$3,884	$4,304	**$3,575**	$2,805	$4,345	0.00	88.6%
Durable medical equipment expenditures	$291	$329	$272	$222	**$89**	-$72	$250	0.36	30.6%
Outpatient expenditures	$3,413	$3,675	$3,375	$4,390	**-$754**	-$1,134	-$374	0.00	-22.1%
Physician/supplier Part B expenditures	$5,478	$3,793	$5,179	$5,917	**-$2,423**	-$3,064	-$1,782	0.00	-44.2%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,283.9	722.2	1,287.9	1,336.8	**-610.6**	-709.2	-512.0	0.00	-47.6%
Intensive care unit admissions	257.2	121.2	255.1	257.4	**-138.3**	-168.8	-107.8	0.00	-53.8%
Emergency department visits	1,499.6	1,094.0	1,508.5	1,619.4	**-516.5**	-620.2	-412.7	0.00	-34.4%
Observational stays	190.8	188.8	193.9	245.6	**-53.7**	-82.9	-24.5	0.00	-28.1%
Office/outpatient visits	22,222.4	15,662.7	21,402.5	23,323.1	**-8,480.3**	-10,194.8	-6,765.9	0.00	-38.2%
Ambulance services	1,506.4	1,024.2	1,500.4	1,550.9	**-532.7**	-709.9	-355.4	0.00	-35.4%
Inpatient 30-day readmissions	457.0	220.6	458.5	502.4	**-280.4**	-327.0	-233.7	0.00	-61.3%
Home health episodes	514.4	453.6	525.4	550.8	**-86.2**	-165.6	-6.8	0.07	-16.8%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.40 Estimates of MCCM Impacts on Utilization and Costs in the Last 180 Days of Life (Subgroup Analysis: Decedents with Cancer Diagnoses)

Outcome	Intervention Group		Comparison Group		Impacts – Last 180 Days of Life				
	Baseline Period (n = 332,575)	Performance Period (n = 264)	Baseline Period (n = 175,586)	Performance Period (n = 318,569)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$50,500	$47,252	$48,968	$55,484	**-$9,764**	-$13,264	-$6,264	0.00	-19.3%
Inpatient expenditures	$22,414	$13,121	$21,947	$24,251	**-$11,596**	-$13,900	-$9,293	0.00	-51.7%
Skilled nursing facility expenditures	$3,858	$3,446	$3,536	$3,648	**-$523**	-$1,266	$219	0.25	-13.6%
Home health expenditures	$1,987	$1,901	$1,926	$2,090	**-$251**	-$569	$67	0.19	-12.6%
Hospice expenditures[a]	$4,795	$10,654	$4,665	$5,075	**$5,449**	$4,012	$6,886	0.00	113.6%
Durable medical equipment expenditures	$529	$600	$601	$519	**$153**	-$330	$636	0.60	28.9%
Outpatient expenditures	$7,163	$8,773	$7,120	$9,365	**-$634**	-$1,867	$599	0.40	-8.9%
Physician/supplier Part B expenditures	$9,754	$8,757	$9,172	$10,536	**-$2,361**	-$3,952	-$771	0.02	-24.2%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,737.7	1,107.3	1,739.1	1,799.2	**-690.5**	-853.6	-527.3	0.00	-39.7%
Intensive care unit admissions	314.3	167.9	315.9	312.1	**-142.6**	-188.2	-97.0	0.00	-45.4%
Emergency department visits	2,161.3	1,690.3	2,173.3	2,369.1	**-666.9**	-867.9	-465.8	0.00	-30.9%
Observational stays	293.3	304.9	294.6	366.8	**-60.6**	-150.8	29.5	0.27	-20.7%
Office/outpatient visits	34,118.2	27,600.9	33,127.3	35,736.6	**-9,126.6**	-12,701.1	-5,552.1	0.00	-26.7%
Ambulance services	2,070.3	1,510.7	2,049.0	2,090.8	**-601.4**	-856.6	-346.3	0.00	-29.1%
Inpatient 30-day readmissions	570.4	310.7	570.2	616.9	**-306.3**	-382.8	-229.8	0.00	-53.7%
Home health episodes	770.1	746.4	784.8	830.5	**-69.5**	-183.0	44.1	0.31	-9.0%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.41 Estimates of MCCM Impacts on Transitions to Hospice (Subgroup Analysis: Decedents with Cancer Diagnoses)

Outcome	Intervention Group		Comparison Group		Impacts – Last 365 Days of Life				
	Baseline Period	Performance Period	Baseline Period	Performance Period	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Full sample	**(n = 879,355)**	**(n = 1,890)**	**(n = 466,217)**	**(n = 855,926)**					
Transition to hospice	67.6%	86.7%	66.8%	69.4%	**16.4%**	14.3%	18.6%	0.00	24.3%
Likelihood of length of stay in MHB of one or two days	7.1%	8.0%	7.1%	7.7%	**0.4%**	-0.9%	1.7%	0.61	5.6%
MHB sample	**(n = 533,140)**	**(n = 1,648)**	**(n = 277,579)**	**(n = 525,366)**					
Number of days from MHB enrollment to death	25.5	30.2	25.4	24.9	**5.3**	3.0	7.5	0.00	20.8%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on transitions to MHB. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes equal the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

MHB = Medicare hospice benefit.

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Exhibit G.42 Estimates of MCCM Impacts on Utilization and Costs in the Last Seven Days of Life (Subgroup Analysis: Decedents without Cancer Diagnoses)

Outcome	Intervention Group		Comparison Group		Impacts – Last 7 Days of Life				
	Baseline Period (n = 715,696)	Performance Period (n = 847)	Baseline Period (n = 408,904)	Performance Period (n = 1,177,993)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$12,948	$7,817	$12,426	$12,458	**-$5,163**	-$5,841	-$4,485	0.00	-39.9%
Inpatient expenditures	$9,439	$3,879	$9,124	$8,950	**-$5,386**	-$6,086	-$4,687	0.00	-57.1%
Skilled nursing facility expenditures	$724	$309	$636	$615	**-$394**	-$496	-$292	0.00	-54.4%
Home health expenditures	$298	$310	$302	$278	**$35**	-$17	$88	0.27	11.9%
Hospice expenditures[a]	$1,207	$2,501	$1,118	$1,372	**$1,040**	$893	$1,188	0.00	86.2%
Durable medical equipment expenditures	$33	$54	$32	$22	**$30**	$10	$51	0.01	91.5%
Outpatient expenditures	$229	$234	$230	$248	**-$13**	-$68	$43	0.71	-5.5%
Physician/supplier Part B expenditures	$1,018	$531	$985	$974	**-$476**	-$533	-$419	0.00	-46.7%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	540.9	276.8	540.8	508.2	**-231.6**	-257.8	-205.3	0.00	-42.8%
Intensive care unit admissions	226.3	92.8	229.1	216.7	**-121.0**	-141.3	-100.8	0.00	-53.5%
Emergency department visits	549.5	310.5	541.4	526.1	**-223.7**	-252.9	-194.5	0.00	-40.7%
Observational stays	38.0	26.3	39.9	47.1	**-18.9**	-29.6	-8.2	0.00	-49.7%
Office/outpatient visits	5,068.7	2,851.6	4,786.0	4,893.8	**-2,324.8**	-2,662.5	-1,987.2	0.00	-45.9%
Ambulance services	432.8	319.2	455.2	444.5	**-103.0**	-155.3	-50.6	0.00	-23.8%
Inpatient 30-day readmissions	214.8	114.4	208.8	196.0	**-87.6**	-112.3	-62.9	0.00	-40.8%
Home health episodes	139.8	143.0	148.4	138.0	**13.7**	-2.8	30.2	0.17	9.8%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.43 Estimates of MCCM Impacts on Utilization and Costs in the Last 30 Days of Life (Subgroup Analysis: Decedents without Cancer Diagnoses)

Outcome	Intervention Group		Comparison Group		Impacts – Last 30 Days of Life				
	Baseline Period (n = 703,083)	Performance Period (n = 708)	Baseline Period (n = 401,663)	Performance Period (n = 1,161,110)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$21,873	$14,567	$21,111	$21,399	**-$7,594**	-$8,715	-$6,472	0.00	-34.7%
Inpatient expenditures	$14,146	$6,411	$13,840	$13,753	**-$7,648**	-$8,580	-$6,716	0.00	-54.1%
Skilled nursing facility expenditures	$2,027	$1,031	$1,796	$1,792	**-$991**	-$1,257	-$724	0.00	-48.9%
Home health expenditures	$728	$718	$715	$679	**$25**	-$71	$121	0.67	3.5%
Hospice expenditures[a]	$1,642	$3,998	$1,519	$1,871	**$2,004**	$1,810	$2,199	0.00	122.1%
Durable medical equipment expenditures	$125	$216	$118	$92	**$117**	$76	$158	0.00	93.7%
Outpatient expenditures	$659	$708	$651	$720	**-$20**	-$127	$86	0.75	-3.1%
Physician/supplier Part B expenditures	$2,547	$1,485	$2,472	$2,492	**-$1,081**	-$1,184	-$978	0.00	-42.5%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	918.8	512.4	929.5	884.3	**-361.2**	-408.3	-314.1	0.00	-39.3%
Intensive care unit admissions	300.0	123.6	308.2	293.0	**-161.2**	-181.6	-140.8	0.00	-53.7%
Emergency department visits	1,001.3	635.8	1,004.1	997.3	**-358.7**	-413.7	-303.7	0.00	-35.8%
Observational stays	87.9	74.0	98.3	118.9	**-34.5**	-52.1	-16.9	0.00	-39.2%
Office/outpatient visits	13,311.1	8,334.0	12,877.5	13,273.3	**-5,372.9**	-6,349.3	-4,396.5	0.00	-40.4%
Ambulance services	1,168.4	908.4	1,185.3	1,177.4	**-252.1**	-406.0	-98.2	0.01	-21.6%
Inpatient 30-day readmissions	364.9	219.4	365.3	343.7	**-123.8**	-161.3	-86.4	0.00	-33.9%
Home health episodes	313.0	294.1	323.6	304.8	**-0.1**	-37.8	37.6	1.00	0.0%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.44 Estimates of MCCM Impacts on Utilization and Costs in the Last 60 Days of Life (Subgroup Analysis: Decedents without Cancer Diagnoses)

Outcome	Intervention Group		Comparison Group		Impacts – Last 60 Days of Life				
	Baseline Period (n = 561,114)	Performance Period (n = 576)	Baseline Period (n = 320,644)	Performance Period (n = 930,838)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$29,612	$22,363	$28,667	$29,362	**-$7,944**	-$9,514	-$6,375	0.00	-26.8%
Inpatient expenditures	$17,959	$9,507	$17,614	$17,648	**-$8,486**	-$9,747	-$7,226	0.00	-47.3%
Skilled nursing facility expenditures	$3,169	$1,702	$2,914	$2,967	**-$1,521**	-$1,891	-$1,151	0.00	-48.0%
Home health expenditures	$1,123	$987	$1,093	$1,076	**-$119**	-$267	$28	0.18	-10.6%
Hospice expenditures[a]	$2,245	$5,647	$2,015	$2,473	**$2,944**	$2,546	$3,342	0.00	131.1%
Durable medical equipment expenditures	$259	$468	$239	$187	**$261**	$161	$361	0.00	101.0%
Outpatient expenditures	$1,149	$1,414	$1,140	$1,292	**$113**	-$67	$294	0.30	9.9%
Physician/supplier Part B expenditures	$3,709	$2,639	$3,652	$3,718	**-$1,136**	-$1,384	-$888	0.00	-30.6%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,241.4	783.9	1,266.9	1,202.4	**-393.0**	-462.2	-323.9	0.00	-31.7%
Intensive care unit admissions	354.2	155.2	364.5	346.1	**-180.6**	-216.3	-144.9	0.00	-51.0%
Emergency department visits	1,414.8	1,030.8	1,443.1	1,432.9	**-373.8**	-441.5	-306.0	0.00	-26.4%
Observational stays	138.4	151.6	163.7	190.4	**-13.5**	-50.1	23.1	0.54	-9.8%
Office/outpatient visits	19,805.9	13,869.5	19,380.3	20,144.6	**-6,700.7**	-8,092.3	-5,309.1	0.00	-33.8%
Ambulance services	1,775.0	1,499.9	1,818.4	1,800.0	**-256.7**	-529.1	15.8	0.12	-14.5%
Inpatient 30-day readmissions	484.0	320.9	480.6	453.8	**-136.3**	-197.1	-75.5	0.00	-28.2%
Home health episodes	459.4	399.2	471.1	452.1	**-41.2**	-84.6	2.1	0.12	-9.0%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.45 Estimates of MCCM Impacts on Utilization and Costs in the Last 90 Days of Life (Subgroup Analysis: Decedents without Cancer Diagnoses)

Outcome	Intervention Group		Comparison Group		Impacts – Last 90 Days of Life				
	Baseline Period (n = 410,836)	Performance Period (n = 472)	Baseline Period (n = 234,949)	Performance Period (n = 682,937)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$35,308	$29,011	$33,900	$34,804	**-$7,201**	-$9,076	-$5,325	0.00	-20.4%
Inpatient expenditures	$20,461	$11,557	$19,917	$19,950	**-$8,936**	-$10,421	-$7,451	0.00	-43.7%
Skilled nursing facility expenditures	$4,031	$2,401	$3,691	$3,735	**-$1,673**	-$2,155	-$1,192	0.00	-41.5%
Home health expenditures	$1,391	$1,273	$1,405	$1,401	**-$115**	-$351	$120	0.42	-8.3%
Hospice expenditures[a]	$2,802	$7,159	$2,500	$3,026	**$3,831**	$3,267	$4,396	0.00	136.7%
Durable medical equipment expenditures	$385	$696	$340	$277	**$374**	$205	$544	0.00	97.3%
Outpatient expenditures	$1,655	$2,323	$1,551	$1,799	**$420**	$90	$749	0.04	25.3%
Physician/supplier Part B expenditures	$4,583	$3,603	$4,496	$4,616	**-$1,101**	-$1,430	-$773	0.00	-24.0%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,482.5	985.9	1,509.5	1,426.7	**-413.9**	-514.7	-313.0	0.00	-27.9%
Intensive care unit admissions	384.7	176.6	399.3	378.1	**-186.9**	-227.8	-145.9	0.00	-48.6%
Emergency department visits	1,756.8	1,379.0	1,791.5	1,773.9	**-360.3**	-464.8	-255.9	0.00	-20.5%
Observational stays	184.8	199.8	215.8	249.3	**-18.5**	-59.3	22.4	0.46	-10.0%
Office/outpatient visits	24,421.0	18,601.1	23,880.5	24,863.8	**-6,803.2**	-8,300.8	-5,305.6	0.00	-27.9%
Ambulance services	2,269.8	2,171.5	2,295.0	2,225.9	**-29.2**	-595.5	537.1	0.93	-1.3%
Inpatient 30-day readmissions	558.2	388.4	554.1	521.8	**-137.5**	-215.1	-59.9	0.00	-24.6%
Home health episodes	561.5	497.8	588.4	568.1	**-43.4**	-120.4	33.6	0.35	-7.7%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, p < 0.05 at the 95% level, and p< 0.01 at the 99% level.

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Exhibit G.46 Estimates of MCCM Impacts on Utilization and Costs in the Last 180 Days of Life (Subgroup Analysis: Decedents without Cancer Diagnoses)

Outcome	Intervention Group		Comparison Group		Impacts – Last 180 Days of Life				
	Baseline Period (n = 264,566)	Performance Period (n = 238)	Baseline Period (n = 151,335)	Performance Period (n = 438,104)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$50,085	$45,804	$47,962	$49,503	**-$5,822**	-$10,133	-$1,510	0.03	-11.6%
Inpatient expenditures	$27,350	$16,304	$26,366	$26,604	**-$11,283**	-$14,455	-$8,112	0.00	-41.3%
Skilled nursing facility expenditures	$6,050	$4,179	$5,576	$5,627	**-$1,923**	-$2,855	-$991	0.00	-31.8%
Home health expenditures	$2,414	$2,409	$2,414	$2,399	**$10**	-$334	$354	0.96	0.4%
Hospice expenditures[a]	$3,396	$10,321	$3,172	$3,829	**$6,268**	$5,084	$7,451	0.00	184.6%
Durable medical equipment expenditures	$780	$1,400	$692	$608	**$703**	$253	$1,153	0.01	90.2%
Outpatient expenditures	$3,198	$4,729	$2,955	$3,416	**$1,070**	-$32	$2,172	0.11	33.5%
Physician/supplier Part B expenditures	$6,898	$6,462	$6,789	$7,019	**-$666**	-$1,746	$413	0.31	-9.7%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	2,123.6	1,394.2	2,133.0	2,020.1	**-616.5**	-764.8	-468.2	0.00	-29.0%
Intensive care unit admissions	481.3	169.8	499.9	473.3	**-284.8**	-335.4	-234.3	0.00	-59.2%
Emergency department visits	2,720.1	2,106.7	2,717.9	2,671.7	**-567.2**	-749.0	-385.5	0.00	-20.9%
Observational stays	311.4	321.1	357.2	398.2	**-31.3**	-89.4	26.7	0.38	-10.1%
Office/outpatient visits	37,600.0	28,836.8	36,128.8	37,686.2	**-10,320.6**	-13,221.3	-7,419.8	0.00	-27.4%
Ambulance services	3,365.8	3,547.4	3,472.7	3,346.4	**307.9**	-1,232.9	1,848.6	0.74	9.1%
Inpatient 30-day readmissions	754.9	460.1	755.2	716.8	**-256.4**	-346.0	-166.7	0.00	-34.0%
Home health episodes	930.9	869.3	960.2	925.2	**-26.5**	-145.7	92.7	0.72	-2.8%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.47 Estimates of MCCM Impacts on Transitions to Hospice (Subgroup Analysis: Decedents without Cancer Diagnoses)

Outcome	Intervention Group		Comparison Group		Impacts – Last 365 Days of Life				
	Baseline Period	Performance Period	Baseline Period	Performance Period	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Full sample	**(n = 715,696)**	**(n = 875)**	**(n = 408,904)**	**(n = 1,177,993)**					
Transition to hospice	46.3%	75.9%	45.1%	49.2%	**25.5%**	23.3%	27.7%	0.00	55.0%
Likelihood of length of stay in MHB of one or two days	7.9%	8.7%	7.6%	7.7%	**0.6%**	-1.1%	2.4%	0.55	8.0%
MHB sample	**(n = 301,571)**	**(n = 677)**	**(n = 165,982)**	**(n = 514,940)**					
Number of days from MHB enrollment to death	30.5	42.6	29.0	30.8	**10.3**	7.3	13.4	0.00	33.9%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on transitions to MHB. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes equal the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.48 Estimates of MCCM Impacts on Utilization and Costs in the Last Seven Days of Life (Subgroup Analysis: MCCM Decedents in Top Nine Enrolling MCCM Hospices)

Outcome	Intervention Group		Comparison Group		Impacts – Last 7 Days of Life				
	Baseline Period (n = 1,595,051)	Performance Period (n = 1,497)	Baseline Period (n = 875,121)	Performance Period (n = 2,033,919)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$11,289	$7,035	$10,995	$11,657	**-$4,915**	-$5,315	-$4,515	0.00	-43.5%
Inpatient expenditures	$7,554	$2,868	$7,465	$7,857	**-$5,077**	-$5,493	-$4,661	0.00	-67.2%
Skilled nursing facility expenditures	$539	$169	$518	$500	**-$352**	-$412	-$292	0.00	-65.2%
Home health expenditures	$270	$273	$272	$266	**$10**	-$38	$57	0.74	3.5%
Hospice expenditures[a]	$1,896	$3,091	$1,721	$1,956	**$959**	$729	$1,190	0.00	50.6%
Durable medical equipment expenditures	$25	$30	$26	$22	**$9**	-$2	$20	0.18	36.5%
Outpatient expenditures	$180	$194	$184	$211	**-$12**	-$53	$28	0.62	-6.8%
Physician/supplier Part B expenditures	$825	$410	$808	$846	**-$452**	-$489	-$415	0.00	-54.8%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	449.9	226.7	454.7	452.9	**-221.3**	-236.6	-206.0	0.00	-49.2%
Intensive care unit admissions	164.2	56.9	171.2	171.6	**-107.7**	-117.4	-98.0	0.00	-65.6%
Emergency department visits	439.7	254.8	441.0	450.4	**-194.4**	-217.0	-171.7	0.00	-44.2%
Observational stays	36.0	28.3	35.7	44.1	**-16.1**	-27.6	-4.6	0.02	-44.7%
Office/outpatient visits	4,258.0	2,429.5	4,084.4	4,385.5	**-2,129.6**	-2,358.9	-1,900.2	0.00	-50.0%
Ambulance services	355.5	242.6	372.8	377.9	**-117.9**	-149.7	-86.2	0.00	-33.2%
Inpatient 30-day readmissions	177.1	82.1	173.4	183.5	**-105.1**	-117.4	-92.8	0.00	-59.3%
Home health episodes	124.0	120.0	131.6	131.2	**-3.7**	-22.9	15.6	0.75	-3.0%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.49 Estimates of MCCM Impacts on Utilization and Costs in the Last 30 Days of Life (Subgroup Analysis: MCCM Decedents in Top 9 Enrolling MCCM Hospices)

Outcome	Intervention Group		Comparison Group		Impacts – Last 30 Days of Life				
	Baseline Period (n = 1,568,440)	Performance Period (n = 1,165)	Baseline Period (n = 860,398)	Performance Period (n = 2,006,137)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$20,400	$13,455	$20,004	$21,683	**-$8,624**	-$9,170	-$8,078	0.00	-42.3%
Inpatient expenditures	$12,134	$4,887	$12,131	$13,137	**-$8,254**	-$8,818	-$7,690	0.00	-68.0%
Skilled nursing facility expenditures	$1,560	$649	$1,494	$1,519	**-$936**	-$1,127	-$744	0.00	-60.0%
Home health expenditures	$723	$690	$707	$707	**-$33**	-$156	$91	0.66	-4.5%
Hospice expenditures[a]	$2,508	$4,892	$2,264	$2,555	**$2,093**	$1,704	$2,482	0.00	83.4%
Durable medical equipment expenditures	$95	$132	$98	$80	**$54**	$23	$86	0.00	57.1%
Outpatient expenditures	$891	$866	$899	$1,083	**-$208**	-$320	-$96	0.00	-23.4%
Physician/supplier Part B expenditures	$2,489	$1,339	$2,413	$2,603	**-$1,340**	-$1,487	-$1,193	0.00	-53.9%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	822.4	416.1	837.1	855.2	**-424.4**	-462.1	-386.7	0.00	-51.6%
Intensive care unit admissions	218.9	73.9	230.3	233.3	**-148.0**	-163.6	-132.4	0.00	-67.6%
Emergency department visits	875.6	537.1	892.0	935.7	**-382.2**	-428.3	-336.1	0.00	-43.7%
Observational stays	94.7	80.7	96.9	122.9	**-40.1**	-53.1	-27.1	0.00	-42.3%
Office/outpatient visits	12,006.6	7,083.1	11,795.8	12,866.4	**-5,994.1**	-6,637.9	-5,350.2	0.00	-49.9%
Ambulance services	936.0	575.9	968.5	1,009.8	**-401.4**	-472.7	-330.0	0.00	-42.9%
Inpatient 30-day readmissions	321.6	152.4	321.6	345.1	**-192.6**	-221.8	-163.5	0.00	-59.9%
Home health episodes	314.0	277.7	318.8	318.9	**-36.4**	-76.9	4.2	0.14	-11.6%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.50 Estimates of MCCM Impacts on Utilization and Costs in the Last 60 Days of Life (Subgroup Analysis: MCCM Decedents in Top 9 Enrolling MCCM Hospices)

