Evaluation of the Oncology Care Model:
Performance Period 1-3 – Appendices

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CONTENTS

A. Methods

A.1. Data and Methods for Analysis of Medicare Claims and Administrative Data

This appendix section contains information about the data and methods we used to construct utilization, payment, and end-of-life (EOL) outcome measures from Medicare claims, for the Oncology Care Model (OCM) evaluation. The primary data sources used to measure OCM impacts on utilization, payments, and EOL outcomes include the Common Medicare Environment (CME) and Enrollment Database files, 100 percent Medicare Parts A and B claims files, and 100 percent Part D Prescription Drug Event (PDE) files.

This appendix section describes how claims and other data sources were used to construct outcome measures, the performance periods (PPs) included in this report, how chemotherapy episodes were identified for analysis, how the comparison group was constructed and validated, and the analytic approaches used to quantify the impacts of the Model.

A.1.1 Secondary Data Sources

The data sources and how they were used to construct the analytic files are summarized below in **Exhibit A-1**.

Exhibit A-1: Data Sources Used in the Claims Analysis

Data Source	Purpose
2014–2018 Part B Claims (VRDC)	• Identify Part B chemotherapy episode triggers for episode identification and cancer-related Evaluation and Management (E&M) services for episode attribution. • Determine the presence of cancer diagnosis within 59 days prior to and including the service date of a Part D chemotherapy claim to identify Part D chemotherapy episodes. • Identify cancer-related E&M services from Carrier claims during episodes. • Calculate episode-level utilization and payment measures for Part B services. • Construct Hierarchical Condition Category (HCC) scores. • Identify supportive care drug use including antiemetics and radiation use. • Determine case mix of oncology providers
2014–2018 PDE Tap Files (VRDC)	• Identify Part D chemotherapy triggers for episode identification. • Calculate episode-level overall drug utilization and payment measures. • Identify supportive care drug use.
2014–2018 Part A Claims (VRDC)	• Calculate episode-level utilization and payment measures for Part A services. • Construct HCC scores.
2014 – 2018 Integrated Data Repository (IDR) System	• Determine standardized Part A and B payments.
2014–2018 Common Medicare Environment (CME) Master Beneficiary Summary Files (VRDC)	• Determine Part A and B enrollment for beneficiary eligibility criteria for episode identification. • Determine: • Beneficiary characteristics including age, race, and gender • Beneficiary zip code of residence • Identify monthly Part D enrollment and dual eligibility • County-level Medicare Advantage Penetration • County-level ED visits among fee-for-service (FFS) population

Data Source	Purpose
2014–2018 Enrollment Database Files (VRDC)	• Determine Medicare Secondary Payer information for beneficiary eligibility criteria for episode identification.
2014–2018 Common Medicare Environment Files (VRDC)	• Determine End-Stage Renal Disease (ESRD) coverage for episode identification.
2016 – 2018 FDA NDC Directory	• Identify PDEs that are for drugs, excluding vaccines.
2016 – 2018 Medicare Part B Drug Average Sales Price	• Identify Part B claims that are indicative of drugs.
2014–2017 CMS Health Professional Shortage Area (HPSA) Files	• Identify proportion of the population within a county residing in a HPSA.
2014–2017 National Plan and Provider Enumeration System (NPPES; VRDC)	• Supplement provider specialty information in the Part B Claims data.
2014–2017 Master Data Management (MDM) Beneficiary Extracts (VRDC)	• Identify beneficiary alignment to the following CMS initiatives: Pioneer Accountable Care Organization (ACO), Medicare Shared Savings Program (MSSP), Next Generation ACO, Comprehensive Primary Care (CPC), and CPC Plus.
July 2015, August 2016, August 2017, and August 2018 SK&A Office-Based Physician File	• Identify practice's affiliation with health system and hospital ownership based on Tax Identification Number (TIN).
2014–2017 Area Health Resource Files (AHRF)	• Construct county-level sociodemographic and market supply characteristics.
Welch and Bindman 2016, Town and Gown Differences Among the Largest Medical Groups in the US[1]	• Identify TINs that are affiliated with a medical school's academic medical group.
NCCN and ASCO clinical guidelines	• Identify emetogenic chemotherapy treatment regimens, and guideline-recommended prophylactic antiemetic supportive therapies.
OCM program data	• Identify OCM practice participation. • Identify legacy TINs for OCM practices in baseline period. • Identify reconciliation episodes in each PP. • Identify total amount paid by Medicare for PBP and MEOS.
Transformation plans submitted annually by participating practices	• Identify specific transformation activities accomplished each year, and plans for the future.

The Medicare claims used in this report were retrieved in January 2019, and three months of claims run-out was applied uniformly. A report on Medicare claims maturity[2] estimates that over 90 percent of Part A and B claims and PDEs are received within three months of service, and approximately 90 percent of Part B claims are finalized within three months. This timing does not apply to claims for the Monthly Enhanced Oncology Services (MEOS) payment, described below.

A.1.2 Observation Period for This Report

OCM began July 1, 2016 and focuses on six-month episodes of care triggered by chemotherapy for Fee-For-Service (FFS) Medicare beneficiaries with continuous Parts A and B enrollment. OCM is organized into six-month PPs, for which CMS retrospectively assesses the performance of participating practices and reconciles payments. The six-year Model has a total of eleven PPs. The first PP included episodes that started between July 1, 2016 and January 1, 2017, and ended by June 30, 2017. The last PP will

[1] Welch, P. and Bindman, A.B. (2016). Town and gown differences among the largest medical groups in the US. Journal of Academic Medicine, July, 91(7):1007–14.

[2] Chronic Condition Data Warehouse. (2017). CCW white paper: Medicare claims maturity. October. Version 2.0. Available from https://www.ccwdata.org/web/guest/ccw-medicare-data-white-papers.

include episodes starting between July 2, 2021 and January 1, 2022, all of which will end by June 30, 2022.

Exhibit A-2 summarizes the observation period for this report, which covers OCM impacts through PP3. The baseline period includes six-month episodes that began July 2, 2014 through January 1, 2016 and ended between January 1, 2015 and June 30, 2016. The intervention period covered in this report includes six-month episodes that began during the Model's first three PPs (PP1-PP3), between July 1, 2016 and January 1, 2018, and ended between December 31, 2016 and June 30, 2018. The baseline period began in July 2014 to align with the calendar start of the Model, which started in July 2016. This alignment by calendar month addresses seasonality in Part D payments[3] which must be studied symmetrically in both time periods.

Practice applications to participate in OCM were due to CMS on June 30, 2015, and CMS notified practices of acceptance into the model in April 2016. CMS anticipated that accepted practices would make changes in staffing, resources, and care delivery in preparation for Model start. As a result, we apply a "hold-out" period so that early anticipatory practice changes did not contaminate the baseline period. Specifically we do not include episodes that began between January 2, 2016 and June 30, 2016 in the baseline data. Episodes that began during this period ended early in the first PP, which would have further contaminated the baseline and intervention periods.

Exhibit A-2: Observation Period for the Report Covering PP1-3

Period	Performance Period	Episodes Triggering	Episodes Ending	Time Periods Specified for DID Analyses
Baseline -3	-3	7/2/14–1/1/15	1/1/15–6/30/15	
Baseline -2	-2	1/2/15–7/1/15	7/1/15–12/31/15	Baseline period
Baseline -1	-1	7/2/15–1/1/16	1/1/16–6/30/16	
Hold-out	0	1/2/16–6/30/16	7/1/16–12/29/16	Hold-out period
PP 1	1	7/1/16–1/1/17	12/31/16–6/30/17	
PP2	2	1/2/17–7/1/17	7/1/17–12/31/17	Intervention period for Report Covering PP1-3
PP3	3	7/2/17–1/1/18	1/1/18–6/30/18	
PP4	4	1/2/18–7/1/18	7/1/18–12/31/18	
PP 5	5	7/2/18–1/1/19	1/1/19–6/30/19	
PP 6	6	1/2/19–7/1/19	7/1/19–12/31/19	Intervention periods for future evaluation reports
PP 7	7	7/2/19–1/1/20	1/1/20–6/30/20	
PP 8	8	1/2/20–7/1/20	7/1/220–12/31/20	
PP 9	9	7/2/20–1/1/21	1/1/21–6/30/21	

Notes: PP: Performance period. DID: Difference-in-difference

[3] As a consequence of the Medicare Part D benefit structure, Medicare payments are not observed on individual Prescription Drug Event (PDE) records until a beneficiary enters catastrophic coverage (unless the beneficiary qualifies for low-income subsidy). As a result, most beneficiaries will not have PDEs with positive Medicare payments recorded until entry into the catastrophic phase, which on average occurs later in the calendar year. Previous analyses showed that among the six-month episodes of care used in the OCM evaluation, episodes that begin during the third quarter of the year tend to have the highest Part D payments, on average.

A.1.3 Episode Identification

We identified all eligible cancer episodes nationwide that occurred during the baseline period and, separately, during the intervention period, following the OCM methodology as implemented during PP3.[4] First, we identified a Part B or Part D chemotherapy trigger event, defined as the first date of a Part B chemotherapy drug claim or Part D chemotherapy drug claim with a corresponding Part B claim for cancer, in each PP, assuming this date is not included in a previous episode.[5] Then, among beneficiaries with a trigger chemotherapy event, we used Part B carrier claims to determine if the beneficiary had at least one cancer-related evaluation and management (E&M) service during the six months following the chemotherapy trigger event, billed under a TIN that has at least one oncology provider (NPI).[6] Finally, we required that the beneficiary meet the additional OCM inclusion criteria during the entire episode: continuous Medicare Parts A and B enrollment; coverage under Medicare FFS (not Medicare HMO, Medicare Advantage, or the United Mine Workers of America program); Medicare as the primary payer; and no Medicare benefit due to End-Stage Renal Disease (ESRD). An episode could only end earlier than six months if the beneficiary died.

Exhibit A-3: Number of Episodes by PP

Period (Episodes Initiating)	Number of Episodes	
	OCM	COMP
Period		
Baseline -3 (7/2/14 – 1/1/15)	113,475	135,450
Baseline -2 (1/2/15 – 7/1/15)	117,281	139,993
Baseline -1 (7/2/15 – 1/1/16)	114,940	134,356
Hold Out Period Before Intervention Start (1/2/16 – 6/30/16)	-	-
PP1 (7/1/16 – 1/1/17)	126,654	146,863
PP2 (1/2/17 – 7/1/17)	128,238	148,287
PP3 (7/2/17 – 1/1/18)	124,327	140,330
All Periods		
All Episodes	724,915	845,279

Note: PP: Performance period

A.1.4 Attribution of Episodes to Practices

After identifying all eligible episodes, per the OCM attribution methodology we assigned episodes to the practice that provided the plurality of cancer-related E&M services during the episode.[7] A practice is defined as a TIN with at least one oncology provider. A TIN is a billing unit for tax purposes, and it may or may not represent the structure of a physician group organization; some oncology groups use multiple TINs, and some oncology groups share a single TIN with a larger multi-specialty organization. For OCM, CMS requires that participating practices each use a single TIN, and that all clinicians in the practice submit oncology claims under that TIN. Participating OCM practices that experienced billing or business changes during the baseline or intervention period provided CMS with any "legacy" (i.e., older) TINs to capture billing for the entire practice. We used these legacy TINs to attribute episodes to OCM practices in the baseline period. Because legacy TINs are not available for groups not participating in OCM (i.e., comparison TINs used for this evaluation), we were unable to track such organizational changes and instead attributed episodes to individual comparison TINs. We therefore define a comparison practice as a TIN.

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4 RTI International. (2018). OCM performance-based payment methodology. Version 5.1. Prepared for the Centers for Medicare and Medicaid Services in partnership with Actuarial Research Corporation. Research Triangle Park, NC: RTI International; December 17. Available from https://innovation.cms.gov/initiatives/oncology-care/

5 This report incorporates the revised chemotherapy trigger event methodology, which includes the use of chemotherapy and immunotherapy administration diagnosis codes Z51.11 and Z51.12.

6 The requirement that a TIN has at least one oncology provider was applied to all baseline and intervention PPs.

7 RTI International. (2018). OCM performance-based payment methodology. Version 5.1. Prepared for the Centers for Medicare and Medicaid Services in partnership with Actuarial Research Corporation. Research Triangle Park, NC: RTI International; December 17. Available from https://innovation.cms.gov/initiatives/oncology-care/.

A.1.5 Sample of OCM and Comparison Practices

OCM practices volunteered to participate in the Model and may differ from non-OCM practices. In the first three PPs, there were 197 practices participating in OCM according to our evaluation design.[8,9] In selecting a comparison group, we sought to identify non-OCM TINs that, as a group, were similar to the group of OCM practices in the period prior to CMS's announcement of OCM. Comparison practices were selected using propensity score matching (PSM). The objective of PSM is to identify a comparison group that is statistically similar to the treatment group, based on observable factors.

First, starting from the universe of non-participating physician practices, we identified a subset of practices that were relevant for OCM, and eligible to participate in OCM based on Model rules. From this subset we estimated a PSM, based on patterns of billing for OCM services and similarity to OCM practices in terms of key practice, beneficiary, and market characteristics. The PSM yielded 538 practices for the comparison group. Detailed information about the comparison group selection and PSM methodology is provided in the ***Performance Period One Report***. In the intervention period as a whole, there were 524 comparison practices with attributed episodes; this number declined to 494 practices with episodes in PP3. This attrition was anticipated and the comparison group was deliberately constructed to be large enough to accommodate a modest reduction over time. Attrition can be due to a variety of reasons including practice closures, mergers with or acquisitions by other practices or hospitals, or the TIN no longer had attributed episodes.

A.1.6 Claims-Based Utilization, Payment and EOL Outcome Measures

This section outlines the key claims-based utilization, payment, and EOL measures.

Exhibits A-4, A-5 and A-6 define each of the utilization, payment, and EOL outcome measures evaluated in this report.

Exhibit A-4: Definition of Utilization Outcome Measures

Outcome Measure	Definition
Inpatient Utilization	
ACH Hospitalizations	Occurrence and number of Part A hospitalizations at acute care hospitals (ACH) per episode (claim type 60, 61). ACH consist of facilities that are paid under the inpatient prospective payment system (IPPS). The measure includes hospitalizations that originated during the episode (i.e., claim from date on the hospitalization occurred within the episode start and end dates). Multiple claims that comprised the same stay were collapsed into a single hospitalization.
ACH Days	Number of ACH days per episode among ACH hospitalizations that originated during the episode. The entire length of a hospitalization was allocated to the episode, even if the hospitalization extended beyond the end of the episode.
Intensive Care Unit (ICU) Admissions	Occurrence of hospitalizations occurring within the ICU per episode. Claims for ICU were identified using revenue center codes of 0200–0209.

[8] Six OCM practices were brought into mandatory pools with existing OCM practices which increased the sample of OCM practices compared to what was reported in the PP1 Report. The addition of the late entrants into the baseline data did not have an effect on overall balance between the OCM and comparison groups.

[9] We report 195 OCM practices contributing to our sample in Section 3.8 of the report because two practices did not have attributed episodes in PP3.

Outcome Measure	Definition
30-Day Readmissions	Occurrence and number of 30-day ACH readmissions (both planned and unplanned) per episode. Only readmissions associated with an index ACH hospitalization (a stay during which the beneficiary survives the hospitalization) that originated during the episode were included. A 30-day readmission that occurred after the end of the episode, but was tied to an index hospitalization that occurred during the episode, was counted in the measure.
Emergency Department (ED) Utilization	
ED Visits not Resulting in a Hospitalization	**Occurrence** and **number** of ED visit not resulting in a hospitalization at the same facility per episode. This measure includes ED visits that did not ultimately lead to an admission to the same facility.(based on the same revenue center codes above). Observations stays that originated in the ED were also counted in this measure. However, observation stays that did not originate in the ED (identified in the hospital outpatient file using revenue center codes 0760 or 0762, or HCPCS codes G0378 or G0379) were not reflected in this measure.
Post-Acute and Outpatient Service Utilization	
Skilled Nursing Facility (SNF) Stays	Occurrence and number of all SNF stays during an episode (claim type 20, 23).
SNF Days	Number of Medicare-covered SNF days per episode. All covered SNF days of the stay were allocated to the episode even if the stay extended past the end of the episode.
Home Health Services	Occurrence of home health service per episode (claim type 10).
60-Day Home Health Spells	Number of 60-day home health spells per episode.
Hospice Services	Occurrence of hospice service per episode (claim type 50)
Hospice Days	Number of days spent in Hospice per episode
Part B Outpatient Service Utilization	
E&M Services	Number of E&M services per episode.
Cancer-Related E&M Services	Number of cancer-related E&M services per episode. A cancer-related E&M service was defined as an E&M service in a non-institutional setting with a cancer diagnosis on the same line (per OCM Model specifications for episode identification and attribution).
Imaging Services	Occurrence of any imaging service (standard, advanced, other) per episode. Number of standard and other imaging services per episode. Standard and other imaging included x-ray, echography, and cardiac catheterization. Number of advanced imaging services per episode. Advanced imaging included computerized axial tomography (CAT) scans, magnetic resonance imaging (MRI), and nuclear medicine.
Radiation Therapy Service	Occurrence and number of radiation therapy services per episode. Procedure codes for radiation therapy were identified per OCM Model specifications.

Outcome Measure	Definition
Outpatient Therapy Services	Occurrence and number of outpatient rehabilitation therapy services per episode. Outpatient rehabilitation therapy services were identified according to procedure codes found in CMS' annual therapy update.[10]
Chemotherapy and Drug Utilization	
Part D 30-Day Equivalents	Number of all Part D 30-day equivalents per episode. A 30-day equivalent was calculated as the day supply reported on the PDE divided by 30. A PDE with a day supply of zero was counted as zero equivalent. However, it was still counted toward the total Part D fills. This measure was restricted to episodes for beneficiaries enrolled in Part D for all months of the episode, while alive.
Part B Chemotherapy Services	Occurrence and Number of Part B chemotherapy services per episode. Part B chemotherapy drugs were identified using the HCPCS codes found within the chemotherapy trigger list, per OCM Model specifications.
Part B Drug Services	Number of all Part B drug services, including chemotherapy, per episode.

[10] Centers for Medicare and Medicaid Services. (2017). Annual therapy update [Internet homepage]. Last modified 11/29/2017. Available from https://www.cms.gov/Medicare/Billing/TherapyServices/AnnualTherapyUpdate.html.

Exhibit A-5: Definition of Payment Outcome Measures

Outcome Measure	Definition
Overall Payments	
Total Episode Payments (TEP) – Part A, B, and D Payments	Total Part A, B, and D payments, not including MEOS payments, per episode. Part A and B payments are standardized. In other words, geographic differences in Medicare payment rates (e.g., due to variations in local wages or input prices) as well as payment variation resulting from CMS program reductions/additions (e.g., for programs including bundled payment) were removed. Part D payments are not standardized and were measured as the sum of low-income cost-sharing amount (LICS) and 80 percent gross drug cost above the out-of-pocket threshold (GDCA). All payments reflect the Medicare payment, not allowed payments.
Part A Payments	Total Part A payments per episode
Part B Payments (without MEOS)	Total Part B payments, excluding MEOS payments, per episode
Part D Payments	Total Part D payments per episode. This measure applies only for beneficiaries enrolled in Part D for all months of the episode, while alive.
Part D GDC	Total Part D gross drug costs (GDC) per episode. A prescription's GDC reflect payments made by all parties (beneficiary, plan, Medicare) and was calculated as the sum of ingredient cost, dispensing fee, sales tax, and vaccine administration fee. This measure applies only to episodes for beneficiaries enrolled in Part D for all months of the episode, while alive.
Part A Payments Components	
ACH Payments	Payments for ACH hospitalization(s) per episode. The full payment of the hospitalization was allocated to the episode, even if the hospitalization extended beyond the end of the episode.
30-Day Readmission Payments	Payments for 30-day readmissions (both planned and unplanned) per episode.
Other Inpatient Hospital (OIP) Payments	Payments for hospitalizations at other inpatient hospitals that are not paid under IPPS. Other inpatient hospitals include prospective payment-exempt cancer hospitals, and inpatient psychiatric hospitals.
SNF Payments	Payments for post-acute SNF stays per episode. The full payment of the SNF stay was allocated to the episode, even if the stay extended beyond the end of the episode.
Home Health Payments	Payments for post-acute home health services per episode.
Inpatient Rehabilitation Payments	Payments for post-acute services at an inpatient rehabilitation facility per episode (claim types 60, 61).
Long-Term Care Payments	Payments for post-acute services at a long-term care hospital per episode (claim types 60, 61).
Part B Payments Components	
Imaging Payments	Payments for standard, advanced, and other imaging services per episode.
Laboratory Payments	Payments for laboratory services per episode.
E&M Payments	Payments for E&M services per episode.

Outcome Measure	Definition
Chemotherapy and Other Cancer-Related Payments	
Part B Chemotherapy Payments	Part B chemotherapy payments per episode.
Part B Novel Therapy Payments	Payments for Part B novel therapy drugs per episode.
Radiation Therapy Payments	Payments for Part B radiation therapy services per episode.
Cancer-Related E&M Payments	Payments for Part B cancer-related E&M services per episode.
Beneficiary Cost Sharing	
Part A Beneficiary Cost Sharing	Standardized Part A beneficiary costs (deductible plus coinsurance) per episode.
Part B Beneficiary Cost Sharing	Standardized Part B beneficiary costs (deductible plus coinsurance) per episode.
Part D Beneficiary Cost Sharing	Part D beneficiary costs per episode. Part D beneficiary cost-sharing was computed as the sum of the patient pay amount and the other True Out of Pocket (TrOOP) amount, and does not include low-income cost-sharing amounts. This measure was restricted to episodes for beneficiaries enrolled in Part D for all months of the episode, while alive.

Exhibit A-6: Definition of End-of-Life Outcome Measures

Outcome Measure	Definition
Aggressive Care	
Any Chemotherapy during the Last 14 Days of Life	Occurrence of any chemotherapy dates of service within 14 days of the beneficiary's date of death.
Any Hospitalization in the Last 30 Days of Life	Occurrence of any hospitalization within 30 days of the beneficiary's date of death.
Emergency Department (ED) Use (2+ Visits) in the Last 30 Days of Life	Occurrence of two or more (2+) ED visits within 30 days of the beneficiary's date of death.
Hospice Utilization and Timing	
Never Admitted to Hospice	Occurrence of a beneficiary dying with no previously recorded hospice use (specifically, no hospice claims ending within the six months prior to the date of death).
Being on Hospice 1–2 Days before Death	Occurrence of a beneficiary discharged to death from hospice (discharge codes 40, 41, or 42) and previously using hospice continuously 1-2 days before death.
Hospice 3–180 Days before Death	Occurrence of a beneficiary discharged to death from hospice (discharge codes 40, 41, or 42) and previously using hospice continuously 3-180 days before death.

A.1.7 Sample Characteristics Analyzed

Exhibits A-7, A-8 and A-9 contain definitions of the beneficiary-, episode-, and practice-level characteristics used in analyses in this report.