Outcome	Intervention Group		Comparison Group		Impacts – Last 60 Days of Life				
	Baseline Period (n = 1,261,809)	Performance Period (n = 834)	Baseline Period (n = 691,775)	Performance Period (n = 1,610,302)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$28,621	$20,373	$28,009	$30,835	**-$11,073**	-$12,129	-$10,018	0.00	-38.7%
Inpatient expenditures	$15,650	$6,959	$15,660	$17,233	**-$10,263**	-$11,205	-$9,321	0.00	-65.6%
Skilled nursing facility expenditures	$2,524	$1,221	$2,383	$2,518	**-$1,438**	-$1,690	-$1,186	0.00	-57.0%
Home health expenditures	$1,100	$890	$1,075	$1,119	**-$254**	-$387	-$121	0.00	-23.1%
Hospice expenditures[a]	$3,217	$6,598	$2,909	$3,235	**$3,055**	$2,470	$3,639	0.00	94.9%
Durable medical equipment expenditures	$200	$271	$192	$158	**$104**	$24	$185	0.03	52.1%
Outpatient expenditures	$1,859	$2,007	$1,860	$2,255	**-$247**	-$496	$2	0.10	-13.3%
Physician/supplier Part B expenditures	$4,070	$2,426	$3,931	$4,317	**-$2,031**	-$2,348	-$1,713	0.00	-49.9%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,120.3	611.6	1,141.9	1,170.9	**-537.7**	-612.7	-462.6	0.00	-48.0%
Intensive care unit admissions	258.5	94.2	271.5	277.6	**-170.4**	-194.0	-146.7	0.00	-65.9%
Emergency department visits	1,258.0	842.7	1,292.1	1,363.9	**-487.1**	-580.8	-393.5	0.00	-38.7%
Observational stays	146.0	143.3	157.6	197.8	**-42.8**	-66.8	-18.8	0.00	-29.3%
Office/outpatient visits	18,515.9	11,929.3	18,245.9	20,038.5	**-8,379.2**	-9,648.8	-7,109.6	0.00	-45.3%
Ambulance services	1,397.6	898.4	1,439.1	1,511.9	**-572.0**	-715.0	-429.1	0.00	-40.9%
Inpatient 30-day readmissions	422.9	214.1	419.7	450.8	**-239.8**	-287.2	-192.5	0.00	-56.7%
Home health episodes	449.8	366.4	459.7	471.1	**-94.8**	-148.8	-40.7	0.00	-21.1%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.51 Estimates of MCCM Impacts on Utilization and Costs in the Last 90 Days of Life (Subgroup Analysis: MCCM Decedents in Top 9 Enrolling MCCM Hospices)

Outcome	Intervention Group		Comparison Group		Impacts – Last 90 Days of Life				
	Baseline Period (n = 927,090)	Performance Period (n = 621)	Baseline Period (n = 508,087)	Performance Period (n = 1,181,354)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$34,721	$26,758	$33,732	$37,467	**-$11,699**	-$13,571	-$9,827	0.00	-33.7%
Inpatient expenditures	$18,055	$8,834	$17,913	$20,029	**-$11,337**	-$12,756	-$9,918	0.00	-62.8%
Skilled nursing facility expenditures	$3,187	$1,705	$2,981	$3,195	**-$1,696**	-$2,113	-$1,279	0.00	-53.2%
Home health expenditures	$1,347	$1,200	$1,331	$1,420	**-$235**	-$465	-$4	0.09	-17.4%
Hospice expenditures[a]	$3,802	$8,034	$3,484	$3,759	**$3,957**	$3,190	$4,724	0.00	104.1%
Durable medical equipment expenditures	$303	$450	$270	$230	**$187**	$6	$369	0.09	61.9%
Outpatient expenditures	$2,694	$2,965	$2,679	$3,230	**-$279**	-$582	$24	0.13	-10.4%
Physician/supplier Part B expenditures	$5,335	$3,570	$5,072	$5,604	**-$2,297**	-$2,861	-$1,733	0.00	-43.1%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,331.0	786.0	1,353.5	1,400.4	**-591.9**	-708.7	-475.2	0.00	-44.5%
Intensive care unit admissions	287.2	107.4	302.6	313.4	**-190.6**	-216.3	-164.9	0.00	-66.4%
Emergency department visits	1,551.0	1,139.4	1,586.0	1,696.4	**-522.1**	-657.5	-386.6	0.00	-33.7%
Observational stays	186.6	198.0	201.9	253.4	**-40.0**	-64.2	-15.9	0.01	-21.5%
Office/outpatient visits	23,188.5	16,263.9	22,786.6	25,165.4	**-9,303.5**	-11,279.4	-7,327.6	0.00	-40.1%
Ambulance services	1,777.5	1,223.1	1,795.9	1,891.3	**-649.8**	-891.3	-408.3	0.00	-36.6%
Inpatient 30-day readmissions	478.3	261.3	476.6	518.6	**-259.1**	-328.6	-189.6	0.00	-54.2%
Home health episodes	537.2	474.4	555.4	578.3	**-85.6**	-176.7	5.4	0.12	-15.9%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.52 Estimates of MCCM Impacts on Utilization and Costs in the Last 180 Days of Life (Subgroup Analysis: MCCM Decedents in Top 9 Enrolling MCCM Hospices)

Outcome	Intervention Group		Comparison Group		Impacts – Last 180 Days of Life				
	Baseline Period (n = 597,141)	Performance Period (n = 247)	Baseline Period (n = 326,921)	Performance Period (n = 756,673)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$49,973	$42,870	$48,324	$53,153	**-$11,932**	-$14,004	-$9,861	0.00	-23.9%
Inpatient expenditures	$23,513	$11,929	$23,227	$25,588	**-$13,944**	-$15,249	-$12,638	0.00	-59.3%
Skilled nursing facility expenditures	$4,796	$3,099	$4,449	$4,741	**-$1,989**	-$2,875	-$1,103	0.00	-41.5%
Home health expenditures	$2,224	$2,027	$2,208	$2,385	**-$373**	-$735	-$11	0.09	-16.8%
Hospice expenditures[a]	$4,503	$11,241	$4,185	$4,476	**$6,447**	$5,346	$7,548	0.00	143.2%
Durable medical equipment expenditures	$617	$1,092	$551	$480	**$546**	$210	$883	0.01	88.6%
Outpatient expenditures	$5,358	$6,587	$5,280	$6,366	**$143**	-$1,549	$1,836	0.89	2.7%
Physician/supplier Part B expenditures	$8,962	$6,895	$8,422	$9,118	**-$2,764**	-$3,676	-$1,851	0.00	-30.8%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,838.2	1,083.3	1,852.6	1,905.4	**-807.6**	-969.3	-646.0	0.00	-43.9%
Intensive care unit admissions	352.7	103.4	373.7	381.8	**-257.4**	-283.4	-231.4	0.00	-73.0%
Emergency department visits	2,303.0	1,689.6	2,317.5	2,490.6	**-786.6**	-984.7	-588.4	0.00	-34.2%
Observational stays	295.4	286.2	316.3	385.9	**-78.9**	-118.0	-39.8	0.00	-26.7%
Office/outpatient visits	35,356.2	25,982.3	34,530.4	37,549.0	**-12,392.5**	-15,761.1	-9,023.8	0.00	-35.1%
Ambulance services	2,555.2	1,742.0	2,602.8	2,753.8	**-964.3**	-1,346.0	-582.5	0.00	-37.7%
Inpatient 30-day readmissions	615.6	309.3	614.9	653.8	**-345.1**	-417.5	-272.8	0.00	-56.1%
Home health episodes	844.7	778.9	865.8	909.3	**-109.3**	-245.8	27.2	0.19	-12.9%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.53 Estimates of MCCM Impacts on Transitions to Hospice (Subgroup Analysis: MCCM Decedents in Top Nine Enrolling MCCM Hospices)

Outcome	Intervention Group		Comparison Group		Impacts – Last 365 Days of Life				
	Baseline Period	Performance Period	Baseline Period	Performance Period	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Full sample	**(n = 1,595,051)**	**(n = 1,540)**	**(n = 875,121)**	**(n = 2,033,919)**					
Transition to hospice	63.4%	85.6%	61.2%	62.8%	**20.7%**	18.6%	22.7%	0.00	32.6%
Likelihood of length of stay in MHB of one or two days	7.5%	8.9%	7.5%	7.9%	**1.0%**	-0.5%	2.5%	0.28	13.4%
MHB sample	**(n = 834,711)**	**(n = 1,329)**	**(n = 443,561)**	**(n = 1,040,306)**					
Number of days from MHB enrollment to death	25.9	32.8	25.6	25.5	**7.0**	5.3	8.7	0.00	27.0%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on transitions to MHB. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes equal the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.54 Estimates of MCCM Impacts on Utilization and Costs in the Last Seven Days of Life (Subgroup Analysis: MCCM Decedents Not in Top Nine Enrolling MCCM Hospices)

Outcome	Intervention Group		Comparison Group		Impacts – Last 7 Days of Life				
	Baseline Period (n = 1,595,051)	Performance Period (n = 1,185)	Baseline Period (n = 875,121)	Performance Period (n = 2,033,919)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$11,076	$7,493	$10,689	$11,318	**-$4,212**	-$4,817	-$3,607	0.00	-38.0%
Inpatient expenditures	$7,527	$3,621	$7,329	$7,643	**-$4,220**	-$4,821	-$3,619	0.00	-56.1%
Skilled nursing facility expenditures	$574	$263	$497	$500	**-$314**	-$403	-$224	0.00	-54.7%
Home health expenditures	$248	$297	$258	$255	**$52**	$0	$105	0.10	21.2%
Hospice expenditures[a]	$1,679	$2,609	$1,605	$1,852	**$683**	$512	$853	0.00	40.7%
Durable medical equipment expenditures	$31	$50	$27	$22	**$25**	$7	$43	0.03	79.6%
Outpatient expenditures	$209	$206	$200	$237	**-$39**	-$82	$4	0.13	-18.8%
Physician/supplier Part B expenditures	$809	$446	$773	$810	**-$399**	-$451	-$347	0.00	-49.3%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	451.7	251.9	453.0	448.4	**-195.2**	-217.5	-173.0	0.00	-43.2%
Intensive care unit admissions	166.6	78.0	169.1	171.6	**-91.2**	-104.9	-77.4	0.00	-54.7%
Emergency department visits	442.7	272.7	440.8	447.9	**-177.1**	-199.0	-155.2	0.00	-40.0%
Observational stays	35.3	29.9	38.1	43.5	**-10.8**	-19.3	-2.2	0.04	-30.6%
Office/outpatient visits	4,103.3	2,455.8	3,864.4	4,117.5	**-1,900.7**	-2,142.3	-1,659.0	0.00	-46.3%
Ambulance services	358.6	283.3	379.7	379.9	**-75.5**	-109.3	-41.7	0.00	-21.0%
Inpatient 30-day readmissions	183.7	107.6	177.7	183.2	**-81.6**	-97.8	-65.5	0.00	-44.4%
Home health episodes	121.4	127.8	130.8	130.9	**6.3**	-10.9	23.5	0.55	5.2%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.55 Estimates of MCCM Impacts on Utilization and Costs in the Last 30 Days of Life (Subgroup Analysis: MCCM Decedents Not in Top 9 Enrolling MCCM Hospices)

Outcome	Intervention Group		Comparison Group		Impacts – Last 30 Days of Life				
	Baseline Period (n = 1,568,440)	Performance Period (n = 955)	Baseline Period (n = 860,398)	Performance Period (n = 2,006,137)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$19,996	$14,203	$19,191	$20,734	**-$7,337**	-$8,311	-$6,362	0.00	-36.7%
Inpatient expenditures	$12,098	$5,802	$11,731	$12,575	**-$7,141**	-$7,995	-$6,286	0.00	-59.0%
Skilled nursing facility expenditures	$1,550	$880	$1,369	$1,408	**-$710**	-$914	-$506	0.00	-45.8%
Home health expenditures	$667	$673	$639	$646	**-$2**	-$73	$69	0.96	-0.3%
Hospice expenditures[a]	$2,251	$4,156	$2,163	$2,475	**$1,594**	$1,301	$1,887	0.00	70.8%
Durable medical equipment expenditures	$112	$176	$105	$88	**$81**	$18	$144	0.03	72.1%
Outpatient expenditures	$956	$1,082	$923	$1,119	**-$70**	-$217	$77	0.43	-7.3%
Physician/supplier Part B expenditures	$2,361	$1,435	$2,260	$2,423	**-$1,089**	-$1,222	-$956	0.00	-46.1%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	829.5	448.2	827.9	836.4	**-389.8**	-432.7	-346.9	0.00	-47.0%
Intensive care unit admissions	225.7	111.1	229.6	233.3	**-118.3**	-134.8	-101.8	0.00	-52.4%
Emergency department visits	895.4	586.4	894.9	928.9	**-343.0**	-388.5	-297.6	0.00	-38.3%
Observational stays	92.4	85.9	97.4	117.8	**-26.9**	-46.2	-7.7	0.02	-29.1%
Office/outpatient visits	11,485.5	7,469.0	10,945.0	11,822.5	**-4,894.0**	-5,497.7	-4,290.3	0.00	-42.6%
Ambulance services	944.5	736.8	953.3	982.3	**-236.6**	-362.4	-110.9	0.00	-25.1%
Inpatient 30-day readmissions	330.7	173.1	326.6	344.5	**-175.4**	-201.9	-148.9	0.00	-53.0%
Home health episodes	300.3	263.9	303.7	306.3	**-39.0**	-63.5	-14.5	0.01	-13.0%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.56 Estimates of MCCM Impacts on Utilization and Costs in the Last 60 Days of Life (Subgroup Analysis: MCCM Decedents Not in Top 9 Enrolling MCCM Hospices)

Outcome	Intervention Group		Comparison Group		Impacts – Last 60 Days of Life				
	Baseline Period (n = 1,261,809)	Performance Period (n = 697)	Baseline Period (n = 691,775)	Performance Period (n = 1,610,302)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$27,988	$21,929	$27,047	$29,532	**-$8,544**	-$10,236	-$6,853	0.00	-30.5%
Inpatient expenditures	$15,671	$8,491	$15,318	$16,618	**-$8,480**	-$9,848	-$7,112	0.00	-54.1%
Skilled nursing facility expenditures	$2,401	$1,427	$2,189	$2,256	**-$1,041**	-$1,302	-$780	0.00	-43.4%
Home health expenditures	$1,003	$896	$956	$988	**-$140**	-$258	-$22	0.05	-13.9%
Hospice expenditures[a]	$2,911	$5,821	$2,765	$3,130	**$2,544**	$2,083	$3,005	0.00	87.4%
Durable medical equipment expenditures	$238	$376	$215	$183	**$169**	$9	$329	0.08	71.0%
Outpatient expenditures	$1,979	$2,165	$1,914	$2,357	**-$256**	-$592	$81	0.21	-12.9%
Physician/supplier Part B expenditures	$3,785	$2,752	$3,691	$3,999	**-$1,341**	-$1,727	-$955	0.00	-35.4%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,130.3	662.4	1,138.2	1,150.9	**-480.6**	-551.7	-409.5	0.00	-42.5%
Intensive care unit admissions	272.5	147.6	276.2	281.8	**-130.6**	-164.2	-96.9	0.00	-47.9%
Emergency department visits	1,287.6	929.5	1,301.7	1,367.4	**-423.8**	-496.2	-351.4	0.00	-32.9%
Observational stays	145.5	151.2	157.3	187.9	**-24.9**	-52.7	2.9	0.14	-17.1%
Office/outpatient visits	17,658.5	12,247.1	16,994.1	18,429.3	**-6,846.6**	-8,022.8	-5,670.4	0.00	-38.8%
Ambulance services	1,370.5	1,164.8	1,407.2	1,463.8	**-262.2**	-532.5	8.0	0.11	-19.1%
Inpatient 30-day readmissions	431.9	237.6	428.1	448.5	**-214.7**	-253.9	-175.5	0.00	-49.7%
Home health episodes	429.3	351.8	432.3	437.4	**-82.5**	-126.1	-39.0	0.00	-19.2%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.57 Estimates of MCCM Impacts on Utilization and Costs in the Last 90 Days of Life (Subgroup Analysis: MCCM Decedents Not in Top 9 Enrolling MCCM Hospices)

Outcome	Intervention Group		Comparison Group		Impacts – Last 90 Days of Life				
	Baseline Period (n = 927,090)	Performance Period (n = 535)	Baseline Period (n = 508,087)	Performance Period (n = 1,181,354)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$33,899	$29,052	$32,661	$35,751	**-$7,937**	-$9,993	-$5,881	0.00	-23.4%
Inpatient expenditures	$17,922	$10,575	$17,486	$18,946	**-$8,807**	-$10,468	-$7,146	0.00	-49.1%
Skilled nursing facility expenditures	$3,018	$2,121	$2,750	$2,897	**-$1,044**	-$1,372	-$716	0.00	-34.6%
Home health expenditures	$1,227	$1,218	$1,217	$1,281	**-$73**	-$281	$134	0.56	-6.0%
Hospice expenditures[a]	$3,473	$7,421	$3,266	$3,652	**$3,563**	$2,766	$4,359	0.00	102.6%
Durable medical equipment expenditures	$333	$501	$316	$284	**$200**	$4	$397	0.09	60.1%
Outpatient expenditures	$2,958	$3,379	$2,812	$3,459	**-$226**	-$702	$251	0.44	-7.6%
Physician/supplier Part B expenditures	$4,968	$3,838	$4,814	$5,233	**-$1,550**	-$2,014	-$1,085	0.00	-31.2%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,344.7	861.9	1,354.2	1,370.9	**-499.4**	-600.5	-398.3	0.00	-37.1%
Intensive care unit admissions	301.7	174.4	304.4	313.1	**-136.0**	-183.0	-89.0	0.00	-45.1%
Emergency department visits	1,603.8	1,265.7	1,614.6	1,698.3	**-421.9**	-543.8	-300.0	0.00	-26.3%
Observational stays	193.4	183.8	202.5	242.4	**-49.4**	-92.8	-6.1	0.06	-25.6%
Office/outpatient visits	22,190.7	17,135.6	21,385.8	23,138.4	**-6,807.7**	-8,512.5	-5,102.8	0.00	-30.7%
Ambulance services	1,719.9	1,695.5	1,772.6	1,855.5	**-107.2**	-635.1	420.7	0.74	-6.2%
Inpatient 30-day readmissions	493.1	308.3	496.9	518.8	**-206.6**	-259.8	-153.4	0.00	-41.9%
Home health episodes	514.8	461.0	533.3	546.5	**-67.0**	-140.1	6.0	0.13	-13.0%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, p < 0.05 at the 95% level, and p< 0.01 at the 99% level.

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Exhibit G.58 Estimates of MCCM Impacts on Utilization and Costs in the Last 180 Days of Life (Subgroup Analysis: MCCM Decedents Not in Top 9 Enrolling MCCM Hospices)

Outcome	Intervention Group		Comparison Group		Impacts – Last 180 Days of Life				
	Baseline Period (n = 597,141)	Performance Period (n = 255)	Baseline Period (n = 326,921)	Performance Period (n = 756,673)	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Total Medicare expenditures	$49,456	$50,433	$48,202	$53,068	**-$3,890**	-$9,165	$1,385	0.23	-7.9%
Inpatient expenditures	$23,856	$16,969	$23,391	$25,480	**-$8,976**	-$12,711	-$5,242	0.00	-37.6%
Skilled nursing facility expenditures	$4,331	$4,349	$4,053	$4,327	**-$256**	-$920	$409	0.53	-5.9%
Home health expenditures	$2,004	$2,183	$1,971	$2,116	**$34**	-$401	$470	0.90	1.7%
Hospice expenditures[a]	$4,083	$10,113	$3,943	$4,410	**$5,563**	$3,878	$7,248	0.00	136.2%
Durable medical equipment expenditures	$605	$882	$676	$648	**$305**	-$158	$767	0.28	50.4%
Outpatient expenditures	$6,149	$7,489	$5,923	$7,139	**$123**	-$1,287	$1,534	0.89	2.0%
Physician/supplier Part B expenditures	$8,429	$8,449	$8,245	$8,948	**-$683**	-$2,181	$815	0.45	-8.1%
Utilization per 1,000 MCCM decedents									
Inpatient admissions	1,871.1	1,363.2	1,882.8	1,916.3	**-541.4**	-726.8	-356.1	0.00	-28.9%
Intensive care unit admissions	377.2	218.0	386.5	396.1	**-168.8**	-234.2	-103.5	0.00	-44.8%
Emergency department visits	2,394.8	2,023.9	2,399.8	2,550.1	**-521.1**	-787.2	-255.0	0.00	-21.8%
Observational stays	310.4	318.3	325.7	381.5	**-47.9**	-126.8	31.0	0.32	-15.4%
Office/outpatient visits	34,599.3	29,685.7	33,536.0	36,099.2	**-7,476.9**	-10,492.9	-4,461.0	0.00	-21.6%
Ambulance services	2,447.8	2,913.0	2,587.1	2,691.7	**360.6**	-886.3	1,607.5	0.63	14.7%
Inpatient 30-day readmissions	634.7	435.7	645.9	682.6	**-235.8**	-329.7	-141.9	0.00	-37.1%
Home health episodes	791.8	811.3	818.6	847.7	**-9.6**	-135.1	115.8	0.90	-1.2%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file, Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on Medicare expenditures (total and 7 subcategories) and the utilization of Medicare-covered services per 1,000 decedents at the end of life. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes are equal to the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. Expenditure estimates do not include MCCM per-beneficiary, per-month payments. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

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Exhibit G.59 Difference-in-Differences Estimates of the Impact of MCCM on Transitions to Hospice in Last 365 Days of Life (Subgroup Analysis: MCCM Decedents Not in Top 9 Enrolling MCCM Hospices)

Outcome	Intervention Group		Comparison Group		Impacts – Last 365 Days of Life				
	Baseline Period	Performance Period	Baseline Period	Performance Period	Impact	90% Confidence Interval Lower Bound	90% Confidence Interval Upper Bound	P-value	Percent Change
Full sample	**(n = 1,595,051)**	**(n = 1,225)**	**(n = 875,121)**	**(n = 2,033,919)**					
Transition to hospice	60.0%	81.1%	59.3%	61.0%	**19.4%**	17.0%	21.8%	0.00	32.4%
Likelihood of length of stay in MHB of one or two days	7.1%	7.4%	6.9%	7.4%	**-0.3%**	-1.7%	1.2%	0.75	-4.0%
MHB sample	**(n = 834,711)**	**(n = 996)**	**(n = 443,561)**	**(n = 1,040,306)**					
Number of days from MHB enrollment to death	27.4	35.3	26.8	27.5	**7.1**	3.6	10.7	0.00	26.1%

Sources: Medicare Enrollment Database and Master Beneficiary Summary file and Medicare claims data, January 1, 2012-September 30, 2019.

Notes: This exhibit shows difference-in-differences impact estimates of MCCM on transitions to MHB. A detailed description of the methodological approach can be found in **Appendix F**. Percent changes equal the difference-in-differences estimate divided by the adjusted mean for similar Medicare decedents who resided in MCCM markets during the baseline period (January 1, 2014-December 31, 2015). **Exhibit D.8** describes the outcome measure specifications. P values < 0.1 denote statistical significance at the 90% level, $p < 0.05$ at the 95% level, and $p < 0.01$ at the 99% level.

MHB = Medicare hospice benefit.

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Appendix H. Caregiver Experience and Care Survey Methodology

This appendix discusses the Caregiver Experience of Care Survey (referred to as the caregiver survey) used to assess beneficiary and family experiences with the Medicare Care Choices Model (MCCM) and comparable beneficiaries who received traditional hospice care without the model. It describes caregiver survey content, survey sampling, analytic methods, and characteristics of survey respondents.

H.1 SURVEY ELIGIBILITY AND SAMPLING

The caregiver survey was administered to the following four groups of caregivers: All caregivers of MCCM enrollees who met the survey eligibility criteria, including MCCM enrollees who elected the Medicare hospice benefit (MHB; Group 1); enrollees who did not elect MHB and died while still receiving MCCM services (Group 2); and comparison Medicare beneficiaries who met MCCM-eligibility criteria and were receiving care from MCCM hospices (Group 3) or from comparison hospices (Group 4), as described in **Exhibit H.1**.

We recruited a subset of 33 comparison hospices from among the 236 propensity score matched comparison hospices to ensure we had a sufficient number of completed surveys to support statistically precise comparisons; additional information regarding identification of these comparison hospices is available in **Annual Report 2, Appendix I**.

We sampled one comparison beneficiary in each of the two comparison groups (Groups 3 and 4) for every MCCM enrollee sampled.[77]

[77] For a comparison of beneficiary characteristics between the groups, please see **Exhibit H.7**; and for a description of the statistical power to detect differences between the groups, see **Section H.5**.