Exhibit A-7: Definition of Beneficiary-Level Characteristics

Characteristic	Definition
HCC Risk Score	Used to quantify beneficiary severity of illness for their cancer and non-cancer comorbidities and predict plan payments in Medicare Advantage risk adjustment, HCC scores are based on beneficiary demographics and diagnostic history, including cancer and non-cancer codes. Each episode was assigned a HCC score based on the beneficiary's diagnosis information during the 12 months prior to the episode start date. For example, the HCC score for an episode that started on July 1, 2015 was constructed using diagnoses from July 1, 2014 – June 30, 2015 claims.
Age Group	Beneficiaries were divided into the following groupings: 0–64, 65–69, 70–74, 75–79, 80–84, and 85+.
Dual Eligibility Status	Beneficiaries were flagged as dual eligible if they were either Medicaid full-dual or partial-dual eligible.
Race/Ethnicity	Beneficiaries were categorized as Non-Hispanic White; Black (or African-American); Hispanic; or Other (Asian/Pacific Islander, American Indian, Other, Unknown). Race/ethnicity was determined using the RTI race code methodology.

Exhibit A-8: Definition of Episode-Level Characteristics

Characteristic	Definition
Cancer Bundle	The 24 cancer bundles of interest were derived from the cancer types assigned to each episode per the OCM methodology. Each episode was assigned a cancer type using the plurality of cancer diagnoses on E&M services in the carrier file that occurred during the episode. The 21 reconciliation-eligible cancer types in the original OCM methodology[11] were expanded to 24, with breast cancer divided into low- versus high-risk, prostate cancer divided into low- versus high-intensity,[12] and bladder cancer divided into low- versus high-risk.[13] We also analyze all non-reconciliation eligible cancer types combined together.
Episodes Triggered by Part D Chemotherapy	Episodes were coded as being triggered by Part D chemotherapy if the initial episode claim for chemotherapy was a Part D claim.
Use of Immunotherapy	Episodes were classified as using an immunotherapy if the one of the following drugs was taken during the episode: Atezolizumab, Avelumab, Durvalumab, Ipilmumab, Nivolumab, or Pembrolizumab.

[11] The 21 cancer types are: acute leukemia, anal cancer, bladder cancer, breast cancer, central nervous system (CNS) tumor, chronic leukemia, endocrine tumor, female genitourinary cancer other than ovary, gastro/esophageal cancer, head and neck cancer, small intestine/colorectal cancer, kidney cancer, liver cancer, lung cancer, lymphoma, myelodysplastic syndrome (MDS), malignant melanoma, multiple myeloma, ovarian cancer, pancreatic cancer, and prostate cancer.

[12] Low- and high-intensity designations for prostate cancer follow the methodology used in the OCM performance-based payment (PBP) prediction model. Low-intensity (or castration sensitive) prostate cancer is defined as episodes in which the primary cancer type is prostate cancer and the patient is treated with androgen deprivation and/or an anti-androgen therapy, without any other chemotherapy during the episode. High-intensity prostate cancer episodes do not meet the above criteria.

[13] Low- and high-risk designations for bladder cancer follow the methodology used in the OCM PBP prediction model. Specifically, low-risk bladder cancer is defined as episodes in which the primary cancer type is bladder cancer and the patient is treated with Bacillus Calmette-Guérin (BCG) therapy and/or mitomycin, without any other chemotherapy during the episode. High-risk bladder cancer episodes do not meet the above criteria.

Exhibit A-9: Definition of Practice-Level Characteristics

Characteristic	Definition
Practice Size	Practice size was measured in two ways: average number of episodes per practice and average number of NPIs per practice. NPIs were identified if they billed a Part B cancer-related E&M service and/or non-institutional Part B chemotherapy through the TIN and also served at least one episode attributed to the TIN.
Provider Specialty Mix	A practice's NPIs were classified into the following provider specialties: • Oncology specialty (hematology/medical oncology, surgical oncology, radiation oncology, gynecologic oncology) • Urology specialty • Nurse Practitioner (NP)/Physician Assistant (PA) specialty • Other specialties providing care (e.g., internal medicine) We assigned the provider specialty by first using the specialty reported in the Part B claims data; if that was not reported or less specific, we augmented using the specialty that mapped to the NPI's primary taxonomy in the NPPES data. We computed practice-level proportions of oncology, urology, and NP/PA specialties among all NPIs, along with the proportion of oncology sub-specialties among oncologist NPIs.
Oncology-Specialty Practices	Oncology specialty practices were classified as those with only oncologist NPIs and/or NP/PA NPIs. The oncology specialty included any of the following specialties: hematology/oncology, medical oncology, surgical oncology, radiation oncology, or gynecologic oncology.
Affiliation with Health System or Hospital Ownership	Practices were identified as affiliated with a health system or as hospital-owned based on information constructed from the July 2015, August 2016–2018 SK&A Office-Based Physician File for the baseline and intervention periods, respectively. The SK&A data are collected on a rolling basis via a telephone survey of physician practice sites.

A.1.8 Approach for Claims-Based Analyses

In this section we describe the claims-based descriptive and impact analyses conducted for this Annual Report. Analyses were conducted in CMS's VRDC environment using SAS Enterprise Guide v7.1 and Stata/MP v14.2 and v15 statistical software.

Descriptive Analyses

We conducted descriptive analyses to compare OCM and comparison practices along a number of episode- and practice-level characteristics. We calculated comparisons for the baseline period, for the cumulative intervention period (PP1-PP3), and for individual intervention PPs (PP1, PP2 and PP3). For episode level descriptive analyses we report z-tests and t-tests of statistical significance for differences in proportions and mean values, respectively, to show significant changes from the baseline period to the intervention period, separately for OCM and comparison practices. Statistical significance is determined at the 10 percent level.

Impact Analyses

Given the quasi-experimental design of OCM, we use difference-in-differences (DID) regression analyses to estimate Model impact on important cost, utilization and EOL outcomes. DID is a statistical technique that quantifies the impact of an intervention by comparing changes in outcomes of treatment cases (in this case, OCM episodes) to changes in outcomes in a matched comparison group (comparison episodes), from before to after Model implementation. The DID results describe the average effect of OCM over the entire duration of the intervention period, and for each of the first three PPs individually.

We performed all DID analyses at the episode-level. Ordinary least squares regression models are used for payment outcome measures; for payment outcome measures with a large proportion of zeros, we applied two-part models (logit and ordinary least squares). Logit models are used for binary utilization outcomes measures, and negative binomial models are used for utilization count measures. Two distinct DID models are used to derive impact estimates: The general DID model yields an overall estimate of the average impact of OCM, and PP quarter DID models derive separate estimates of the impact of OCM for each PP quarter. Using a weighted average, PP quarter estimates were combined into PP estimates (two quarters per PP). In all DID analyses, standard errors were adjusted to reflect the fact that episodes were clustered at the practice level because multiple episodes are attributed to the same practice, and provider patterns or actions that affect all episodes attributed to a practice will result in errors that are correlated. Most DID analyses also included state fixed effects to adjust for state-level characteristics (e.g., regulations, policies) not otherwise captured by the covariates included in the models (see below).

DID Specification

The general form of our DID specification was:

$$y_{it} = \beta_0 + \beta_1 OCM_i + \beta_2 Post_t + \boldsymbol{\alpha_0}(OCM_i * Post_t) + X'_{it}\beta_3 + \varepsilon_{it}, \qquad (1)$$

where ***y*** is an outcome for episode *i* originating in quarter *t*; ***OCM*** is an indicator distinguishing OCM practices from comparison practices; ***Post*** is an indicator distinguishing intervention data from the baseline data; and **X** is a vector of pre-determined covariates for episode *i* occurring at quarter *t*.

The coefficient $\boldsymbol{\alpha_0}$ in model (1) captures the incremental, or marginal, impact of the OCM intervention on outcome ***y***, relative to changes over the same time period in episodes of comparison practices. This interpretation is valid only in linear models. In non-linear models, the outcome of interest is modeled using a nonlinear functional form. In order to unify interpretation across linear and non-linear models, we use the estimated coefficients to generate predicted values. We compare two predictions to calculate the marginal effect (ME). The ME is equal to the average ME for each observation, which was calculated as

the difference between the predicted treatment outcome and a predicted counterfactual outcome where the impact of OCM ($\boldsymbol{\alpha_0}$) is assumed to be zero.[14]

The form of our PP quarter DID was:

$$y_{it} = \beta_0 + \beta_1 OCM_i + \sum_{p=1}^{N} \gamma_p QTR_t + \sum_{p=1}^{N} \alpha_p (QTR_t * OCM_i) + X'_{it}\beta_2 + \varepsilon_{it} \qquad \textbf{(2)}$$

where $\mathbf{QTR_t}$ are indicators identifying episodes that originate in quarter t of the intervention period. N represents the number of quarters in the intervention period (N=6, through PP3).

This DID separately identifies the impact of OCM for each PP quarter. The coefficients α_p in model (2) capture the incremental, or marginal, impact of the OCM intervention on outcome $\boldsymbol{y}$ in PP quarter QTR_t, relative to changes from baseline to the same quarters among comparison episodes. Again, this interpretation is only valid for linear models. The same type of adjustment described in equation (1) was applied for non-linear models. Using this model, we constructed estimates of the impact of specific PPs. These estimates were made by taking linear combinations of the estimates of the appropriate PP quarters. The PP quarter estimates were weighted by the number of episodes in each PP quarter to obtain the average PP impact. The delta method was used to assign significance to combined estimates.

In addition to the DID estimates, we present regression-adjusted means for OCM and comparison episodes during the baseline and intervention periods, and examine trends across the two periods. The DID estimate is also presented as a percentage of the OCM baseline mean, to provide context (scale) and quantify the relative percent change associated with OCM.

Covariate Selection

DID controls for time-varying changes/influences that affect both the comparison and OCM groups, as long as model assumptions are met, and any unmeasured time-invariant differences not otherwise captured. **Exhibit A-10** shows the beneficiary-, practice-, and market-level factors we controlled for in DID analyses. The covariates included in DID models were informed by the broader research literature on oncology outcomes, a review of National Quality Forum measures,[15] discussions with clinical experts, and through extensive statistical testing of alternative specifications using baseline period data. We identified 27 covariates for inclusion in all DID impact analyses. For a small group of outcomes, we excluded redundant covariates to achieve model convergence. For example, for all Part D payment and utilization measures, which are restricted to episodes for beneficiaries enrolled in Part D, the covariate indicating Part D enrollment was excluded.

Exhibit A-10: Covariates Included in DID Models

Domain	Model Covariate	Definition
Beneficiary-Level		
Beneficiary Characteristics	Gender	Beneficiaries were categorized as male or female.
	Race/ethnicity	Beneficiaries were categorized as non-Hispanic White, Black, Hispanic, or Other.
	Age	Beneficiaries were categorized as under 65, 65–69, 70–74, 75–79, 80–84, and 85+ years of age.
	Medicaid dual eligibility	Beneficiaries were categorized as having full/partial Medicaid benefits or having no benefits.

[14] Puhani, P. A. (2012). The treatment effect, the cross difference, and the interaction term in nonlinear "difference-in-differences" models. *Economics Letters* 115(1):85–87.

[15] National Quality Form. (2018). National Quality Forum [Internet homepage]. [Updated March 23, 2003; cited November 9, 2003]. Available from http://www.qualityforum.org/Home.aspx.

Domain	Model Covariate	Definition
	Part D enrollee	Beneficiaries were coded as a Part D enrollee if enrolled in Part D for all months of the episode, while alive.
CMS Program Alignment	Beneficiary alignment to other CMS programs	Beneficiaries were coded as aligned if they were involved in at least one of the following CMS initiatives during their episode: Pioneer ACO, MSSP, Next Generation ACO, CPC, or CPC Plus.
Beneficiary Clinical Characteristics	Cancer bundle	Depending on the model, this covariate was based on all 24 cancer bundles (along with the group of non-reconciliation eligible cancers) or a subset of cancer bundles that are relevant to the outcome/subgroup.
	Previous episode	If beneficiaries with a current episode had an episode in the immediately preceding PP, they were flagged as having a previous episode.
	Chemotherapy source	Episodes were categorized based on the type(s) of chemotherapy the beneficiary used during the episode: Part B chemotherapy only, Part D chemotherapy only, or Part B and D chemotherapy.
	CMS HCC risk score	A beneficiary's HCC risk score for the episode was categorized based on quartiles. Quartile cut-points were derived from the episode-level distribution during the baseline period.
Practice-Level		
Practice Organization and Affiliations	Affiliation with an academic medical center	A practice was coded as affiliated if it was affiliated with an academic medical center.
	Affiliation with a health system	A practice was coded as affiliated if it was affiliated with at least one health system.
	Hospital ownership	A practice was coded as owned if it was owned by at least one hospital.
Practice Size and Volume	Episode count	A practice's total number of episodes was categorized based on quartiles. Quartile cut-points were derived from the practice-level distribution during the baseline period.
	Practice size	Practices were coded as having 1–3 or 4+ oncology NPIs to distinguish between small and other practices.
Practice Specialty Type	Oncology-only specialty	Practices were coded as oncology-only if all NPIs within the practice had either an oncology specialty or an NP/PA specialty.
	Presence of radiation oncology NPIs	A practice was flagged if it had at least one radiation oncology NPI.
	Presence of surgical oncology NPIs	A practice was flagged if it had a least one surgical oncology NPI.
	Presence of gynecologic oncology NPIs	A practice was flagged if it had a least one gynecologic oncology NPI.
	Percent NP/PA NPIs	A practice's share of NPIs who is/are an NP/PA was categorized based on quartiles. Quartile cut-points were derived from the practice-level distribution during the baseline period.
Market-Level		
Market Size	County population	The population size of the practice's county was categorized based on quartiles. For practices with multiple counties, this market characteristic and all other listed below were weighted according to the number of cancer E&M services the practice billed through each county. Quartile cut-points were derived from the market-level distribution during the baseline period.
Market Demographics, Income, and Poverty	Percent of population 65+	The percent of population over age 65 in the practice's county was categorized based on quartiles. Quartile cut-points were derived from the market-level distribution during the baseline period.

Domain	Model Covariate	Definition
	Percent in poverty	The percent of population living in poverty in the practice's county was categorized based on quartiles. Quartile cut-points were derived from the market-level distribution during the baseline period.
Market Exposure to Alternative Models	Medicare Advantage penetration	The percent of Medicare Advantage penetration in the practice's county was categorized based on quartiles. Quartile cut-points were derived from the market-level distribution during the baseline period.
Market Provider Supply	Percent of population designated as a Primary Care HPSA	The practice's percent of county population residing in a HPSA was categorized as 0 percent, >0–20 percent, or >20 percent. Cut-points were derived from the 2015 distribution of the HPSA proportion among markets with at least one OCM practice or comparison practice.
	Ratio of specialists to primary care providers	A ratio was calculated from the number of specialists divided by the number of primary care physicians in the practice's county. Each practice's ratio was categorized based on quartiles. Quartile cut-points were derived from the market-level distribution during the baseline period.
Market Utilization	Total IP ED visits among FFS population	The practice's county-level IP ED visits per 10,000 FFS population was categorized based on quartiles. Quartile cut-points were derived from the market-level distribution during the baseline period (composite score averaging 2014 and 2015 values).

Subgroup Analyses

Subgroup analyses were conducted for a select group of outcome measures to examine differential impacts of OCM by cancer bundle or beneficiary characteristics. The subgroup analyses served several purposes: (1) to measure whether OCM leads to unintended consequences for particular groups of beneficiaries; (2) to inform the generalizability of OCM, and (3) to identify underlying drivers of success in OCM.

We identified six subgroup categories, and multiple subgroups within each category, including: cancer bundle, cancer treatment intensity, beneficiary age, beneficiary race, dual eligibility status, and beneficiary risk defined by HCC risk score.[16] The specific subgroups are shown in **Exhibit A-11** below. We ran DID analyses for the specific subgroup samples, and compared results across each subgroup category. Outcome measures for which we conducted subgroup analyses included: TEP, Part A payments, Part B payments, Part D payments, Part B chemotherapy payments, acute care hospital (ACH) hospitalizations, ED visits, and ED visits not resulting in a hospitalization. DID analyses were not run for every outcome measure and subgroup combination.

[16] The HCC score is calculated inclusive of the cancer condition categories: Metastatic Cancer and Acute Leukemia; Lung and Other Severe Cancers; Lymphoma and Other Cancers; Colorectal, Bladder; and Other Cancers; and Breast, Prostate, and Other Cancers and Tumors. As a result, it is not a measure of non-cancer comorbidity.

Exhibit A-11: Subgroups Evaluated in the Report Covering PP1-3

Subgroup Category	Subgroups
Cancer	Low-Risk Breast Cancer High-Risk Breast Cancer Low-Intensity Prostate Cancer Lung Cancer Lymphoma Colorectal/Small Intestine Cancer Multiple Myeloma Non-Reconciliation Eligible Cancers High-Intensity Prostate Cancer Chronic Leukemia
Treatment Intensity	Low-Risk Cancer Bundles High-Risk Cancer Bundles
Age Group	Beneficiaries Aged 80 or Older Beneficiaries Aged 65 to 79
Race	Episodes for Minority Beneficiaries Episodes for Non-Minority Beneficiaries
Dual Eligible	Episodes for Dual Eligible Beneficiaries Episodes for Non-Dual Eligible Beneficiaries
HCC Risk Score	Episodes for Lower Risk Beneficiaries Episodes for Higher Risk Beneficiaries

Parallel Trends Assumption

DID analysis assumes that trends for outcome measures in the baseline period were similar for OCM and comparison episodes, and would have remained so in the absence of OCM. Thus DID accounts for unobserved variables affecting both groups equally, which are assumed to remain equally relevant for both groups over time. Failure of the parallel trends assumption results in biased DID estimates.

For each outcome measure, we tested the null hypothesis that OCM practices and comparison practices had parallel trends during the baseline period. We compared baseline trends on a quarterly basis instead of a PP basis. For each measure, we estimated a DID regression model using the same functional form and covariates as the main impact analyses, including an indicator for OCM versus comparison, a linear trend, and an OCM specific trend. We rejected the null hypothesis that there were parallel trends in the baseline (i.e., cannot conclude that trends were parallel) at the 5 percent level of significance. Where this occurs, it is pointed out in the results that follow.

Sensitivity Tests

We performed several sensitivity tests to understand whether the reported impact estimates are robust with respect to the model specification, measurement period, and the episode sample used. Sensitivity testing was performed on 14 outcome measures: TEP, Part A payments, Part B payments without MEOS, Part D payments, Part B chemotherapy payments, ED visits, ED visits not resulting in hospitalization, ACH hospitalizations, and EOL outcome measures including any chemotherapy during the last 14 days of life, any inpatient admission in the last 30 days of life, ED use (two or more visits) in the last 30 days of life, admission to hospice, being on hospice 1-2 days before death, and being on hospice 3-180 days before death. These measures were selected because they are important for understanding the impact of OCM, and because they rely on different types of data and have different functional forms.

The tests examined sensitivity of the results to the following:

- Choice of model functional form

- Selection of covariates included in the model
- Exclusion of episodes with outlier payments (top five and ten percent of TEP)
- Exclusion of episodes for the largest OCM practices (for which comparison matching was most difficult)
- Exclusion of episodes for beneficiaries without Part D enrollment in all months
- Exclusion of episodes for specific cancer bundles, or with specific treatment timing (e.g., new versus ongoing chemotherapy treatment)

Estimation of Probability of Impact

In addition to the DID impact analyses described above, we estimated the probability of alternative levels of OCM impacts for five key outcomes in the main analyses: TEP, Part B chemotherapy payments, ACH hospitalizations, and ED visits not resulting in a hospitalization. The probability estimates can be useful for gauging the likelihood that OCM is contributing to changes in key outcomes. Three payment outcome measures were selected for the probability calculations because they reflect the broad impact of OCM on episode savings and highlight specific areas where OCM could be having the largest effect. Two utilization outcome measures were selected because they may be important early indicators of the potential impacts of enhanced services under OCM.

Instead of using a Bayesian framework to calculate probabilities, frequentist estimates and standard errors were combined with a normal distribution to approximate the probabilities generated by a Bayesian model. Specifically for each of the five outcomes, we estimated a normal distribution, with the mean and standard deviation equal to the DID estimate and the corresponding standard error (with an adjustment to account for clustering), respectively. The probability that the impact was a particular value (e.g., fell above or below zero) was estimated from this distribution.

The results obtained from this frequentist analysis closely approximate the results from a Bayesian approach when sample sizes are very large, or where minimal prior information is incorporated into the Bayesian framework. Further, the frequentist approximation allowed us to construct probabilities that account for clustering at the practice level, in a manner consistent with the main DID analysis.

Estimation of Net Impact to Medicare

A reduction in per-episode payments (TEP) would suggest that OCM is reducing episode payments, but this does not necessarily translate into net savings for Medicare because TEP does not include the MEOS or PBP that Medicare pays to participating practices. To assess the net impact of OCM we must include the MEOS and PBP payments made to participating practices to determine whether OCM is achieving sufficient savings to cover its costs. To calculate the net impact to Medicare in PP1 and PP2, we added total MEOS and PBP amounts paid by Medicare to impact on TEP from reduced episode payments, as follows:

$$Net\ Impact = (Reduction\ in\ Episode\ Payments\ (TEP) + (PBP + MEOS)$$

We estimated reduction in episode payments (TEP) in a multi-step approach:

$$Reduction\ in\ Episode\ Payments\ (TEP) = (\sum_{c=1}^{22}(TEP_{c,p} * W_{c,p}))(N_p)$$

First, we estimated the impact on TEP separately for each cancer bundle, *c*, and PP, *p*, using our DID framework. We then calculated a cancer-bundle weighted average of the impact on TEP, where the weights, *W*, were based on the distribution of cancer bundles among OCM episodes identified in the PP1 and PP2 reconciliation data. We derived ninety percent confidence intervals for the weighted-average

episode-level impact on TEP using bootstrap methods (2,000 bootstrap samples, with replacement). Next, we multiplied the (weighted-average) episode-level impact on TEP by the total number of episodes, *N*, in each PP to estimate the reduction in payments. Finally, we summed the impact on TEP (reduced episode payments), the PBP payments, and the MEOS payments to estimate the net impact for Medicare. **Exhibit A-12** defines the measures used in this analysis.

Exhibit A-12: Definition of Measures Used in the Estimation of the Net Impact to Medicare

Measure	Description
Episode-level DID estimate of TEP, by cancer bundle and PP	A per episode estimate of the impact on TEP attributable to the OCM model. Estimated for each cancer bundle and PP separately.
Pooled, weighted DID estimate of TEP, by PP	Average of the cancer-bundle specific TEP impacts, weighted based on the number of episodes for each cancer bundle, and calculated for each PP separately. The cancer bundle definitions align with the OCM practices' reconciliation reports for PP1 and PP2.
Total number of episodes attributed to OCM participants, by PP	The number of episodes attributed to OCM participants for each PP separately. This count includes reconciliation and non-reconciliation eligible episodes.
Reductions in Episode Payments (TEP) by PP	The product of the pooled, weighted DID estimate of TEP by the total number of episodes, calculated for each PP separately.
MEOS + PBP, by PP	Sum of MEOS and PBP paid amounts for each PP separately (first true-up reconciliation results).
Net impact to Medicare, by PP	Reduction in Episode Payments (TEP) plus total MEOS + PBP, calculated for each PP separately.

Notes: DID= difference-in-difference, TEP: Total episode payments, PP=Performance period, MEOS: Monthly enhanced oncology services, PBP: Performance based payment

Chemotherapy-Associated Hospital Utilization

We adapted the CMS measure of chemotherapy-associated hospitalizations and ED visits, which was originally developed and tested among patients receiving chemotherapy in hospital outpatient departments. Our revised measure examines chemotherapy-associated utilization that occurs during six-month episodes in OCM practices and comparison practices, regardless of the location where the patients received chemotherapy.

Specifically, we first identified all chemotherapy with dates between the episode trigger start and end dates. We included outpatient claims, carrier claims, and Part D claims for which there was also a cancer diagnosis on a Part B claim (as per the CMS specifications for OCM episode identification[17]). We assessed ED visits and hospitalizations that occurred within 30 days after Part B chemotherapy infusions or 30 days after taking a Part D drug (through the last available dose based on fill date plus the number of days dispensed).

As specified by the CMS measure, we identified hospitalizations and ED visits that occurred within 30 days after a claim for chemotherapy with diagnosis codes for one of the following diagnoses: anemia, dehydration, diarrhea, emesis, fever, nausea, neutropenia, pain, pneumonia, or sepsis.

For each measure, we then used logistic regression models to assess the DID impact of OCM. In addition to the covariates in our standard models, we also adjusted for the number of days receiving infused chemotherapy (Part B claims) or days of oral medication (Part D claims) during the six-month episode, to adjust for differences in exposure to chemotherapy and time at risk for associated ED visit or hospitalization.

[17] https://innovation.cms.gov/Files/x/ocm-pp3beyond-pymmeth.pdf

In this report covering PP1-3, we present results for hospitalizations and for all ED visits (with and without leading to a hospitalization). Because patients who go to the ED and are admitted will be counted in both measures, we also show results for ED visits that led and did not lead to a hospitalization.

A.2. Patient Survey Methods

A.2.1 Survey Analytic Methods

For this report covering PP1-3, we examined trends in care experiences reported on the OCM patient survey (and for deceased patients, the OCM caregiver survey) from the baseline (April 2016-September 2016) survey[18] through intervention survey wave 7 (July 2017-June 2018). The trend analysis used the following regression model:

$$y_{it} = \beta_0 + \beta_1 IW1_i + \beta_2 IW2_i + \beta_3 IW3_i + \beta_4 IW4_i + \beta_5 IW5_i + \beta_6 IW6_i + \beta_7 IW7_i + \beta_8 X_{it} + \varepsilon_{it}$$

where $\boldsymbol{y_{it}}$ is a survey outcome for patient i in wave t, ***IW1-IW7*** are indicators signifying respondents in intervention wave 1-7 (baseline wave is the reference wave), and $\boldsymbol{X_{it}}$ represents a set of patient- and practice-level covariates for patient *i* in wave *t*. This model estimated risk-adjusted outcomes for each survey wave (i.e., how OCM practices perform over time if they treat the same patient population in each wave). To test whether there was a statistically significant change over all survey waves, we estimated a separate regression model with a linear time trend for each outcome. In the model with a linear time trend, wave indicators were replaced with a single, continuous wave variable. The coefficient of the linear time trend variable is our estimate of the average change in outcome per wave over the period covering baseline through wave 7.

We combined responses to the patient survey and the caregiver survey to understand care received by patients who survived and those who did not, except for EOL care questions. The EOL questions are not asked in the survey sent to living patients. For the trend analysis of EOL care we used only the caregiver survey for EOL outcomes.

We used an Ordinary Least Square (OLS) regression if the outcome measure was a continuous variable and a logistic regression if the outcome measure was a dichotomous variable. Respondents reported their annual out-of-pocket (OOP) expenses related to cancer care in six expense categories, and we used an ordered logit regression to estimate the risk-adjusted share of respondents reporting each expense category. We report the 90 percent confidence intervals for all estimates of interest.

We adjusted all analyses with sampling and nonresponse weights, and clustered the standard errors at the practice level.

Risk Adjustment

For all patient and caregiver survey analyses, we included both patient and practice characteristics in risk adjustment for composite scores and for individual questions. Patient characteristics included: age group; gender; race; Medicare and Medicaid dual-eligibility;, self-reported education level, overall health and mental health; whether or not another person helped complete the survey (i.e., proxy respondent); cancer type; comorbidity indicators (represented by aggregate groups of HCC indicators); duration between the start of current chemotherapy and the end of the most recent prior chemotherapy; breast/prostate cancer with long-term oral hormonal therapy only (no other chemotherapy); cancer-related surgery or radiation therapy during the episode; and the calendar month when the episode was triggered. Practice characteristics included: practice size categories (based on the number of oncologist NPIs), academic

[18] Note that the baseline period for claims analysis ends a year before OCM began; that year is "held out" to ensure that any changes in preparation for OCM do not affect the baseline. The baseline survey, in contrast, took place just as OCM began, because it was not possible to collect data a year earlier.

medical center affiliation, oncology versus multi-specialty practice, practice affiliation with a health system, and hospital ownership.

A.2.2 Patient Survey Instruments and Response Rates

Exhibit A-13: Two Patient Survey Instruments and Periodicity

	Patient Survey	Caregiver Survey
Target Patient Population	Patients who were alive at the time of sampling (based on latest death records).	Mailed to families of patients who had already died at the time of the survey mailing (based on latest death records).
Survey Questions	Complete set of survey questions except EOL care, including items for composite scoring and current health status.	Same questions as main survey, but (1) no current health status questions (because patient is deceased), and (2) with EOL care questions.
Survey Addressee	Patient.	"To the Family of…."
Frequency	Every quarterly wave.	Every quarterly wave.
Role in Scoring for Payment Purpose	Responses from the same items on the patient and caregiver surveys were combined to calculate practice composite scores for payment adjustment. No EOL questions are used in scoring or payment adjustment.	

Exhibit A-14: Patient Experience Composites and Overall Rating

Composite	Questions
Overall Rating	Number from 0 (worst possible) to 10 (best possible) the patient selects to rate cancer therapy team
Access	Encouraged contact between visits once drug therapy was decided[a]
	Told patient to call immediately about side-effects once drug therapy was decided[a]
	Gave patient clear instructions on how to contact after-hours once drug therapy was decided[a]
	Visits scheduled at convenient times[b]
	Tests and procedures scheduled as soon as needed[b]
	Waited longer than expected for test results[b]
Affective Communication	Showed respect for patient[b]
	Listened carefully to patient[b]
	Was straightforward when talking to patient about therapy[b]
	Spent enough time with patient[b]
Enabling Patient Self-Management	Talked with patient about pain[c]
	Helped patient deal with pain (if a problem)[a]
	Talked with patient about changes in energy[c]
	Helped patient deal with changes in energy (if a problem)[a]
	Talked with patient about emotional problems, such as anxiety or depression[c]
	Helped patient deal with emotional problems (if a problem)[a]
	Talked with patient about additional services to manage cancer care at home[a]
	Talked with patient about things to do to maintain health during treatment[a]

Composite	Questions
Exchanging Information	Clearly explained how cancer and drug therapy would affect normal activities[a]
	Told patient what the next steps in treatment would be[a]
	Explained test results in a way that was easy to understand[b]
	Explained medications in a way that was easy to understand[a]
Shared Decision Making	Talked with patient about reasons to have drug therapy[a]
	Talked with patient about reasons to not have drug therapy[a]
	Asked for patient opinion on whether or not to have drug therapy[a]
	Involved patient in decisions about treatment as much as they wanted[a]
Symptom Management	Helped patient deal with pain (if a problem)[a]
	Helped patient deal with changes in energy levels (if a problem)[a]
	Helped patient deal with emotional problems (if a problem)[a]
	Helped patient deal with nausea/vomiting (if a problem)[a]
	Helped patient deal with difficulty breathing (if a problem)[a]
	Helped patient deal with coughing (if a problem)[a]
	Helped patient deal with constipation/diarrhea (if a problem)[a]
	Helped patient deal with neuropathy (if a problem)[a]

Notes: [a] Responses are "Yes, definitely"; "Yes, somewhat"; and "No."
[b] Responses are "Never," "Sometimes," "Usually," and "Always."
[c] Responses are "Yes" and "No."

Exhibit A-15: OCM Patient and Caregiver Survey Response Rates

Survey Wave	Patient Survey		Caregiver Survey (Deceased Patients Only)	
	Surveys Sent	Response Rate	Surveys Sent	Response Rate
Baseline Wave (4/16-9/16)	22,106	48.3%	1,849	39.0%
Intervention Wave 1 (7/16-12/16)	21,679	47.1%	1,957	37.1%
Intervention Wave 2 (10/16-3/17)	21,042	46.3%	1,688	33.2%
Intervention Wave 3 (1/17-6/17)	22,169	45.0%	1,756	33.8%
Intervention Wave 4 (4/17-9/17)	22,048	45.8%	1,674	36.4%
Intervention Wave 5 (7/17-12/17)	22,052	47.3%	1,727	35.1%
Intervention Wave 6 (10/17-3/18)	21,825	48.6%	1,727	35.1%
Intervention Wave 7 (1/18-6/18)	23,043	44.9%	2,015	32.6%

A.3. Clinician Survey Methods

A.3.1 Survey instrument and data collection

We surveyed three types of clinicians at participating OCM practices (oncologists, advanced practice providers [APPs], and clinical care coordinators) from August to October 2018. Each of the three groups of clinicians received a slightly different questionnaire (survey instruments are in Appendix G).

We administered a multi-mode survey to clinicians working in OCM participating practices, including oncologists, advanced practice providers (APPs: nurse practitioners and physician assistants), and clinical care coordinators. Respondents were able to complete the survey on paper (with a free mail-back envelope), online, or by phone. To optimize response rates, a non-conditional, up-front incentive of $75

was included in the initial mailed survey invitation.[19] We invited 2,100 clinicians to participate in the survey, and received 1,253 responses. The unadjusted response rate across all three groups was 59.7 percent; after removing 20 ineligible clinicians (moved away, on leave, retired, etc.), the final adjusted response rate was 60.2 percent (**Exhibit A-16**).

Exhibit A-16: Sixty Percent Overall Response Rate on the OCM Clinician Survey

Clinician Type	Initial Sample	Survey Responses	Raw Response Rate	Adjusted Response Rate
Oncologists	900	400	44.4%	44.8%
APPs	600	373	62.2%	62.7%
Care Coordinators	600	480	80.0%	81.1%
Total	2,100	1,253	59.7%	60.2%

Source: Analysis of responses to the OCM Clinician Survey (August – October, 2018)
Notes: Adjusted response rates reflect the response rate after removing 20 ineligible clinicians.

A.3.2 Survey Analysis

We conducted two analyses for the Clinician Survey: (1) a non-response analysis to understand the generalizability of the survey results to all OCM clinicians; and (2) a descriptive analysis. Each of these analyses is described below.

Survey Weights

We applied sampling and non-response weights in all analyses of survey responses. The sampling weight was calculated as the inverse of the selection probability (the number of clinicians in each practice divided by the number of clinicians selected for the survey). We used a censored measure of practice size to calculate the sampling weights for the 10 largest OCM practices, so that results from the survey will be more generalizable to all oncology practices (including those that are not participating in OCM). The nonresponse weight was calculated as the inverse of the probability of response among eligible members of the sample (the number of clinicians selected from each practice divided by the number of survey respondents from each practice). The final nonresponse-adjusted weight was calculated as the product of the sampling weight and the nonresponse weight.

A.3.3 OCM Clinician Survey Non-response Analysis

Methods for OCM Clinician Survey Non-Response Analysis

We compared survey response rates for the three different types of respondents, and for respondents from different types of practices, such as large versus small practices, or hospital-owned versus independent. Statistically significant differences in response rates across respondent types or practice characteristics may indicate that the survey results are less generalizable for some types of OCM practices.

Findings from OCM Clinician Survey Non-Response Analysis

Exhibit A-17 shows the survey response rates stratified by practice characteristics, separately for each clinician type—oncologists, APPs, and clinical care coordinators. Among 2,100 surveyed clinicians, we received 1,253 surveys that were completed (N=1,247) or partially completed (N=6). We used chi-squared tests to assess the statistical significance of differences in response rates by practice characteristics.

The response rates did not vary significantly when stratified by many practice characteristics, for most of the clinicians. These characteristics include: mix of oncology specialties, academic affiliation (except for APPs), number of sites and ownership (except for oncologists). Practices with fewer oncologists had higher survey response rates on average than did those with higher number of oncologists ($p<0.05$ for oncologists and for clinical care coordinators, $p<0.10$ for APPs). Similarly, for oncologists and clinical care coordinators, those working in practices with fewer attributed episodes were more likely to respond

than those working in practices with more attributed episodes ($p<0.05$). Response rates also differed for independent practices versus those owned by a hospital or affiliated with a health system and by specialty type. This suggests that survey findings may be more generalizable to smaller and independently-owned practices, and practices that are oncology-only. However, use of non-response weights, defined based on the probability of clinicians in each practice responding to the survey, helps mitigate concerns related to non-response bias.

Exhibit A-17: Adjusted Survey Response Rates by Clinician Type

	Oncologists Complete		APPs Complete		Care Coordinators Complete	
	%	n	%	n	%	n
Number of oncologists	**		*		**	
1-4 oncologists	70.0%	28	76.0%	19	87.8%	36
5-9 oncologists	53.2%	50	76.4%	42	87.0%	80
10-19 oncologists	41.1%	88	60.7%	99	81.2%	134
20-49 oncologists	43.0%	128	57.7%	105	73.3%	118
50 or more oncologists	42.9%	106	63.5%	108	84.2%	112
Number of episodes initiated by the clinician's practice†	**				**	
First quartile (<=103 episodes)	57.7%	45	71.4%	25	81.5%	53
Second quartile (104-197 episodes)	46.5%	53	62.0%	44	83.8%	98
Third quartile (198-356 episodes)	40.2%	110	59.4%	114	77.5%	141
Fourth quartile (357 or more episodes)	45.7%	191	64.2%	190	83.2%	188
Specialty type	**				*	
Multi-specialty	42.2%	293	61.8%	289	80.1%	353
Oncology-only Practice	55.8%	106	66.7%	84	85.2%	127
Ownership	**					
Independent	49.2%	211	65.6%	183	79.3%	226
Owned by hospital/health system	41.3%	188	60.3%	190	83.3%	254
Affiliated with an academic faculty			**			
Not affiliated	45.9%	299	66.4%	285	82.1%	372
Affiliated with academic faculty	41.9%	101	53.0%	88	77.7%	108
Number of sites	*					
One site	48.6%	194	63.0%	167	82.3%	233
More than one site	42.3%	205	62.6%	206	80.5%	247

Source: Analysis of responses to the OCM Clinician Survey (August – October, 2018)
Notes: Response rates were adjusted by removing 20 ineligible clinicians. We assessed whether differences in response rates were significantly different across clinician characteristics using chi-squared tests. *p<0.10; **p<0.05. †Quartiles for the number of episodes initiated by each practice were defined at the practice level, based on the number of episodes initiated during PP3.

A.4. Case Study Methods

We conducted 13 in-person case studies with participating practices during Model Year Two (approximately PP3-4), one or two each month starting in July 2017. We selected practices with a range of attributes including size, ownership, and geographic location. We iteratively updated both the interview protocols and the accompanying codebook based on the findings from case studies. Depending on the practice size and staffing structure, interviewees for each case study included some or all of the following (and often more than one of each):

- Clinical and administrative leaders
- Medical oncologists and specialty oncologists

- Palliative medicine specialists
- Physician assistants and nurse practitioners
- Nurses
- Patient navigators and care coordinators
- Medical assistants
- Business/finance directors
- Patient financial advocates/counselors
- Directors of performance improvement
- IT staff (e.g., electronic health records)
- Pharmacists
- Staff involved in data management and analytics

Exhibit A-18 shows characteristics of the 13 OCM practices we visited during Year Two.

Cross-Case Analysis
After each case study visit, the team coded themes using NVivo software and updated the codebook to include new themes as appropriate. We identified themes found in at least two of the 13 case studies, and important insights that emerged from one case study in contrast with the others.

In reporting the findings from the cross-case analysis, we note practice characteristics that appear to be associated with an observed theme, where applicable.

Exhibit A-18. About Half of Practices Visited in Year Two are Independent and most are of Medium or Large Size

Characteristic		Number
Ownership[a]	Health system/hospital	6 (3 AMCs)
	Independent	7
Size[b]	Small	1
	Medium	8
	Large	4
Geographic Location	Northeast	2
	Midwest	3
	West	3
	South	5

Notes: [a] Hospital-owned or health system affiliated, based on SK&A data
[b] Size based on number of episodes in the PP1 second true-up: Small ≤ 245 episodes, Medium = 246-820 episodes, Large ≥ 821 episodes

A.5. Practice Transformation Plans and Methods

CMS asks participating OCM practices to submit annual Practice Transformation Plans (PTPs). These are structured self-assessments of their practice transformation activities during the prior year, and their plans for the future. OCM practices have submitted three PTPs to date, early in Model Year One (September 2016) which can be considered 'baseline', early in Year Two (September 2017), and early in Year Three

(July 2018). CMS's reporting template contains primarily close-ended questions covering several domains.[20]

Completion rates for PTPs were high. For this report, we analyzed responses to the 2018 PTP, in which CMS asked practices to indicate whether they implemented certain care processes prior to OCM starting, implemented the care processes after OCM started, or were not yet using the care processes.

[20] The 2018 PTPs included the following domains: Respondent information; Access and continuity; Care coordination; Care planning and management; Patient and caregiver engagement; Team-based care; Data-driven quality improvement; Evidence-based medicine; Strategic plan; and Practice redesign priorities for the next 6 to 12 months, and OCM learning needs assessment.

B. Payment and Utilization Outcome Analyses

B.1. Total Episode Payments and Beneficiary Cost Sharing

Exhibit B-1: OCM Had no Impact on TEP, but Decreased Part A Payments and Increased Part D Payments

Measure	Number of Episodes	OCM		COMP		Impact Estimates Through PP3				Period by Period Impact Estimates		
		Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change	PP1 DID	PP2 DID	PP3 DID
Total Part A, B, and D Payments without MEOS	1,570,194	$28,500	$31,755	$28,364	$31,764	-$145	-$379	$89	-0.5%	-$44	-$206	-$223
Part A Payments	1,570,194	$5,973	$5,860	$5,843	$5,849	-$119**	-$217	-$22	-2.0%	-$83	-$109	-$161**
Part B Payments	1,570,194	$17,013	$18,978	$16,928	$18,976	-$83	-$259	$93	-0.5%	-$17	-$161	-$94
Part D Payments[a]	1,289,835	$6,746	$8,364	$6,836	$8,294	$160**	$56	$264	2.4%	$123**	$169**	$169**
Part D GDC[b]	1,289,835	$10,329	$12,782	$10,503	$12,845	$111	-$61	$283	1.1%	$88	$148	$60

Source: Medicare claims 2014–2018.
Notes: [a] Part D payments are calculated as the sum of low income cost-sharing and reinsurance amounts, as reflected on the PDE.
[b] Part D GDC is calculated as the sum of ingredient cost, dispensing fee, vaccine administration fee, and sales tax, as reflected on the PDE.
Asterisks denote statistically significant impact estimates at *p<0.10, **p<0.05, and ***p<0.01. OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period. TEP: Total episode payments. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3. DID: Difference-in-difference. LCL: Lower confidence limit; UCL: Upper confidence limit.

Exhibit B-2: OCM Likely Reduced TEP, but by $100 or less

Savings Category	Probability
DID Estimate: TEP	-$145
Any Amount of Increase in Costs to Medicare per Episode	15.3%
Any Amount of Savings for Medicare per Episode	84.7%
Savings of at Least $100 per Episode	62.5%
Savings of at Least $200 per Episode	35.0%
Savings of at Least $300 per Episode	13.8%

Source: Medicare claims 2014–2018.
Note: TEP: Total episode payments. DID: Difference-in-difference.

Exhibit B-3: Divergent Impacts by Medicare Coverage Part Resulted in no Change in Total Beneficiary Cost-Sharing

Measure	Number of Episodes	OCM		COMP		Impact Estimates Through PP3				Period by Period Impact Estimates		
		Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change	PP1 DID	PP2 DID	PP3 DID
Cost-Sharing for all Services												
Total Part A, B, and D Beneficiary Cost-Sharing	1,570,194	$5,564	$5,992	$5,527	$5,970	-$16	-$66	$35	-0.3%	-$4	-$39	-$10
Part A Beneficiary Cost-Sharing	1,570,194	$457	$442	$443	$430	-$2	-$8	$5	-0.3%	-$2	-$2	$0
Part B Beneficiary Cost-Sharing	1,570,194	$4,498	$4,864	$4,468	$4,864	-$30	-$78	$18	-0.7%	-$20	-$49	-$27
Part D Beneficiary Cost-Sharing[a]	1,289,835	$733	$827	$743	$816	$20***	$7	$33	2.7%	$23***	$16**	$21**

Source: Medicare claims 2014–2018.

Notes: [a] Part D beneficiary cost-sharing is calculated as the sum of patient paid amount and other TrOOP amount, as reflected on the PDE.

Asterisks denote statistically significant impact estimates at *p<0.10, **p<0.05, and ***p<0.01. OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period. DID: Difference-in-difference. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3. LCL: Lower confidence limit; UCL: Upper confidence limit.