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Exhibit H.1 Caregiver Survey Data Collection Approach, by Decedent/Caregiver Group

Group	Decedent/Caregiver Group	Sample Size	Enrolled in MCCM	Enrolled in MHB	Hospice Type	Survey Version
1	Caregivers of MCCM enrollees who elected MHB	All cases	Yes	Yes	MCCM hospice	MCCM + MHB: CAHPS® Hospice Survey (47 items) + 15 supplemental MCCM items
2	Caregivers of MCCM enrollees who did not elect MHB (i.e., who died while still receiving MCCM services)	All cases	Yes	No	MCCM hospice	MCCM only: Modified CAHPS® Hospice Survey (42 items) + 16 supplemental MCCM items
3	Caregivers of hospice decedents who met MCCM-eligibility criteria and received care from MCCM hospices, but who were not enrolled in MCCM	Equal to the number of MCCM cases (MCCM + MHB and MCCM-only)	No	Yes	MCCM hospice	MHB comparisons from MCCM hospices and non-MCCM hospices: CAHPS® Hospice Survey (47 items) + 13 supplemental MCCM items
4	Caregivers of hospice decedents who met MCCM-eligibility criteria and received care from matched comparison hospices	Equal to the number of MCCM cases (MCCM + MHB and MCCM-only)	No	Yes	Propensity score matched comparison hospice	

Note: The caregiver survey versions administered to the 3 groups of caregivers of deceased beneficiaries who received hospice care (Groups 1, 3, and 4) include all 47 items from the CAHPS® Hospice Survey. The modified CAHPS® Hospice Survey administered to Group 2 excludes five items from the CAHPS® Hospice Survey that are not relevant to MCCM enrollees who did not elect MHB. The number of MCCM items also differs across versions. The MCCM + MHB version of the caregiver survey includes all MCCM items from the domains of interest. The MCCM-only version of the caregiver survey includes one additional screener item meant to ascertain whether the deceased beneficiary or caregiver had ever had a conversation with anyone from the "special program" about enrolling in full hospice care. Caregiver surveys administered to the two comparison groups (Groups 3 and 4) do not include the overall rating and willingness-to-recommend questions specific to the "special program."

CAHPS® = Consumer Assessment of Healthcare Providers and Systems, MHB = Medicare hospice benefit.

Eligibility. To maintain consistency with the CAHPS® Hospice Survey national implementation effort and minimize disruption and potential error, deceased beneficiaries and caregivers were eligible for inclusion in the caregiver survey sample, using the same criteria as those for the ongoing national CAHPS® Hospice Survey, with one exception[78]:

- Deceased beneficiary was age 18 or over

[78] Caregivers who requested that they not be contacted (those who signed "no publicity" requests while in hospice care, or otherwise requested not to be contacted) were excluded.

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- Deceased beneficiary had a caregiver on record
- Deceased beneficiary's caregiver had a home address in the United States or a United States territory
- Deceased beneficiary had a caregiver other than a non-familial legal guardian.

Caregiver surveys were not sent to beneficiaries who were discharged from a hospice while alive, because this population would require a separate survey instrument and administrative procedures.[79] Caregivers were not eligible for the CAHPS® Hospice Survey if the beneficiary died within 48 hours of admission to hospice care because of these caregivers' limited experience with hospice care. This restriction was not applied for the caregiver survey because most MCCM participants who elected MHB had more than 48 hours of experience with the model.

Sampling. We used Medicare claims data to identify potential comparison beneficiaries who met MCCM-eligibility criteria at the time of their first hospice enrollment, as hospice enrollment represents a time in the beneficiary's disease trajectory when he or she could have been referred to the model (i.e., when a provider determined that he or she had a prognosis of six months or less to live). Specifically, we used claims data to verify the following MCCM-eligibility criteria, described in **Section 1.1** in the main report.

We identified MCCM-eligible diagnoses for comparison beneficiaries from the following data sources in the following order[80]: Primary diagnosis provided by the hospice in its sample file, primary diagnosis on claims, and secondary diagnosis on claims. A beneficiary was considered to have an MCCM-eligible diagnosis based on a secondary diagnosis *unless the non-MCCM-eligible primary diagnosis implied a different disease trajectory and expected cause of death*. A list of primary diagnoses with this implication was developed by the team's clinical advisor and includes end-stage renal disease and chronic kidney disease; progressive neurogenerative diseases such as Parkinson's, Alzheimer's, and non-Alzheimer's dementia; stroke; Merkel cell carcinoma; and cirrhosis of the liver.

Note that since all beneficiaries considered as possible comparisons for the caregiver survey were enrolled in MHB, they automatically satisfied two additional MCCM-eligibility

[79] Beneficiaries discharged alive from hospices were excluded from the CAHPS® Hospice Survey sample (and therefore, the caregiver survey) because the survey content and administration procedures are designed for bereaved caregivers and family members.

[80] Assigning MCCM-eligible diagnoses for comparison beneficiaries for the caregiver survey is a different process than the process used to identify MCCM-qualifying diagnoses for comparison decedents to estimate the impacts of the model, as described in **Section F.2**.

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requirements: A six-month prognosis or less and residence within the hospice's service area.

For sampling October 2017 through February 2019 beneficiaries, we selected comparisons for both comparison groups (Groups 3 and 4) using simple random sampling. Beginning with the March 2019 beneficiaries, we updated this approach for Group 4 comparison beneficiaries (i.e., comparison beneficiaries from comparison hospices) to increase their similarity to MCCM beneficiaries.[81] To accomplish this, we sampled beneficiaries based on predicted values from a logistic regression model that predicts MCCM enrollment. This logistic regression model is conceptually similar to a propensity score model, but instead of using the propensity score to adjust for differences after data collection, it is used to prospectively sample comparison beneficiaries it deems to be more likely to enroll in MCCM (i.e., more similar to MCCM beneficiaries).

The logistic regression model was refit before each month of sampling using all available months of data for MCCM-eligible potential comparison beneficiaries in comparison hospices and MCCM enrollees who elected MHB. It included the following beneficiary characteristics provided by hospices for each beneficiary in the possible sample: Decedent's age, decedent's length of final episode of hospice care, decedent's race/ethnicity, decedent's gender, decedent's final setting of care, decedent's diagnosis, and caregiver's relationship to the decedent. Comparison beneficiaries were sampled based on the predicted value from the logistic regression model. The exact probability of being selected depended on the number of comparison beneficiaries that needed to be sampled for the given month, the number of comparison beneficiaries available to be sampled for the given month, and the predicted probabilities from the model.

Additional information regarding the handling of sample files, as well as the timing and mode of survey administration, is available in **Annual Report 2, Appendix I, Section I.2.**

H.2 SURVEY CONTENT

The caregiver survey contains two sets of questions: (1) items from CAHPS®, and (2) supplemental items we developed specifically for the MCCM evaluation.

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[81] We continued to use simple random sampling to select comparison beneficiaries from within MCCM hospices (Group 3) because the comparisons are selected from the same MCCM hospice as sampled MCCM + MHB beneficiaries. Other sampling approaches are not feasible for this group because the pool of potential comparison beneficiaries within a given hospice is generally similar to the number of MCCM enrollees in that hospice. Therefore, to sample within MCCM hospice comparisons, we often needed to sample all comparison beneficiaries meeting MCCM-eligibility criteria from MCCM hospices. Since this is already a near census of this group for many hospices, altering the sampling approach will not yield meaningful advantages.

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The CAHPS® Hospice Survey measures key processes that together comprise high-quality hospice care, for which the primary informal caregiver (i.e., family member or close friend) of the hospice enrollee is the best or only source of information. The CAHPS® Hospice Survey is grounded in a conceptual model developed from a review of existing surveys,[82] a previous review of guidelines for quality end-of-life care,[83] National Quality Forum Preferred Practices in Palliative Care, and the work of the National Consensus Project for Quality Palliative Care.[84] The eight CAHPS® Hospice Survey measures, shown in the left panel of **Exhibit H.2**, are endorsed by National Quality Forum #2651. Supplemental items for the caregiver survey were developed and tested to span several care domains prioritized by the Centers for Medicare & Medicaid Services, as shown in the right panel of **Exhibit H.2**.

Exhibit H.2 Caregiver Experience of Care Survey Content

Consumer Assessment of Healthcare Provider and System Hospice Survey Measures	Additional Caregiver Survey Domains
• Composite measures – Communication with family – Getting timely help – Treating enrollee with respect – Emotional and spiritual support – Help for pain and symptoms – Training family to care for enrollee • Global rating measures, assessed with single survey items – Overall rating of the hospice – Willingness to recommend the hospice	• Shared decision making regarding enrollment in the Medicare hospice benefit, including involvement in decision, timing of referral to hospice care, and reasons for enrolling or not enrolling in hospice care • Consistency of care with beneficiary preferences, including continued access to services for the qualifying diagnosis before hospice enrollment • Care coordination, including coordination between curative and MCCM care teams, assessed with a single survey item • Quality of life, assessed with a single survey item • Global rating measures, assessed with single survey items – Overall rating of MCCM – Willingness to recommend MCCM •

Three different caregiver survey instrument versions were used, each appropriate for different populations of deceased beneficiaries whose caregivers were sampled for the survey, as described in **Section H.1**. Differences in survey items across the three survey

[82] Lendon, JP, Ahluwalia, SC, Walling, AM. (2015). Measuring experience with end-of-life care: A systematic literature review. *J Pain Symptom Manag*, *49,* 904-915.

[83] Teno, JM, Casey, VA, Welch, L, Edgman-Levitan, S. (2001). Patient-focused, family-centered end-of-life medical care: Views of the guidelines and bereaved family members. *Pain Symptom Manag – Special Section on Measuring Quality of Care at Life's End II*, *22,* 738-751.

[84] Clinical Practice Guidelines for Quality Palliative Care. (2013). *National Consensus Project for Quality Palliative Care 3rd edition*. Retrieved on July 24, 2019 from http://www.nationalconsensusproject.org/Guidelines_Download2.aspx.

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versions, as well as the comp lete survey instrument for MCCM enrollees who transitioned to MHB, appear in **Exhibits H.9** and **Section H.8**, respectively.

The survey instruments took approximately 20 minutes for caregivers to complete. Questions were predominantly closed-ended, with two open-ended questions that asked for (1) information about the decision to enroll in hospice care, and (2) examples of successes or problems with the care received. Additional information regarding the development of the survey content is available in **Annual Report 2, Appendix I**.

H.2.1 Composite Measure Development

Composite measures are summary measures that incorporate responses to two or more survey items that assess the same topical domain. Composite measures typically are better able to distinguish between groups, less prone to having overly high or low scores, and more strongly associated with overall ratings of care, than individual survey items. The caregiver survey contains composite measures previously developed and validated for the CAHPS® Hospice Survey, as shown in the left panel of **Exhibit H.2**; as well as new survey items to address domains of specific interest for assessing care experiences in MCCM, as shown in the right panel of **Exhibit H.2**. Two of these domains, Shared Decision Making Regarding Enrollment in MHB and Consistency of Care with Beneficiary Preferences, were assessed using eight new survey items that have not previously been combined and tested as composites. Therefore, we conducted analyses to determine which of these survey items could be grouped together into composite measures.

Results indicated that groupings of three and four survey items, respectively, are reliable and valid composite measures of Shared Decision Making Regarding Enrollment in MHB and Consistency of Care with Beneficiary Preferences across all groups of survey respondents. One survey item, regarding pressure to enroll in hospice, was not included in either composite, as it did not improve the reliability of the measures.

The eight survey items assessed for grouping into composites were:

1. MCCM or hospice team spoke to the patient/family about types of care/services wanted
2. MCCM or hospice team provided care that respected the patient's wishes
3. MCCM or hospice team provided care that went against the patient's wishes
4. Beneficiary continued to receive treatment for illness as long as he or she wanted
5. MCCM or hospice team talked to the patient/family about reasons for enrolling or not enrolling in hospice
6. MCCM or hospice team involved the patient/family as much as they would have wanted about the decision to enroll in hospice

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7. MCCM or hospice team allowed the patient/family to ask as many questions as they wanted about enrolling in full hospice care
8. Decision to enroll in hospice was made free of pressure from the MCCM or hospice team.

MCCM enrollees were asked about care from the MCCM team and MHB comparison beneficiaries were asked about care from the hospice team. The full text of each survey item is shown in **Exhibit H.9** at the end of this appendix.

When developing the survey items, the evaluation team hypothesized that survey items 1 through 4 would perform well together as a composite measure to assess the underlying domain of Consistency of Care with Beneficiary Preferences, and that survey items 5 through 8 would perform well together as a composite measure to assess the underlying domain of Shared Decision Making Regarding Enrollment in MHB. The team also hypothesized that survey items 7 and 8 might be related to Consistency of Care with Beneficiary Preferences, and therefore, might be a better fit for that composite.

To examine which of these survey items should be combined into composite measures that assess the two domains of interest, we analyzed survey response data reflecting care received by MCCM enrollees, and comparison MHB beneficiaries who died between October 2017 and September 2019. To determine whether the proposed measures functioned similarly across the four subgroups of caregiver survey respondents described in **Exhibit H.1**, we initially conducted analyses separately for each of these four subgroups. Because results were generally similar for the two comparison caregiver groups of beneficiaries enrolled in MHB (Groups 3 and 4), analyses described here are for MCCM + MHB enrollees (Group 1), MHB beneficiary comparison groups (Groups 3 and 4), and the MCCM-only group (Group 2).

For all possible combinations of items within the two hypothesized composite measures, we assessed psychometric properties of the proposed composites in three ways:

- **Confirmatory factor analysis.** We assessed proposed composite measures using a confirmatory factor analysis. The selection of the final item combinations for the two composite measures is based on model fit indices and the substantive interpretability of the domains. We examined the association between survey items and the domains they are intended to measure, addressing the degree to which the survey items are good indicators of the corresponding composite.
- **Internal consistency.** We calculated the internal consistency of proposed composite combinations by using Cronbach's alpha statistic, which is a zero-to-one index of the magnitude of internal consistency for composite measures, and increases with the number of items in a composite measure and their average correlation with each other. Higher values indicate more precise measurement of the domain underlying the measure.

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- **Construct validity.** Construct validity refers to the degree a composite measure assesses the intended domain (also referred to as a "construct"). We examined construct validity of proposed composites by assessing the degree to which the proposed composite is associated with respondents' overall rating of the model (among MCCM enrollees) or the hospice (among MHB comparison beneficiaries) by using Pearson's correlations that adjust for systematic differences in decedent and caregiver characteristics between the groups. These results aim to assess the degree to which the proposed composite measures are related to other aspects of care experience that one would expect them to relate to (i.e., overall assessments of care experience).

We discuss the findings of these analyses below.

H.2.1.1 Confirmatory Factor Analysis

The confirmatory factor analysis results suggested optimal combinations of survey items for the two composites, which are shown in **Exhibit H.3**, with Consistency of Care with Beneficiary Wishes composed of four items, and Shared Decision Making Regarding Enrollment in Hospice composed of three items.

Exhibit H.3 Caregiver Survey Items by Final Composite

Consistency of Care with Beneficiary Wishes	Shared Decision Making Regarding Enrollment in Hospice
• Team spoke to the patient/family about types of care/services wanted • Team provided care that respected the patient's wishes • Team provided care that went against the patient's wishes • Patient continued to receive treatment for illness as long as he or she wanted	• Team talked to the patient/family about reasons for enrolling or not enrolling in hospice • Team involved the patient/family as much as they would have wanted about the decision to enroll in hospice • Team allowed the patient/family to ask as many questions as they wanted about enrolling in full hospice care

The item regarding pressure to enroll in hospice was not included in either composite because it barely improved or even worsened the internal consistency reliability of composites among MCCM + MHB and MHB comparison groups. We evaluated the overall model fit using the Comparative Fit Index, the root mean square error of approximation,

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and the weighted root mean square residual.[85] Based on these metrics, we found that this two-factor model provided an acceptable-to-excellent fit for each of the groups.[86]

Standardized factor loadings from confirmatory factor analysis models are measures of the association between items and a factor (i.e., the underlying domain or construct). Their magnitude can range from zero to one; values greater than 0.5 indicate the items are good indicators of the corresponding composite. Across all groups, standardized factor loadings were 0.58 or above for items in the Consistency of Care with Beneficiary Wishes composite, with the exception of one item, "Team provided care that went against the patient's wishes," which had a standardized factor loading of 0.49 for MHB beneficiary comparison groups. We retained this item in the composite as its loading is close to 0.50 and because of the importance of tracking the relatively rare but concerning situations in which care goes against a beneficiary's wishes. In addition, maintaining the item ensures that the composite is consistent across groups. Across all groups, standardized factor loadings were 0.70 or above for all items in the Shared Decision Making Regarding Enrollment in Hospice composite, as shown in **Exhibit H.4**.

H.2.1.2 Internal Consistency

The Cronbach's alpha for the Consistency of Care with Beneficiary Wishes composite was 0.60 for the MCCM + MHB group, 0.62 for the MHB comparison groups, and 0.57 for the MCCM-only group. For Shared Decision Making Regarding Enrollment in MHB, the Cronbach's alpha was 0.65 for the MCCM + MHB group, 0.73 for MHB beneficiary comparison groups, and 0.63 for the MCCM-only group. Cronbach's alphas of 0.70 or higher are considered adequate in creating a composite for group comparisons and values above 0.60 are considered acceptable.[87] Both composites demonstrate acceptable internal consistency reliability across all respondent groups, with the exception of the MCCM-only group, for which the Cronbach's alpha is slightly lower than 0.60 for Consistency of Care

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85 Prior research indicates that a model with a good fit has a Comparative Fit Index > 0.95, a root mean square error of approximation < 0.05, and a weighted root mean square residual < 0.8; and an acceptable fit has a Comparative Fit Index > 0.90, a root mean square error of approximation < 0.08, and a weighted root mean square residual < 1.0. Hu L, Bentler PM. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct Eq Modeling*, 6, 1-55. DiStefano C, Liu J, Jiang N, Shi D. (2018). Examination of the weighted root mean square residual: Evidence for trustworthiness? *Struct Eq Modeling*, 25(3), 453-466. MacCallum RC, Browne MW, Sugawara HM. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychol Methods*, 1, 130–49.

86 The chosen model provided an acceptable fit for the MCCM-only group with a Comparative Fit Index of 0.96, a root mean square error of approximation of 0.09, and a weighted root mean square residual of 0.92; and an excellent fit for all other groups with a Comparative Fit Index > 0.99, a root mean square error of approximation < 0.03, and a weighted root mean square residual < 0.64.

87 Nunnally JC, Bernstein IH. (1994). *Psychometric Theory.* New York: McGraw Hill.

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with Beneficiary Wishes. Therefore, for this group, it is important to consider both survey results for the composite and the individual survey items that compose it.

H.2.1.3 Construct Validity

Composites are moderately to highly correlated with the overall ratings of care, as shown by Pearson's correlations between the two proposed composites and the overall ratings of care, for all groups, as shown in **Exhibit H.4**. For the MCCM-only group, both composites have a strong correlation (> 0.5) with the overall rating of MCCM. For the MCCM + MHB group, correlations with the overall rating of MCCM are strong and higher than correlations with the overall rating of hospice care. Among comparison MHB groups, there is a moderate-to-strong correlation between the proposed composites and the overall rating of hospice care.

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Exhibit H.4 Psychometric Properties of Caregiver Survey Composites and Survey Items, October 2017–September 2019

Proposed Composites	Mean (range) of Item Standardized Factor Loadings			Pearson's Correlation between Composite and Overall Rating			
	MCCM + MHB Group	MCCM-Only Group	Comparison MHB Beneficiary Groups	MCCM + MHB Group (overall rating of MHB)	MCCM + MHB Group (overall rating of MCCM)	MCCM-Only Group (overall rating of MCCM)	Comparison MHB Beneficiary Groups (overall rating of MHB)
Consistency of Care with Beneficiary Wishes	0.75 (0.58-0.94)	0.72 (0.68-0.83)	0.75 (0.49-0.95)	0.38	0.62	0.53	0.59
Shared Decision Making Regarding Enrollment in Hospice	0.80 (0.72-0.99)	0.77 (0.64-0.92)	0.85 (0.79-0.92)	0.30	0.45	0.67	0.44

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H.3 RESPONSE RATES

The overall response rate to the caregiver survey for October 2017 through September 2019 was 49.4 percent, ranging from 35.9 percent for MCCM-only caregivers to 54.5 percent for MCCM + MHB caregivers, as shown in **Exhibit H.5**. For reference, the CAHPS® Hospice Survey rate, when it was administered in the same mode as the caregiver survey (mail with telephone follow-up), was 40 percent.[88] Response rates can vary based on a number of factors, including decedent and caregiver characteristics.[89]

The substantially lower response rate for MCCM-only caregivers may be because those caregivers were less familiar, or less involved, with the care received by these deceased beneficiaries. Also, more time passed between the beneficiary's death and these caregivers' receipt of the survey, which may have resulted in both less-interested caregivers and fewer locatable ones. The lower response rate for the MCCM-only group resulted in less-precise estimates for the MCCM-only caregiver group compared to the other survey groups.

Exhibit H.5 Caregiver Survey Response Rates

Type of Survey	Number of Surveys Completed	Response Rate
MCCM + MHB	793	54.5%
MCCM-only	131	35.9%
MHB comparisons from MCCM hospices	786	50.3%
MHB comparisons from matched hospices	696	46.9%

Note: Response rate = completed surveys/(total sample - ineligibles).

Sources: Caregiver Experience of Care Survey responses for MCCM enrollees who transitioned to MHB and comparisons who died between October 1, 2017 and September 30, 2019, and MCCM enrollees who did not transition to MHB who died between April 1, 2017 and September 30, 2019.

MHB = Medicare hospice benefit.

H.4 SURVEY DATA ANALYSIS

We calculated two types of scores:

- Mean scores for each survey item having response options on a 0-to-10 scale (overall rating of MCCM, overall rating of the hospice, and quality of life).

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88 The CAHPS® Hospice Survey response rate is for hospices across the United States that administered the survey using the same mode as the caregiver survey (mail with telephone follow-up). The caregiver survey response rate is calculated for the 104 hospices (71 MCCM and 33 comparison) participating in the caregiver survey.

89 Parast L, Haas A, Tolpadi A, Elliott MN, Teno JM, Zaslavsky AM, Anhang Price R. (2018). Effects of caregiver and decedent characteristics on CAHPS Hospice Survey scores. *J Pain Symptom Manage, 56*(4), 519-529.

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- Top-box scores for CAHPS® Hospice Survey composite measures and willingness to recommend the hospice, and MCCM-specific composite measures and supplemental items. Top-box scores reflect the proportion of respondents who provide the most positive response(s).

We applied the following weights to account for different sources of variation:

- A sampling weight based on the sampling approach described in **Section H.1** to account for sampling differences across time.
  - For all groups except MHB comparisons from matched hospices, the sampling weight is one because we used a simple random sample within a hospice (MHB comparisons from MCCM hospices) or a census (MCCM + MHB and MCCM-only).
  - For MHB comparisons from matched hospices sampled before the change in sampling methodology described in **Section H.1**, we used weights derived as the probability of being sampled had the updated sampling approach been implemented, normalized to the number sampled in a given month.
  - For MHB comparisons from matched hospices sampled after the change in sampling methodology, we used weights defined as the ratio of the probability from the sampling model to that of the actual probability of being sampled, normalized to the number sampled in a given month. This corrects over- or under-sampling of MHB comparisons from matched hospices in a given month due to the finite population.
- Propensity score weights derived to adjust for observed differences between MCCM + MHB cohort 1 and MCCM + MHB cohort 2. Weights were derived from a logistic regression using only the MCCM + MHB respondents predicting cohort using main effects of the following characteristics: response percentile, beneficiary age at death, first MCCM-eligible diagnosis, duration (in days) of the final episode of hospice care, caregiver respondent age, caregiver respondent education, relationship of caregiver respondent to the deceased beneficiary, language, settings in which the caregiver respondent indicated that the decedent received hospice care, beneficiary race/ethnicity, beneficiary gender, count of chronic conditions, and hierarchical condition category (HCC) score. Each cohort was weighted back to the full population of MCCM + MHB respondents.
- Propensity score weights to adjust for observed differences between MCCM + MHB and the two comparison groups. Separately for each comparison group, propensity score weights were derived from a sampling-weighted, logistic regression model predicting MCCM + MHB using the following characteristics: response percentile, beneficiary age at death, first MCCM-eligible diagnosis, duration (in days) of the final episode of hospice care, caregiver respondent age, caregiver respondent education, relationship of caregiver respondent to the deceased beneficiary, language, settings in which the caregiver respondent indicated that the decedent received hospice care, beneficiary race/ethnicity, beneficiary gender, count of chronic conditions, and HCC score. Both comparison groups were weighted back to the full population of MCCM + MHB respondents.