B.2. Cancer-Related Utilization and Payments

Exhibit B-4: The Proportion of Episodes Triggered by Part D Has Stabilized in the Intervention Period

Measure	Baseline Period Episodes Initiating: (7/2/14-1/1/16)		Intervention Period Episodes Initiating: (7/1/16-1/1/18)		PP1 Episodes Initiating: (7/1/16 - 1/1/17)		PP2 Episodes Initiating: (1/2/17 - 7/1/17)		PP3 Episodes Initiating: (7/2/17 - 1/1/18)	
	OCM N=345,696	COMP N=409,799	OCM N=379,219	COMP N=435,480	OCM N=126,654	COMP N=146,863	OCM N=128,238	COMP N=148,287	OCM N=124,327	COMP N=140,330
Episodes Triggered by Part D Chemotherapy	39.7%	39.7%	41.8%	40.5%	41.5%	40.8%	42.2%	40.6%	41.6%	40.2%

Source: Medicare claims 2014–2018.
Notes: OCM: OCM intervention group; COMP: Comparison group. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3

Exhibit B-5: Use of Novel Therapies and Immunotherapies Increased at a Similar Rate for OCM and Comparison Episodes in the First Three PPs of OCM

Measure	Baseline Period Episodes Initiating: (7/2/14-1/1/16)		Intervention Period Episodes Initiating: (7/1/16-1/1/18)		PP1 Episodes Initiating: (7/1/16 - 1/1/17)		PP2 Episodes Initiating: (1/2/17 - 7/1/17)		PP3 Episodes Initiating: (7/2/17 - 1/1/18)	
	OCM N=345,696	COMP N=409,799	OCM N=379,219	COMP N=435,480	OCM N=126,654	COMP N=146,863	OCM N=128,238	COMP N=148,287	OCM N=124,327	COMP N=140,330
Proportion of episodes utilizing a novel therapy (immunotherapy, other novel therapy)	16.1%	15.8%	14.4%	13.9%	12.1%	11.8%	13.5%	13.1%	17.6%	17.0%
Proportion of episodes utilizing an immunotherapy	1.3%	1.5%	6.4%	6.5%	5.4%	5.4%	6.2%	6.3%	7.7%	7.8%

Source: Medicare claims 2014–2018.
Notes: OCM: OCM intervention group; COMP: Comparison group. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3

Exhibit B-6: There Was no Overall Impact of OCM on the Use of Chemotherapy-Related Services or Drugs

Measure	Number of Episodes	OCM		COMP		Impact Estimates Through PP3				Period by Period Impact Estimates		
		Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change	PP1 DID	PP2 DID	PP3 DID
Part D Drugs												
Number of Part D 30-day Equivalents	1,289,835	29.772	30.236	29.820	30.162	0.123	-0.013	0.259	0.4%	-0.004	0.260**	0.112
Part B Drugs												
Number of Part B Drug Services	1,570,194	19.282	19.402	18.747	18.738	0.129	-0.188	0.446	0.7%	0.048	0.241	0.106
Chemotherapy Services												
Occurrence of Part B Chemotherapy Use	1,570,194	65.4%	65.0%	65.1%	64.8%	-0.1%	-0.3%	0.2%	-0.1%	0.2%	-0.2%	-0.2%
Number of Part B Chemotherapy Services	1,570,194	7.305	7.652	7.146	7.640	-0.148	-0.336	0.041	-2.0%	-0.164*	-0.146	-0.150
Other Cancer-Related Services												
Occurrence of Part B Radiation Therapy Services	1,570,194	13.2%	13.0%	13.7%	13.6%	-0.0%	-0.3%	0.2%	-0.4%	-0.0%	0.1%	-0.1%
Number of Part B Radiation Therapy Services	1,570,194	4.358	4.232	4.767	4.592	0.048	-0.097	0.192	1.1%	0.072	0.024	0.055
Number of Cancer-Related EM Services	1,570,194	5.262	5.081	5.041	4.844	0.016	-0.076	0.108	0.3%	-0.027	0.039	0.040

Source: Medicare claims 2014–2018.

Notes: Asterisks denote statistically significant impact estimates at *p<0.10, **p<0.05, and ***p<0.01. OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3. DID: Difference-in-difference. LCL: Lower confidence limit; UCL: Upper confidence limit.

Exhibit B-7: OCM Had No Impact on Part B Chemotherapy Payments or Radiation Therapy Payments, Relative to Comparison Episodes

Measure	Number of Episodes	OCM		COMP		Impact Estimates Through PP3				Period by Period Impact Estimates		
		Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change	PP1 DID	PP2 DID	PP3 DID
Part B Chemotherapy Drug Costs												
Part B Chemotherapy Payments	1,570,194	$7,749	$9,488	$7,631	$9,312	$58	-$97	$213	0.7%	$105	-$59	$97
Other Cancer-Related Costs												
Radiation Therapy Payments	1,570,194	$802	$805	$892	$889	$5	-$13	$24	0.7%	$3	$10	$5
Cancer-Related EM Payments per Episode	1,570,194	$388	$371	$353	$335	$2	-$6	$10	0.5%	-$1	$5	$2

Source: Medicare claims 2014–2018.

[a] Part D payments are calculated as the sum of low income cost-sharing and reinsurance amounts, as reflected on the PDE.

[b] Part D GDC is calculated as the sum of ingredient cost, dispensing fee, vaccine administration fee, and sales tax, as reflected on the PDE.

Notes: Asterisks denote statistically significant impact estimates at *p<0.10, **p<0.05, and ***p<0.01. OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3. DID: Difference-in-difference. LCL: Lower confidence limit; UCL: Upper confidence limit.

Exhibit B-8: OCM Led to Increases in Novel Therapy Use and Payments

Measure	Number of Episodes	OCM		COMP		Impact Estimates Through PP3				Period by Period Impact Estimates		
		Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change	PP1 DID	PP2 DID	PP3 DID
Part B Novel Therapy Payments	1,375,272	$1,960	$2,959	$1,936	$2,887	$48	-$60	$157	2.5%	$35	-$16	$97

Source: Medicare claims 2014–2018.
Notes: [a] Part D payments are calculated as the sum of low income cost-sharing and reinsurance amounts, as reflected on the PDE.
Asterisks denote statistically significant impact estimates at *p<0.10, **p<0.05, and ***p<0.01. OCM intervention group; COMP: Comparison group. Int.: Intervention period. DID: Difference-in-difference. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3. LCL: Lower confidence limit; UCL: Upper confidence limit

Exhibit B-9: OCM had Less than One Percent Probability of Saving at Least $200 in Part B Chemotherapy Payments

Savings Category	Probability
DID Estimate: Part B Chemotherapy Payments	$58
Any Amount of Increase in Costs to Medicare per Episode	73.0%
Any Amount of Savings for Medicare per Episode	27.0%
Savings of at Least $100 per Episode	4.7%
Savings of at Least $200 per Episode	0.3%
Savings of at Least $300 per Episode	0.0%

Source: Medicare claims 2014–2018.

B.3. Differential Impacts by Cancer Bundle

Exhibit B-10: OCM Reduced TEP among Episodes for Higher Cost, Higher Risk Cancers

TEP	Number of Episodes	OCM		COMP		Impact Estimates Through PP3			
		Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change
Cancer Bundle									
Low-Risk Breast Cancer†	366,996	$5,419	$5,486	$5,403	$5,364	$106	-$4	$217	2.0%
High-Risk Breast Cancer	155,613	$35,169	$39,428	$34,364	$39,201	-$578*	-$1,095	-$60	-1.6%
Low-Intensity Prostate Cancer†	156,587	$11,312	$11,877	$11,117	$11,439	$244	-$61	$549	2.2%
Lung Cancer	142,745	$39,883	$47,965	$39,122	$48,168	-$965***	-$1,555	-$375	-2.4%
Lymphoma	93,422	$42,948	$46,479	$43,248	$47,542	-$762	-$1,527	$3	-1.8%
Colorectal/Small Intestine Cancer	86,891	$36,290	$35,963	$34,846	$35,261	-$742*	-$1,442	-$43	-2.0%
Multiple Myeloma	86,920	$52,515	$64,510	$53,101	$65,151	-$55	-$1,141	$1,031	-0.1%
Non-Reconciliation Eligible Cancers	78,081	$36,757	$42,271	$35,816	$41,212	$118	-$652	$888	0.3%
High-Intensity Prostate Cancer	60,906	$42,492	$44,733	$42,200	$44,575	-$135	-$1,057	$788	-0.3%
Chronic Leukemia	54,522	$43,775	$47,355	$43,955	$47,795	-$260	-$1,101	$580	-0.6%
Cancer Bundle Risk									
Low-Risk Cancer Bundles	540,387	$7,174	$7,395	$7,280	$7,371	$130*	$8	$252	1.8%
High-Risk Cancer Bundles	1,029,807	$39,753	$44,538	$39,359	$44,573	-$430**	-$746	-$113	-1.1%

Source: Medicare Claims 2014–2018.
Notes: Asterisks denote statistically significant impact estimates at *p<0.10, **p<0.05, and ***p<0.01. OCM intervention group; COMP: Comparison group. Int.: Intervention period. DID: Difference-in-difference. LCL: Lower confidence limit; UCL: Upper confidence limit. † denotes a low-risk cancer bundle; low-risk bladder cancer not shown.

Exhibit B-11: OCM Reduced Part A Payments within Higher-Risk Cancer Bundles, Notably for Lymphoma and Non-Reconciliation Eligible Cancers

Part A Payments	Number of Episodes	OCM		COMP		Impact Estimates Through PP3			
		Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change
Cancer Bundle									
Low-Risk Breast Cancer†	366,996	$1,718	$1,722	$1,630	$1,558	$76	-$2	$155	4.4%
High-Risk Breast Cancer	155,613	$4,976	$4,766	$4,872	$4,549	$114	-$86	$314	2.3%
Low-Intensity Prostate Cancer†	156,587	$3,655	$3,512	$3,402	$3,167	$92	-$102	$286	2.5%
Lung Cancer	142,745	$9,458	$9,156	$9,044	$8,878	-$135	-$394	$124	-1.4%
Lymphoma	93,422	$7,121	$6,930	$7,393	$7,650	-$448*	-$824	-$71	-6.3%
Multiple Myeloma	86,920	$7,529	$7,115	$7,628	$7,500	-$286	-$746	$175	-3.8%
Non-Reconciliation Eligible Cancers	78,081	$7,293	$7,207	$7,103	$7,418	-$401*	-$801	-$0	-5.5%
High-Intensity Prostate Cancer	60,906	$6,439	$6,118	$5,934	$5,690	-$77	-$484	$330	-1.2%
Chronic Leukemia	54,522	$5,083	$4,995	$5,312	$5,107	$116	-$315	$548	2.3%
Cancer Bundle Risk									
Low-Risk Cancer Bundles	540,387	$7,904	$7,760	$7,723	$7,806	$82	-$2	$165	3.6%
High-Risk Cancer Bundles	1,029,807	$2,271	$2,253	$2,242	$2,142	-$227***	-$360	-$94	-2.9%

Source: Medicare Claims 2014–2018.

Notes: Asterisks denote statistically significant impact estimates at *p<0.10, **p<0.05, and ***p<0.01. OCM intervention group; COMP: Comparison group. Int.: Intervention period. DID: Difference-in-difference. LCL: Lower confidence limit; UCL: Upper confidence limit. † denotes a low-risk cancer bundle; low-risk bladder cancer not shown.

Exhibit B-12: OCM Reduced Part B Payments within High-Risk Breast and Colorectal Cancers

Part B Payments	Number of Episodes	OCM		COMP		Impact Estimates Through PP3			
		Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change
Cancer Bundle									
Low-Risk Breast Cancer†	366,996	$3,135	$3,180	$3,172	$3,217	$0	-$48	$49	0.0%
High-Risk Breast Cancer	155,613	$25,052	$26,505	$24,534	$26,640	-$653***	-$1,061	-$244	-2.6%
Low-Intensity Prostate Cancer†	156,587	$7,358	$8,014	$7,411	$7,934	$134	-$87	$354	1.8%
Lung Cancer	142,745	$26,839	$34,236	$26,265	$34,213	-$551	-$1,137	$35	-2.1%
Lymphoma	93,422	$31,087	$34,574	$31,018	$34,548	-$43	-$622	$535	-0.1%
Colorectal/Small Intestine Cancer	86,891	$26,313	$25,582	$25,095	$25,011	-$648*	-$1,205	-$91	-2.5%
Multiple Myeloma	86,920	$21,174	$25,083	$21,323	$25,217	$14	-$557	$585	0.1%
Non-Reconciliation Eligible Cancers	78,081	$17,153	$20,230	$17,012	$20,077	$13	-$570	$596	0.1%
High-Intensity Prostate Cancer	60,906	$18,254	$19,059	$17,963	$19,404	-$636	-$1,375	$103	-3.5%
Chronic Leukemia	54,522	$13,458	$14,586	$13,283	$14,464	-$53	-$474	$369	-0.4%
Cancer Bundle Risk									
Low-Risk Cancer Bundles	540,387	$4,424	$4,645	$4,529	$4,722	$28	-$46	$103	0.6%
High-Risk Cancer Bundles	1,029,807	$23,547	$26,457	$23,420	$26,561	-$232	-$481	$16	-1.0%

Source: Medicare claims 2014–2018.

Notes: Asterisks denote statistically significant impact estimates at *p<0.10, **p<0.05, and ***p<0.01. OCM intervention group; COMP: Comparison group. Int.: Intervention period. DID: Difference-in-difference. LCL: Lower confidence limit; UCL: Upper confidence limit. † denotes a low-risk cancer bundle; low-risk bladder cancer not shown.

Exhibit B-13: OCM Increased Part D Payments within High-Risk Cancer Bundles, Notably for Colorectal and High-Intensity Prostate Cancer

Part D Payments[a]	Number of Episodes	OCM		COMP		Impact Estimates Through PP3			
		Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change
Cancer Bundle									
Low-Risk Breast Cancer†	365,830	$570	$584	$604	$585	$33	-$8	$74	5.7%
High-Risk Breast Cancer	123,080	$6,425	$10,042	$6,317	$9,852	$81	-$231	$394	1.3%
Low-Intensity Prostate Cancer†	102,990	$453	$538	$455	$509	$30	-$42	$101	6.6%
Lung Cancer	107,111	$4,790	$6,180	$5,076	$6,629	-$164	-$459	$131	-3.4%
Lymphoma	68,939	$6,380	$6,785	$6,636	$6,996	$45	-$393	$482	0.7%
Colorectal/Small Intestine Cancer	64,057	$2,552	$2,978	$2,595	$2,773	$248*	$26	$469	9.7%
Multiple Myeloma	73,898	$27,726	$37,716	$28,207	$37,685	$513	-$165	$1,190	1.8%
Non-Reconciliation Eligible Cancers	64,671	$14,815	$17,553	$14,221	$16,615	$344	-$223	$910	2.3%
High-Intensity Prostate Cancer	53,323	$20,208	$22,185	$20,744	$22,090	$630**	$144	$1,116	3.1%
Chronic Leukemia	49,540	$27,612	$30,461	$27,813	$30,874	-$212	-$851	$426	-0.8%
Cancer Bundle Risk									
Low-Risk Cancer Bundles	480,370	$540	$558	$573	$566	$26	-$10	$61	4.7%
High-Risk Cancer Bundles	809,465	$10,465	$13,013	$10,508	$12,828	$229**	$80	$377	2.2%

Source: Medicare claims 2014–2018.

Notes: [a] Part D payments are calculated as the sum of low income cost-sharing and reinsurance amounts, as reflected on the PDE.

Asterisks denote statistically significant impact estimates at *p<0.10, **p<0.05, and ***p<0.01. OCM intervention group; COMP: Comparison group. Int.: Intervention period. DID: Difference-in-difference. LCL: Lower confidence limit; UCL: Upper confidence limit.

B.4. Utilization and Payments for Hospital Services, Other Part A Services, and Other Part B Service

Exhibit B-14: There Was No OCM Impact on Hospital-Based Payments

Measure	Number of Episodes	OCM		COMP		Impact Estimates Through PP3				Period by Period Impact Estimates		
		Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change	PP1 DID	PP2 DID	PP3 DID
ACH Payments	1,570,194	$3,879	$3,832	$3,629	$3,575	$7	-$66	$79	0.2%	$30	$13	-$19
OIP Payments	1,570,194	-$19	$4	$215	$362	-$124**	-$206	-$42	650.8%	-$122**	-$127**	-$123**
30-day Readmission Payments	1,570,194	$1,039	$991	$933	$919	-$34	-$69	$1	-3.3%	-$29	-$31	-$41

Source: Medicare claims 2014–2018.
Notes: Asterisks denote statistically significant impact estimates at *p<0.10, **p<0.05, and ***p<0.01. OCM intervention group; COMP: Comparison group. Int.: Intervention period. DID: Difference-in-difference. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3. LCL: Lower confidence limit; UCL: Upper confidence limit.

Exhibit B-15: There Was No Overall OCM Impact on Hospital-Based Services Use Despite the Fact that Use Decreased Over Time for both OCM and Comparison Episodes

Measure	Number of Episodes	OCM		COMP		Impact Estimates Through PP3				Period by Period Impact Estimates		
		Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change	PP1 DID	PP2 DID	PP3 DID
Occurrence of ACH Hospitalizations	1,570,194	27.2%	25.9%	25.9%	24.3%	0.2%	-0.2%	0.5%	0.6%	0.1%	0.1%	0.3%
Number of ACH Hospitalizations	1,570,194	0.428	0.403	0.401	0.376	0.000	-0.007	0.007	0.0%	0.000	0.000	0.000
Number of ACH Days	404,385	8.543	8.297	8.433	8.246	-0.059	-0.153	0.036	-0.7%	-0.008	0.015	-0.184**
Occurrence of ICU Admissions	1,570,194	9.9%	9.5%	9.4%	9.2%	-0.3%	-0.6%	0.0%	-2.8%	-0.3%*	-0.2%	-0.3%
Occurrence of 30-day Readmissions	385,260	22.3%	21.8%	21.6%	21.4%	-0.3%	-0.8%	0.2%	-1.3%	-0.4%	-0.2%	-0.3%
Number of 30-day Readmissions	1,570,194	0.103	0.096	0.094	0.089	-0.002	-0.006	0.001	-2.4%	-0.003	-0.002	-0.003
Occurrence of ED Visits not Resulting in an Hospitalization	1,570,194	23.5%	23.6%	24.2%	24.3%	-0.0%	-0.3%	0.3%	-0.1%	-0.1%	0.1%	0.0%
Number of ED Visits not Resulting in a Hospitalization	1,570,194	0.358	0.359	0.373	0.375	-0.000	-0.006	0.005	-0.1%	-0.002	0.002	0.000

Source: Medicare claims 2014–2018.
Notes: Asterisks denote statistically significant impact estimates at *p<0.10, **p<0.05, and ***p<0.01. OCM intervention group; COMP: Comparison group. Int.: Intervention period. DID: Difference-in-difference. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3. LCL: Lower confidence limit; UCL: Upper confidence limit.

Exhibit B-16: OCM Likely Reduced the Number of Hospitalizations and ED Visits not Resulting in Hospitalization, but by Less than One Percent

	Hospitalizations		ED Visits not Resulting in a Hospitalization	
	Number of Hospitalizations (per 10,000 Episodes) Associated with Reduction	Probability	Number of Visits (per 10,000 Episodes) Associated with Reduction	Probability
DID Estimate	0.931		-2.637	
Any Reduction in Utilization per Episode	>0	49.1%	>0	53.0%
Reduction of at Least 1%	43	15.8%	36	17.0%
Reduction of at Least 2%	86	2.4%	72	2.3%
Reduction of at Least 3%	128	0.1%	107	0.1%
Reduction of at Least 4%	171	0.0%	143	0.0%
Reduction of at Least 5%	214	0.0%	179	0.0%

Source: Medicare claims 2014–2018.

Exhibit B-17: OCM Had No Impact on Utilization or Payments for Hospice or Post-Acute Services

Measure	Number of Episodes	OCM		COMP		Impact Estimates Through PP3				Period by Period Impact Estimates		
		Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change	PP1 DID	PP2 DID	PP3 DID
SNF Services												
Occurrence of Episodes with a SNF Stay	1,570,194	5.1%	4.7%	5.0%	4.6%	-0.0%	-0.2%	0.1%	-0.6%	0.0%	-0.0%	-0.1%
Number of SNF Stays per Episode	1,570,194	0.067	0.062	0.065	0.060	-0.001	-0.003	0.001	-0.8%	-0.000	-0.001	-0.001
Number of SNF Days per Episode	76,259	27.971	26.167	27.304	25.610	-0.110	-0.619	0.400	-0.4%	0.119	-0.053	-0.411
SNF Payments	1,570,194	$667	$622	$634	$600	-$11	-$33	$11	-1.7%	$10	-$16	-$27
HHA Services												
Occurrence of Episodes with a HHA Service	1,570,194	15.4%	14.3%	15.1%	14.2%	-0.1%	-0.4%	0.2%	-0.8%	-0.2%	-0.0%	-0.1%
Number of 60-day HHA Spells per Episode	1,570,194	0.292	0.273	0.285	0.268	-0.003	-0.010	0.005	-0.9%	-0.006	0.002	-0.003
HHA Payments	1,570,194	$653	$617	$643	$616	-$10	-$25	$6	-1.5%	-$17	$2	-$15
Hospice Care Services												
Occurrence of Episodes with a Hospice Care Service	1,570,194	8.4%	7.8%	7.9%	7.2%	0.1%	-0.1%	0.2%	0.7%	0.0%	-0.0%	0.2%
Number of Days Spent in Hospice Care per Episode	122,218	27.600	27.531	27.515	27.230	0.217	-0.535	0.968	0.8%	0.469	0.147	0.026
Hospice Care Payments	1,570,194	$464	$462	$421	$416	$4	-$11	$18	0.8%	$6	-$2	$8
Other Part A Services												
Inpatient Rehab Facility Payments	1,570,194	$214	$222	$181	$195	-$6	-$20	$9	-2.7%	-$9	$2	-$10
Long Term Care Facility Payments	1,559,842	$121	$98	$114	$83	$8	-$5	$20	6.4%	$12	$7	$4

Source: Medicare claims 2014–2018.
Notes: OCM intervention group; COMP: Comparison group. Int.: Intervention period. DID: Difference-in-difference. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3. LCL: Lower confidence limit; UCL: Upper confidence limit.

Exhibit B-18: OCM Led to Small, but not Clinically Meaningful Reductions in Imaging Use and Payments

Measure	Number of Episodes	OCM		COMP		Impact Estimates Through PP3				Period by Period Impact Estimates		
		Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change	PP1 DID	PP2 DID	PP3 DID
Evaluation & Management Services												
Number of EM Services	1,570,194	20.900	19.571	20.040	19.018	-0.307	-0.731	0.117	-1.5%	-0.673***	-0.162	-0.054
EM Payments	1,570,194	$1,278	$1,248	$1,221	$1,197	-$6	-$22	$10	-0.5%	-$14	$4	-$8
Imaging Services												
Number of Part B Standard and Other Imaging Services	1,570,194	4.409	3.972	4.362	3.967	-0.042*	-0.083	-0.002	-1.0%	-0.009	-0.033	-0.082***
Number of Part B Advanced Imaging Services	1,570,194	3.473	3.492	3.511	3.564	-0.035	-0.081	0.012	-1.0%	-0.025	-0.041	-0.038
Imaging Payments	1,570,194	$807	$805	$810	$823	-$14**	-$25	-$4	-1.8%	-$12	-$12	-$21***
Standard and Other Imaging Payments	1,570,194	$204	$198	$198	$196	-$3	-$8	$2	-1.6%	-$2	-$2	-$7*
Advanced Imaging Payments	1,570,194	$603	$607	$612	$627	-$11**	-$20	-$2	-1.8%	-$10	-$10*	-$14**
Outpatient Therapy Services												
Occurrence of Outpatient Therapy Services	1,570,194	8.5%	8.8%	8.8%	9.3%	-0.2%	-0.5%	0.0%	-2.7%	-0.2%	-0.2%	-0.3%
Number of Outpatient Therapy Services	1,570,194	1.736	1.819	1.766	1.839	0.011	-0.056	0.077	0.6%	0.040	-0.037	0.030
Other Part B Services												
Lab Payments	1,570,194	$453	$455	$415	$415	$2	-$9	$14	0.5%	$4	$5	-$2

Source: Medicare claims 2014–2018.