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The final analytic weight multiplies sampling weights by derived propensity score weights. In addition, we adjusted for factors that are a part of the standard case-mix adjustment for CAHPS® Hospice Survey measures,[90] with adaptations for the MCCM population, as described below. Variables selected for adjustment are beneficiary and caregiver characteristics that vary in their distribution across hospices, and are associated with systematic differences in how caregivers respond to the survey,[91] which include:

- Response percentile [ranked lag time between death and survey response among caregivers in each group (i.e., ranking days between death and survey response among all respondents in a respective group, and then dividing by the total sample size for the group)].
- Beneficiary age at death.
- Payer for hospice care (including categories for combinations of Medicare with other payers; because all MCCM enrollees must have Medicare as their primary payer, we use fewer payer categories than for the CAHPS® Hospice Survey).
- First MCCM-eligible diagnosis using MCCM-eligible diagnosis categories, where cancer is further categorized into colon cancer, pancreatic cancer, lung cancer, breast cancer, prostate cancer, other MCCM-eligible cancer, and an "other diagnosis" category. Diagnosis reflects the first MCCM-eligible diagnosis, identified as follows: (1) primary diagnosis provided by the hospice to the survey vendor, (2) primary diagnosis in the MCCM portal for MCCM enrollees or primary diagnosis on claims for comparison respondents, and (3) secondary diagnoses in the MCCM portal for MCCM enrollees or secondary diagnosis in claims for comparison respondents. Although some individuals may be eligible for MCCM due to more than one diagnosis, only the first MCCM-eligible diagnosis using the specified order is used for adjustments.
- Duration (in days) of the final episode of hospice care. In addition to the categories used for the CAHPS® Hospice Survey, there is a category for less than two days; these individuals were eligible for the caregiver survey, even though they are not considered eligible for the national CAHPS® Hospice Survey. For MCCM-only enrollees, this is the duration (in days) of enrollment in the model.
- Caregiver respondent age.
- Caregiver respondent education.
- Relationship of caregiver respondent to the deceased beneficiary.

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90 Information regarding case-mix adjustment of CAHPS® Hospice Survey measures is available at: www.hospicecahpssurvey.org/en/scoring-and-analysis.

91 Parast, L, Haas, A, Tolpadi, A, Elliott, MN, Teno, JM, Zaslavsky, AM, Anhang Price, R. (2018). Effects of caregiver and decedent characteristics on CAHPS Hospice Survey scores. *J Pain Symptom Manag, 56*(4), 519-529.

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- Language (survey in Spanish or home language of Spanish versus all other languages).

In addition to these CAHPS® Hospice Survey adjustments, we adjusted for the settings in which the caregiver respondent indicated that the decedent received hospice care, because the settings are known to be a strong predictor of beneficiary and family experiences of care, and the distribution of settings varies across MCCM and comparison groups. To account for systematic differences in disease severity across groups, we also adjusted for the beneficiary's HCC score and a count of comorbidities from the Centers for Medicare & Medicaid Services Chronic Conditions Data Warehouse in the calendar years surrounding their first enrollment in MHB.[92]

The three caregiver groups for beneficiaries who enrolled in MHB (MCCM + MHB and the two comparison groups) were included in a single regression model, which allowed for more precise estimates of the model's effects. We used a separate regression model for the MCCM-only group because beneficiaries in that group received fewer hospice-like services before death than those who elected MHB, and MCCM care may be delivered by a different care team than MHB. In addition, the MCCM-only version of the survey uses slightly different wording for most questions, inquiring about the special program team rather than the hospice team, for example, and about "discussions" regarding enrollment in hospice care rather than the actual decision to enroll in hospice. For the time period of data in this Third Annual Report, only 131 survey responses came from MCCM-only respondents; some items, such as those who compose the CAHPS® Hospice Survey measure regarding training the family to care for the beneficiary, had as few as 45 respondents.

We reviewed open-ended comments submitted in response to two survey items regarding (1) reasons for enrolling or not enrolling in MHB, and (2) overall experiences with the model and/or MHB. Two researchers identified common themes and then coded each comment, and we calculated counts of each theme for each of the caregiver-respondent groups.

[92] The list of 27 common chronic conditions is available at: https://www2.ccwdata.org/web/guest/condition-categories.

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H.5 POWER TO DETECT DIFFERENCES BETWEEN MCCM AND COMPARISON GROUPS

The power of a statistical test tells us the probability of finding a statistically significant result. In this report, we have 80-percent power to detect differences in scores of approximately 2.5 to 7.2 percentage points between the intervention group (MCCM + MHB and MCCM-only) and the comparison groups, depending on the item and the scoring method (i.e., mean or top-box score). Specifically, we have 80-percent power to detect the following differences in scores reported in **Sections 3** and **5** in the main report:

- 3.9 to 6.0 points for top-box scores on CAHPS® Hospice Survey measures of MHB care experiences and willingness to recommend the hospice, reported in **Section 3**
- 3.9 to 4.8 points for top-box scores on items regarding shared decision making to enroll in MHB, reported in **Section 5**
- 4.8 to 7.2 points for top-box scores on items regarding consistency of care with beneficiary preferences, reported in **Section 5**
- 0.38 points for mean-reported quality of life on a scale of 0 to 10, reported in **Section 5**
- 0.25 points for the mean overall rating of MCCM and the hospice on a scale of 0 to 10 (2.5 points on a scale of 0 to 100), reported in **Section 5**.

Some of the observed differences between groups in this Third Annual Report cannot be distinguishable at this level of precision, and statistical tests should be interpreted with caution. However, as more data are collected, the power to detect medium-sized differences will improve. For reference, prior analyses of enrollee experience measure scores from the CAHPS® Hospice Survey data suggest that differences of 1 point on a 0-to-100 scale (i.e., 1 percentage point) can be considered small, differences of 3 points (i.e., 3 percentage points) can be considered medium, and differences of 5 points (i.e., 5 percentage points) can be considered large.[93] Even seemingly small differences in survey scores reflect substantially different care experiences.[94] For example, a 5-point difference in hospice team communication on a 0-to-100 scale is associated with a 4-percentage-point difference in a willingness to definitely recommend the hospice.

[93] Quigley, DD, Elliott, MN, Setodji, CM, Hays RD. (2018). Quantifying magnitude of differences in patient experiences with healthcare measures. *Health Serv Res, 53* Suppl 1, 3027-3051.

[94] Anhang Price, R, Stucky B, Parast L, Elliott MN, Haas A, Bradley M, Teno JM. (2018). Development of valid and reliable measures of patient and family experiences of hospice care for public reporting. *J Palliat Med 21*(7), 924-932.

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H.6 CHARACTERISTICS OF MCCM AND COMPARISON HOSPICES PARTICIPATING IN THE CAREGIVER SURVEY

We examined standardized differences between the 71 MCCM hospices and 33 comparison hospices participating in the caregiver survey in **Exhibit H.6**. Hospices are considered to be participating in the caregiver survey if they provide lists of beneficiaries and caregivers from which the evaluation team can conduct survey sampling, and if caregivers from the hospice were sampled. Overall, we found that MCCM and comparison hospices were similar across a wide range of characteristics, as shown in **Exhibit H.6**. Although several characteristics have standardized differences that are larger than 0.20 (e.g., proportion of beneficiaries who are White, Black, and Asian), many of these differences are not large enough to be substantively meaningful (e.g., differences in religious affiliation, nursing home penetration, levels of care, demographics, and medical utilization). We believe that the comparison hospices are sufficiently similar to MCCM hospices for the purposes of comparing caregiver survey responses. Nonetheless, some differences in survey responses between MCCM and comparison hospices may reflect, in part, differences in hospice characteristics. The caregiver survey was voluntary and our ability to balance our subgroup of 33 comparison hospices across the full range of hospice characteristics was limited.

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Exhibit H.6 Standardized Differences between Characteristics of MCCM Hospices and Comparison Hospices Participating in the Caregiver Survey

Characteristic	MCCM Hospices (n = 71)	Comparison Hospices (n = 33)	Standardized Difference
Ownership			
Non-profit	69.0%	69.7%	0.01
For-profit	15.5%	18.2%	0.07
Government	1.4%	0.0%	0.17
Other	14.1%	12.1%	0.06
Size			
Large	84.5%	81.8%	0.07
Medium	14.1%	15.2%	0.03
Small	1.4%	3.0%	0.11
Age			
Founded in 1980s	56.3%	57.6%	0.02
Founded in 1990s	31.0%	27.3%	0.08
Founded in 2000s	7.0%	9.1%	0.07
Founded in 2010s	5.6%	6.1%	0.02
Census region			
Midwest	38.0%	42.4%	0.09
South	32.4%	30.3%	0.04
Northeast	18.3%	21.2%	0.07
West	11.3%	6.1%	0.18
Facility type			
Freestanding	71.8%	78.8%	0.16
Facility-based	28.2%	21.2%	0.16
Religious affiliation			
Yes	5.6%	0.0%	**0.34**
No	94.4%	100.0%	**0.34**
Chain affiliation			
Yes	45.1%	30.3%	**0.31**
No	54.9%	69.7%	**0.31**
Other characteristics			
Non-hospice Medicare expenditures	$1,072,157	$615,448	**0.32**
Nursing home penetration	22.6%	26.5%	**0.25**
Hospice level of care			
Days in routine home care	96.7%	97.3%	**0.26**
Days in general inpatient care	2.7%	2.0%	**0.35**
Days in continuous home care	0.2%	0.3%	0.12
Days in inpatient respite care	0.4%	0.4%	0.12

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Characteristic	MCCM Hospices (n = 71)	Comparison Hospices (n = 33)	Standardized Difference
Duration of stay in hospice			
Stays under seven days	33.7%	32.4%	0.18
Stays over 180 days	11.6%	11.9%	0.06
Hospice-level beneficiary demographics			
Sex: Female	37.5%	37.3%	0.03
Race/ethnicity: White	90.6%	93.9%	**0.45**
Race/ethnicity: Black	6.1%	3.5%	**0.47**
Race/ethnicity: Asian	0.9%	0.3%	**0.38**
Race/ethnicity: Hispanic	0.9%	0.5%	0.19
Race/ethnicity: Other	1.4%	1.9%	0.14
Age group: Under 65	4.6%	4.6%	0.03
Age group: 65–74	14.6%	14.6%	0.01
Age group: 75–84	26.9%	27.3%	0.10
Age group: 85+	53.6%	52.9%	0.07
Mean length of stay on Medicare hospice benefit (days)	75.0	78.0	0.14
Quality of care ratings			
Hospice team communication	79.6	80.7	**0.24**
Getting timely care	77.6	80.1	**0.38**
Overall rating	80.3	81.9	**0.25**
Market characteristics			
Deaths occurring in hospital	20.3	20.0	0.10
Home health agency reimbursements per decedent	$441	$452	0.05
Hospice reimbursements per decedent	$6,486	$5,962	**0.28**
Hospice reimbursement per enrollee	$353	$329	**0.22**
Hospital care intensity index	1.0	0.9	0.07
Hospital/skilled nursing facility reimbursements per decedent	$4,103	$4,090	0.02
Inpatient days per Medicare enrollee	1.2	1.2	0.15
Medicare reimbursements per decedent	$66,782	$64,054	**0.23**
Mortality among Medicare enrollees	4.3%	4.4%	**0.25**
Physician visits per decedent	53.0	51.9	0.07
Physician visit reimbursements per decedent	$5,286	$5,139	0.09
Intensive care unit days per decedent	5.1	4.6	**0.23**

Sources: CMS Provider of Services file, December 2016; Consumer Assessment of Healthcare Providers and Systems, 2016; Hospice Survey Dartmouth Atlas of Health Care, 2014-2015; and 2015 CMS hospice claims, using https://www.federalregister.gov/documents/2017/08/04/2017-16294/medicare-program-fy-2018-hospice-wage-indexand-payment-rate-update-and-hospice-quality-reporting.

Note: This exhibit displays comparisons of hospices participating in the caregiver survey for beneficiaries who died between October 1, 2017 and January 31, 2020, based on characteristics documented in administrative data before the start of MCCM. The subgroup of 71 MCCM hospices participating in the survey represents those MCCM hospices that were actively participating at the time of survey administration (i.e., hospices from which cases have been surveyed).

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The subgroup excludes hospices that had no enrollees who died during the data collection period. The comparison group includes 33 hospices randomly selected for participation in the survey, as described in **Section H.1**. The right-hand column presents standardized differences between MCCM hospices and comparison hospices. The standardized difference is the mean difference between two populations and the standard deviation of the difference. We highlight in bold large differences between mean characteristics of MCCM and comparison hospices, defined as those exceeding the threshold of 0.20. There were respondents from all participating hospices described in this exhibit. Market variable descriptions and data sources are provided in **Exhibit D.7**.

H.7 CHARACTERISTICS OF CAREGIVER SURVEY RESPONDENTS AND BENEFICIARIES FOR WHOM THEY REPORT CARE EXPERIENCES

Incorporating analytic weights, MCCM + MHB beneficiaries and MHB comparison beneficiaries were similar across characteristics, as shown in **Exhibits H.7 and H.8**; however, MCCM enrollees who transitioned to MHB beneficiaries and MHB comparison beneficiaries differed substantially from MCCM-only beneficiaries with regard to diagnosis. For example, 69-71 percent of MCCM enrollees who transitioned to MHB and comparison beneficiaries in MCCM and matched hospices had diagnoses of cancer, compared to 52 percent of MCCM-only beneficiaries, as shown in **Exhibit H.7**. Differences in characteristics underscore the importance of accounting for beneficiary and caregiver characteristics when sampling and comparing across groups. Details regarding how scores are weighted and adjusted are included in **Section H.4.**

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Exhibit H.7 Characteristics of Caregiver Survey Respondents

Characteristic	MCCM + MHB (n = 793)	MCCM + MHB: Cohort 1 (n = 507)	MCCM + MHB: Cohort 2 (n = 286)	MCCM-Only (n = 131)	Comparisons from MCCM Hospices (n = 786)	Comparisons from Matched Non-MCCM Hospices (n = 696)
Decedent age at death						
18-64	5.3%	5.3%	5.3%	3.8%	4.9%	4.8%
65-74	27.4%	27.8%	27.1%	29.8%	30.0%	30.8%
75-84	38.1%	38.7%	37.5%	37.4%	37.9%	37.0%
85+	29.1%	28.1%	30.2%	29.0%	27.3%	27.4%
Decedent gender						
Male	52.4%	52.9%	52.0%	58.0%	50.7%	51.9%
Female	47.6%	47.1%	48.0%	42.0%	49.2%	48.1%
Decedent race/ethnicity						
White	89.5%	89.3%	89.7%	84.0%	88.8%	89.6%
Black	4.6%	4.8%	4.5%	6.9%	4.2%	4.2%
Hispanic	2.2%	2.2%	2.2%	1.5%	3.1%	2.7%
Other	1.8%	1.7%	1.8%	4.6%	1.8%	1.5%
Length of final episode of hospice care						
Less than two days	5.7%	5.9%	5.5%	N/A	6.4%	5.9%
Two to five days	18.4%	18.4%	18.3%	N/A	18.3%	17.6%
6 to 12 days	16.8%	17.0%	16.7%	N/A	15.5%	16.1%
13 to 29 days	20.2%	20.4%	20.0%	N/A	21.8%	20.6%
30 to 80 days	21.1%	21.0%	21.1%	N/A	20.8%	23.0%
81+ days	17.8%	17.2%	18.4%	N/A	17.1%	16.8%
Length of MCCM care						
Less than two days	2.6%	2.5%	2.7%	1.5%	N/A	N/A
Two to five days	5.6%	6.5%	4.8%	4.6%	N/A	N/A
6 to 12 days	11.9%	9.7%	14.1%	8.4%	N/A	N/A
13 to 29 days	18.7%	18.6%	18.8%	13.0%	N/A	N/A

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Characteristic	MCCM + MHB (n = 793)	MCCM + MHB: Cohort 1 (n = 507)	MCCM + MHB: Cohort 2 (n = 286)	MCCM-Only (n = 131)	Comparisons from MCCM Hospices (n = 786)	Comparisons from Matched Non-MCCM Hospices (n = 696)
30 to 80 days	28.5%	25.8%	31.3%	27.5%	N/A	N/A
81+ days**	32.6%	36.9%	28.3%	45.0%	N/A	N/A
Payer for hospice services						
Medicare-only***	72.0%	81.4%	62.8%	8.4%	79.4%	51.9%
Medicare and Medicaid***	1.5%	2.1%	1.0%	0.0%	2.3%	5.0%
Medicare and private***	5.5%	8.9%	2.1%	1.5%	3.3%	28.6%
Other*	10.6%	6.8%	14.4%	0.8%	8.5%	14.2%
Final setting of hospice care						
Home	65.7%	65.4%	66.0%	7.6%	65.5%	46.6%
Nursing home	4.8%	4.9%	4.7%	0.0%	3.7%	2.3%
Acute care hospital	4.1%	2.9%	5.2%	0.0%	3.0%	3.4%
Hospice inpatient unit	19.9%	20.0%	19.7%	0.0%	18.7%	13.1%
MCCM diagnosis						
Cancer***	70.6%	69.8%	71.4%	51.9%	69.3%	71.0%
Congestive heart failure	18.8%	19.1%	18.4%	26.0%	20.2%	18.2%
Chronic obstructive pulmonary disease***	10.4%	10.7%	10.0%	22.1%	10.5%	10.8%
Other (including human immunodeficiency virus/acquired immunodeficiency syndrome)	0.2%	0.3%	0.1%	0.0%	0.0%	0.0%
Decedent education						
8th grade or less	2.9%	2.9%	2.8%	3.8%	3.8%	4.1%
Some high school but did not graduate	7.2%	7.7%	6.7%	10.7%	5.5%	8.6%
High school graduate or General Education Development	34.6%	33.9%	35.2%	30.5%	34.8%	33.2%
Some college or two-year degree	21.4%	23.6%	19.4%	26.0%	23.3%	19.4%
Four-year college graduate	15.5%	14.2%	16.7%	12.2%	15.6%	14.4%
More than four-year college degree	15.9%	14.7%	17.0%	14.5%	14.4%	16.2%

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Characteristic	MCCM + MHB (n = 793)	MCCM + MHB: Cohort 1 (n = 507)	MCCM + MHB: Cohort 2 (n = 286)	MCCM-Only (n = 131)	Comparisons from MCCM Hospices (n = 786)	Comparisons from Matched Non-MCCM Hospices (n = 696)
Caregiver relationship to decedent						
Spouse or partner	52.1%	52.3%	51.8%	51.1%	52.1%	52.0%
Child, son-in-law, or daughter-in-law	38.4%	37.8%	39.1%	37.4%	37.0%	36.0%
Other relative or friend	9.0%	9.5%	8.5%	9.9%	10.4%	11.2%
Respondent age						
18-64	41.8%	41.1%	42.5%	36.6%	39.4%	39.2%
65-74	29.8%	29.7%	29.8%	35.1%	31.1%	30.2%
75-84	21.0%	21.6%	20.5%	20.6%	22.2%	21.1%
85+	5.6%	5.3%	5.9%	5.3%	5.3%	7.4%
Respondent gender						
Male**	28.0%	31.1%	25.0%	14.5%	27.4%	30.1%
Female**	69.7%	66.3%	73.1%	82.4%	70.7%	68.0%
Respondent education						
8th grade or less	0.4%	0.5%	0.3%	1.5%	0.4%	0.2%
Some high school but did not graduate	3.1%	3.0%	3.2%	1.5%	2.4%	2.7%
High school graduate or General Education Development	22.9%	22.6%	23.2%	22.1%	23.4%	24.2%
Some college or two-year degree	27.9%	28.3%	27.5%	28.2%	27.6%	25.3%
Four-year college graduate	21.5%	21.2%	21.7%	21.4%	20.9%	20.7%
More than four-year college degree	22.2%	22.2%	22.2%	22.9%	23.1%	24.1%
Respondent language spoken at home						
English	97.6%	96.7%	98.4%	97.7%	96.8%	97.1%
Spanish	0.2%	0.4%	0.0%	0.0%	0.3%	0.4%
Polish	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%
Some other language	0.3%	0.6%	0.0%	0.8%	0.3%	0.4%

Sources: Caregiver Experience of Care Survey responses for MCCM enrollees who transitioned to MHB and comparison MHB enrollees, and died between October 1, 2017 and September 30, 2019; and MCCM enrollees who did not transition to MHB and died between April 1, 2017 and September 30, 2019.

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Note: Beneficiary and caregiver characteristics are derived from four sources:

- Information that hospices provide to their CAHPS® Hospice Survey vendors in sample frame files, including decedent age at death, gender, diagnosis, and length and setting of final episode of hospice care
- Caregiver responses to survey questions, including decedent race/ethnicity and education; caregiver relationship to decedent; respondent's age, gender, and education; and language spoken at home
- Information available in the MCCM portal
- Information available in hospice claims.

Hospices do not include MCCM-only beneficiaries in their sample frame files because these individuals never elected MHB and their caregivers are not eligible for the CAHPS® Hospice Survey. Thus, information regarding MCCM-only beneficiaries was gathered via telephone calls to the hospice rather than by the sample frame data. As a result, there is generally a higher rate of missing data for the MCCM-only group than for the other groups for variables that the hospice reports. The percentage of beneficiaries/caregivers for whom data are missing for each characteristic is not shown.

Percentages are weighted using analytic weights, as described in **Section I.4**. Missing categories are not shown.

Significance was evaluated by conducting an ANOVA test for each category of each characteristic among cases with non-missing values for the characteristic (e.g., testing for differences in the category of decedent age at death being between 18 and 64 among cases with a non-missing decedent age at death), with statistical significance at the 10% (*), 5% (**), and 1% (***) levels. Tests compared:

- All MCCM + MHB caregiver respondents (cohorts 1 and 2)
- All MCCM-only caregiver respondents (cohorts 1 and 2)
- Comparison caregiver respondents in MCCM hospices, and respondents from matched comparison hospices.

Diagnosis reflects the first MCCM-eligible diagnosis, identified as follows:

- Primary diagnosis provided by the hospice to the survey vendor.
- Primary diagnosis in the MCCM portal for MCCM enrollees.
- Primary diagnosis on claims for comparison respondents.
- Secondary diagnoses in the MCCM portal for MCCM enrollees, or secondary diagnosis in claims for comparison respondents.
- Although some individuals may be eligible for MCCM due to having more than one diagnosis, only the first MCCM-eligible diagnosis using the specified order is shown here and used for adjustments. The "other diagnosis" category includes human immunodeficiency virus/acquired immunodeficiency syndrome, as well as all non-MCCM-eligible diagnoses. "Other payer for hospice services" reflects beneficiaries for whom the hospice reported a combination of primary and secondary, and other payers that are not encompassed by the three listed categories (Medicare-only, Medicare and Medicaid, Medicare and Private). These "other payer" sources include Medicare and Other; Medicare, Medicaid, and Other; and Medicare, Medicaid, and Private.

CAHPS® = Consumer Assessment of Healthcare Providers and Systems, MHB = Medicare hospice benefit, N/A = not applicable.

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Exhibit H.8 Standardized Differences between Characteristics of Caregiver Survey Respondent Groups, Before and After Weighting

Characteristic	MCCM + MHB (weighted)	Comparisons from MCCM Hospices (weighted)	Comparisons from Matched Hospices (weighted)	Standardized Difference (unweighted MHB versus unweighted comparisons in MCCM hospices)	Standardized Difference (weighted MHB versus weighted comparisons in MCCM hospices)	Standardized Difference (unweighted MHB versus unweighted comparisons in matched hospices)	Standardized Difference (weighted MHB versus weighted comparisons in matched hospices)
Decedent age at death							
18-64	5.3%	4.9%	4.8%	0.08	0.02	0.04	0.02
65-74	27.4%	30.0%	30.8%	0.04	0.06	0.02	0.07
75-84	38.1%	37.9%	37.0%	0.17	0.00	0.06	0.02
85+	29.1%	27.3%	27.4%	**0.27**	0.04	0.10	0.04
Decedent gender							
Male	52.4%	50.8%	51.9%	0.00	0.03	0.00	0.01
Female	47.6%	49.2%	48.1%	0.00	0.03	0.00	0.01
Decedent race/ethnicity							
White	89.5%	88.8%	89.6%	0.08	0.02	0.03	0.00
Black	4.6%	4.2%	4.2%	0.09	0.02	0.02	0.02
Hispanic	2.2%	3.1%	2.7%	0.04	0.06	0.03	0.04
Other	3.7%	3.8%	3.4%	0.07	0.01	0.01	0.01
Length of final episode of hospice care							
Less than two days	5.7%	6.4%	5.9%	0.05	0.03	0.01	0.01
Two to five days	18.4%	18.3%	17.6%	0.00	0.00	0.01	0.02
6 to 12 days	16.8%	15.5%	16.1%	0.01	0.04	0.04	0.02
13 to 29 days	20.2%	21.8%	20.6%	0.04	0.04	0.00	0.01
30 to 80 days	21.1%	20.8%	23.0%	0.04	0.01	0.01	0.05
81+ days	17.8%	17.1%	16.8%	0.13	0.02	0.05	0.03

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Characteristic	MCCM + MHB (weighted)	Comparisons from MCCM Hospices (weighted)	Comparisons from Matched Hospices (weighted)	Standardized Difference (unweighted MHB versus unweighted comparisons in MCCM hospices)	Standardized Difference (weighted MHB versus weighted comparisons in MCCM hospices)	Standardized Difference (unweighted MHB versus unweighted comparisons in matched hospices)	Standardized Difference (weighted MHB versus weighted comparisons in matched hospices)
Payer for hospice service							
Medicare only	80.3%	85.0%	52.0%	0.04	0.12	**0.71**	**0.72**
Medicare and Medicaid	1.7%	2.4%	5.1%	0.06	0.05	**0.21**	**0.23**
Medicare and private	6.1%	3.5%	28.7%	0.09	0.11	**0.69**	**0.89**
Other	11.8%	9.1%	14.2%	0.00	0.09	**0.25**	0.08
Final setting of hospice care							
Home	69.5%	72.2%	71.0%	0.04	0.06	0.12	0.03
Nursing home	5.1%	4.0%	3.5%	0.14	0.05	0.09	0.07
Acute care hospital	4.3%	3.3%	5.2%	0.05	0.05	0.02	0.04
Hospice inpatient unit	21.0%	20.6%	19.9%	0.05	0.01	0.09	0.03
Other	0.2%	0.0%	0.3%	0.04	0.05	0.08	0.04
Diagnosis							
Cancer	70.6%	69.3%	71.0%	0.15	0.03	0.09	0.01
Congestive heart failure	18.8%	20.2%	18.2%	0.13	0.03	0.10	0.02
Chronic obstructive pulmonary disease	10.4%	10.5%	10.8%	0.06	0.00	0.01	0.01
Other (including human immunodeficiency virus/acquired immunodeficiency syndrome)	0.2%	0.0%	0.0%	0.06	0.03	0.06	0.03

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Characteristic	MCCM + MHB (weighted)	Comparisons from MCCM Hospices (weighted)	Comparisons from Matched Hospices (weighted)	Standardized Difference (unweighted MHB versus unweighted comparisons in MCCM hospices)	Standardized Difference (weighted MHB versus weighted comparisons in MCCM hospices)	Standardized Difference (unweighted MHB versus unweighted comparisons in matched hospices)	Standardized Difference (weighted MHB versus weighted comparisons in matched hospices)
Decedent education							
8th grade or less	2.9%	3.9%	4.2%	0.15	0.06	0.16	0.08
Some high school but did not graduate	7.4%	5.7%	9.0%	0.02	0.07	0.15	0.06
High school graduate or General Education Development	35.5%	35.7%	34.7%	0.03	0.01	0.03	0.02
Some college or two-year degree	22.0%	23.9%	20.2%	0.03	0.04	0.05	0.04
Four-year college graduate	15.9%	16.0%	15.1%	0.05	0.00	0.04	0.02
More than four-year college degree	16.3%	14.8%	16.9%	0.04	0.04	0.12	0.02
Caregiver relationship to decedent							
Spouse or partner	52.3%	52.4%	52.4%	0.13	0.00	0.05	0.00
Child, son-in-law, or daughter-in-law	38.6%	37.2%	36.3%	0.15	0.03	0.05	0.05
Other relative or friend	9.1%	10.4%	11.3%	0.02	0.05	0.01	0.07
Respondent age							
18-64	42.6%	40.2%	40.1%	0.01	0.05	0.03	0.05
65-74	30.3%	31.7%	30.8%	0.01	0.03	0.01	0.01
75-84	21.4%	22.7%	21.5%	0.08	0.03	0.03	0.00
85+	5.7%	5.4%	7.6%	0.11	0.01	0.10	0.08
Respondent gender							
Male	28.6%	27.9%	30.7%	0.05	0.02	0.03	0.04
Female	71.4%	72.1%	69.3%	0.05	0.02	0.03	0.04

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Characteristic	MCCM + MHB (weighted)	Comparisons from MCCM Hospices (weighted)	Comparisons from Matched Hospices (weighted)	Standardized Difference (unweighted MHB versus unweighted comparisons in MCCM hospices)	Standardized Difference (weighted MHB versus weighted comparisons in MCCM hospices)	Standardized Difference (unweighted MHB versus unweighted comparisons in matched hospices)	Standardized Difference (weighted MHB versus weighted comparisons in matched hospices)
Respondent education							
8th grade or less	0.4%	0.4%	0.2%	0.06	0.00	0.01	0.03
Some high school but did not graduate	3.1%	2.5%	2.8%	0.00	0.04	0.08	0.02
High school graduate or General Education Development	23.4%	23.9%	24.9%	0.05	0.01	0.07	0.04
Some college or two-year degree	28.5%	28.2%	26.0%	0.02	0.00	0.08	0.05
Four-year college graduate	21.9%	21.3%	21.3%	0.01	0.01	0.08	0.02
More than four-year college degree	22.7%	23.6%	24.8%	0.04	0.02	0.12	0.05
Respondent language spoken at home							
English	99.5%	99.2%	99.2%	0.07	0.05	0.01	0.04
Spanish	0.2%	0.3%	0.4%	0.03	0.02	0.01	0.04
Polish	0.0%	0.2%	0.0%	--	--	--	--
Some other language	0.3%	0.3%	0.4%	0.02	0.01	0.02	0.02

Sources: Caregiver Experience of Care Survey responses for MCCM enrollees and comparison MHB enrollees who died between October 1, 2017 and September 30, 2019.

Note: Beneficiary and caregiver characteristics are derived from four sources:

- Information that hospices provide to their Consumer Assessment of Healthcare Providers and Systems Hospice Survey vendors in sample frame files, including decedent age at death, gender, diagnosis, and length and setting of final episode of hospice care
- Caregiver responses to survey questions, including decedent race/ethnicity and education; caregiver relationship to decedent; respondent's age, gender, and education; and language spoken at home
- Information available in the MCCM portal
- Information available in hospice claims.

Missing categories are excluded.

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Diagnosis reflects the first MCCM-eligible diagnosis, identified as follows:

- Primary diagnosis provided by the hospice to the survey vendor.
- Primary diagnosis in the MCCM portal for MCCM enrollees.
- Primary diagnosis on claims for comparison respondents.
- Secondary diagnoses in the MCCM portal for MCCM enrollees, or secondary diagnosis in claims for comparison respondents.
- Although some individuals may be eligible for MCCM due to having more than one diagnosis, only the first MCCM-eligible diagnosis using the specified order is shown here and used for adjustments. The "other diagnosis" category includes human immunodeficiency virus/acquired immunodeficiency syndrome, as well as all non-MCCM-eligible diagnoses. "Other payer for hospice services" reflects beneficiaries for whom the hospice reported a combination of primary and secondary, and other payers that are not encompassed by the three listed categories (Medicare only, Medicare and Medicaid, Medicare and Private). These "other payer" sources include Medicare and Other; Medicare, Medicaid, and Other; and Medicare, Medicaid, and Private.

The right-hand columns present standardized differences between MCCM enrollees who transitioned to MHB, and their MHB beneficiary comparisons from MCCM and matched hospices, before and after weighting. The standardized difference is the absolute value of the mean difference between the two populations (MCCM enrollees who transitioned to MHB and the relevant comparison group, before and after weighting), divided by the standard deviation of the MCCM enrollees who transitioned to MHB group. We highlight in **bold** large differences between mean characteristics of respondent groups, defined as those exceeding the threshold of 0.20.

MHB = Medicare hospice benefit.

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Exhibit H.9 Caregiver Survey Supplemental Items by Survey Version

MCCM + MHB	MCCM Only	Hospice Only (administered to comparisons in MCCM and comparison hospices)
CARE RECEIVED FROM SPECIAL PROGRAM	**ADDITIONAL QUESTIONS ABOUT THE SPECIAL PROGRAM**	**ADDITIONAL QUESTIONS ABOUT HOSPICE CARE**
41. Prior to starting full hospice care, your family member was enrolled in a special program that allowed him or her to continue receiving treatment for his or her terminal illness while receiving palliative or some supportive care from the hospice. You might know this special program as [MCCM PROGRAM NAME]. The next questions are about your family member's experience with this special program. How often did the team from this special program seem informed and up-to-date about your family member's treatment from providers that are not part of this program? 1 Never 2 Sometimes 3 Usually 4 Always	36. How often did the special program team seem informed and up-to-date about your family member's treatment from providers that are not part of the program? 1 Never 2 Sometimes 3 Usually 4 Always	41. The following additional questions focus on care your family member received from the hospice. How often did the hospice team seem informed and up-to-date about your family member's treatment? 1 Never 2 Sometimes 3 Usually 4 Always
42. Did the team from this special program speak to you or your family member about what types of care or services he or she wanted? 1 Yes, definitely 2 Yes, somewhat 3 No	37. Did the special program team speak to you or your family member about what types of care or services he or she wanted? 1 Yes, definitely 2 Yes, somewhat 3 No	42. Did the hospice team speak to you or your family member about what types of care or services he or she wanted? 1 Yes, definitely 2 Yes, somewhat 3 No
43. Did the team from this special program provide care that respected your family member's wishes? 1 Yes, definitely 2 Yes, somewhat 3 No	38. Did the special program team provide care that respected your family member's wishes? 1 Yes, definitely 2 Yes, somewhat 3 No	43. Did the hospice team provide care that respected your family member's wishes? 1 Yes, definitely 2 Yes, somewhat 3 No

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MCCM + MHB	MCCM Only	Hospice Only (administered to comparisons in MCCM and comparison hospices)
44. Did the team from this special program do anything that went against your family member's wishes? 1 Yes, definitely 2 Yes, somewhat 3 No	39. Did the special program team do anything that went against your family member's wishes? 1 Yes, definitely 2 Yes, somewhat 3 No	44. Did the hospice team do anything that went against your family member's wishes? 1 Yes, definitely 2 Yes, somewhat 3 No
45. Using any number from 0 to 10, where 0 is the worst experience possible and 10 is the best experience possible, what number would you use to rate your family member's experience with this special program? (0 to 10 scale)	40. Using any number from 0 to 10, where 0 is the worst experience possible and 10 is the best experience possible, what number would you use to rate your family member's experience with this special program? (0 to 10 scale)	
46. Would you recommend this special program to your friends and family? 1 Definitely no 2 Probably no 3 Probably yes 4 Definitely yes	41. Would you recommend this special program to your friends and family? 1 Definitely no 2 Probably no 3 Probably yes 4 Definitely yes	
YOUR FAMILY MEMBER'S TRANSITION TO FULL HOSPICE CARE	**DISCUSSIONS ABOUT HOSPICE CARE**	**YOUR FAMILY MEMBER'S TRANSITION TO HOSPICE CARE**
	42. The decision to enroll in hospice involves a shift in the focus of care from extending life as much as possible to one that focuses on comfort. The next questions are about your family member's decision to enroll or not enroll in full hospice care. Did you or your family member ever talk with anyone from the special program about enrolling in full hospice care? 1. Yes 2. No --> If No, go to Question 46	

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MCCM + MHB	MCCM Only	Hospice Only (administered to comparisons in MCCM and comparison hospices)
47. The decision to enroll in hospice involves a shift in the focus of care from extending life as much as possible to one that focuses on comfort. The next questions are about your family member's decision to enroll in full hospice care. In your opinion, was the decision to enroll in full hospice care made too early, at the right time, or too late? 1 Too early 2 At the right time 3 Too late	43. In your opinion, did the discussion about enrolling in full hospice care happen too early, at the right time, or too late? 1 Too early 2 At the right time 3 Too late	45. The decision to enroll in hospice involves a shift in the focus of care from extending life as much as possible to one that focuses on comfort. The next questions are about your family member's decision to enroll in hospice care. In your opinion, was the decision to enroll in hospice care made too early, at the right time, or too late? 1 Too early 2 At the right time 3 Too late
48. How much did you talk to a member of the team from the special program about the reasons for enrolling or not enrolling in full hospice care? 1 Too little 2 Right amount 3 Too much	44. How much did you talk to a member of the special program team about the reasons for enrolling or not enrolling in full hospice care? 1 Too little 2 Right amount 3 Too much	46. How much did you talk to a member of the hospice team about the reasons for enrolling or not enrolling in hospice care? 1 Too little 2 Right amount 3 Too much
49. Did you feel that the team from the special program allowed you to ask as many questions as you wanted about enrolling in full hospice care? 1 Yes, definitely 2 Yes, somewhat 3 No	45. Did you feel that the special program team allowed you to ask as many questions as you wanted about enrolling in full hospice care? 1 Yes, definitely 2 Yes, somewhat 3 No	47. Did you feel that the hospice team allowed you to ask as many questions as you wanted about enrolling in hospice care? 1 Yes, definitely 2 Yes, somewhat 3 No
50. Were you or your family member involved in the decision to enroll in full hospice care as much as you would have wanted? 1 Yes, definitely 2 Yes, somewhat 3 No	46. Were you or your family member involved in the decision about enrolling in full hospice care as much as you would have wanted? 1 Yes, definitely 2 Yes, somewhat 3 No	48. Were you or your family member involved in the decision to enroll in hospice care as much as you would have wanted? 1 Yes, definitely 2 Yes, somewhat 3 No

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MCCM + MHB	MCCM Only	Hospice Only (administered to comparisons in MCCM and comparison hospices)
51. Was the decision to enroll in full hospice care made free of pressure from anyone from the special program? 1 Yes, definitely 2 Yes, somewhat 3 No 4 I was not involved in this decision	47. Was the decision about enrolling in full hospice care made free of pressure from anyone from the special program? 1 Yes, definitely 2 Yes, somewhat 3 No 4 I was not involved in this decision	49. Was the decision to enroll in hospice care made free of pressure from anyone from the hospice? 1 Yes, definitely 2 Yes, somewhat 3 No 4 I was not involved in this decision
52. Did your family member continue to receive treatment for his or her terminal illness for as long as he or she wanted? 1 Yes, definitely 2 Yes, somewhat 3 No	48. Did your family member continue to receive treatment for his or her terminal illness for as long as he or she wanted? 1 Yes, definitely 2 Yes, somewhat 3 No	50. Did your family member continue to receive treatment for his or her terminal illness for as long as he or she wanted? 1 Yes, definitely 2 Yes, somewhat 3 No
53. Using any number from 0 to 10, where 0 is the worst quality of life possible and 10 is the best quality of life possible, what number would you use to rate the quality of your family member's life during the time he or she was receiving care from the special program? (0 to 10 scale)	49. Using any number from 0 to 10, where 0 is the worst quality of life possible and 10 is the best quality of life possible, what number would you use to rate the quality of your family member's life during the time he or she was receiving care from the special program? (0 to 10 scale)	51. Using any number from 0 to 10, where 0 is the worst quality of life possible and 10 is the best quality of life possible, what number would you use to rate the quality of your family member's life during the time he or she was receiving care from the hospice? (0 to 10 scale)
54. What are the reasons your family member switched from the special program to full hospice care? [OPEN END]	50. What are the reasons your family member did not to switch from the special program to full hospice care? [OPEN END]	52. What are the reasons your family member enrolled in hospice? [OPEN END]
62. This question allows you to provide additional feedback about your family member's care. In thinking about your experiences with the special program and the hospice, was there anything that went well or that you wish had gone differently for you and your family member? Please tell us about those experiences. [OPEN END]	58. This question allows you to provide additional feedback about your family member's care. In thinking about your experiences with this special program, was there anything that went well or that you wish had gone differently for you and your family member? Please tell us about those experiences. [OPEN END]	60. This question allows you to provide additional feedback about your family member's care. In thinking about your experiences with the hospice, was there anything that went well or that you wish had gone differently for you and your family member? Please tell us about those experiences. [OPEN END]

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H.8 CAREGIVER EXPERIENCE OF CARE SURVEY INSTRUMENT FOR MCCM ENROLLEES WHO TRANSITION TO MHB

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CAHPS® Hospice Survey

Please answer the survey questions about the care the patient received from this hospice:

All of the questions in this survey will ask about the experiences with this hospice.

If you want to know more about this survey, please call 1-877-414-8076. All calls to that number are free.

OMB # 0938-1257

SURVEY INSTRUCTIONS

- Please give this survey to the person in your household who knows the most about the hospice care received by the person listed on the survey cover letter.
- Use a dark colored pen to fill out the survey.
- Place an X directly inside the square indicating a response, like in the sample below.

  ☐ Yes

  ☒ No

- To indicate an answer selected was in error, clearly draw a line through the square and select another square.
- You are sometimes told to skip over some questions in this survey. When this happens you will see an arrow with a note that tells you what question to answer next, like this:

  ☒ Yes → **If Yes, go to Question 1**

  ☐ No

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THE HOSPICE PATIENT

1. How are you related to the person listed on the survey cover letter?

- ☐ My spouse or partner
- ☐ My parent
- ☐ My mother-in-law or father-in-law
- ☐ My grandparent
- ☐ My aunt or uncle
- ☐ My sister or brother
- ☐ My child
- ☐ My friend
- ☐ Other (please print):

2. For this survey, the phrase "family member" refers to the person listed on the survey cover letter. In what locations did your family member receive care from this hospice? Please choose one or more.

- ☐ Home
- ☐ Assisted living facility
- ☐ Nursing home
- ☐ Hospital
- ☐ Hospice facility/hospice house
- ☐ Other (please print):

YOUR ROLE

3. While your family member was in hospice care, how often did you take part in or oversee care for him or her?

- ☐ Never → **If Never, go to Question 41**
- ☐ Sometimes
- ☐ Usually
- ☐ Always

YOUR FAMILY MEMBER'S HOSPICE CARE

As you answer the rest of the questions in this survey, please think only about your family member's experience with the hospice named on the survey cover.

4. For this survey, the hospice team includes all the nurses, doctors, social workers, chaplains and other people who provided hospice care to your family member. While your family member was in hospice care, did you need to contact the hospice team during evenings, weekends, or holidays for questions or help with your family member's care?

- ☐ Yes
- ☐ No → **If No, go to Question 6**

5. How often did you get the help you needed from the hospice team during evenings, weekends, or holidays?

- ☐ Never
- ☐ Sometimes
- ☐ Usually
- ☐ Always

6. **While your family member was in hospice care, how often did the hospice team keep you informed about when they would arrive to care for your family member?**
   - ☐ Never
   - ☐ Sometimes
   - ☐ Usually
   - ☐ Always

7. **While your family member was in hospice care, when you or your family member asked for help from the hospice team, how often did you get help as soon as you needed it?**
   - ☐ Never
   - ☐ Sometimes
   - ☐ Usually
   - ☐ Always

8. **While your family member was in hospice care, how often did the hospice team explain things in a way that was easy to understand?**
   - ☐ Never
   - ☐ Sometimes
   - ☐ Usually
   - ☐ Always

9. **While your family member was in hospice care, how often did the hospice team keep you informed about your family member's condition?**
   - ☐ Never
   - ☐ Sometimes
   - ☐ Usually
   - ☐ Always

10. **While your family member was in hospice care, how often did anyone from the hospice team give you confusing or contradictory information about your family member's condition or care?**
    - ☐ Never
    - ☐ Sometimes
    - ☐ Usually
    - ☐ Always

11. **While your family member was in hospice care, how often did the hospice team treat your family member with dignity and respect?**
    - ☐ Never
    - ☐ Sometimes
    - ☐ Usually
    - ☐ Always

12. **While your family member was in hospice care, how often did you feel that the hospice team really cared about your family member?**
    - ☐ Never
    - ☐ Sometimes
    - ☐ Usually
    - ☐ Always

13. **While your family member was in hospice care, did you talk with the hospice team about any problems with your family member's hospice care?**
    - ☐ Yes
    - ☐ No → **If No, go to Question 15**

14. **How often did the hospice team listen carefully to you when you talked with them about problems with your family member's hospice care?**
    - ☐ Never
    - ☐ Sometimes
    - ☐ Usually
    - ☐ Always

15. While your family member was in hospice care, did he or she have any pain?

- ☐ Yes
- ☐ No → **If No, go to Question 17**

16. Did your family member get as much help with pain as he or she needed?

- ☐ Yes, definitely
- ☐ Yes, somewhat
- ☐ No

17. While your family member was in hospice care, did he or she receive any pain medicine?

- ☐ Yes
- ☐ No → **If No, go to Question 21**

18. Side effects of pain medicine include things like sleepiness. Did any member of the hospice team discuss side effects of pain medicine with you or your family member?

- ☐ Yes, definitely
- ☐ Yes, somewhat
- ☐ No

19. Did the hospice team give you the training you needed about what side effects to watch for from pain medicine?

- ☐ Yes, definitely
- ☐ Yes, somewhat
- ☐ No

20. Did the hospice team give you the training you needed about if and when to give more pain medicine to your family member?

- ☐ Yes, definitely
- ☐ Yes, somewhat
- ☐ No
- ☐ I did not need to give pain medicine to my family member

21. While your family member was in hospice care, did your family member ever have trouble breathing or receive treatment for trouble breathing?

- ☐ Yes
- ☐ No → **If No, go to Question 24**

22. How often did your family member get the help he or she needed for trouble breathing?

- ☐ Never
- ☐ Sometimes
- ☐ Usually
- ☐ Always

23. Did the hospice team give you the training you needed about how to help your family member if he or she had trouble breathing?

- ☐ Yes, definitely
- ☐ Yes, somewhat
- ☐ No
- ☐ I did not need to help my family member with trouble breathing

24. While your family member was in hospice care, did your family member ever have trouble with constipation?

- ☐ Yes
- ☐ No → **If No, go to Question 26**

25. How often did your family member get the help he or she needed for trouble with constipation?

- ☐ Never
- ☐ Sometimes
- ☐ Usually
- ☐ Always

26. While your family member was in hospice care, did he or she show any feelings of anxiety or sadness?

- ☐ Yes
- ☐ No → **If No, go to Question 28**

27. How often did your family member get the help he or she needed <u>from the hospice team</u> for feelings of anxiety or sadness?

- ☐ Never
- ☐ Sometimes
- ☐ Usually
- ☐ Always

28. While your family member was in hospice care, did he or she ever become restless or agitated?

- ☐ Yes
- ☐ No → **If No, go to Question 30**

29. Did the hospice team give you the training you needed about what to do if your family member became restless or agitated?

- ☐ Yes, definitely
- ☐ Yes, somewhat
- ☐ No

30. Moving your family member includes things like helping him or her turn over in bed, or get in and out of bed or a wheelchair. Did the hospice team give you the training you needed about how to safely move your family member?

- ☐ Yes, definitely
- ☐ Yes, somewhat
- ☐ No
- ☐ I did not need to move my family member

31. Did the hospice team give you as much information as you wanted about what to expect while your family member was dying?

- ☐ Yes, definitely
- ☐ Yes, somewhat
- ☐ No

HOSPICE CARE RECEIVED IN A NURSING HOME

32. Some people receive hospice care while they are living in a nursing home. Did your family member receive care from this hospice while he or she was living in a nursing home?

- ☐ Yes
- ☐ No → **If No, go to Question 35**

33. While your family member was in hospice care, how often did the nursing home staff and hospice team work well together to care for your family member?

- ☐ Never
- ☐ Sometimes
- ☐ Usually
- ☐ Always

34. While your family member was in hospice care, how often was the information you were given about your family member by the nursing home staff different from the information you were given by the hospice team?

- ☐ Never
- ☐ Sometimes
- ☐ Usually
- ☐ Always

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YOUR OWN EXPERIENCE WITH HOSPICE

35. While your family member was in hospice care, how often did the hospice team listen carefully to you?

- ☐ Never
- ☐ Sometimes
- ☐ Usually
- ☐ Always

36. Support for religious or spiritual beliefs includes talking, praying, quiet time, or other ways of meeting your religious or spiritual needs. While your family member was in hospice care, how much support for your religious and spiritual beliefs did you get from the hospice team?

- ☐ Too little
- ☐ Right amount
- ☐ Too much

37. While your family member was in hospice care, how much <u>emotional</u> support did you get from the hospice team?

- ☐ Too little
- ☐ Right amount
- ☐ Too much

38. In the weeks <u>after</u> your family member died, how much emotional support did you get from the hospice team?

- ☐ Too little
- ☐ Right amount
- ☐ Too much

OVERALL RATING OF HOSPICE CARE

39. Please answer the following questions about your family member's care from the hospice named on the survey cover. Do not include care from other hospices in your answers.

Using any number from 0 to 10, where 0 is the worst hospice care possible and 10 is the best hospice care possible, what number would you use to rate your family member's hospice care?

- ☐ 0 Worst hospice care possible
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 Best hospice care possible

40. Would you recommend this hospice to your friends and family?

- ☐ Definitely no
- ☐ Probably no
- ☐ Probably yes
- ☐ Definitely yes

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CARE RECEIVED FROM SPECIAL PROGRAM

41. Prior to starting full hospice care, your family member was enrolled in a special program that allowed him or her to continue receiving treatment for his or her terminal illness while receiving palliative or some supportive care from the hospice.

You may know this special program as:

The next questions are about your family member's experience with this special program.

How often did the team from this special program seem informed and up-to-date about your family member's treatment from providers that are not part of this program?