Notes: Asterisks denote statistically significant impact estimates at *p<0.10, **p<0.05, and ***p<0.01. OCM intervention group; COMP: Comparison group. Int.: Intervention period. DID: Difference-in-difference. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3. LCL: Lower confidence limit; UCL: Upper confidence limit.

Exhibit B-19: There Was No OCM Impact on Chemotherapy Toxicity-Associated Hospitalizations or ED Visits

Measure	# of Episodes		OCM		COMP		Impact Estimates Through PP3			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change
Episodes with chemotherapy-associated inpatient admission	724,815	845,188	9.31%	8.67%	8.85%	8.22%	-0.01%	-0.21%	0.19%	-0.09%
Episodes with chemotherapy-associated ED visit	724,815	845,188	12.98%	12.43%	12.83%	12.42%	-0.13%	-0.34%	0.07%	-1.02%
Episodes with chemotherapy-associated ED visit leading to admissions	724,815	845,188	7.39%	7.06%	6.93%	6.72%	-0.12%	-0.30%	0.07%	-1.60%
Episodes with chemotherapy associated ED visit without admission	724,815	845,188	6.68%	6.39%	7.01%	6.77%	-0.05%	-0.21%	0.10%	-0.81%

Source: Medicare claims 2014-2018

Notes: Some of the patients who had ED visits were admitted to the hospital, thus are also recorded in the chemotherapy-associated inpatient visits. OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period. DID: Difference-in-difference. LCL: Lower confidence limit; UCL: Upper confidence limit.

B.5. Differential Impacts by Beneficiary Type

Exhibit B-20: OCM Reduced TEP for Two Subgroups – Episodes for Minority Beneficiaries and Higher Risk Beneficiaries

TEP	Number of Episodes	OCM		COMP		Impact Estimates Through PP3			
		Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change
Age									
Beneficiaries Aged 80 or Older	348,779	$25,148	$28,150	$24,781	$27,787	-$5	-$367	$357	-0.0%
Beneficiaries Aged 65 to 79	1,061,182	$28,288	$31,526	$28,220	$31,638	-$181	-$433	$71	-0.6%
Minority									
Episodes for Minority Beneficiaries	274,443	$30,281	$33,481	$30,192	$33,968	-$576**	-$1,024	-$127	-1.9%
Episodes for Non-Minority Beneficiaries	1,295,751	$28,128	$31,397	$27,973	$31,288	-$46	-$277	$186	-0.2%
Dual Eligible									
Episodes for Dual-Eligible Beneficiaries	242,928	$33,307	$37,367	$33,094	$37,294	-$140	-$581	$300	-0.4%
Episodes for Non-Dual Eligible Beneficiaries	1,327,266	$27,624	$30,731	$27,516	$30,736	-$114	-$358	$131	-0.4%
Risk Level									
Episodes for Lower Risk Beneficiaries	820,337	$20,531	$22,628	$20,605	$22,616	$86	-$157	$329	0.4%
Episodes for Higher Risk Beneficiaries	749,857	$37,133	$41,735	$36,784	$41,729	-$344*	-$652	-$35	-0.9%

Source: Medicare claims 2014–2018.

Notes: Asterisks denote statistically significant impact estimates at *p<0.10, **p<0.05, and ***p<0.01. OCM intervention group; COMP: Comparison group. Int.: Intervention period. DID: Difference-in-difference. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3. LCL: Lower confidence limit; UCL: Upper confidence limit.

B.6. Practice and Episode Trends

Exhibit B-21: The Number of OCM Practices Was Stable over Time, While the Number of Comparison Practices Declined Due to Consolidation and Attrition[21,22]

	Baseline Period Practices with Episodes: (7/2/14-1/1/16)		Intervention Period Practices with Episodes: (7/1/16-1/1/18)		PP1 Practices with Episodes: (7/1/16-1/1/17)		PP2 Practices with Episodes: (1/2/17-7/1/17)		PP3 Practices with Episodes: (7/2/17-1/1/18)	
	OCM	COMP	OCM	COMP	OCM	COMP	OCM	COMP	OCM	COMP
N	194	538	197	524	190	522	190	508	195	494

Source: Medicare claims 2014–2018

Note: Practice counts reflect an intention-to-treat approach, where terminated OCM practices remain in the sample as long as they continue to contribute episodes. OCM practices could voluntarily terminate participation, and some joined OCM late through pooling arrangements with existing participants. OCM intervention group; COMP: Comparison group. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3.

[21] In PP3, six practices entered into pooling arrangements with existing OCM practices. We included these practices in the baseline sample as well as the intervention sample, once they joined the Model. Three of these new practices had no episodes in the baseline period.

[22] During PP3, five practices terminated OCM participation. Three of these practices no longer contributed episodes in PP3 because of a merger or acquisition by another TIN and are not reflected in the PP3 practice counts in Exhibit B-22. Two practices terminated early in PP3, but did have episodes in that period. Under our intention-to-treat (ITT) evaluation approach, terminated practices remain in the sample and these two are thus included in the PP3 practice counts.

Exhibit B-22: Practice Size Increased between the Baseline and Intervention Periods among OCM and Comparison Practices

Statistic	Baseline Period Episodes Initiating: (7/2/14-1/1/16)		PP1 Episodes Initiating: (7/1/16 - 1/1/17)		PP2 Episodes Initiating: (1/2/17 - 7/1/17)		PP3 Episodes Initiating: (7/2/17 - 1/1/18)	
	OCM N=194	COMP N=538	OCM N=190	COMP N=522	OCM N=190	COMP N=508	OCM N=195	COMP N=494
Number of NPIs								
Median	18	9	23	10	22	10	23	10
Mean	36	21	41	23	42	24*	42	25*
Std Dev	53	31	60	37	62	39	63	41
Number of Episodes								
Median	336	158	396	173	397	185	391	173
Mean	594	254	667	281	675	292*	638	284
Std Dev	1,179	296	1,311	349	1,340	361	1,263	360

Source: Practice analytic file, 2014–2018.
Notes: * Denotes a statistically significant difference from baseline to intervention estimates at p<0.10; Statistical significance not calculated for median values. OCM intervention group; COMP: Comparison group. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3

Exhibit B-23: The Growth in NPIs Was Concentrated in the Hiring of NP/PAs in the Intervention Period, Particularly among OCM Practices

	Baseline Period Episodes Initiating: (7/2/14-1/1/16)		PP1 Episodes Initiating: (7/1/16 - 1/1/17)		PP2 Episodes Initiating: (1/2/17 - 7/1/17)		PP3 Episodes Initiating: (7/2/17 - 1/1/18)	
Proportion of Specialties Per Practice	OCM N=194	COMP N=538	OCM N=190	COMP N=522	OCM N=190	COMP N=508	OCM N=195	COMP N=494
Oncologists	64.0%	62.0%	62.1%	61.0%	61.6%	60.1%	61.4%	60.7%
NP/PA	12.4%	10.1%	14.5%	11.1%	15.8%*	12.1%*	16.8%*	12.1%*
Urologists	4.5%	6.5%	4.4%	6.2%	4.6%	6.6%	4.4%	6.6%
Other	19.1%	21.5%	19.0%	21.7%	18.1%	21.2%	17.3%	20.6%

Source: Practice analytic file, 2014–2018.
Notes: * Denotes a statistically significant difference from baseline to intervention estimates at p<0.10. OCM intervention group; COMP: Comparison group. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3

Exhibit B-24: Affiliation with a Health System or Ownership by a Hospital Increased between the Baseline and Intervention Periods

	Baseline Period Episodes Initiating: (7/2/14-1/1/16)		PP1 Episodes Initiating: (7/1/16 - 1/1/17)		PP2 Episodes Initiating: (1/2/17 - 7/1/17)		PP3 Episodes Initiating: (7/2/17 - 1/1/18)	
	OCM N=191	COMP N=534	OCM N= 190	COMP N=514	OCM N= 190	COMP N=502	OCM N= 195	COMP N=487
Proportion of Practices Owned by a Hospital or Affiliated with a Health System	44.0%	54.7%	50.0%	59.7%*	48.4%	57.8%	47.7%	60.8%*

Source: Practice analytic file, 2014–2018.
Notes: * Denotes a statistically significant difference from baseline to intervention estimates at p<0.10. OCM intervention group; COMP: Comparison group. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3

Exhibit B-25: The Proportion of Low-Risk Cancer Bundle Episodes Slightly Increased for OCM Practices and Slightly Decreased for Comparison Practices

	Baseline Period Episodes Initiating: (7/2/14-1/1/16)		Intervention Period Episodes Initiating: (7/1/16-1/1/18)		PP1 Episodes Initiating: (7/1/16 - 1/1/17)		PP2 Episodes Initiating: (1/2/17 - 7/1/17)		PP3 Episodes Initiating: (7/2/17 - 1/1/18)	
	OCM N=345,696	COMP N=409,799	OCM N=379,219	COMP N=435,480	OCM N=126,654	COMP N=146,863	OCM N=128,238	COMP N=148,287	OCM N=124,327	COMP N=140,330
Proportion of low-risk cancer bundle episodes	32.8%	35.7%	33.6%	35.1%	33.4%	35.1%	34.1%	35.5%	33.4%	34.7%

Source: Medicare claims 2014–2018.
Notes: OCM intervention group; COMP: Comparison group. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3. Low-risk episodes includes low-risk breast cancer episodes, low-intensity prostate cancer episodes, and low-risk bladder cancer episodes.

Exhibit B-26: Average HCC Risk Score Increased between the Baseline and Intervention Periods

	Baseline Period Episodes Initiating: (7/2/14-1/1/16)		Intervention Period Episodes Initiating: (7/1/16-1/1/18)		PP1 Episodes Initiating: (7/1/16 - 1/1/17)		PP2 Episodes Initiating: (1/2/17 - 7/1/17)		PP3 Episodes Initiating: (7/2/17 - 1/1/18)	
	OCM	COMP	OCM	COMP	OCM	COMP	OCM	COMP	OCM	COMP
N	345,696	409,799	379,219	435,480	126,654	146,863	128,238	148,287	124,327	140,330
Mean	2.66	2.66	2.81	2.85	2.80	2.83	2.79	2.82	2.85	2.89
Median	2.34	2.35	2.62	2.75	2.62	2.73	2.57	2.71	2.67	2.83
Std Deviation	1.85	1.84	1.93	1.93	1.92	1.92	1.93	1.92	1.95	1.95

Source: Medicare claims 2014–2018.
Notes: OCM intervention group; COMP: Comparison group. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3

Exhibit B-27: Changes in Beneficiary Demographics from the Baseline to Intervention Period Were Consistent with National Shifts in Demographics and an Aging Population

	Baseline Period Episodes Initiating: (7/2/14-1/1/16)		Intervention Period Episodes Initiating: (7/1/16-1/1/18)		PP1 Episodes Initiating: (7/1/16 - 1/1/17)		PP2 Episodes Initiating: (1/2/17 - 7/1/17)		PP3 Episodes Initiating: (7/2/17 - 1/1/18)	
	OCM N=345,696	COMP N=409,799	OCM N=379,219	COMP N=435,480	OCM N=126,654	COMP N=146,863	OCM N=128,238	COMP N=148,287	OCM N=124,327	COMP N=140,330
Gender	%	%	%	%	%	%	%	%	%	%
Female	60.3%	57.8%	60.3%	57.4%	60.2%	57.7%	60.5%	57.3%	60.1%	57.1%
Age Bracket	%	%	%	%	%	%	%	%	%	%
< 65	9.9%	11.2%	9.2%	10.4%	9.5%	10.7%	9.3%	10.4%	8.8%	10.0%
65-69	25.1%	24.4%	25.0%	24.5%	25.4%	24.9%	24.9%	24.4%	24.6%	24.2%
70-74	23.7%	23.0%	24.6%	23.9%	23.9%	23.2%	24.8%	24.0%	25.2%	24.5%
75-79	19.2%	18.7%	19.4%	19.1%	19.4%	19.0%	19.3%	19.1%	19.6%	19.1%
80-84	12.6%	12.8%	12.5%	12.6%	12.5%	12.6%	12.4%	12.5%	12.7%	12.6%
85+	9.5%	9.9%	9.2%	9.6%	9.4%	9.8%	9.2%	9.6%	9.1%	9.6%
Race/Ethnicity	%	%	%	%	%	%	%	%	%	%
Non-Hispanic White	82.7%	82.7%	82.4%	82.3%	82.6%	82.5%	82.1%	82.2%	82.4%	82.2%
Non-Hispanic Black	9.0%	9.1%	8.8%	8.6%	8.7%	8.6%	9.0%	8.8%	8.7%	8.4%
Hispanic	4.8%	4.3%	4.9%	4.4%	4.8%	4.5%	4.9%	4.3%	4.9%	4.4%
Other	3.4%	3.8%	3.9%	4.7%	3.8%	4.5%	4.0%	4.7%	4.1%	5.0%
Dual Eligible Status	%	%	%	%	%	%	%	%	%	%
Dual Eligible	14.4%	16.8%	14.2%	16.1%	14.3%	16.4%	14.3%	16.0%	14.0%	16.0%

Source: Medicare claims 2014–2018.
Notes: OCM intervention group; COMP: Comparison group. PP1: Performance Period 1; PP2: Performance Period 2; PP3: Performance Period 3

C. Patient and Caregiver Survey Analyses

Exhibit C-1: No Meaningful Changes over Time in Adjusted Composite Measures of Quality of Care

Composite Measures (scale 0–10)	Mean								Linear Time Trend
	Baseline	Intervention Survey Waves							
	4/16-9/16	7/16-12/16	10/16-3/17	1/17-6/17	4/17-9/17	7/17-12/17	10/17-3/18	1/18-6/18	Point Estimate
N	11,100	10,749	10,097	10,292	10,387	10,607	10,788	10,654	
Shared Decision Making	7.45	7.38	7.30	7.43	7.46	7.42	7.54	7.37	0.006
Access to Care	8.88	8.79	8.78	8.79	8.79	8.82	8.87	8.80	-0.001
Affective Communication	9.01	8.96	8.91	8.92	8.96	8.94	8.98	8.98	-0.001
Exchange of Information	8.50	8.42	8.36	8.40	8.44	8.49	8.44	8.40	-0.003
Self-Management	5.93	5.85	5.92	5.89	5.91	6.00	5.85	5.93	0.003
Symptom Management	7.28	7.16	7.29	7.25	7.16	7.28	7.17	7.13	-0.013**
Overall Rating of Cancer Team	9.27	9.22	9.25	9.20	9.21	9.17	9.23	9.24	-0.004

Source: OCM Patient and Caregiver Surveys, April 2016 – June 2018

Note: Estimates weighted for sampling and non-response and adjusted for age, gender, education, mental health, respondent, dual eligibility, race, breast cancer or prostate cancer treatment during episode, number of HCC flags, cancer type, month of episode period, radiation, surgery, and practice characteristics. Each composite measure has a different number of missing values, see Exhibits C-3 through C-8 for individual composite measure number of observations. Asterisks denote statistically significant impact estimates at *p<0.10, **p<0.05, and ***p<0.01.

Exhibit C-2: No Significant Changes over Time in Adjusted Self-Reported Out-of-Pocket Expenses

Expense Category	Percent								Linear Time Trend
	Baseline	Intervention Survey Waves							
	4/16-9/16	7/16-12/16	10/16-3/17	1/17-6/17	4/17-9/17	7/17-12/17	10/17-3/18	1/18-6/18	Point Estimate
N	8,616	8,475	7,925	8,118	8,095	8,436	8,462	8,418	
Under $100	23.7%	22.1%	21.8%	23.7%	23.6%	22.6%	22.4%	23.5%	
$100–$499	28.3%	27.7%	27.6%	28.3%	28.3%	27.9%	27.9%	28.3%	
$500–$999	14.4%	14.6%	14.6%	14.4%	14.4%	14.5%	14.6%	14.4%	
$1,000–$1,999	11.4%	11.8%	11.8%	11.3%	11.4%	11.6%	11.7%	11.4%	
$2,000–$4,999	12.5%	13.2%	13.3%	12.4%	12.5%	12.9%	13.0%	12.5%	
$5,000 or more	9.7%	10.6%	10.8%	9.7%	9.8%	10.3%	10.4%	9.8%	
Trend Analysis									-0.2%

Source: OCM Patient and Caregiver Surveys, April 2016 – June 2018.

Note: Trend analysis is based on the midpoint of the out of pocket expense categories ($50, $300, &750, $1500, $3500, and $7500). Estimates weighted for sampling and non-response and adjusted for age, gender, education, mental health, respondent, dual eligibility, race, breast cancer or prostate cancer treatment during episode, number of HCC flags, cancer type, month of episode period, radiation, surgery, and practice characteristics.

Exhibit C-3: No Significant Changes over Time in Adjusted Measures of Access to Care

Measure	Mean or Percent								Linear Time Trend
	Baseline	Intervention Survey Waves							
	4/16-9/16	7/16-12/16	10/16-3/17	1/17-6/17	4/17-9/17	7/17-12/17	10/17-3/18	1/18-6/18	Point Estimate
N	11,100	10,749	10,097	10,292	10,387	10,607	10,788	10,654	
Composite score: Access to Care (scale 0–10)	8.88	8.79	8.78	8.79	8.79	8.82	8.87	8.80	-0.001
Definitely encouraged patient contact between visits	82.7%	81.1%	81.7%	81.1%	81.4%	81.6%	83.4%	81.8%	0.0%
Definitely told to call immediately about certain side-effects	84.2%	82.7%	83.1%	82.8%	82.2%	85.3%	83.8%	82.6%	0.0%
Definitely gave instructions how to contact after- hours	74.1%	71.9%	71.0%	72.9%	72.5%	71.7%	73.0%	72.1%	-0.1%
Visits always scheduled at convenient times	74.5%	72.7%	76.0%	72.9%	73.6%	75.1%	73.5%	73.9%	0.0%
Tests and procedures always scheduled as soon as needed	86.0%	85.3%	86.2%	85.0%	84.5%	86.4%	85.8%	87.0%	0.1%
Never waited longer than expected for test results	80.2%	79.8%	81.1%	79.5%	79.4%	79.4%	80.4%	78.6%	-0.2%

Source: OCM Patient and Caregiver Surveys, April 2016 – June 2018.
Note: Estimates weighted for sampling and non-response and adjusted for age, gender, education, mental health, respondent, dual eligibility, race, breast cancer or prostate cancer treatment during episode, number of HCC flags, cancer type, month of episode period, radiation, surgery, and practice characteristics

Exhibit C-4: No Significant Changes over Time in Adjusted Measures of Affective Communication

Measure	Mean or Percent								Linear Time Trend
	Baseline	Intervention Survey Waves							Point Estimate
	4/16-9/16	7/16-12/16	10/16-3/17	1/17-6/17	4/17-9/17	7/17-12/17	10/17-3/18	1/18-6/18	
N	10,970	10,639	9,991	10,218	10,290	10,520	10,633	10,550	
Composite score: Affective Communications (scale 0–10)	9.01	8.96	8.91	8.92	8.96	8.94	8.98	8.98	-0.001
Always showed respect for patient	81.2%	79.5%	78.8%	80.0%	80.3%	79.3%	80.5%	79.4%	-0.1%
Always listened carefully to patient	78.9%	78.2%	78.1%	78.4%	78.5%	78.5%	79.1%	78.7%	0.1%
Always straightforward when talking to patient about therapy	77.5%	76.2%	74.1%	74.9%	75.9%	76.6%	75.6%	76.3%	0.0%
Always spent enough time with patient	72.7%	72.2%	70.1%	70.2%	72.2%	72.9%	71.7%	70.9%	-0.1%

Source: OCM Patient and Caregiver Surveys, April 2016–June 2018.
Note: Estimates weighted for sampling and non-response and adjusted for age, gender, education, mental health, respondent, dual eligibility, race, breast cancer or prostate cancer treatment during episode, number of HCC flags, cancer type, month of episode period, radiation, surgery, and practice characteristics

Exhibit C-5: No Significant Changes over Time in Adjusted Measures of Shared Decision Making

Measure	Mean or Percent								Linear Time Trend
	Baseline	Intervention Survey Waves							Point Estimate
	4/16-9/16	7/16-12/16	10/16-3/17	1/17-6/17	4/17-9/17	7/17-12/17	10/17-3/18	1/18-6/18	
N	11,008	10,719	10,042	10,168	10,129	10,396	10,569	10,485	
Composite score: Shared Decision Making (scale 0–10)	7.45	7.38	7.30	7.43	7.46	7.42	7.54	7.37	0.006
Definitely talked with patient about reasons to have drug therapy	85.7%	85.4%	84.7%	84.2%	85.8%	85.8%	86.6%	85.1%	0.1%
Definitely talked with patient about reasons to not have drug therapy	44.8%	42.0%	41.2%	43.8%	44.6%	43.5%	44.5%	42.7%	0.0%
Definitely asked for patient opinion on whether or not to have drug therapy	61.4%	61.0%	60.7%	62.4%	62.3%	62.7%	63.8%	60.6%	0.1%
Definitely involved patient in decisions about treatment as much as they wanted	74.9%	74.1%	72.7%	75.2%	74.2%	74.2%	75.5%	74.3%	0.1%

Source: OCM Patient and Caregiver Surveys, April 2016–June 2018.
Note: Estimates weighted for sampling and non-response and adjusted for age, gender, education, mental health, respondent, dual eligibility, race, breast cancer or prostate cancer treatment during episode, number of HCC flags, cancer type, month of episode period, radiation, surgery, and practice characteristics.