- ☐ Never
- ☐ Sometimes
- ☐ Usually
- ☐ Always

42. Did the team from this special program speak to you or your family member about what types of care or services he or she wanted?

- ☐ Yes, definitely
- ☐ Yes, somewhat
- ☐ No

43. Did the team from this special program provide care that respected your family member's wishes?

- ☐ Yes, definitely
- ☐ Yes, somewhat
- ☐ No

44. Did the team from this special program do anything that went against your family member's wishes?

- ☐ Yes, definitely
- ☐ Yes, somewhat
- ☐ No

45. Using any number from 0 to 10, where 0 is the worst experience possible and 10 is the best experience possible, what number would you use to rate your family member's experience with this special program?

- ☐ 0 Worst experience possible
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 Best experience possible

46. Would you recommend this special program to your friends and family?

- ☐ Definitely no
- ☐ Probably no
- ☐ Probably yes
- ☐ Definitely yes

YOUR FAMILY MEMBER'S TRANSITION TO FULL HOSPICE CARE

47. The decision to enroll in hospice involves a shift in the focus of care from extending life as much as possible to one that focuses on comfort. The next questions are about your family member's decision to enroll in full hospice care.

In your opinion, was the decision to enroll in full hospice care made too early, at the right time, or too late?

- ☐ Too early
- ☐ At the right time
- ☐ Too late

48. How much did you talk to a member of the team from the special program about the reasons for enrolling or not enrolling in full hospice care?

- ☐ Too little
- ☐ Right amount
- ☐ Too much

49. Did you feel that the team from the special program allowed you to ask as many questions as you wanted about enrolling in full hospice care?

- ☐ Yes, definitely
- ☐ Yes, somewhat
- ☐ No

50. Were you or your family member involved in the decision to enroll in full hospice care as much as you would have wanted?

- ☐ Yes, definitely
- ☐ Yes, somewhat
- ☐ No

51. Was the decision to enroll in full hospice care made free of pressure from anyone from the special program?

- ☐ Yes, definitely
- ☐ Yes, somewhat
- ☐ No
- ☐ I was not involved in this decision

52. Did your family member continue to receive treatment for his or her terminal illness for as long as he or she wanted?

- ☐ Yes, definitely
- ☐ Yes, somewhat
- ☐ No

53. Using any number from 0 to 10, where 0 is the worst quality of life possible and 10 is the best quality of life possible, what number would you use to rate the quality of your family member's life during the time he or she was receiving care from the special program?

- ☐ 0 Worst quality of life possible
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 Best quality of life possible

54. What are the reasons your family member switched from the special program to full hospice care?

ABOUT YOUR FAMILY MEMBER

55. What is the highest grade or level of school that <u>your family member</u> completed?

- ☐ 8th grade or less
- ☐ Some high school but did not graduate
- ☐ High school graduate or GED
- ☐ Some college or 2-year degree
- ☐ 4-year college graduate
- ☐ More than 4-year college degree
- ☐ Don't know

56. Was <u>your family member</u> of Hispanic, Latino, or Spanish origin or descent?

- ☐ No, not Spanish/Hispanic/Latino
- ☐ Yes, Puerto Rican
- ☐ Yes, Mexican, Mexican American, Chicano/a
- ☐ Yes, Cuban
- ☐ Yes, Other Spanish/Hispanic/Latino

57. What was <u>your family member's</u> race? Please choose one or more.

- ☐ White
- ☐ Black or African American
- ☐ Asian
- ☐ Native Hawaiian or other Pacific Islander
- ☐ American Indian or Alaska Native

ABOUT YOU

58. What is your age?

- ☐ 18 to 24
- ☐ 25 to 34
- ☐ 35 to 44
- ☐ 45 to 54
- ☐ 55 to 64
- ☐ 65 to 74
- ☐ 75 to 84
- ☐ 85 or older

59. Are you male or female?

- ☐ Male
- ☐ Female

60. What is the highest grade or level of school that you have completed?

- ☐ 8th grade or less
- ☐ Some high school but did not graduate
- ☐ High school graduate or GED
- ☐ Some college or 2-year degree
- ☐ 4-year college graduate
- ☐ More than 4-year college degree

61. What language do you <u>mainly</u> speak at home?

- ☐ English
- ☐ Spanish
- ☐ Chinese
- ☐ Russian
- ☐ Portuguese
- ☐ Vietnamese
- ☐ Polish
- ☐ Korean
- ☐ Some other language (please print):

10889

62. This question allows you to provide additional feedback about your family member's care.

In thinking about your experiences with <u>the special program and the hospice</u>, was there anything that went well or that you wish had gone differently for you and your family member? Please tell us about those experiences.

Thank you.
Please return the completed survey in the postage-paid envelope.

RAND Corporation
Attn: Ryan McKay
1776 Main Street
Santa Monica, CA 90401

Appendix I. Supplemental Analyses by Topic

This appendix presents supplemental analyses on selected topics:

- **Sections I.1** and **I.2** present additional analyses based on topics presented in the main report.
- **Sections I.3** and **I.4** present updated data on hospice delivery of Medicare Care Choices Model (MCCM) encounters and services, enrollees' use of home health care and oncology visits, and learning and diffusion activities offered during 2019.
- **Section I.5** presents comparisons of MCCM hospices' organizational and market characteristics across participation status and cumulative enrollment levels.

I.1 MCCM REFERRALS AND ENROLLMENTS

We present information about the volume of referrals to MCCM and the disposition of MCCM-eligible referrals between 2016 and the first three quarters of 2019 in **Section 1.1** in the main report. This section presents the following supplemental analyses on these topics by cohort:

- **Exhibit I.1** shows the volume and eligibility of referrals to MCCM for cohorts 1 and 2.
- **Exhibit I.2** shows the disposition of eligible referrals to MCCM for cohorts 1 and 2 in terms of (1) enrollment in MCCM, (2) enrollment in the Medicare hospice benefit (MHB), (3) declined enrollment offers, and (4) death.

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Exhibit I.1 MCCM-Eligibility of Medicare Beneficiaries Referred to Cohort 1 and Cohort 2 Hospices by Year

Disposition	2016		2017		2018		2019[a]	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Cohort 1								
Referred to MCCM	3,207	N/A	4,032	N/A	4,454	N/A	1,736	N/A
Eligible for MCCM	1,147	35.8%	1,836	45.5%	1,507	33.8%	782	45.0%
Cohort 2								
Referred to MCCM	N/A	N/A	N/A	N/A	2,684	N/A	1,910	N/A
Eligible for MCCM	N/A	N/A	N/A	N/A	1,551	57.8%	1,204	N/A

Sources: MCCM portal data for January 1, 2016 through September 30, 2019.

Note: This exhibit shows the number of Medicare beneficiaries referred to MCCM cohort 1 and 2 hospices, and the number and percentage of referrals who were eligible for MCCM by calendar year. [a] Exhibit entries for 2019 cover the nine-month period ending on September 30, 2019.

Exhibit I.2 Disposition of MCCM-Eligible Medicare Beneficiaries Referred to Cohort 1 and Cohort 2 Hospices by Year

Disposition	2016		2017		2018		2019[a]	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Cohort 1								
Enrolled in MCCM	632	55.1%	951	51.8%	981	65.1%	540	69.1%
Enrolled directly in MHB	276	24.1%	468	25.5%	248	16.5%	111	14.2%
Declined to enroll in MCCM or MHB	198	17.3%	343	18.7%	230	15.3%	110	14.1%
Died	41	3.6%	74	4.0%	48	3.2%	21	2.7%
Total	**1,147**	**100.0%**	**1,836**	**100.0%**	**1,507**	**100.0%**	**782**	**100.0%**
Cohort 2								
Enrolled in MCCM	N/A	N/A	N/A	N/A	1,061	68.4%	815	67.7%
Enrolled directly in MHB	N/A	N/A	N/A	N/A	236	15.2%	146	12.1%
Declined to enroll in MCCM or MHB	N/A	N/A	N/A	N/A	192	12.4%	195	16.2%
Died	N/A	N/A	N/A	N/A	62	4.0%	48	4.0%
Total	**N/A**	**N/A**	**N/A**	**N/A**	**1,551**	**100.0%**	**1,204**	**100.0%**

Sources: MCCM portal data for January 1, 2018 through September 30, 2019.

Note: This exhibit shows the disposition of MCCM-eligible Medicare beneficiaries referred to cohort 2 hospices. Totals may not sum to 100% due to rounding.

[a] Exhibit entries for 2019 cover the nine-month period ending on September 30, 2019.

MHB = Medicare hospice benefit, N/A = not applicable.

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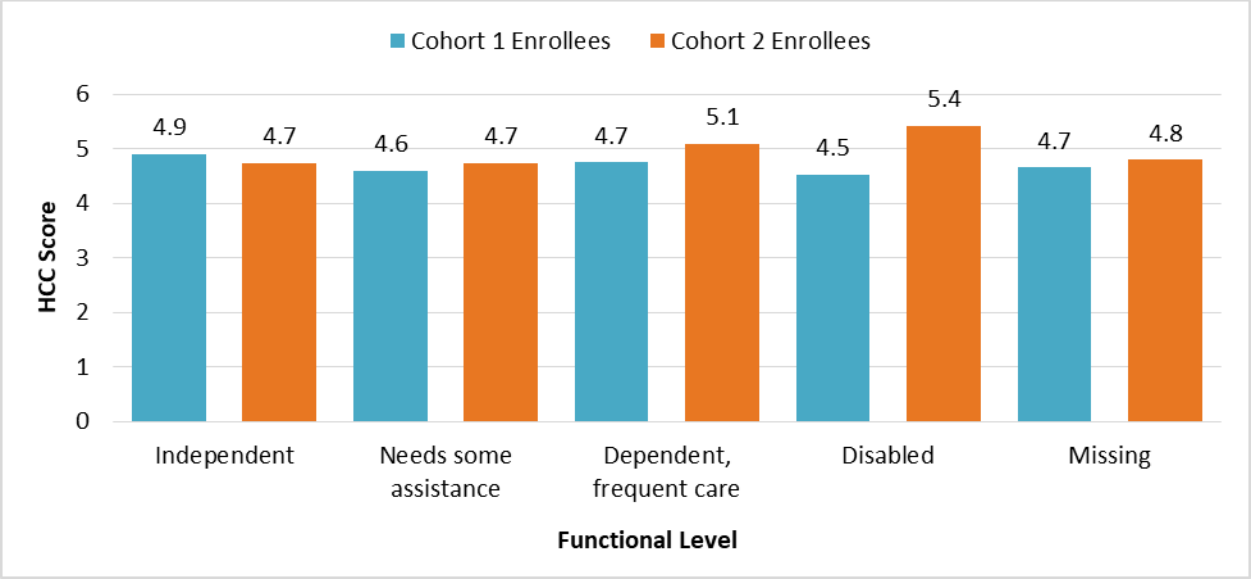
I.2 PATHWAYS TO MCCM

Information about the health status and use of Medicare services for Medicare beneficiaries during the year before enrollment in MCCM is presented in **Section 2** in the main report. This section presents supplemental analyses describing enrollee health and functional status, and hospice-reported data from the 2017 and 2018 organizational survey:

- **Exhibit I.3** shows hierarchical condition category codes by cohort and functional status.
- **Exhibit I.4** compares the demographic characteristics of MCCM enrollees and decedents.
- **Exhibit I.5** compares social support and living arrangements for MCCM enrollees and decedents.
- **Exhibits I.6** and **I.7** show hospice-reported affiliations and contracts with outside organizations, and access to medical record data by survey wave and cohort.

Exhibit I.3 Hierarchical Condition Category Scores of MCCM Enrollees, by Cohort and Functional Status



Sources: Medicare claims data, Master Beneficiary Summary file, and MCCM portal data, January 1, 2016-September 30, 2019.

Note: This exhibit displays MCCM decedent's HCC scores by functional level by MCCM cohort. The analysis is based on MCCM decedents (n = 3,603), with dates of death on or before September 30, 2019. Two MCCM decedents were not included in the analysis due to missing hospice provider numbers. Sample sizes for each cohort and functional status were as follows: Independent, cohort 1: n = 415, cohort 2: n = 228; needs some assistance, cohort 1: n = 1,223, cohort 2: n = 483; dependent, frequent care, cohort 1: n = 342, cohort 2: n = 243; and disabled, cohort 1: n = 170, cohort 2: = 58. Information on functional status was missing for 439 enrollees (cohort 1: n = 267, and cohort 2: n = 172). HCC scores used in this exhibit were calculated for each MCCM decedent at the time of enrollment. These HCC scores were updated from the HCC scores reported in **MCCM Annual Report 2**, which were drawn from 2015 data in the CMS Chronic Conditions Data Warehouse. Higher scores represent higher-than-expected Medicare expenditures. The average HCC score reported here is higher than that reported in **Annual Reports 1 and 2**. This is because for this report, we calculated HCC scores based on diagnoses recorded on claims submitted during the 12 months before beneficiaries' enrollment in MCCM, which more accurately reflects pre-enrollment terminal diagnoses.

HCC = hierarchical condition category.

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Exhibit I.4 Demographic Characteristics of MCCM Enrollees and MCCM Decedents

Beneficiary Characteristic	MCCM Enrollees (n = 4,988)	MCCM Decedents (n = 3,603)
Age		
0-64	6.3%	5.4%
65-74	24.5%	24.4%
75-84	35.6%	37.1%
85+	33.6%	33.1%
Gender		
Male	48.0%	50.1%
Female	51.9%	49.8%
Missing	0.1%	0.1%
Race/ethnicity		
White	85.8%	85.7%
Black	6.8%	6.6%
Hispanic	2.4%	2.4%
Other	1.8%	1.8%
None given	3.3%	3.6%
Census region		
South	36.9%	37.8%
Midwest	25.8%	26.1%
Northeast	20.6%	20.6%
West	16.6%	15.4%
Dual eligible		
No	93.0%	91.0%
Yes	7.0%	9.1%
Location		
Rural	10.7%	10.2%
Urban	89.3%	89.8%

Sources: MCCM portal data, Medicare Enrollment Data, and Master Beneficiary Summary file, January 1, 2016-September 30, 2019.

Note: This exhibit displays column percentages for characteristics of MCCM enrollees and MCCM decedents. MCCM decedents are enrollees with dates of death on or before September 30, 2019.

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Exhibit I.5 Social Support and Living Arrangement for MCCM Enrollees and MCCM Decedents

Beneficiary Characteristic	MCCM Enrollees (n = 4,988)	MCCM Decedents (n = 3,603)
Marital status		
Married	49.8%	51.9%
Widowed	28.6%	26.8%
Divorced	9.2%	9.0%
Never married	5.7%	5.7%
Declined to report	5.9%	5.8%
Partner	0.9%	0.9%
Caregiver		
Spouse/partner	39.5%	40.4%
Immediate family	29.0%	28.6%
Other relative	2.6%	2.6%
Friend/neighbor	1.7%	1.9%
Other	4.5%	4.6%
None listed	22.7%	21.9%
Living arrangement		
Lives with other person(s)	75.0%	77.6%
Lives alone	22.4%	20.1%
Missing	2.6%	2.4%

Sources: MCCM portal data, January 1, 2016-September 30, 2019.

Note: This exhibit displays column percentages for MCCM enrollees and MCCM decedents with dates of death on or before September 30, 2019. Caregiver is the first recorded caregiver, whether at screening (for beneficiaries who enrolled before January 1, 2018) or during an encounter (after January 1, 2018).

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Exhibit I.6 Hospice-Reported Organizational Affiliation and Contracts

Organizational Types	2017		2018	
	Cohort 1 (n = 37)	Cohort 2 (n = 34)	Cohort 1 (n = 37)	Cohort 2 (n = 34)
Hospital	83.8%	73.5%	81.1%	91.2%
Inpatient rehabilitation facility	27.0%	26.5%	29.7%	29.4%
Palliative care program	51.4%	67.6%	59.5%	67.6%
Nursing facility/skilled nursing facility	75.7%	67.6%	64.9%	79.4%
Home health agency	48.6%	61.8%	54.1%	64.7%
Assisted living community	51.4%	52.9%	51.4%	55.9%
Continuing care retirement community	18.9%	17.6%	18.9%	23.5%
Personal care home	18.9%	26.5%	16.2%	0.0%
Medical home	13.5%	5.9%	13.5%	0.0%
Physician practice	37.8%	41.2%	40.5%	52.9%
None of the above	5.4%	5.9%	2.7%	2.9%
Other	5.4%	8.8%	5.4%	5.9%

Sources: Organizational survey fielded in 2017 (wave 1) and 2018 (wave 2).

Note: This exhibit displays information from hospices that responded to both waves (2017 and 2018) of the organizational survey. We include responses from 37 cohort 1 hospices and 34 cohort 2 hospices to the following survey item: "Please indicate the types of health care organizations the hospice has an affiliation or contract with." Hospices could select multiple responses for each item. The other category included write-in responses: Durable medical equipment, Meals on Wheels, mobile medicine, private duty/caregiving service, independent hospice, Program of All-inclusive Care for the Elderly, cancer center-palliative care, and visiting nurse service.

Exhibit I.7 Hospice-Reported Access to Medical Record Data

Organizational Types	2017		2018	
	Cohort 1 (n = 37)	Cohort 2 (n = 34)	Cohort 1 (n = 37)	Cohort 2 (n = 34)
Hospital	91.9%	82.4%	85.7%	82.4%
Inpatient rehabilitation facility	41.4%	44.8%	40.0%	36.7%
Palliative care program	84.8%	81.8%	73.5%	69.7%
Nursing facility/skilled nursing facility	60.6%	67.6%	25.8%	45.5%
Home health agency	58.1%	77.4%	52.9%	60.6%
Assisted living community	50.0%	51.5%	16.1%	18.2%
Continuing care retirement community	25.0%	20.7%	6.7%	16.7%
Physician practice	61.3%	64.3%	53.1%	43.8%

Sources: Organizational survey fielded in 2017 (wave 1) and 2018 (wave 2).

Note: This exhibit displays information from hospices that responded to both waves (2017 and 2018) of the organizational survey. We include responses from 37 cohort 1 hospices and 34 cohort 2 hospices to the following survey item: "Please indicate the settings of care for which the hospice has access to medical record information." Hospices could select multiple responses for each item.

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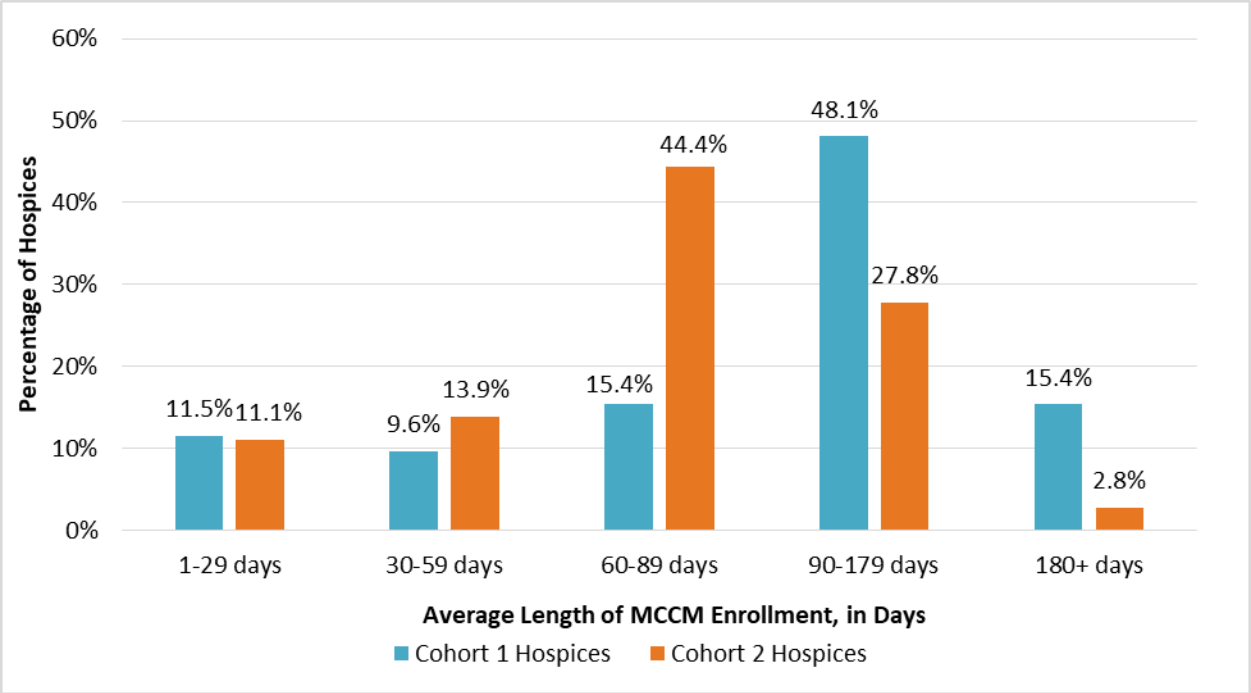
I.3 TRANSITIONS FROM MCCM TO MHB

Information on transitions from MCCM to MHB appears in **Section 3** in the main report. Data on MCCM enrollment duration by cohort are shown in **Exhibit I.8** and enrollee and caregiver experiences of transitions to MHB are shown in **Exhibits I.9** and **I.10**.

Exhibit I.8 MCCM Enrollment Duration by Cohort



Sources: Master Beneficiary Summary file and MCCM portal data, January 1, 2016-September. 30, 2019.

Note: This exhibit displays an analysis of the number of days that Medicare beneficiaries were enrolled in MCCM before discharge by cohort. The analysis includes 4,226 of the 4,988 Medicare beneficiaries who enrolled in MCCM on or before September 30, 2019 with a discharge reason code (2,720 cohort 1 enrollees and 1,506 cohort 2 enrollees; 2 enrollees with missing hospice-identifying information were omitted from the analysis). The sample includes enrollees who were discharged from MCCM, whether or not they died before September 30, 2019.

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Exhibit I.9 Shared Decision Making among MCCM Enrollees Who Transitioned to Medicare Hospice Benefit, and Medicare Hospice Benefit Comparisons

Caregiver Survey Item	MCCM Enrollees Who Transitioned to MHB (n = 793)	MCCM Enrollees Who Transitioned to MHB: Cohort 1 (n = 507)	MCCM Enrollees Who Transitioned to MHB: Cohort 2 (n = 286)	MHB Comparisons in MCCM Hospices (n = 786)	MHB Comparisons in Matched Hospices (n = 696)
A member of the MCCM team/hospice team talked with the beneficiary or family about the reasons for enrolling or not enrolling in hospice:					
Too little	8.9%	9.3%	8.0%	7.8%	8.9%
Right amount	90.2%	90.2%	90.2%	91.6%	90.7%
Too much	0.9%	0.5%	1.8%++	0.6%^^	0.4%
A member of the MCCM team/hospice team allowed the beneficiary or family to ask as many questions as they wanted about enrolling in full hospice care					
Yes, definitely	86.7%	86.8%	86.5%	89.0%	86.7%
Yes, somewhat	10.6%	9.9%	11.9%	9.1%	11.6%
No	2.7%	3.3%	1.6%+	1.9%	1.7%
The beneficiary or family were involved as much as they would have wanted to be in the decision to enroll in hospice					
Yes, definitely	90.4%	90.4%	90.2%	89.6%	88.4%
Yes, somewhat	6.8%	7.4%	5.7%	8.8%^	10.1%**
No	2.8%	2.1%	4.1%++	1.6%^^^	1.5%
The decision to enroll in hospice was made free of pressure from the MCCM team/hospice team					
Yes, definitely	88.1%	87.1%	89.8%	90.7%+	90.6%
Yes, somewhat	5.6%	5.5%	5.6%	5.0%	3.3%*
No	6.4%	7.4%	4.6%+	4.4%*, ++	6.1%
The decision to enroll in hospice was made:					
Too early	2.2%	1.8%	2.9%	1.7%	4.1%**
At the right time	90.0%	91.5%	87.4%++	87.8%+	87.5%
Too late	7.8%	6.7%	9.7%+	10.5%*, ++	8.4%

Sources: Caregiver Experience of Care Survey responses for MCCM enrollees and comparison MHB beneficiaries who died between October 1, 2017 and September 30, 2019.

Note: Significance is reported from a linear regression model, including case-mix adjustors and weights with statistical significance at the 10% (*,+,^), 5% (**,++,^^), and 1% (***,+++,^^^) levels. The following tests were performed: Comparisons in MCCM hospices overall (both cohorts) versus MHB cases overall (both cohorts), comparisons in comparison hospices versus MHB cases overall (both cohorts), MHB cases in cohort 1 hospices versus MHB cases in cohort 2 hospices, comparisons in MCCM hospices overall (both cohorts) versus MHB cases in cohort 1 hospices, and comparisons in MCCM hospices overall (both cohorts) versus MHB cases in cohort 2 hospices. Asterisks (*) are used to identify tests for differences compared to MHB overall (both cohorts). Plus signs (+) are used to identify tests compared to MHB cohort 1 cases. Carets (^) are used to identify tests for differences compared to MHB cohort 2 cases. Please refer to **Exhibit H.5** for the power analysis and additional details on the caregiver survey.