Exhibit C-6: No Significant Changes over Time in Adjusted Measures of Exchange of Information

Measure	Mean or Percent								Linear Time Trend
	Baseline	Intervention Survey Waves							Point Estimate
	4/16-9/16	7/16-12/16	10/16-3/17	1/17-6/17	4/17-9/17	7/17-12/17	10/17-3/18	1/18-6/18	
N	10,956	10,608	9,985	10,159	10,205	10,469	10,611	10,526	
Composite score: Exchange of Information (scale 0–10)	8.50	8.42	8.36	8.40	8.44	8.49	8.44	8.40	-0.003
Definitely explained how cancer and drug therapy would affect normal activities	74.3%	72.6%	74.7%	72.3%	72.6%	73.2%	74.4%	72.8%	-0.1%
Definitely told patient what the next steps in treatment would be	69.4%	68.5%	65.5%	68.1%	68.6%	69.7%	68.0%	66.4%	-0.1%
Always explained test results in a way that was easy to understand	75.3%	74.5%	73.5%	74.2%	75.5%	76.6%	74.4%	75.3%	0.1%
Always explained medications in a way that was easy to understand	88.4%	89.3%	88.6%	90.2%	89.8%	88.5%	88.5%	90.3%	0.1%

Source: OCM Patient and Caregiver Surveys, April 2016–June 2018.
Note: Estimates weighted for sampling and non-response and adjusted for age, gender, education, mental health, respondent, dual eligibility, race, breast cancer or prostate cancer treatment during episode, number of HCC flags, cancer type, month of episode period, radiation, surgery, and practice characteristics

Exhibit C-7: No Meaningful Changes over Time in Adjusted Measures of Encouraging Patient Self-management

Measure	Mean or Percent								Linear Time Trend
	Baseline	Intervention Survey Waves							Point Estimate
	4/16-9/16	7/16-12/16	10/16-3/17	1/17-6/17	4/17-9/17	7/17-12/17	10/17-3/18	1/18-6/18	
N	10,872	10,567	9,909	10,105	10,120	10,424	10,540	10,400	
Composite score: Patient Self-management (scale 0–10)	5.93	5.85	5.92	5.89	5.91	6.00	5.85	5.93	0.003
Definitely talked with patient about pain	71.0%	69.7%	69.8%	69.2%	69.6%	69.4%	68.8%	70.4%	-0.1%
Definitely helped patient deal with pain (if a problem)	74.8%	74.4%	73.8%	75.3%	71.2%	72.9%	74.5%	72.8%	-0.3%**
Definitely talked with patient about changes in energy	78.6%	78.0%	79.2%	77.2%	76.5%	77.8%	76.6%	78.5%	-0.1%
Definitely helped patient deal with changes in energy (if a problem)	52.2%	49.3%	48.7%	50.7%	50.3%	51.5%	49.2%	49.3%	-0.2%*
Definitely talked with patient about emotional problems, such as anxiety or depression	53.5%	54.7%	54.2%	54.1%	54.7%	55.1%	54.7%	55.8%	0.2%***
Definitely helped patient deal with emotional problems (if a problem)	44.3%	45.8%	45.2%	48.1%	46.6%	47.2%	43.9%	44.9%	0.0%
Definitely talked with patient about additional services to manage cancer care at home	21.6%	22.0%	21.7%	19.4%	18.5%	22.3%	18.0%	19.7%	-0.4%***
Definitely talked with patient about things to do to maintain health during treatment	47.1%	46.4%	47.1%	49.5%	48.1%	48.4%	48.3%	48.6%	0.3%

Source: OCM Patient and Caregiver Surveys, April 2016–June 2018.

Note: Estimates weighted for sampling and non-response and adjusted for age, gender, education, mental health, respondent, dual eligibility, race, breast cancer or prostate cancer treatment during episode, number of HCC flags, cancer type, month of episode period, radiation, surgery, and practice characteristics. Asterisks denote statistically significant impact estimates at *p<0.10, **p<0.05, and ***p<0.01.

Exhibit C-8: No Meaningful Changes over Time in Adjusted Measures of Symptom Management

Measure	Mean or Percent								Linear Time Trend
	Baseline	Intervention Survey Waves							Point Estimate
	4/16-9/16	7/16-12/16	10/16-3/17	1/17-6/17	4/17-9/17	7/17-12/17	10/17-3/18	1/18-6/18	
N	5,700	5,570	5,166	5,259	5,045	5,223	5,410	5,325	
Composite score: Symptom Management (scale 0–10)	7.28	7.16	7.29	7.25	7.16	7.28	7.17	7.13	-0.013**
Received help with pain	74.8%	74.4%	73.8%	75.3%	71.2%	72.9%	74.5%	72.8%	-0.3%**
Received help with changes in energy levels	52.2%	49.3%	48.7%	50.7%	50.3%	51.5%	49.2%	49.3%	-0.2%*
Received help with emotional problems	44.3%	45.8%	45.2%	48.1%	46.6%	47.2%	43.9%	44.9%	0.0%
Received help with nausea/ vomiting	80.3%	79.5%	77.7%	79.4%	78.4%	76.6%	80.6%	77.9%	-0.2%*
Received help with difficulty breathing	57.5%	56.1%	58.6%	56.6%	52.7%	59.0%	52.6%	54.9%	-0.5%*
Received help with coughing	48.0%	57.2%	53.2%	52.9%	48.7%	54.6%	52.4%	48.5%	-0.3%
Received help with constipation/ diarrhea	66.5%	63.8%	68.8%	68.4%	64.6%	66.7%	65.2%	64.0%	-0.2%*
Received help with neuropathy	48.5%	47.3%	47.1%	45.3%	44.1%	49.5%	47.6%	47.4%	0.0%

Source: OCM Patient and Caregiver Surveys, April 2016–June 2018.
Note: Estimates weighted for sampling and non-response and adjusted for age, gender, education, mental health, respondent, dual eligibility, race, breast cancer or prostate cancer treatment during episode, number of HCC flags, cancer type, month of episode period, radiation, surgery, and practice characteristics.
Asterisks denote statistically significant impact estimates at *p<0.10, **p<0.05, and ***p<0.01.

D. Clinician Survey Analyses

D.1. Descriptive Findings

Methods for Descriptive Analyses from the OCM Clinician Survey

We calculated descriptive statistics separately for the three groups of respondents (oncologists, APPs, and clinical care coordinators), as the percent of respondents for binary and categorical measures (no continuous outcome measures were included in the analysis).

Descriptive Findings from the OCM Clinician Survey

This section includes the following findings:

- Experience with new care process changes related to OCM, responses from APPs (**Exhibit D-1**)
- Experience with new care process changes related to OCM, responses from clinical care coordinators (**Exhibit D-2**)
- Demographic characteristics of survey respondents, by clinician type (**Exhibit D-3**)
- Practice characteristics of survey respondents stratified clinician type (**Exhibit D-4**)
- Demographic characteristics of oncologist survey respondents, overall and stratified by practice ownership (**Exhibit D-5**)

Exhibit D-1: Experience with New Care Process Changes Related to OCM, Responses from APPs

Care Processes	Care Process Implemented before OCM and unchanged, Percent APPs	New or Enhanced since OCM began, Percent APPs
Clinical care		
Restructured care teams since OCM began (e.g., added social workers, patient navigators, care coordinators)	n/a[a]	72.5%
Access to care		
Slots set aside for same day appointments during normal clinic hours, to meet some or all patients' urgent needs	37.4%	38.0%
Evening/weekend appointments for patients with urgent needs	9.5%	12.7%
Care coordination		
Routinely telephone some or all patients taking oral chemotherapy drugs to monitor side effects and refill needs	31.2%	37.7%
Educate all patients to "call us first" before going to the emergency department	52.1%	44.0%
Routinely initiate proactive outreach telephone calls to some or all high-risk patients	10.9%	22.9%
Sharing elements of a care plan in writing with patients		
Routinely share the expected prognosis in writing with patients	11.5%	28.1%
Routinely discuss advance care planning with patients and families and include completed forms in the EHR	30.3%	50.9%

Care Processes	Care Process Implemented before OCM and unchanged, Percent APPs	New or Enhanced since OCM began, Percent APPs
Routinely advise some or all patients about the estimated out-of-pocket costs for their cancer treatment	30.0%	31.0%
Routinely discuss survivorship plans with patients and share written survivorship plans with patients	18.1%	52.8%
Psycho-social health		
Routinely screen patients for depression	23.8%	70.9%
Routinely screen patients for psychosocial distress	22.8%	62.7%
End-of-life care		
Use "trigger events" or another standard to decide when to discuss hospice care with cancer patients	17.8%	19.1%

Source: Analysis of responses to the OCM Clinician Survey (August–October, 2018)
Notes: N=372 APPs. Estimates weighted for sampling and non-response. [a]Item was specific to OCM, so it was not possible to have implementation prior to OCM.

Exhibit D-2: Experience with New Care Process Changes Related to OCM, Responses from Clinical Care Coordinators

Care Processes	Care Process Implemented before OCM and unchanged, Percent Care Coordinators	New or Enhanced since OCM began, Percent Care Coordinators
Clinical care		
Restructured care teams since OCM began (e.g., added social workers, patient navigators, care coordinators)	n/a[a]	71.1%
Access to care		
Slots set aside for same day appointments during normal clinic hours, to meet some or all patients' urgent needs	35.0%	33.3%
Evening/weekend appointments for patients with urgent needs	11.2%	8.5%
Care coordination		
Routinely telephone some or all patients taking oral chemotherapy drugs to monitor side effects and refill needs	26.6%	42.1%
Educate all patients to "call us first" before going to the emergency department	43.3%	47.7%
Routinely initiate proactive outreach telephone calls to some or all high-risk patients	11.5%	38.6%
Sharing elements of a care plan in writing with patients		
Routinely share the expected prognosis in writing with patients	19.1%	32.8%
Routinely discuss advance care planning with patients and families and include completed forms in the HER	22.7%	51.5%
Routinely advise some or all patients about the estimated out-of-pocket costs for their cancer treatment	32.3%	41.6%
Routinely discuss survivorship plans with patients and share written survivorship plans with patients	17.1%	50.7%

Care Processes	Care Process Implemented before OCM and unchanged, Percent Care Coordinators	New or Enhanced since OCM began, Percent Care Coordinators
Psycho-social health		
Routinely screen patients for depression	25.2%	70.5%
Routinely screen patients for psychosocial distress	26.6%	63.7%
End-of-life care		
Use "trigger events" or another standard to decide when to discuss hospice care with cancer patients	19.3%	20.5%

Source: Analysis of responses to the OCM Clinician Survey (August–October, 2018)
Notes: N=476 clinical care coordinators. Estimates weighted for sampling and non-response. [a]Item was specific to OCM, so it was not possible to have implementation prior to OCM.

Exhibit D-3: Demographic Characteristics of Survey Respondents, by Clinician Type

Characteristics of Respondents	Response to Each Option, n (Percent Clinicians)		
	Oncologists (N=399)	Advanced Practice Providers (N=372)	Clinical Care Coordinators (N=476)
Gender			
Male	272 (66.4%)	16 (5.8%)	16 (3.0%)
Female	117 (31.8%)	347 (92.4%)	457 (96.2%)
Don't know/Refused	9 (1.8%)	9 (1.8%)	3 (0.8%)
Age			
18-30 years	0 (0.0%)	38 (11.2%)	49 (11.9%)
31-40 years	81 (22.8%)	151 (44.6%)	106 (21.7%)
41-50 years	118 (30.4%)	89 (21.4%)	115 (23.6%)
51-60 years	117 (28.9%)	64 (15.2%)	148 (30.3%)
61-70 years	62 (14.3%)	21 (4.9%)	52 (10.9%)
71 years or more	10 (1.7%)	1 (0.6%)	0 (0.0%)
Don't know/Refused	10 (1.9%)	8 (2.2%)	6 (1.6%)
Years worked in current specialty or area of training			
Less than 3 years	23 (5.4%)	85 (25.7%)	72 (16.8%)
3 years up to 11 years	123 (31.1%)	152 (40.9%)	172 (36.3%)
11 years up to 20 years	104 (28.4%)	86 (22.3%)	121 (24.2%)
More than 20 years	147 (35.1%)	49 (11.1%)	111 (22.7%)
Don't know/Refused	1 (0.1%)	0 (0.0%)	0 (0.0%)
Years worked in current practice			
Less than 3 years	61 (14.1%)	120 (32.4%)	130 (27.5%)
3 years up to 11 years	118 (30.8%)	161 (45.8%)	166 (36.7%)
11 years up to 20 years	110 (29.7%)	60 (14.9%)	100 (20.0%)
More than 20 years	108 (25.3%)	30 (6.7%)	80 (15.8%)
Don't know/Refused	1 (0.1%)	1 (0.2%)	0 (0.0%)
Hours worked per week			
Less than 20 hours per week	34 (8.4%)	22 (5.8%)	70 (14.5%)
20 to 29 hours per week	46 (12.9%)	39 (11.0%)	62 (11.3%)

Characteristics of Respondents	Response to Each Option, n (Percent Clinicians)		
	Oncologists (N=399)	Advanced Practice Providers (N=372)	Clinical Care Coordinators (N=476)
30 to 39 hours per week	81 (23.7%)	86 (21.4%)	103 (21.3%)
40 or more hours per week	227 (53.1%)	219 (60.7%)	222 (48.3%)
Don't know/Refused	10 (1.9%)	5 (1.2%)	19 (4.7%)
Primary specialty or area of training			
Oncologists			
Medical oncologist or hematologist	333 (80.9%)	n/a	n/a
Gynecologic oncologist	16 (4.4%)	n/a	n/a
Radiation oncologist	33 (7.7%)	n/a	n/a
Surgical oncologist	12 (6.6%)	n/a	n/a
Other	4 (0.5%)	n/a	n/a
Don't know/Refused	0 (0.0%)	n/a	n/a
Advanced Practice Provider			
Nurse practitioner	n/a	269 (71.3%)	n/a
Physician assistant	n/a	92 (26.4%)	n/a
Other	n/a	10 (2.0%)	n/a
Don't know/Refused	n/a	1 (0.2%)	n/a
Clinical Care Coordinator			
Masters-trained nurse	n/a	n/a	43 (8.0%)
Registered nurse/BSN	n/a	n/a	346 (73.1%)
Social worker	n/a	n/a	13 (2.4%)
Licensed practical nurse	n/a	n/a	22 (5.6%)
Other	n/a	n/a	45 (9.7%)
Don't know/Refused	n/a	n/a	7 (1.4%)
Were you hired specifically for OCM or have you taken a new role in the practice specifically for OCM? (APPs and clinical care coordinators only)			
Yes, hired specifically for OCM	n/a	7 (1.5%)	61 (12.4%)
Yes, took a new role in the practice specifically for OCM	n/a	17 (3.9%)	100 (18.0%)
No	n/a	338 (91.3%)	298 (65.5%)
Don't know/Refused	n/a	10 (3.4%)	17 (4.0%)
Typical caseload (clinical care coordinators only)			
Fewer than 40 patients	n/a	n/a	113 (24.0%)
41-80 patients	n/a	n/a	93 (20.0%)
81-120 patients	n/a	n/a	70 (15.1%)
121 or more patients	n/a	n/a	121 (23.3%)
Don't know/Refused	n/a	n/a	76 (17.6%)

Source: Analysis of responses to the OCM Clinician Survey (August–October, 2018)
Notes: Estimates weighted for sampling and non-response.

Exhibit D-4: Practice Characteristics of Survey Respondents, by Clinician Type

Practice Characteristics of Respondents	Response to Each Option, n (Percent Clinicians)		
	Oncologists (N=399)	Advanced Practice Providers (N=372)	Clinical Care Coordinators (N=476)
Number of oncologists			
1-4 oncologists	28 (2.1%)	19 (3.1%)	36 (6.3%)
5-9 oncologists	50 (6.1%)	42 (8.0%)	80 (13.6%)
10-19 oncologists	88 (16.9%)	99 (26.0%)	134 (26.8%)
20-49 oncologists	128 (29.6%)	105 (32.1%)	118 (30.4%)
50 or more oncologists	106 (45.4%)	108 (30.8%)	112 (22.8%)
Number of episodes[a]			
First quartile (<=103 episodes)	45 (4.3%)	25 (3.7%)	53 (9.9%)
Second quartile (104-197 episodes)	53 (8.0%)	44 (10.8%)	98 (18.0%)
Third quartile (198-356 episodes)	110 (24.2%)	114 (31.1%)	141 (33.3%)
Fourth quartile (357 or more episodes)	191 (63.5%)	190 (54.4%)	188 (38.8%)
Specialty type			
Multi-specialty	110 (17.8%)	108 (27.3%)	163 (33.6%)
Oncology-only Practice	289 (82.2%)	265 (72.7%)	317 (66.4%)
Ownership			
Independent	211 (46.0%)	183 (46.1%)	226 (46.8%)
Owned by hospital/health system	188 (54.0%)	190 (53.9%)	254 (53.2%)
Affiliated with an academic faculty			
Not affiliated	299 (63.9%)	285 (70.7%)	372 (74.8%)
Affiliated with academic faculty	101 (36.1%)	88 (29.3%)	108 (25.2%)
Number of sites			
One site	194 (35.9%)	167 (43.4%)	233 (48.9%)
More than one site	205 (64.1%)	206 (56.6%)	247 (51.1%)

Source: Analysis of responses to the OCM Clinician Survey (August–October, 2018)
Notes: Estimates weighted for sampling and non-response. [a] Quartiles for the number of episodes initiated by each practice were defined at the practice level, based on the number of episodes initiated during PP3.

Exhibit D-5: Demographic Characteristics of Oncologist Survey Respondents, Overall and Stratified by Practice Ownership

Characteristics of Respondents	Overall (N=399), n (Percent)	Independent Practice (n=211), n (Percent)	Practice Owned by a Hospital or Health System (n=188), n (Percent)
Gender			
Male	272 (66.4%)	146 (68.9%)	126 (64.7%)
Female	117 (31.8%)	60 (29.6%)	56 (33.3%)
Don't know/Refused	9 (1.8%)	4 (1.4%)	5 (2.1%)
Age			
31-40 years	81 (22.8%)	37 (22.3%)	44 (23.3%)
41-50 years	118 (30.4%)	62 (29.9%)	55 (30.6%)
51-60 years	117 (28.9%)	67 (29.5%)	50 (28.4%)

Characteristics of Respondents	Overall (N=399), n (Percent)	Independent Practice (n=211), n (Percent)	Practice Owned by a Hospital or Health System (n=188), n (Percent)
61-70 years	62 (14.3%)	30 (13.2%)	32 (15.4%)
71 years or more	10 (1.7%)	10 (3.7%)	0 (0.0%)
Don't know/Refused	10 (1.9%)	4 (1.4%)	6 (2.3%)
Years worked in current specialty or area of training			
Less than 3 years	23 (5.4%)	27 (13.0%)	34 (15.1%)
3 years up to 11 years	123 (31.1%)	54 (26.5%)	63 (34.1%)
11 years up to 20 years	104 (28.4%)	64 (29.3%)	46 (30.2%)
More than 20 years	147 (35.1%)	65 (31.2%)	43 (20.4%)
Don't know/Refused	1 (0.1%)	0 (0.0%)	1 (0.1%)
Years worked in current practice			
Less than 3 years	61 (14.1%)	27 (13.0%)	34 (15.1%)
3 years up to 11 years	118 (30.8%)	54 (26.5%)	63 (34.1%)
11 years up to 20 years	110 (29.7%)	64 (29.3%)	46 (30.2%)
More than 20 years	108 (25.3%)	65 (31.2%)	43 (20.4%)
Don't know/Refused	1 (0.1%)	0 (0.0%)	1 (0.1%)
Hours worked per week**			
Less than 20 hours per week	34 (8.4%)	11 (4.1%)	23 (12.1%)
20 to 29 hours per week	46 (12.9%)	17 (7.3%)	29 (17.7%)
30 to 39 hours per week	81 (23.7%)	45 (21.9%)	35 (24.9%)
40 or more hours per week	227 (53.1%)	131 (64.1%)	96 (43.9%)
Don't know/Refused	10 (1.9%)	6 (2.6%)	4 (1.3%)
Primary specialty or area of training**			
Medical oncologist or hematologist	333 (80.9%)	181 (85.0%)	151 (77.3%)
Gynecologic oncologist	16 (4.4%)	7 (2.6%)	9 (5.9%)
Radiation oncologist	33 (7.7%)	18 (10.7%)	15 (5.1%)
Surgical oncologist	12 (6.6%)	2 (1.0%)	10 (11.3%)
Other	4 (0.5%)	2 (0.7%)	2 (0.3%)

Source: Analysis of responses to the OCM Clinician Survey (August–October, 2018)
Notes: Estimates weighted for sampling and non-response. *p <0.10; **p<0.05.

D.2. Comparisons by Practice Characteristics

We conducted bivariate analyses of clinician survey responses, stratifying by measures of practice characteristics, to understand whether experiences with OCM were systematically different for clinicians working in different types of practices.

Specifically, this section presents oncologist responses to the OCM Clinician Survey stratified by: (1) hospital or health system ownership vs independent; (2) affiliated with an academic faculty vs not affiliated; and (3) practice size as measured by number of OCM episodes in the first and second quartile vs number of OCM episodes in the third and fourth quartiles.

Methods for Survey Analysis by Clinician Type

For these analyses, we created binary measures for each survey item, and used chi-squared tests to assess differences by practice characteristics. For the domain of Experience with Care Process Changes Related to OCM, we created a binary measure for each item reflecting whether respondents felt that each care process improved quality of care (vs neutral impact, worse impact, or not sure). For the domain of Perspectives about OCM, we created a binary measure for each item reflecting whether respondents had a positive impression of OCM (e.g., agree or strongly agree with a statement, vs neutral, disagree, or strongly disagree).

Findings by Practice Characteristics

This section includes the following findings, each stratified by ownership, academic affiliation, and practice size:

- Oncologist experiences with new care process changes related to OCM (**Exhibits D-6 – D-8**)
- Oncologist experiences with using data for CQI related to OCM, responses from oncologists (**Exhibits D-9 – D-11**)
- Oncologist satisfaction with OCM (**Exhibits D-12 – D14**)

Specific findings of interest include:

- Oncologists working in independent practices were more likely to report that their practices restructured care teams and enhanced Care Plan information sharing with patients. Oncologists in hospital- or health system-owned practices were more likely to report that they share Care Plan information with patients in writing, and that their practices screen for psychosocial needs, and did so before OCM began (**Exhibit D-6**).
- Oncologists working in practices of different sizes generally reported similar use of various patient-centered care processes (**Exhibit D-8**).
- Oncologists working in hospital- or health system-owned practices were more likely than those working in independent practices, to regularly receive information (based on patient surveys) about their patients' satisfaction and care experiences. Oncologists working in independent practices were more likely to receive performance feedback about their adherence to guideline-recommended care (**Exhibit D-9**).
- Oncologists working in independent practices reported greater satisfaction with their OCM experiences than did those in hospital- or health system-owned practices. Oncologists in independent practices were also more likely to agree with the statement that "OCM takes too much of my time" (**Exhibit D-12**).