MHB = Medicare hospice benefit.

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Exhibit I.10 Shared Decision Making among MCCM Enrollees Who Did Not Transition to the Medicare Hospice Benefit

Caregiver Survey Item	MCCM-Only (n = 131)
A member of the MCCM team talked with the beneficiary or family about the reasons for enrolling or not enrolling in hospice:	
Too little	7.9%
Right amount	59.1%
Too much	3.1%
Did not talk with anyone from the special program about enrolling in full hospice care	29.9%
A member of the MCCM team allowed the beneficiary or family to ask as many questions as they wanted about enrolling in full hospice care	
Yes, definitely	56.3%
Yes, somewhat	11.9%
No	1.6%
Did not talk with anyone from the special program about enrolling in full hospice care	30.2%
The beneficiary or family were involved as much as they would have wanted to be in the decision to enroll in hospice	
Yes, definitely	66.9%
Yes, somewhat	21.8%
No	11.3%
The decision to enroll in hospice was made free of pressure from the MCCM team	
Yes, definitely	70.9%
Yes, somewhat	12.7%
No	16.4%
The discussion about enrolling in hospice happened:	
Too early	11.3%
At the right time	50.0%
Too late	8.1%
Did not talk with anyone from the special program about enrolling in full hospice care	30.6%

Sources: Caregiver Experience of Care Survey responses for MCCM enrollees who did not transition to the Medicare hospice benefit and died between April 1, 2017 and September 30, 2019.

Note: Scores are reported from a linear regression model, including case-mix adjustors. Please refer to **Exhibit H.5** for the power analysis and additional details on the caregiver survey.

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I.4 QUALITY OF CARE EXPERIENCED BY MCCM ENROLLEES AND CAREGIVERS

We present the analysis of the quality of care experienced by MCCM enrollees and their caregivers in **Section 5** in the main report. This section provides the following supplemental analyses related to these topics:

- **Exhibit I.11** shows characteristics of MCCM enrollees who did or did not receive comprehensive assessments
- **Exhibit I.12** shows caregiver reports about quality of life and experiences of care among MCCM enrollees who transitioned to hospice and MHB comparisons
- **Exhibit I.13** shows caregiver reports about quality of life and experiences of care among MCCM enrollees who did not transition to MHB
- **Exhibit I.14** shows caregiver reports regarding hospice quality of care among MCCM enrollees who transitioned to MHB and MHB comparisons
- **Exhibit I.15** shows caregiver reports regarding MCCM care experiences among MCCM enrollees who did not transition to MHB.

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Exhibit I.11 Characteristics of MCCM Enrollees Who Did or Did Not Receive Comprehensive Assessments

Characteristic	MCCM Enrollees Receiving One or More Comprehensive Assessments	MCCM Enrollees Receiving No Comprehensive Assessments
MCCM-qualifying diagnosis		
Cancer	59.8%	60.2%
Chronic obstructive pulmonary disease	17.0%	17.8%
Congestive heart failure	23.0%	21.5%
Human immunodeficiency virus/acquired immunodeficiency syndrome	0.3%	0.5%
Age (mean)	80.1	81.1
Female	51.8%	52.4%
Race/ethnicity		
White non-Hispanic	85.9%	84.4%
Black non-Hispanic	6.8%	6.1%
Hispanic	2.3%	3.7%
Other	5.0%	5.9%
Lives alone	22.8%	24.8%
Marital status		
Married/partner	50.8%	49.8%
Widowed/divorced	37.9%	35.9%
Other	11.3%	14.4%

Sources: MCCM portal data, January 1, 2018-September 30, 2019.

Note: This exhibit includes data on 3,258 MCCM enrollees. CMS expects MCCM hospices to administer a comprehensive assessment within 5 days of enrollment and subsequent assessments, as needed, no more than 15 days apart, in accordance with Medicare hospice benefit conditions of participation. During comprehensive assessments, MCCM staff assess (and record) the enrollee's functional status for clinical indicators such as pain, shortness of breath, and emotional distress. If a hospice records only a 48-hour initial assessment and no comprehensive assessments for a given enrollee, then we count the 48-hour initial assessment as a comprehensive assessment because the same data are collected, although fewer hospice personnel are involved. Functional status is the first recorded functional status, whether at screening (for beneficiaries who enrolled before January 1, 2018) or during an encounter (after January 1, 2018).

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Exhibit I.12 Quality of Life and Experiences of Care among MCCM Enrollees Who Transitioned to the Medicare Hospice Benefit and Medicare Hospice Benefit Comparisons

Caregiver Survey Item	MCCM Enrollees Who Transitioned to MHB (n = 793)	MCCM Enrollees Who Transitioned to MHB: Cohort 1 (n = 507)	MCCM Enrollees Who Transitioned to MHB: Cohort 2 (n = 286)	MHB Comparisons in MCCM Hospices (n = 786)	MHB Comparisons in Matched Hospices (n = 696)
Quality-of-life rating					
0 to 10 rating of the quality of family member's life during the time he or she was receiving care from the [MCCM program/hospice] (mean)	8.6	8.5	8.6	8.4	8.5
Care coordination					
Special program team seemed informed and up-to-date about your family member's treatment from providers that are not part of this program					
Never	4.2%	4.3%	4.0%	N/A	N/A
Sometimes	10.3%	10.9%	9.2%	N/A	N/A
Usually	31.4%	30.0%	34.0%	N/A	N/A
Always	54.1%	54.8%	52.8%	N/A	N/A
Consistency of care with beneficiary preferences					
MCCM program/hospice team spoke to beneficiary or family about what types of care or services beneficiary wanted					
Yes, definitely	77.6%	77.8%	77.3%	76.7%	79.1%
Yes, somewhat	18.5%	17.5%	20.4%	18.7%	16.3%
No	3.9%	4.7%	2.3%++	4.6%^	4.6%
MCCM program/hospice team provided care that respected the patient's wishes					
Yes, definitely	87.2%	86.6%	88.4%	90.6%**,++	90.8%**
Yes, somewhat	10.5%	10.9%	9.8%	8.4%	8.1%
No	2.2%	2.5%	1.7%	1.0%*,++	1.1%
MCCM program/hospice team did anything that went against the patient's wishes					
Yes, definitely	1.9%	2.1%	1.6%	1.6%	0.6%**
Yes, somewhat	2.3%	2.2%	2.3%	2.6%	3.9%*
No	95.8%	95.6%	96.1%	95.8%	95.5%
Enrollee continued to receive treatment for his or her illness for as long as he or she wanted					
Yes, definitely	90.8%	91.3%	89.9%	90.2%	92.9%
Yes, somewhat	6.3%	6.7%	5.4%	6.5%	3.4%**
No	2.9%	1.9%	4.7%++	3.2%	3.7%
Overall rating					
0 to 10 rating of family member's experience with MCCM program (mean)	9.1	9.1	9.1	N/A	N/A

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Caregiver Survey Item	MCCM Enrollees Who Transitioned to MHB (n = 793)	MCCM Enrollees Who Transitioned to MHB: Cohort 1 (n = 507)	MCCM Enrollees Who Transitioned to MHB: Cohort 2 (n = 286)	MHB Comparisons in MCCM Hospices (n = 786)	MHB Comparisons in Matched Hospices (n = 696)
Willingness to recommend MCCM program to friends and family					
Definitely no	1.5%	1.8%	0.9%	N/A	N/A
Probably no	2.5%	2.9%	1.6%	N/A	N/A
Probably yes	19.4%	18.9%	20.3%	N/A	N/A
Definitely yes	76.6%	76.3%	77.2%	N/A	N/A

Sources: Caregiver Experience of Care Survey responses for MCCM enrollees and comparison MHB beneficiaries who died between October 1, 2017 and September 30, 2019.

Note: Significance is reported from a linear regression model, including case-mix adjustors and weights, with statistical significance at the 10% (*,+,^), 5% (**,++,^^), and 1% (***,+++,^^^) levels. The following tests were performed: Comparisons in MCCM hospices overall (both cohorts) versus MHB cases overall (both cohorts), comparisons in comparison hospices versus MHB cases overall (both cohorts), MHB cases in cohort 1 hospices versus MHB cases in cohort 2 hospices, comparisons in MCCM hospices overall (both cohorts) versus MHB cases in cohort 1 hospices, and comparisons in MCCM hospices overall (both cohorts) versus MHB cases in cohort 2 hospices. Asterisks (*) are used to identify test differences with MHB overall (both cohorts). Plus signs (+) are used to identify test differences with MHB cohort 1 cases. Carets (^) are used to identify test differences with MHB cohort 2 cases. If a version of the measure/item was not asked on a respective decedent/caregiver group's survey, that group was excluded from the model. Results for the item regarding whether the model team was informed and up-to-date about a family member's treatment from providers that are not part of this model are not shown for comparison groups, as the parallel survey item on the comparison survey asks about the care coordination within the hospice team, not between the MCCM team and outside providers. Underlined text indicates where the item wording varied across the survey versions. Items regarding the overall rating and willingness to recommend the model are not included in the comparison survey version.

MHB = Medicare hospice benefit, N/A = not applicable.

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Exhibit I.13 Quality of Life and Experiences of Care among MCCM Enrollees Who Did Not Transition to the Medicare Hospice Benefit

Caregiver Survey Item	MCCM Only (n = 131)
Quality-of-life rating	
0 to 10 rating of the quality of family member's life during the time he or she was receiving care from the [MCCM program/hospice] (mean)	7.0
Care coordination	
Special program team seemed informed and up-to-date about your family member's treatment from providers that are not part of this program	
Never	11.8%
Sometimes	26.8%
Usually	27.6%
Always	33.9%
Consistency of care with beneficiary preferences	
Team from MCCM program spoke to enrollee or family about what types of care or services enrollee wanted:	
Yes, definitely	65.1%
Yes, somewhat	27.9%
No	7.0%
Team from this MCCM program provided care that respected the patient's wishes	
Yes, definitely	80.6%
Yes, somewhat	15.5%
No	3.9%
Team from MCCM program did anything that went against the patient's wishes	
Yes, definitely	0.8%
Yes, somewhat	3.8%
No	95.4%
Enrollee continued to receive treatment for his or her illness for as long as he or she wanted	
Yes, definitely	82.5%
Yes, somewhat	13.3%
No	4.2%
Overall rating	
0 to 10 rating of family member's experience with MCCM program (mean)	8.4
Willingness to recommend MCCM program to friends and family	
Definitely no	2.3%
Probably no	4.6%
Probably yes	16.9%
Definitely yes	76.2%

Sources: Caregiver Experience of Care Survey responses for MCCM enrollees who did not transition to the Medicare hospice benefit and died between April 1, 2017 and September 30, 2019.

Note: Scores are reported from a linear regression model, including case-mix adjustors. Underlined text indicates where the item wording varied across the survey versions. Please refer to **Section H.5** for the power analysis and additional details on the caregiver survey.

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Exhibit I.14 Hospice Care Experiences among MCCM Enrollees Who Transitioned to the Medicare Hospice Benefit and Medicare Hospice Benefit Comparisons

Caregiver Survey Item	MCCM Enrollees Who Transitioned to MHB: Top-Box Score (n = 793)	MCCM Enrollees Who Transitioned to MHB: Cohort 1 Top-Box Score (n = 507)	MCCM Enrollees Who Transitioned to MHB: Cohort 2 Top-Box Score (n = 286)	MHB Comparisons in MCCM Hospices: Top-Box Score (n = 786)	MHB Comparisons in Matched Hospices: Top-Box Score (n = 696)
Communication with family	82.3%	82.3%	82.2%	82.5%	82.0%
Getting timely help	76.6%	76.4%	76.9%	78.8%	78.8%
Treating patient with respect	90.0%	90.0%	89.9%	90.5%	90.6%
Help for pain and symptoms	74.3%	74.3%	74.4%	76.0%	78.1%**
Emotional and spiritual support	90.1%	90.2%	89.9%	91.3%	91.3%
Training family to care for patient	76.7%	76.1%	77.8%	77.3%	76.5%
Willingness to recommend the hospice	85.6%	85.1%	86.7%	83.0%^	86.3%

Sources: Caregiver Experience of Care Survey responses for MCCM enrollees and comparison MHB beneficiaries who died between October 1, 2017 and September 30, 2019.

Note: Significance is reported from a linear regression model, including case-mix adjustors and weights, with statistical significance at the 10% (*,+,^), 5% (**,++,^^), and 1% (***,+++,^^^) levels. The following tests were performed: Comparisons in MCCM hospices overall (both cohorts) versus MHB cases overall (both cohorts), comparisons in comparison hospices versus MHB cases overall (both cohorts), MHB cases in cohort 1 hospices versus MHB cases in cohort 2 hospices, comparisons in MCCM hospices overall (both cohorts) versus MHB cases in cohort 1 hospices, and comparisons in MCCM hospices overall (both cohorts) versus MHB cases in cohort 2 hospices. Asterisks (*) are used to identify test differences with MHB overall (both cohorts). Plus signs (+) are used to identify test differences with MHB cohort 1 cases. Carets (^) are used to identify test differences with MHB cohort 2 cases. If a version of the measure/item was not asked on a respective decedent/caregiver group's survey, that group was excluded from the model. Top-box scores reflect the proportion of respondents who selected the most-favorable response options. For example, for frequency ("How often?") questions with response options of "Never," "Sometimes," "Usually," and "Always," the top-box score is the proportion of respondents who responded "Always." Please refer to **Section H.5** for the power analysis and additional details on the caregiver survey.

MHB = Medicare hospice benefit.

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Exhibit I.15 Care Experiences among MCCM Enrollees Who Did Not Transition to the Medicare Hospice Benefit

Caregiver Survey Item	MCCM Only Top-Box Score (n = 131)
Communication with family	74.6%
Getting timely help	59.9%
Treating patient with respect	86.1%
Help for pain and symptoms	52.6%
Emotional and spiritual support	77.4%
Training family to care for patient	56.4%

Sources: Caregiver Experience of Care Survey responses for MCCM enrollees who did not transition to the Medicare hospice benefit and died between April 1, 2017 and September 30, 2019.

Note: Scores are reported from a linear regression model, including case-mix adjustors. Top-box scores reflect the proportion of respondents who selected the most-favorable response options. For example, for frequency ("How often?") questions with response options of "Never," "Sometimes," "Usually," and "Always," the top-box score is the proportion of respondents who responded "Always." Please refer to **Section H.5** for the power analysis and additional details on the caregiver survey.

I.5 UPDATED MCCM ENCOUNTER AND SERVICE DATA

This section provides a new and updated analysis of the MCCM encounter and service data that were presented in **Annual Report 2, Section 4** and **J.4** of the report's Technical Appendix. This section provides the following supporting data:

- **Exhibit I.16** shows receipt of MCCM-delivered encounters and services to enrollees, family members, and non-family caregivers overall and by cohort.
- **Exhibit I.17** shows MCCM-delivered encounters and services by delivery mode and by cohort.
- **Exhibit I.18** shows the number of MCCM encounters per month by duration of MCCM enrollment.
- **Exhibit I.19** shows the number of MCCM encounters per month by MCCM diagnosis and functional status.
- **Exhibit I.20** shows enrollee receipt of MCCM services by provider type and cohort.
- **Exhibit I.21** shows enrollee receipt of MCCM encounters by provider type and cohort.
- **Exhibit I.22** shows documentation of interdisciplinary group meetings and other encounters in the MCCM portal.
- **Exhibit I.23** shows MCCM enrollee receipt of home health care services by type of service.
- **Exhibit I.24** shows MCCM enrollee receipt of oncology visits by enrollment duration.

We describe the specification of relevant measures in **Appendix E**.

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Exhibit I.16 Distribution of MCCM Encounters by Recipient Type

Recipient	Total (n = 112,947)	Cohort 1 (n = 69,004)	Cohort 2 (n = 43,882)
Enrollee	93.2%	92.7%	94.1%
Family member	34.4%	31.1%	39.5%
Caregiver (not family)	5.7%	7.0%	3.6%

Sources: MCCM portal data, January 1, 2016 to September 30, 2019.

Note: This exhibit includes data on 4,988 MCCM enrollees. Sixty-one encounters are missing cohort information due to having invalid hospice identifiers. An "encounter" refers to a meeting, either in person or by phone, between an MCCM beneficiary or caregiver and a health care provider. Note that single encounters may benefit multiple individuals. Totals are greater than 100%, as a single encounter can benefit multiple recipients.

Exhibit I.17 Distribution of MCCM Encounters by Delivery Mode and Cohort

Delivery Mode	Total (n = 112,947)	Cohort 1 (n = 69,004)	Cohort 2 (n = 43,882)
Home/residence	75.6%	74.5%	77.3%
Phone	22.4%	23.7%	20.5%
Facility bedside	0.3%	0.6%	0.0%
Mail/email/video conference	1.6%	1.3%	2.2%
Missing	0.0%	0.0%	0.0%

Sources: MCCM portal data, January 1, 2016 to September 30, 2019.

Note: The exhibit includes data on 4,988 MCCM enrollees. Sixty-one encounters are missing cohort information due to having invalid hospice identifiers. An "encounter" refers to a meeting, either in person or by phone, between an MCCM beneficiary or caregiver and a health care provider.

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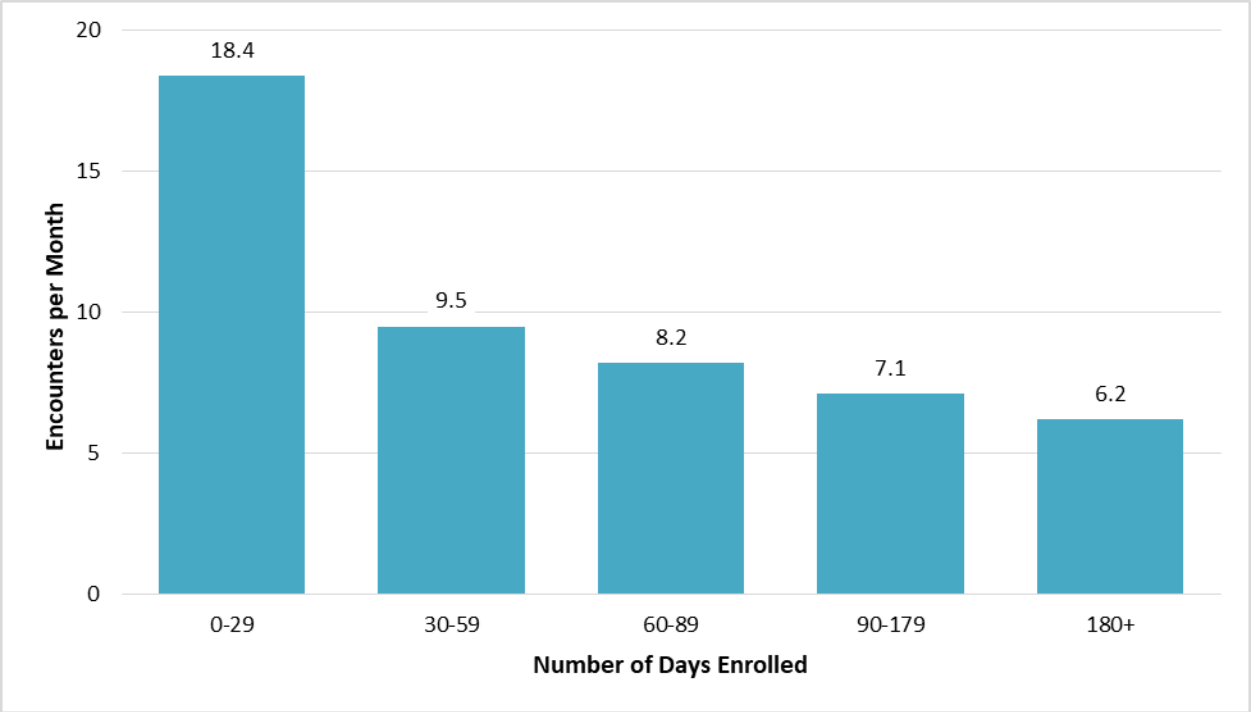
Exhibit I.18 Average MCCM Encounters per Month, by Duration of Enrollment



Sources: MCCM portal data, January 1, 2016-September 30, 2019.

Note: This exhibit displays analysis results of 4,988 MCCM enrollees and includes recorded encounters occurring from January 1, 2016 to September 30, 2019. "Encounter" refers to a meeting between an MCCM enrollee or caregiver and a health care provider.

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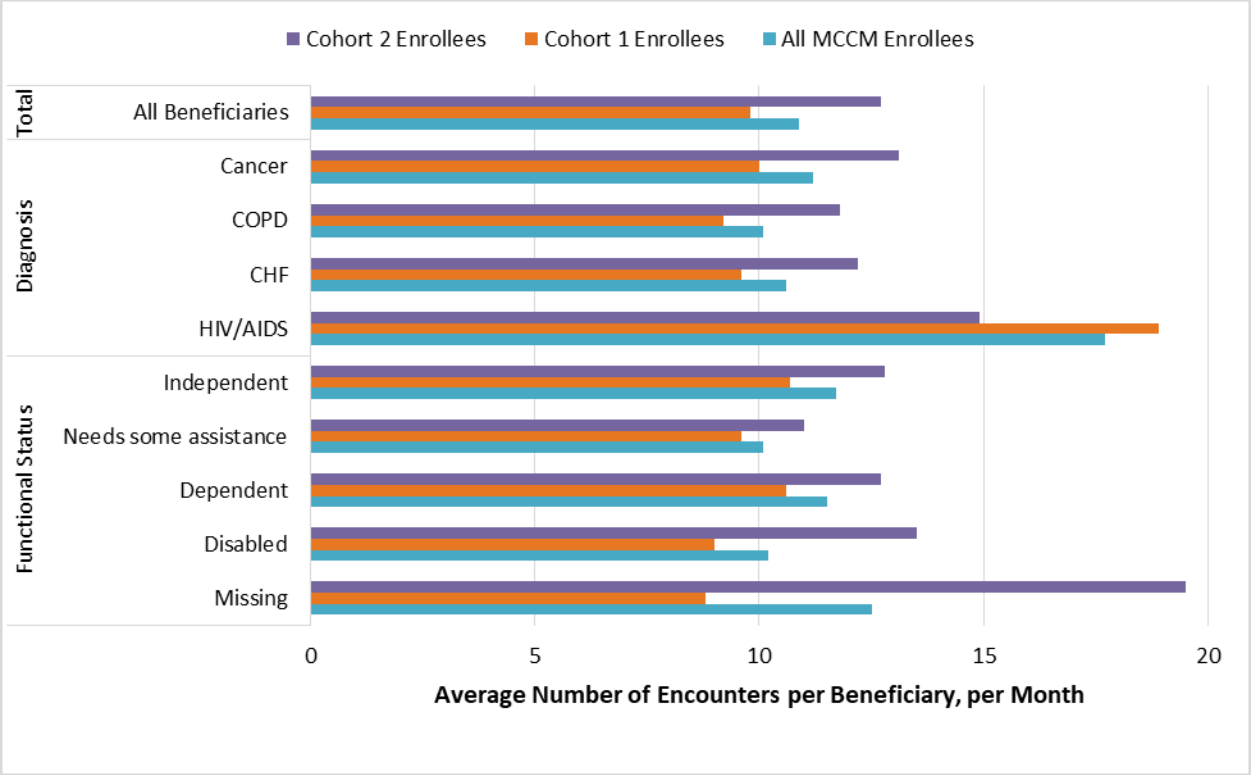
Exhibit I.19 Average MCCM Encounters per Month, by Eligible Condition and Functional Status



Sources: MCCM portal data, January 1, 2016-September 30, 2019.

Note: This exhibit displays analysis results of 4,988 MCCM enrollees. There were 5 MCCM enrollees missing cohort information due to having invalid hospice identifiers and 345 MCCM enrollees missing functional status information. Functional status is the first recorded functional status, whether at screening (for beneficiaries who enrolled before January 1, 2018) or during an encounter (after January 1, 2018).

CHF = congestive heart failure, COPD = chronic obstructive pulmonary disease, HIV/AIDS = human immunodeficiency virus/acquired immunodeficiency syndrome.