Exhibit D-6: Oncologists in Independent Practices were More Likely to Report having Restructured Care Teams and Enhanced Care Plan Information Since the Start of OCM

Care Processes	Care Process Implemented before OCM and unchanged, Percent Oncologists		New or Enhanced Change since OCM began, Percent Oncologists	
	Independent	Owned by Hospital or Health System	Independent	Owned by Hospital or Health System
Clinical care				
Typically use treatment pathways to guide treatment decisions	28.8%	20.9%	38.8%	33.5%
Provide access to outpatient palliative care	52.1%	61.4%	37.8%	34.1%
Restructured care teams since OCM began (e.g., added social workers, patient navigators, care coordinators)	n/a†%	n/a†%	77.5%**	56.7%**
Access to care				
Slots set aside for same day appointments during normal clinic hours, to meet some or all patients' urgent needs	41.8%	39.1%	36.1%	33.0%
Evening/weekend appointments for patients with urgent needs	15.3%	14.9%	12.2%	12.2%
Care coordination				
Routinely telephone some or all patients taking oral chemotherapy drugs to monitor side effects and refill needs	39.5%	39.5%	40.3%	30.5%
Educate all patients to "call us first" before going to the emergency department	39.7%**	52.9%**	51.7%**	31.6%**
Routinely initiate proactive outreach telephone calls to some or all high-risk patients	11.7%	13.2%	35.6%**	21.4%**
Sharing elements of a care plan in writing with patients				
Routinely share the expected prognosis in writing with patients	17.8%	13.7%	43.6%**	25.4%**
Routinely share the goals of treatment in writing with patients	28.2%	33.2%	50.2%**	32.5%**
Routinely share the expected response to treatment in writing with patients	26.1%*	15.3%*	37.5%**	24.8%**
Routinely share the potential harms from treatment in writing with patients	62.1%	64.0%	33.0%**	22.1%**
Routinely discuss advance care planning with patients and families and include completed forms in the EHR	19.6%**	39.9%**	55.5%	45.1%
Routinely advise some or all patients about the estimated out-of-pocket costs for their cancer treatment	54.9%**	26.1%**	32.8%	31.0%
Routinely discuss survivorship plans with patients and share written survivorship plans with patients	17.2%	19.6%	49.4%	53.0%

Care Processes	Care Process Implemented before OCM and unchanged, Percent Oncologists		New or Enhanced Change since OCM began, Percent Oncologists	
	Independent	Owned by Hospital or Health System	Independent	Owned by Hospital or Health System
Psycho-social health				
Routinely screen patients for depression	17.6%**	31.3%**	75.7%**	64.2%**
Routinely screen patients for psychosocial distress	14.3%**	34.2%**	63.4%	56.8%
End of life care				
Use "trigger events" or another standard to decide when to discuss hospice care with cancer patients	14.9%	11.0%	19.9%	18.6%

Source: Analysis of responses to the OCM Clinician Survey (August–October, 2018)
Notes: N=399 oncologists. Estimates weighted for sampling and non-response. *p<0.10; **p<0.05. †Item was specific to OCM, so it was not possible to have implementation prior to OCM.

Exhibit D-7: Oncologist Experiences with New Care Process Changes Related to OCM Were Generally Similar for Practices with Differing Academic Affiliation and Differing Ownership

Care Processes	Care Process Implemented before OCM and unchanged, Percent Oncologists		New or Enhanced Change since OCM began, Percent Oncologists	
	No Academic Affiliation	Affiliated with Academic Faculty	No Academic Affiliation	Affiliated with Academic Faculty
Clinical care				
Typically use treatment pathways to guide treatment decisions	25.7%	22.3%	36.7%	34.4%
Provide access to outpatient palliative care	52.2%*	65.4%*	36.9%	33.7%
Restructured care teams since OCM began (e.g., added social workers, patient navigators, care coordinators)	n/a†	n/a†	72.5%**	55.4%**
Access to care				
Slots set aside for same day appointments during normal clinic hours, to meet some or all patients' urgent needs	40.9%	39.8%	37.7%	28.4%
Evening/weekend appointments for patients with urgent needs	12.9%	18.8%	11.1%	14.0%
Care coordination				
Routinely telephone some or all patients taking oral chemotherapy drugs to monitor side effects and refill needs	38.4%	41.8%	39.8%*	26.4%*
Educate all patients to "call us first" before going to the emergency department	38.7%**	61.5%**	50.3%**	24.0%**
Routinely initiate proactive outreach telephone calls to some or all high-risk patients	10.7%	15.5%	32.0%*	20.6%*
Sharing elements of a care plan in writing with patients				
Routinely share the expected prognosis in writing with patients	18.6%*	10.1%*	39.5%**	23.5%**
Routinely share the goals of treatment in writing with patients	27.1%	37.4%	46.8%**	29.5%**
Routinely share the expected response to treatment in writing with patients	22.1%	16.9%	35.8%**	21.3%**
Routinely share the potential harms from treatment in writing with patients	61.5%	66.2%	30.9%**	20.3%**
Routinely discuss advance care planning with patients and families and include completed forms in the EHR	25.6%**	39.9%**	52.7%	44.5%
Routinely advise some or all patients about the estimated out-of-pocket costs for their cancer treatment	48.2%**	24.1%**	34.6%	26.8%
Routinely discuss survivorship plans with patients and share written survivorship plans with patients	16.0%	22.7%	54.9%	44.7%
Psycho-social health				
Routinely screen patients for depression	16.5%**	39.6%**	76.9%**	56.5%**
Routinely screen patients for psychosocial distress	14.6%**	43.2%**	64.7%*	51.6%*

Care Processes	Care Process Implemented before OCM and unchanged, Percent Oncologists		New or Enhanced Change since OCM began, Percent Oncologists	
	No Academic Affiliation	Affiliated with Academic Faculty	No Academic Affiliation	Affiliated with Academic Faculty
End of life care				
Use "trigger events" or another standard to decide when to discuss hospice care with cancer patients	14.7%	9.3%	19.3%	19.0%

Source: Analysis of responses to the OCM Clinician Survey (August–October, 2018)
Notes: N=399 oncologists. Estimates weighted for sampling and non-response. *p<0.10; **p<0.05. †Item was specific to OCM, so it was not possible to have implementation prior to OCM.

Exhibit D-8: Oncologist's Use of Care Processes Prior to OCM, and Changes since OCM Began, were Broadly Similar for Smaller and Larger Practices

Care Processes	Care Process Implemented before OCM and unchanged, Percent Oncologists		New or Enhanced Change since OCM began, Percent Oncologists	
	Small	Large	Small	Large
Clinical care				
Typically use treatment pathways to guide treatment decisions	16.3%*	25.7%*	31.4%	36.6%
Provide access to outpatient palliative care	58.5%	56.9%	32.0%	36.4%
Restructured care teams since OCM began (e.g., added social workers, patient navigators, care coordinators)	n/a†	n/a†	60.3%	67.1%
Access to care				
Slots set aside for same day appointments during normal clinic hours, to meet some or all patients' urgent needs	48.5%	39.2%	23.9%**	35.9%**
Evening/weekend appointments for patients with urgent needs	4.8%**	16.5%**	9.8%	12.5%
Care coordination				
Routinely telephone some or all patients taking oral chemotherapy drugs to monitor side effects and refill needs	35.1%	40.1%	33.5%	35.2%
Educate all patients to "call us first" before going to the emergency department	46.7%	46.8%	47.4%	40.0%
Routinely initiate proactive outreach telephone calls to some or all high-risk patients	11.8%	12.6%	24.4%	28.4%
Sharing elements of a care plan in writing with patients				
Routinely share the expected prognosis in writing with patients	19.5%	15.0%	31.8%	34.1%
Routinely share the goals of treatment in writing with patients	31.7%	30.8%	43.7%	40.2%
Routinely share the expected response to treatment in writing with patients	15.5%	21.0%	26.8%	31.2%

Care Processes	Care Process Implemented before OCM and unchanged, Percent Oncologists		New or Enhanced Change since OCM began, Percent Oncologists	
	Small	Large	Small	Large
Routinely share the potential harms from treatment in writing with patients	59.3%	63.7%	26.2%	27.3%
Routinely discuss advance care planning with patients and families and include completed forms in the EHR	31.5%	30.4%	50.3%	49.8%
Routinely advise some or all patients about the estimated out-of-pocket costs for their cancer treatment	34.6%	40.0%	37.0%	31.1%
Routinely discuss survivorship plans with patients and share written survivorship plans with patients	16.1%	18.8%	50.1%	51.5%
Psycho-social health				
Routinely screen patients for depression	18.9%	25.8%	68.5%	69.6%
Routinely screen patients for psychosocial distress	18.6%	26.0%	62.2%	59.5%
End of life care				
Use “trigger events” or another standard to decide when to discuss hospice care with cancer patients	22.4%*	11.5%*	18.7%	19.3%

Source: Analysis of responses to the OCM Clinician Survey (August–October, 2018)
Notes: N=399 oncologists. Estimates weighted for sampling and non-response. Small - first or second quartile of total number of attributed episodes; Large – third or fourth quartile of total number of attributed episodes. *p<0.10; **p<0.05. †Item was specific to OCM, so it was not possible to have implementation prior to OCM.

Exhibit D-9: Oncologists in Independent Practices Were More Likely to Receive Performance Feedback about Adhering to Clinical Guidelines than Those Working in Practices Owned by Hospitals or Health Systems, and Were More Likely to Want Additional Performance Feedback

Use of Data for Continuous Quality Improvement	Percent Oncologists	
	Independent	Owned by Hospital or Health System
Sharing performance metrics with physicians		
Practice routinely shares performance metrics comparing with other physicians within practice	54.1%	56.6%
Practice routinely shares performance metrics comparing with other physicians regionally or nationally	33.6%	26.9%
Practice routinely shares performance metrics (either)	67.0%	67.2%
Practice routinely shares performance metrics (both)	20.7%	16.3%
Types of data used for CQI		
Surveys about your patients' satisfaction/experiences with cancer care**	60.5%	88.0%
Your adherence to guideline-recommended care**	74.2%	48.8%
Your patients' emergency department visits, inpatient hospitalizations*	64.7%	48.5%
Your patients' imaging, biomarker testing, or other ancillary services*	50.7%	34.3%
Your patients' total episode costs of care*	44.0%	27.7%
Experience with using data for continuous quality improvement		
It is important to me to understand how my performance compares with that of other oncologists in my practice (my peers).	62.8%	57.4%
I would like more information about my performance relative to that of my peers.**	51.0%	32.6%
It is important to me to understand how my performance compares with that of other oncologists outside of my practice.	70.7%	72.8%
Information about my performance relative to peers is easy to understand	64.8%	62.7%
I change my behavior based on information that compares my performance with that of my peers	70.8%	72.7%

Source: Analysis of responses to the OCM Clinician Survey (August–October, 2018)
Notes: N=399 oncologists. Estimates weighted for sampling and non-response. *p<0.10; **p<0.05.

Exhibit D-10: Oncologists in Academic Practices Were Less Likely Than Oncologists without Any Academic Affiliation to Receive Performance Feedback about Adhering to Guidelines, Utilization Patterns, or Episode Costs

Use of Data for Continuous Quality Improvement	Percent Oncologists	
	No Academic Affiliation	Affiliated with Academic Faculty
Sharing performance metrics with physicians		
Practice routinely shares performance metrics comparing with other physicians within practice	55.1%	55.5%
Practice routinely shares performance metrics comparing with other physicians regionally or nationally	32.8%	24.8%
Practice routinely shares performance metrics (either)	67.2%	66.4%
Practice routinely shares performance metrics (both)	20.8%	13.9%
Types of data used for CQI		
Surveys about your patients' satisfaction/experiences with cancer care**	69.2%	86.3%
Your adherence to guideline-recommended care**	71.9%	40.3%
Your patients' emergency department visits, inpatient hospitalizations**	63.4%	42.7%
Your patients' imaging, biomarker testing, or other ancillary services**	49.9%	27.4%
Your patients' total episode costs of care**	43.3%	20.8%
Experience with using data for continuous quality improvement		
It is important to me to understand how my performance compares with that of other oncologists in my practice (my peers).	59.9%	59.9%
I would like more information about my performance relative to that of my peers.	45.3%	33.6%
It is important to me to understand how my performance compares with that of other oncologists outside of my practice.	72.0%	71.8%
Information about my performance relative to peers is easy to understand	66.2%	59.4%
I change my behavior based on information that compares my performance with that of my peers	72.3%	71.1%

Source: Analysis of responses to the OCM Clinician Survey (August–October, 2018)
Notes: N=399 oncologists. Estimates weighted for sampling and non-response. *p<0.10; **p<0.05.

Exhibit D-11: Oncologists' Experiences with Using Data for CQI Related to OCM Did not Differ by OCM Practice Size

Use of Data for Continuous Quality Improvement	Percent Oncologists	
	Small	Large
Sharing performance metrics with physicians		
Practice routinely shares performance metrics comparing with other physicians within practice	49.0%	56.3%
Practice routinely shares performance metrics comparing with other physicians regionally or nationally	36.7%	29.1%
Practice routinely shares performance metrics (either)	61.1%	67.9%
Practice routinely shares performance metrics (both)	24.6%	17.5%
Types of data used for CQI		
Surveys about your patients' satisfaction/experiences with cancer care	78.9%	74.9%
Your adherence to guideline-recommended care	56.1%	61.1%
Your patients' emergency department visits, inpatient hospitalizations	58.5%	55.7%
Your patients' imaging, biomarker testing, or other ancillary services	48.6%	41.0%
Your patients' total episode costs of care	43.9%	34.1%
Experience with using data for continuous quality improvement		
It is important to me to understand how my performance compares with that of other oncologists in my practice (my peers).	62.9%	59.5%
I would like more information about my performance relative to that of my peers.	50.4%	39.9%
It is important to me to understand how my performance compares with that of other oncologists outside of my practice.	73.1%	71.7%
Information about my performance relative to peers is easy to understand	72.4%	62.4%
I change my behavior based on information that compares my performance with that of my peers	74.1%	71.5%

Source: Analysis of responses to the OCM Clinician Survey (August–October, 2018)
Notes: N=399 oncologists. Estimates weighted for sampling and non-response. Small: first or second quartile of total number of attributed episodes. Large: third or fourth quartile of total number of attributed episodes. There are no statistically significant differences in this table.

Exhibit D-12: Oncologists in Independent Practices Were More Likely to Report Positive Experiences with OCM Than Oncologists in Hospital- or Health System-Owned Practices, and Were Also More Likely to Feel That OCM Takes Too Much of Their Time

Experience and Satisfaction with OCM	Agree or Strongly Agree, Percent Oncologists	
	Independent	Owned by Hospital or Health System
I have a clear understanding of the goals and objectives of the Oncology Care Model**	79.9%	59.3%
There is a need for the Oncology Care Model**	65.0%	52.9%
The Oncology Care Model helps improve patient care**	61.2%	49.0%
My patients are better informed about the goals, potential benefits and potential harms of treatment because of the Oncology Care Model**	66.3%	45.5%
Performing my duties related to the Oncology Care Model takes up too much of my time**	58.2%	42.1%
The Oncology Care Model has helped me do my job more effectively	22.6%	24.6%
I feel a great deal of stress because of the Oncology Care Model	30.5%	27.1%
My overall job satisfaction has improved as a result of the Oncology Care Model	12.2%	10.9%

Source: Analysis of responses to the OCM Clinician Survey (August–October, 2018)
Notes: N=399 oncologists. Estimates weighted for sampling and non-response. *p<0.10; **p<0.05.

Exhibit D-13: Oncologists' Experiences and Satisfaction with OCM Were Generally the Same, Regardless of Academic Affiliation or Practice Ownership

Experience and Satisfaction with OCM	Agree or Strongly Agree, Percent Oncologists	
	No Academic Affiliation	Affiliated with Academic Faculty
I have a clear understanding of the goals and objectives of the Oncology Care Model**	74.3%	58.6%
There is a need for the Oncology Care Model	58.8%	57.8%
The Oncology Care Model helps improve patient care	56.1%	51.6%
My patients are better informed about the goals, potential benefits and potential harms of treatment because of the Oncology Care Model**	60.2%	45.8%
Performing my duties related to the Oncology Care Model takes up too much of my time**	57.7%	35.5%
The Oncology Care Model has helped me do my job more effectively	22.2%	26.3%
I feel a great deal of stress because of the Oncology Care Model**	32.5%	21.6%
My overall job satisfaction has improved as a result of the Oncology Care Model	11.6%	11.2%

Source: Analysis of responses to the OCM Clinician Survey (August–October, 2018)
Notes: N=399 oncologists. Estimates weighted for sampling and non-response. *p<0.10; **p<0.05.

Exhibit D-14: Oncologists' Experiences and Satisfaction with OCM Did not Differ by Practice Size

Experience and Satisfaction with OCM	Agree or Strongly Agree, Percent Oncologists	
	Small	Large
I have a clear understanding of the goals and objectives of the Oncology Care Model	67.3%	69.0%
There is a need for the Oncology Care Model	54.1%	59.2%
The Oncology Care Model helps improve patient care	54.0%	54.8%
My patients are better informed about the goals, potential benefits and potential harms of treatment because of the Oncology Care Model	59.9%	54.4%
Performing my duties related to the Oncology Care Model takes up too much of my time	54.6%	48.9%
The Oncology Care Model has helped me do my job more effectively	21.1%	24.1%
I feel a great deal of stress because of the Oncology Care Model	32.0%	28.2%
My overall job satisfaction has improved as a result of the Oncology Care Model	11.8%	11.5%

Source: Analysis of responses to the OCM Clinician Survey (August–October, 2018)
Notes: N=399 oncologists. Estimates weighted for sampling and non-response. Small: first or second quartile of total number of attributed episodes. Large: third or fourth quartile of total number of attributed episodes. There are no statistically significant differences in this table.

E. Clinical Analyses

E.1. Radiation Therapy

E.1.1 Adjuvant Radiation for Breast Cancer

Measures and Analytic Approach

As described in the main report, we sought to understand if OCM is affecting use of radiation therapy for breast cancer, including receipt of adjuvant radiation, use of short- vs. long-course radiation (short-course radiation may be higher-value), or use of intensity-modulated radiation therapy (IMRT is lower value care in this context). The initial cohort was constructed from all patients who received chemotherapy for breast cancer in the high-risk breast cancer bundle. We then identified receipt of breast cancer surgery (lumpectomy or mastectomy) from 180 days prior to the episode, through 180 days following the episode.

We then identified radiotherapy delivery codes during the episode. Because our goal was to identify adjuvant radiotherapy, we excluded any radiotherapy for which the initial radiation claim had an ICD9 or ICD10 code for distant metastatic cancers or for bone metastases. Metastatic cancer codes included ICD9 197-197.9 (secondary neoplasm of respiratory/digestive system), ICD9 198-198.9 (secondary malignant neoplasm of other sites), and the corresponding ICD10 codes C78.00-C79.9. The diagnosis codes for bone metastases included: ICD9 code 198.5 (secondary malignant neoplasm of bone), ICD10 code C7951 (secondary malignant neoplasm of bone), and ICD10 code C7952 (secondary malignant neoplasm of bone marrow).

We examined receipt of any radiation during the episode. We then looked at the number and fractions and type of radiation, also examining radiation fractions through 30 days after the episode ended to capture all fractions for patients where adjuvant therapy that started towards the end of an episode.

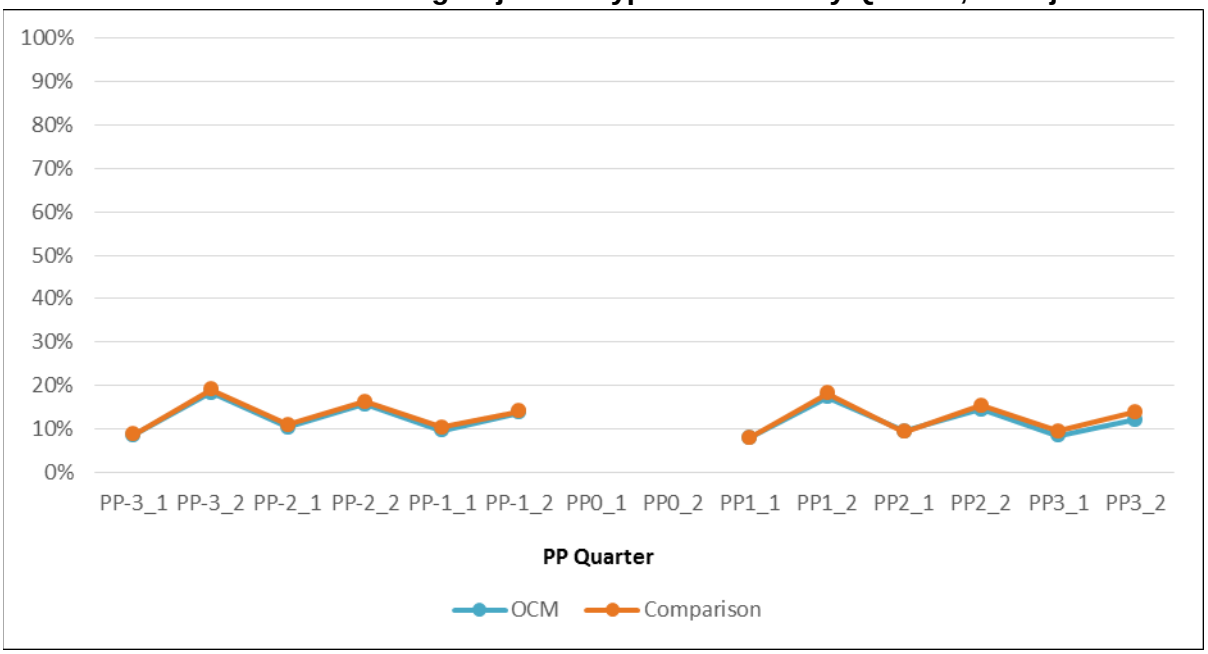
We assessed IMRT (and also proton beam radiation, which occurred for less than 1 percent of episodes). We also assessed receipt of short course radiation. Short course radiation therapy (generally 15-20 fractions) was defined as radiation delivery codes consisting of no more than 21 fractions. Courses of 22 fractions or more, were classified as long course treatment. Of note, we examined the proportion of adjuvant-type radiation that was short course radiation among all patients receiving adjuvant-type radiation (whether their surgical treatment was with lumpectomy or mastectomy).

Finally, we repeated analyses stratified by whether or not there was a radiation oncologist in the TIN to evaluate whether the impact of OCM differed for practices that did or did not employ radiation oncologists.

Baseline and Intervention Trends

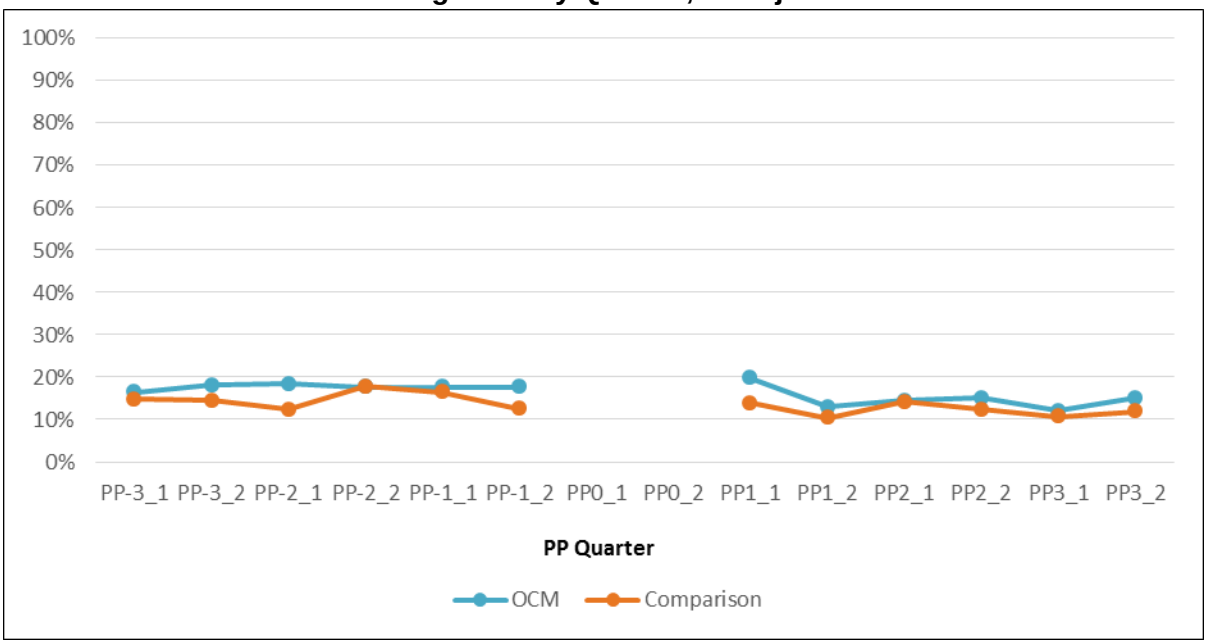
Exhibits E-1 through E-3 show the unadjusted proportion of episodes with adjuvant-type radiation and use of IMRT and short-course radiation among patients receiving radiation in the baseline and intervention periods. Baseline trends were similar in OCM and comparison practices.