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Exhibit I.20 Percent of MCCM Enrollees who Receive Services from Each Type of Provider

Provider Type	All Enrollees (n = 4,988)	Cohort 1 Enrollees (n = 3,106)	Cohort 2 Enrollees (n = 1,877)
Care coordinator	68.6%	63.1%	77.8%
Nurse (registered/licensed practical)	69.8%	69.1%	70.9%
Social worker	79.6%	75.2%	86.8%
Aide	24.8%	22.0%	29.6%
Chaplain	29.4%	33.7%	22.3%
Volunteer	9.0%	8.5%	10.0%
Nurse practitioner	3.7%	3.7%	3.7%
Medical doctor	1.8%	1.6%	2.1%
Massage therapist	1.0%	1.3%	0.6%
Bereavement counselor	1.0%	1.0%	1.0%
Pharmacist	0.8%	0.2%	1.9%
Other therapist	0.7%	0.8%	0.5%
Music therapist	0.4%	0.6%	0.1%
Nutritional counselor	0.5%	0.7%	0.3%
Other spiritual counselor	0.3%	0.3%	0.4%
Pet therapist	0.1%	0.1%	0.1%
Art therapist	0.0%	0.1%	0.0%

Sources: MCCM portal data, January 1, 2016 to September 30, 2019.

Note: This exhibit displays analysis results of 4,988 MCCM beneficiaries enrolled between January 1, 2016 and September 30, 2019. Five enrollees are missing cohort data due to having invalid hospice identifiers. An "encounter" is a meeting, whether in person or by phone, between an MCCM enrollee or caregiver and a health care provider.

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Exhibit I.21 Average MCCM Services per Encounter by Provider Type and Cohort

Provider Type	All Enrollees (n = 4,988)	Cohort 1 Enrollees (n = 3,106)	Cohort 2 Enrollees (n = 1,877)
Care coordinator	4.3	4.5	4.1
Nurse (registered/licensed practical)	3.8	3.7	3.2
Social worker	3.2	3.6	2.7
Aide	0.9	1.3	0.5
Chaplain	2.3	2.4	1.9
Volunteer	1.4	1.6	1.0
Nurse practitioner	3.8	4.0	3.5
Massage therapist	1.4	1.5	1.0
Hospice physician	3.6	3.9	3.3
Pharmacist	2.2	2.5	2.1
Other therapist	3.0	3.3	2.0
Music therapist	2.6	2.7	1.8
Bereavement counselor	2.0	2.4	1.4
Other spiritual counselor	3.6	5.0	1.9
Nutritional counselor[a]	2.1	2.0	2.4
Pet therapist[a]	5.5	7.0	1.0
Art therapist[a]	3.9	3.9	n/a

Sources: MCCM portal data, January 1, 2016 to September 30, 2019.

[a] Denominators contain fewer than 10 enrollees.

Note: This exhibit includes data on 4,988 MCCM enrollees. An "encounter" is a meeting, either in person or by phone, between an MCCM beneficiary or caregiver and a health care provider. "Service" refers to the type of care or care coordination occurring during the encounter. Five enrollees are missing cohort data due to having invalid hospice identifiers. Typically, multiple services are provided during a single encounter. In general, the number of services per encounter in cohort 2 is lower than in cohort 1.

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Exhibit I.22 Documentation of Interdisciplinary Group Meetings and Other Encounters in the MCCM Portal

Encounter Type	All Encounters Recorded in the Portal		Encounters Recorded in Original Portal Before Instructions to Record Interdisciplinary Group Meetings[a]		Encounters Recorded in Original Portal Using Instructions to Record Interdisciplinary Group Meetings		Encounters Recorded in Revised Portal[b]	
IDG meeting	45,651	28.8%	1,843	9.3%	14,264	57.4%	29,544	26.0%
All other	112,947	71.2%	18,073	90.8%	10,587	42.6%	84,287	74.1%
Total	**158,598**	**100.0%**	**19,916**	**100.0%**	**24,851**	**100.0%**	**113,831**	**100.0%**

Sources: MCCM portal data, January 1, 2016-September 30, 2019.

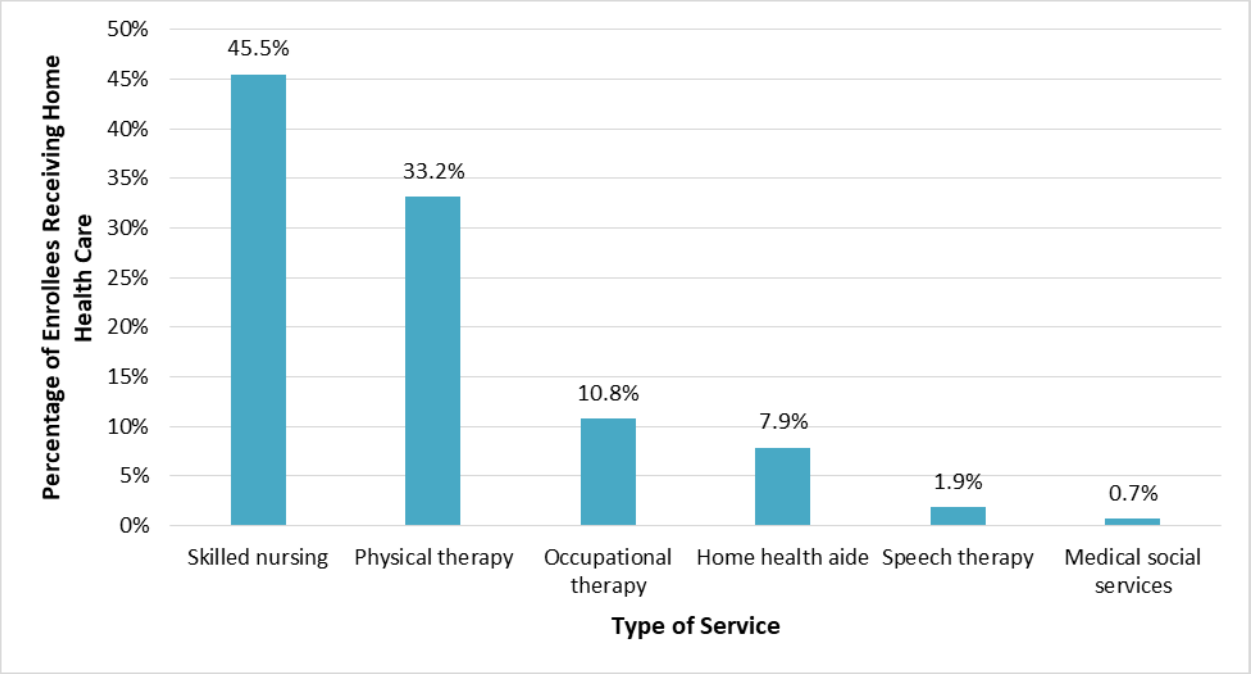
Note: This exhibit displays analysis results of IDG meetings as a percentage of all encounters with 4,988 MCCM enrollees during different phases of portal development. An "encounter" is a meeting, either in person or by phone, between an MCCM beneficiary or caregiver and a health care provider. CMS requires MCCM hospices to hold IDGs to discuss a new enrollee's assessment results and service needs, and then to review the enrollee's plan of care.

[a] The MCCM portal did not originally include a way to consistently report IDG meetings. CMS provided guidance on how to document IDG meetings using an open text field.

[b] CMS revised the portal to facilitate documentation of IDG meetings in 2017. Hospices began to record IDG meetings in the revised portal starting January 1, 2018.

IDG = interdisciplinary group.

Exhibit I.23 Percentage of MCCM Enrollees Using Home Health Care by Type of Service



Sources: Medicare claims data and MCCM portal data, January 1, 2016-September 30, 2019.

Note: This exhibit displays analysis results of the 2,633 beneficiaries, or 52.8 percent out of a total of 4,988 eligible beneficiaries, who enrolled in MCCM before September 30, 2019 and received home health services during an enrolled month. Home health agencies record the calendar date of home health visits on home health claims. We compared those dates to MCCM enrollment dates, and counted only visits that occurred during MCCM enrollment. We then aggregated the visits by calendar month.

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Exhibit I.24 Oncology Visits Increased with Duration of MCCM Enrollment

Length of MCCM Enrollment	Percentage of Enrollees with at Least One Oncology Visit While in MCCM	Average Number of Visits per Month among Enrollees with at Least One Oncology Visit While in MCCM
1-30 days	50.7%	6.1
31-60 days	72.7%	4.0
61+ days	82.7%	2.8

Sources: Medicare claims data, January 1, 2016-September 30, 2019.

Note: This exhibit displays analysis results of 3,165 MCCM enrollees with cancer who enrolled in MCCM before September 30, 2019. The data displayed in this exhibit are virtually identical in magnitude compared to results reported in **Annual Report 2, Exhibit 4.9**.

I.6 UPDATED LEARNING AND DIFFUSION ACTIVITIES

Learning and diffusion activities by date and topic during 2019 are shown in **Exhibit I.25**. These activities during 2019 targeted both cohort 1 and cohort 2 hospices.

Exhibit I.25 2019 MCCM Learning and Diffusion Activities – Cohort 1 and Cohort 2

Date	Event	Description
1/30/2019	MCCM 2019 kick-off	Discussion by the CMS model lead and invited speakers as to how the model has developed over time, the challenges and successes learned to date, what hospices and CMS still needs to learn, and where the model is headed.
2/13/2019, 2/19/2019	February TouchPoints	Discussion on MCCM-specific challenges, lessons learned, suggested areas of improvement, and end-of-life care.
3/12/2019, 3/19/2019	March TouchPoints	Discussion on advance care planning and coordination of care.
4/10/2019, 4/16/2019	April TouchPoints	Continued discussion on advance care planning, and establishing and updating goals of care accordingly.
5/8/2019, 5/21/2019	May TouchPoints	Discussion on billing insights, with a continued conversation on advance care planning, and portal documentation of advance care planning and bereavement services.
6/18/2019, 6/26/2019	June TouchPoints	Discussion on care coordination and potentially (favorable) impacts of MCCM on Medicare beneficiaries' experiences.
7/10/2019, 7/16/2019	July TouchPoints	Discussion on lessons learned and new ideas going forward for the model, particularly on MCCM-specific challenges, suggested areas of improvement, and end-of-life care.
8/14/2019, 8/20/2019	August TouchPoints	Model status update and discussion based on quarterly reports and quality dashboards.
9/11/2019	Billing specialists check-in	Discussion by billing specialists and any personnel who submit claims for participating hospices regarding solutions to frequent billing questions and ongoing issues during a real-time brainstorming session.
9/11/2019	Community providers special event	Guidance as to the value-added from the model, an overview of the eligibility criteria, a review of the MCCM physicians' brochure, and a discussion from currently engaged providers about why they refer individuals to the model.

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Date	Event	Description
10/15/2019, 10/23/2019	October TouchPoints	Discussion on the hospice-level caregiver survey reports from the evaluation contractor, as well as a discussion on care coordination and caregiver support.
11/13/2019, 11/19/2019	November TouchPoints	Discussion on the health insurance claim number and Medicare beneficiary identifier changes, an in-depth look at the quarterly data report and quality dashboard, and how to avoid hospital admissions for MCCM beneficiaries.
12/11/2019, 12/17/2019	December TouchPoints	Update on MCCM claims processing and a discussion on supporting beneficiaries, caregivers, and families around the holidays.

I.7 ORGANIZATIONAL AND MARKET-LEVEL CHARACTERISTICS OF MCCM HOSPICES

This section presents supplemental analyses describing the organizational and market-level characteristics of MCCM hospices discussed in **Section 2** in the main report:

- **Exhibit I.26** shows organizational and market characteristics of MCCM hospices by cumulative enrollment percentiles
- **Exhibit I.27** shows organizational and market characteristics for active and withdrawn MCCM hospices.

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Exhibit I.26 Organizational and Market Characteristics of MCCM Hospices by Cumulative Enrollment Percentiles

	No Enrollment 0 MCCM Enrollees 52 hospices	Enrollment Percentiles				
		0 to 25th 1-6 MCCM Enrollees 23 hospices	Above 25 to 50th 7-28 MCCM Enrollees 22 hospices	Above 50 to 75th 28-59 MCCM Enrollees 22 hospices	Above 75 to 100th 60-564 MCCM Enrollees 22 hospices	90th to 100th 130-564 MCCM Enrollees 9 hospices
Hospice characteristics						
Ownership						
Non-profit	73.1%	69.6%	68.2%	68.2%	59.1%	66.7%
For-profit	15.4%	17.4%	13.6%	18.2%	22.7%	22.2%
Other	11.5%	13.0%	18.2%	9.1%	18.2%	11.1%
Government	0.0%	0.0%	0.0%	4.5%	0.0%	0.0%
Size						
Large	67.3%	73.9%	81.8%	81.8%	95.5%	100.0%
Medium	28.8%	21.7%	13.6%	18.2%	4.5%	0.0%
Small	3.8%	4.3%	4.5%	0.0%	0.0%	0.0%
Age						
Founded in 1980s	51.9%	47.8%	54.5%	36.4%	68.2%	55.6%
Founded in 1990s	34.6%	39.1%	27.3%	45.5%	22.7%	33.3%
Founded in 2000s	9.6%	13.0%	9.1%	13.6%	4.5%	0.0%
Founded in 2010s	3.8%	0.0%	9.1%	4.5%	4.5%	11.1%
Census region						
Midwest	32.7%	30.4%	45.5%	36.4%	27.3%	22.2%
South	28.8%	39.1%	22.7%	36.4%	36.4%	44.4%
Northeast	23.1%	13.0%	18.2%	18.2%	22.7%	22.2%
West	15.4%	17.4%	13.6%	9.1%	13.6%	11.1%

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Location, ††**						
Urban	75.0%	91.3%	90.9%	72.7%	100.0%	100.0%
Rural	25.0%	8.7%	9.1%	27.3%	0.0%	0.0%
Type						
Freestanding	65.4%	65.2%	59.1%	72.7%	81.8%	88.9%
Facility-based	34.6%	34.8%	40.9%	27.3%	18.2%	11.1%
Religious affiliation						
No	100.0%	95.7%	95.5%	90.9%	100.0%	100.0%
Yes	0.0%	4.3%	4.5%	9.1%	0.0%	0.0%
Chain affiliation						
No	57.7%	52.2%	59.1%	45.5%	50.0%	66.7%
Yes	42.3%	47.8%	40.9%	54.5%	50.0%	33.3%
Level of care (MHB)						
Days in routine home care	97.7%	96.4%	96.7%	96.4%	97.2%	96.5%
Days in general inpatient care	1.8%	3.1%	2.5%	3.1%	2.3%	3.2%
Days in continuous home care	0.1%	0.3%	0.3%	0.2%	0.2%	0.1%
Days in inpatient respite care‡‡	0.3%	0.3%	0.5%	0.4%	0.3%	0.2%
Duration of stay in hospice (MHB)						
Stays under seven days	29.7%	30.8%	34.5%	33.4%	33.5%	35.6%
Stays over 180 days	13.3%	12.1%	11.6%	11.6%	12.5%	12.7%

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Hospice-level demographics (MHB)						
Sex: Female	38.1%	35.5%	37.9%	37.7%	36.9%	35.6%
Race/ethnicity: White*	92.9%	85.6%	92.6%	92.0%	90.1%	89.0%
Race/ethnicity: Black	4.5%	7.2%	3.6%	6.0%	7.1%	8.1%
Race/ethnicity: Asian	0.6%	1.6%	0.4%	0.6%	0.9%	0.9%
Race/ethnicity: Hispanic	0.5%	3.5%	2.2%	0.5%	0.7%	0.7%
Race/ethnicity: Other	1.4%	2.1%	1.3%	0.9%	1.2%	1.3%
Age group: 64 and under	4.8%	4.3%	3.9%	5.2%	4.5%	4.2%
Age group: 65-74‡‡	15.2%	14.9%	14.4%	15.3%	13.5%	13.3%
Age group: 75-84	27.4%	27.0%	27.0%	26.8%	26.8%	26.0%
Age group: 85+ ‡	52.1%	53.4%	54.3%	52.2%	54.7%	56.1%
Quality of care ratings (MHB)						
Hospice team communication	80.6	80.6	78.7	80.2	79.8	78.9
Getting timely care	78.6	77.3	76.6	79.3	78.2	78.3
Overall rating*	81.3	82.2	77.8	81.5	81.3	80.8
Other hospice characteristics (MHB)						
Percentage of beneficiaries enrolled in Medicare Advantage plans before enrolling in MHB	23.5%	31.5%	24.2%	25.3%	26.8%	26.6%
Nursing home penetration*	19.7%	18.6%	24.9%	27.7%	16.3%	20.4%
Non-hospice Medicare expenditures	$650,817	$1,665,311	$862,310	$972,177	$1,057,562	$1,734,344
Mean length of stay on MHB (days)	86.1	78.9	76.5	74.5	79.6	81.8

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Market characteristics (by hospital referral region)						
Mortality rate among Medicare beneficiaries	4.4%	4.4%	4.3%	4.4%	4.3%	4.3%
Percentage of deaths occurring in hospital	19.5	21.5	20.2	20.0	20.3	18.6
Medicare reimbursements per decedent†	$62,685	$70,169	$66,854	$64,834	$70,629	$70,216
Hospital/skilled nursing facility reimbursements per decedent	$3,963	$4,246	$4,183	$4,075	$4,264	$4,121
Hospice reimbursements per decedent	$6,458	$6,534	$6,584	$6,242	$6,627	$7,452
Hospice reimbursements per beneficiary	$363	$375	$351	$346	$371	$410
Home health agency reimbursements per decedent	$484	$552	$468	$443	$454	$446
Reimbursement for physician visits per decedent††, ‡	$4,619	$5,672	$5,149	$4,993	$5,851	$5,997
Physician visits per decedent†	46.1	57.3	50.3	51.3	57.4	57.4
Intensive care unit days per decedent†	4.4	5.7	4.8	4.8	5.7	6.3
Inpatient days per Medicare beneficiary	1.2	1.2	1.2	1.2	1.3	1.3
Hospital care intensity index†	0.8	1.0	0.9	0.9	1.0	1.0
Medicare Advantage penetration	29.0%	35.0%	28.5%	29.7%	27.9%	28.1%

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Sources: CMS Provider of Services file, December 2016; Consumer Assessment of Healthcare Providers and Systems Hospice Survey, 2016; Dartmouth Atlas of Health Care, 2014-2015; and 2015 CMS hospice claims

Notes: This exhibit shows average organizational and market characteristics of hospices across cumulative enrollment percentiles. Hospice enrollment percentiles are based on the total number of enrollees from January 1, 2016 to September 30, 2019 and represent 89 MCCM hospices with at least 1 enrollee and 52 MCCM hospices with no enrollment during MCCM's performance period. Hospice size is defined using the number of routine home care days in fiscal year 2016. Hospices with 0-3,499 routine homecare days are classified as small, 3,500-19,999 as medium, and 20,000+ as large. This classification is used by CMS for hospice payment and policy: https://www.federalregister.gov/documents/2017/08/04/2017-16294/medicare-program-fy-2018-hospice-wage-index-and-payment-rate-update-and-hospice-quality-reporting. Urban and rural classifications are defined in the CMS Provider of Services file. Hospice-level Medicare managed care enrollment comes from the Medicare Enrollment Database and Master Beneficiary Summary file. All market characteristics are calculated at the hospital referral region using 2014 data from the Dartmouth Atlas of Health Care. We provide further details on hospice and market variable descriptions and data sources in **Exhibits D.6 and D.7**. We used Fisher's exact tests to identify group differences between categorical characteristics across enrollment quartiles, conditional on enrolling at least one beneficiary; and ANOVA tests for continuous characteristics (n = 89). Asterisks represent statistical significance at the 10% (*), 5% (**), and 1% (***) levels. We conducted Fisher's exact tests for categorical variables and Welch's t-tests for continuous variables to identify differences across hospices in the top enrollment quartile (n = 22) and all other hospices (n = 119). Daggers represent statistical significance at the 10% (†), 5% (††), and 1% (†††) levels. We also conducted Fisher's exact tests for categorical variables and Welch's t-tests for continuous variables to identify differences across hospices in the top enrollment decile (n = 9) and all other hospices (n = 132). Double daggers represent statistical significance at the 10% (‡), 5% (‡‡), and 1% (‡‡‡) levels.

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Exhibit I.27 Organizational and Market Characteristics for Active and Withdrawn MCCM Hospices

	Active MCCM Hospices (n = 85)	Withdrawn MCCM Hospices (n = 56)
Hospice characteristics		
Ownership		
Non-profit	67.1%	71.4%
For-profit	17.6%	16.1%
Other	14.1%	12.5%
Government	1.2%	0.0%
Size		
Large	77.6%	76.8%
Medium	18.8%	21.4%
Small	3.5%	1.8%
Age		
Founded in 1980s	51.8%	51.8%
Founded in 1990s	34.1%	33.9%
Founded in 2000s	9.4%	10.7%
Founded in 2010s	4.7%	3.6%
Census region		
Midwest	36.5%	30.4%
South	31.8%	32.1%
Northeast	18.8%	21.4%
West	12.9%	16.1%
Location		
Urban	84.7%	82.1%
Rural	15.3%	17.9%
Type		
Freestanding	71.8%	62.5%
Facility-based	28.2%	37.5%
Religious affiliation		
No	95.3%	100.0%
Yes	4.7%	0.0%
Chain affiliation		
No	52.9%	55.4%
Yes	47.1%	44.6%
Level of care (MHB)		
Days in routine home care	97.0%	97.2%
Days in general inpatient care	2.5%	2.2%
Days in continuous home care	0.2%	0.2%
Days in inpatient respite care	0.3%	0.4%

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	Active MCCM Hospices (n = 85)	Withdrawn MCCM Hospices (n = 56)
Duration of stay in hospice (MHB)		
Stays under seven days***	33.4%	29.5%
Stays over 180 days**	11.6%	13.7%
Hospice-level demographics (MHB)		
Sex: Female	37.6%	37.0%
Race/ethnicity: White	90.4%	92.2%
Race/ethnicity: Black	5.8%	4.8%
Race/ethnicity: Asian	0.9%	0.6%
Race/ethnicity: Hispanic	1.4%	1.2%
Race/ethnicity: Other	1.5%	1.3%
Age group: 64 and under	4.4%	4.9%
Age group: 65-74	14.8%	14.6%
Age group: 75-84	27.0%	27.2%
Age group: 85+	53.3%	52.7%
Quality of care ratings (MHB)		
Hospice team communication	79.7	80.7
Getting timely care	78.0	78.3
Overall rating	80.7	81.3
Other hospice characteristics (MHB)		
Percentage of beneficiaries enrolled in Medicare Advantage plans before enrolling in Medicare hospice benefit	25.5%	25.9%
Nursing home penetration	22.4%	18.9%
Non-hospice Medicare expenditures	$1,095,317	$761,925
Mean length of stay on MHB (days)***	75.1	89.0
Market characteristics (by hospital referral region)		
Mortality rate among Medicare beneficiaries	4.4%	4.4%
Percentage of deaths occurring in hospital	20.6	19.4
Medicare reimbursements per decedent*	$67,606	$63,893
Hospital/skilled nursing facility reimbursements per decedent	$4,153	$4,039
Hospice reimbursements per beneficiary	$355	$372
Hospice reimbursements per decedent	$6,430	$6,563
Home health agency reimbursements per decedent	$460	$515
Reimbursement for physician visits per decedent**	$5,364	$4,760
Physician visits per decedent***	54.0	46.9
Intensive care unit days per decedent	5.1	4.6
Inpatient days per Medicare beneficiary	1.2	1.2
Hospital care intensity index**	1.0	0.9
Medicare Advantage penetration	29.4%	30.5%

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Sources: CMS Provider of Services file, December 2016; Consumer Assessment of Healthcare Providers and Systems Hospice Survey, 2016; Dartmouth Atlas of Health Care, 2014-2015; 2015 CMS hospice claims; and implementation contractor files.

Notes: This exhibit shows average organizational and market characteristics of active and withdrawn MCCM hospices using reported effective withdrawal dates from the implementation contractor as of September 30, 2019. Hospice size is defined using the number of routine home care days in fiscal year 2016. Hospices with 0-3,499 routine homecare days are classified as small, 3,500-19,999 as medium, and 20,000+ as large. This classification is used by CMS for hospice payment and policy: https://www.federalregister.gov/documents/2017/08/04/2017-16294/medicare-program-fy-2018-hospice-wage-index-and-payment-rate-update-and-hospice-quality-reporting. Urban and rural classifications are defined in the CMS Provider of Services file. Hospice-level Medicare managed care enrollment comes from the Medicare Enrollment Database and Master Beneficiary Summary file. All market characteristics are calculated at the hospital referral region using 2014 data from the Dartmouth Atlas of Health Care. We provide further details on hospice and market variable descriptions and data sources in **Exhibits D.6** and **D.7.** We used Fisher's exact tests to identify differences across groups for categorical variables and t-tests were used for continuous variables. Asterisks represent statistical significance at the 10% (*), 5% (**), and 1% (***) levels.

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