Exhibit E-1: Percent Receiving Adjuvant-Type Radiation by Quarter, Unadjusted



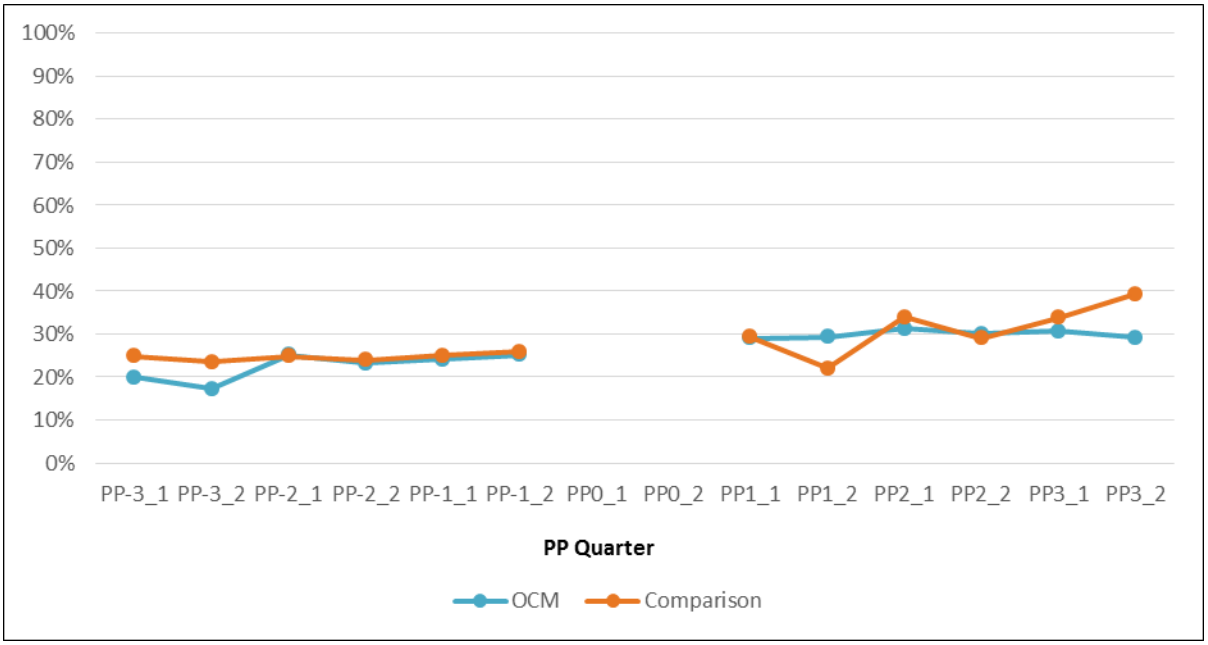
Source: Medicare claims 2014–2018.
Notes: Quarter*OCM versus comparison group baseline trend: -0.07% (95% CI: -0.31%, 0.16%)

Exhibit E-2: Percent Receiving IMRT by Quarter, Unadjusted



Source: Medicare claims 2014–2018.
Notes: Quarter*OCM versus comparison group baseline trend: -0.17% (95% CI: -1.23%, 0.88%)

Exhibit E-3: Percent Receiving Short-Course Radiation by Quarter, Unadjusted



Source: Medicare claims 2014–2018.
Notes: Quarter*OCM versus comparison group baseline trend: 1.25% (95% CI: 0.19%, 2.31%)

Analyses Stratified by Presence or Absence of Radiation Oncologist Billing in the Practice

Exhibit E-4 shows that there was no OCM impact on radiation treatment for breast cancer, when practices are stratified by the presence or absence of radiation oncologists billing in the practice. However, the 90 percent confidence intervals are relatively wide and we have limited power to detect small differences in these stratified analyses.

Exhibit E-4. No Difference in OCM Impact on Radiation for Breast Cancer for Practices with or without Radiation Oncologists

Measure	# of Episodes		OCM		COMP		Impact Estimates Through PP3			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Percentage Point Impact	90% LCL	90% UCL	Percent Change
External Beam Radiation During Episode - Stratified by Radiation Oncologist in TIN										
EBRT during episode (Radiation oncologist in TIN)	51,758	35,717	11.4%	11.5%	11.0%	11.4%	-0.3%	-1.0%	0.5%	-2.4%
EBRT during episode (No radiation oncologist in TIN)	23,875	43,722	11.2%	11.4%	11.4%	11.4%	0.2%	-0.5%	1.0%	2.2%
Use of IMRT - Stratified by Radiation Oncologist in TIN										
Use of IMRT (Radiation oncologist in TIN)	5,655	4,257	15.9%	14.5%	19.5%	16.3%	1.8%	-1.4%	5.0%	11.1%
Use of IMRT (No radiation oncologist in TIN)	2,706	4,980	14.5%	10.3%	14.9%	12.9%	-2.1%	-5.0%	0.8%	-14.8%
Use of Short Course Radiation - Stratified by Radiation Oncologist in TIN										
Use of short course radiation (Radiation oncologist in TIN)	5,655	4,257	23.8%	30.8%	24.8%	32.0%	-0.3%	-4.0%	3.4%	-1.3%
Use of short course radiation (No radiation oncologist in TIN)	2,706	4,980	22.4%	31.0%	22.8%	29.4%	1.9%	-2.1%	5.9%	8.5%

Source: Medicare claims 2014–2018.
Notes: LCL: Lower confidence limit; UCL: Upper confidence limit.

E.1.2 Palliative Radiation for Bone Metastasis

Measures and Analytic Approach

As described in the main report, we examined use of more than 10 or fewer radiation fractions, and single fraction, for patients with bone metastases, which may reflect higher value care. We identified all patients (with any cancer diagnosis) with an index claim for radiation delivery during an episode. The index radiation claim was defined as any radiation claim with no prior radiation delivery claim in the preceding 30 days. Individual patients may have had more than one index radiation claim in an episode or over multiple episodes.

We next assessed if the radiation was for treatment of bone metastases.[23,24] We identified E&M claims for physician office, inpatient, or outpatient visits in the 14 days preceding the index radiation claim, inclusive of the index date (99201-99215, 99241-99245, 99221-99239, 99291-99292, 99281-99285). E&M claims were required to have an ICD9 code of 198.5 or an ICD10 code of C79.51 (secondary malignant neoplasm of bone) or C79.52 (secondary malignant neoplasm of bone marrow).

We then summed the number of radiation delivery billing codes (each code indicative of a radiation treatment fraction), inclusive of the index date. We categorized radiation as 10 or fewer fractions (versus >10) and as single fraction (versus >1 fraction).

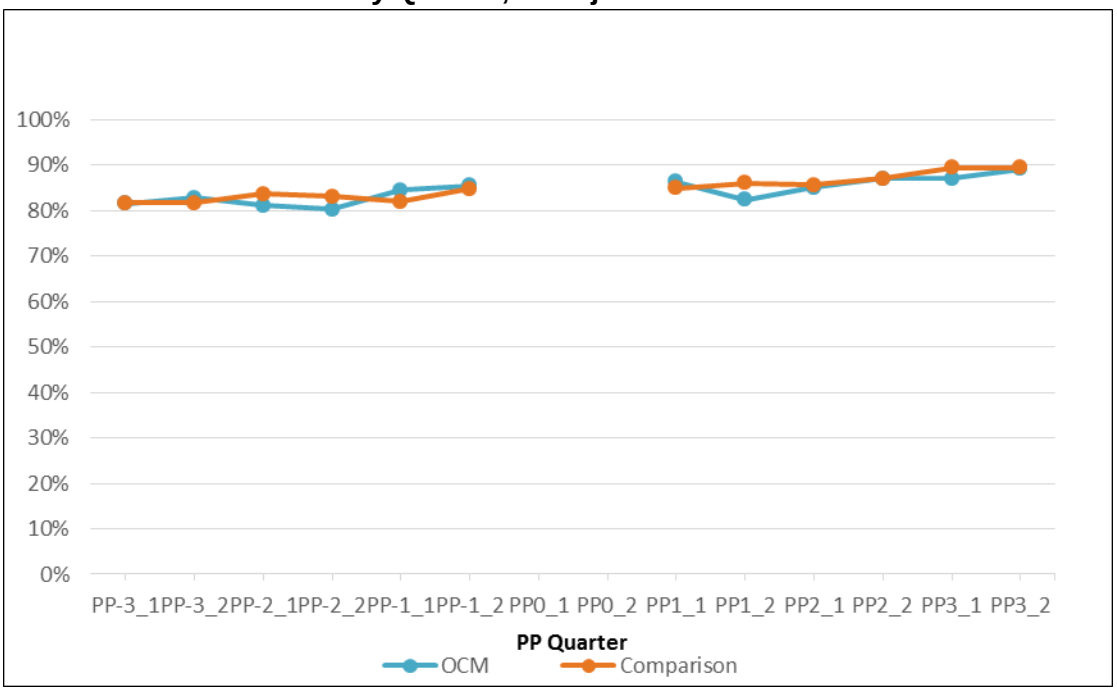
Baseline and Intervention Trends

Exhibit E-5 and **E-6** show the proportion of patients receiving 10 or fewer radiation fractions (**Exhibit E-5**) or a single radiation fraction (**Exhibit E-6**) for treatment of bone metastases, by quarter, for patients in OCM and comparison practices. Trends in the baseline period were similar in OCM and comparison practices.

[23] McDougall JA, Bansal A, Goulart BH, et al. The Clinical and Economic Impacts of Skeletal-Related Events Among Medicare Enrollees with Prostate Cancer Metastatic to Bone. *Oncologis*t. Mar 2016; 21(3):320-326.

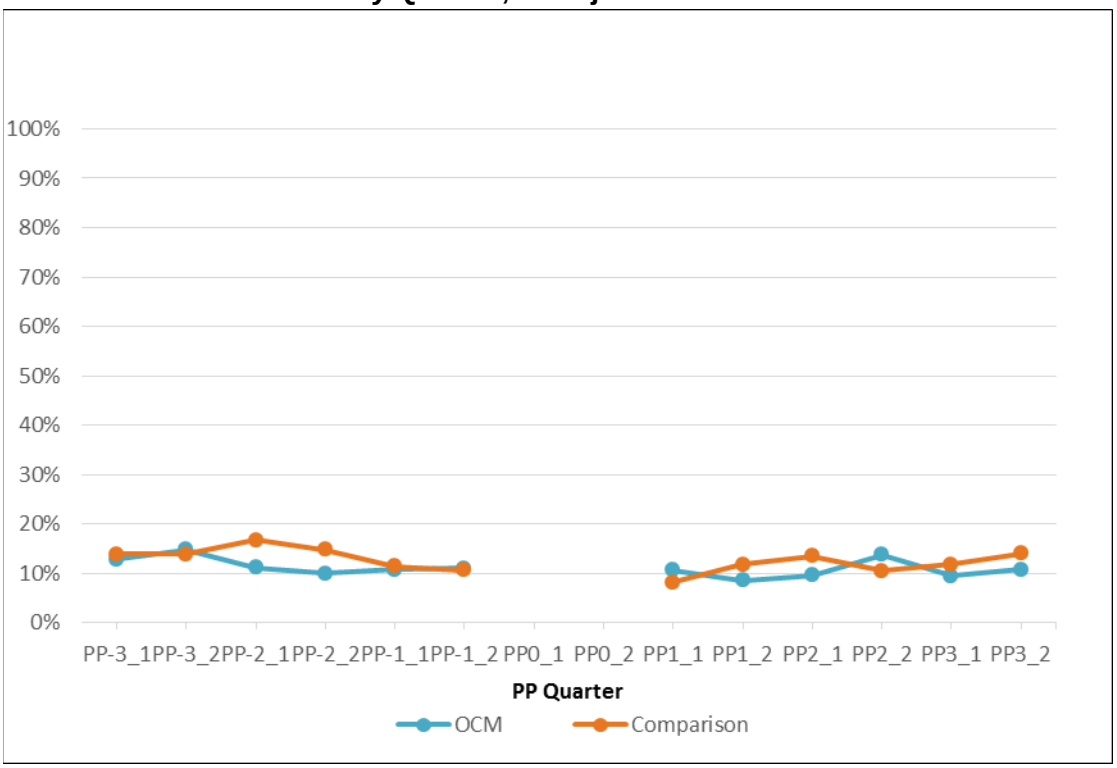
[24] Robinson TJ, Dinan MA, Li Y, Lee WR, Reed SD. Longitudinal Trends in Costs of Palliative Radiation for Metastatic Prostate Cancer. *J Palliat Med*. Nov 2015; 18(11):933-939.

Exhibit E-5: Percent Receiving 10 or Fewer Radiation Fractions for Treatment of Bone Metastasis by Quarter, Unadjusted



Source: Medicare claims 2014–2018.
Notes: Quarter*OCM versus comparison group baseline trend: 0.2% per quarter (95% CI -1.0, 1.4)

Exhibit E-6: Percent Receiving Single Radiation Fraction for Treatment of Bone Metastasis by Quarter, Unadjusted



Source: Medicare claims 2014–2018.
Notes: Quarter*OCM versus comparison group baseline trend: 0.2% per quarter (95% CI -0.7, 1.2)

E.2. Treatment Patterns

E.2.1 Use of Chemotherapy Regimens for Lung, Colorectal, Breast, and Prostate Cancer

We examined chemotherapy regimens for four frequently diagnosed cancers, to understand if OCM is influencing choice of chemotherapy treatment.

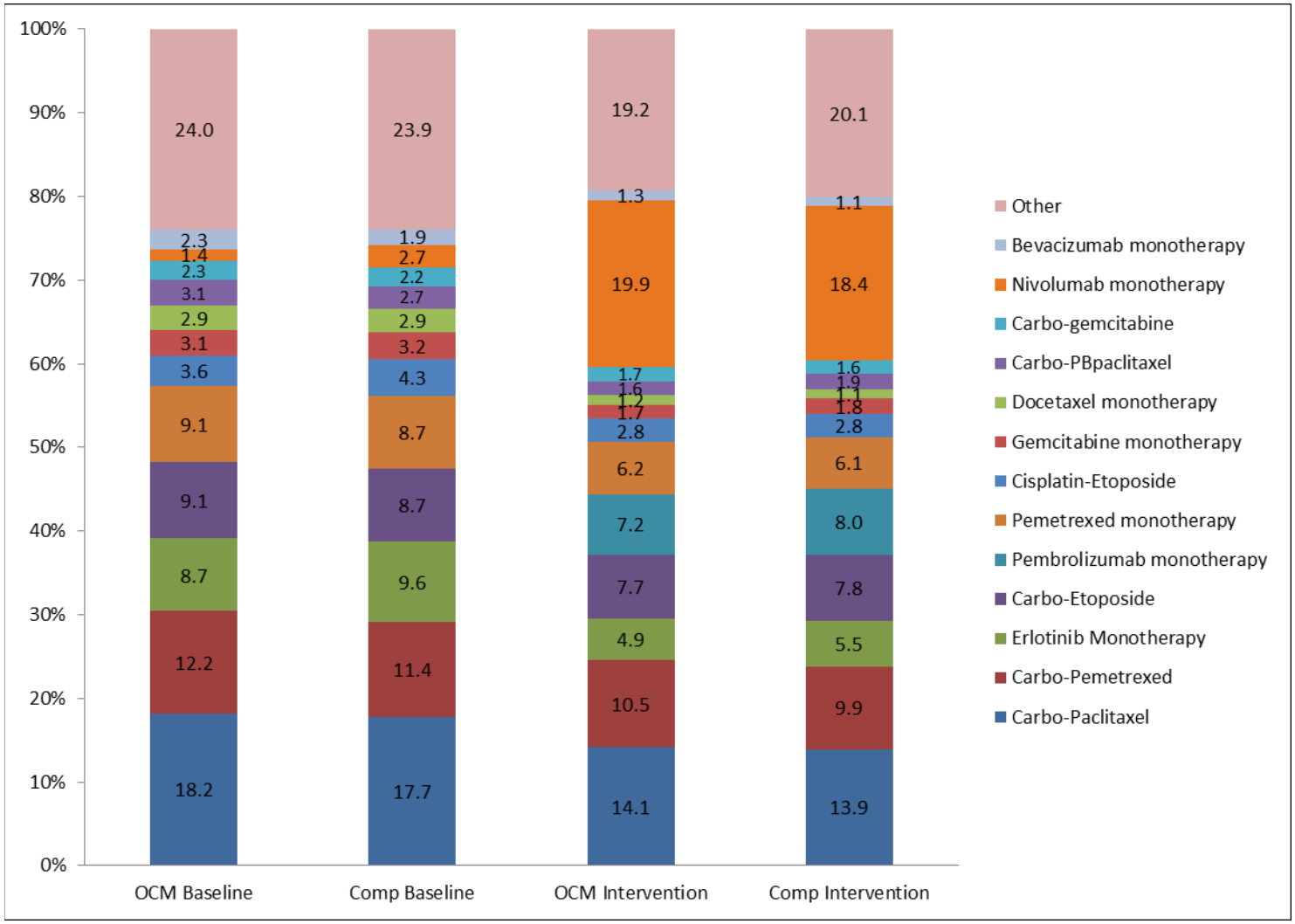
Methods

We identified patients with lung, colorectal, breast and prostate cancer who initiated new six-month chemotherapy treatment episodes. We assigned patients to chemotherapy regimens by identifying all chemotherapy agents received within eight days of the episode-trigger date. For regimens that can be given at either standard or "dose-dense" intervals, we identified dose-dense regimens by counting the days until the second treatment cycle. We excluded oral endocrine therapies for breast cancer (e.g., tamoxifen and aromatase inhibitors) and luteinizing-hormone releasing hormone (LHRH) agonists for prostate cancer, in order to focus on more intensive and variably-used categories of chemotherapy agents. We assessed the proportion of patients receiving distinct chemotherapy regimens in OCM and comparison practices, during the baseline and intervention periods. Finally, we categorized chemotherapy regimens by common elements (e.g., use of immunotherapy agents) for each of the four cancer types. Due to the many permutations of chemotherapy regimens, we did not perform statistical testing of these patterns of care analyses.

Findings Related to Specific Regimens

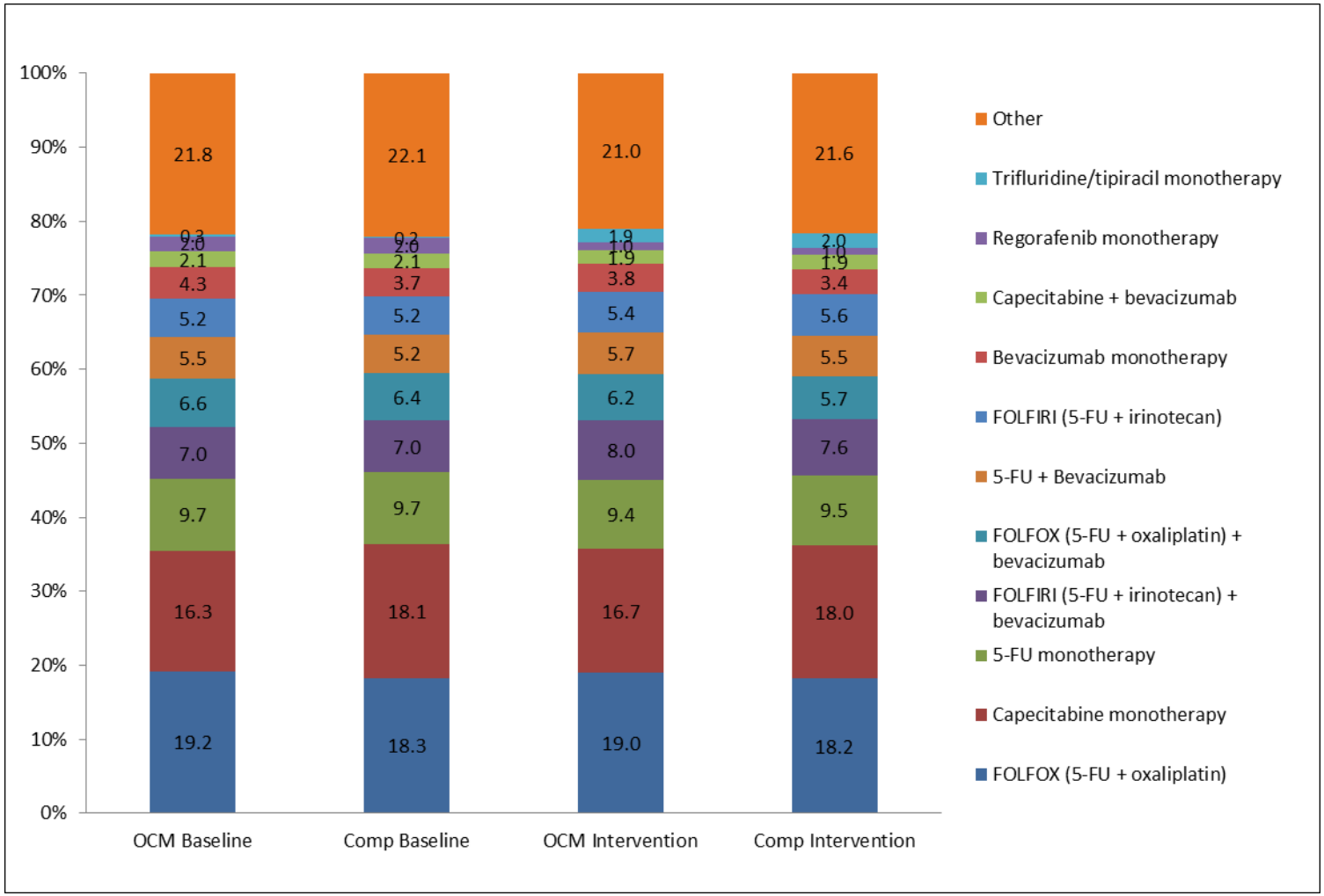
Exhibit E-7 through E-9 show the specific regimens used for new patients in episodes for lung cancer, colorectal cancer, and non-hormonal breast cancer (the prostate cancer regimens are simpler and summarized in the main text of the report only.) Overall, chemotherapy regimens were similar for OCM and comparison patients, both at baseline and during the intervention period.

Exhibit E-7: Chemotherapy Regimens for Lung Cancer (Stratified by OCM and Comparison)



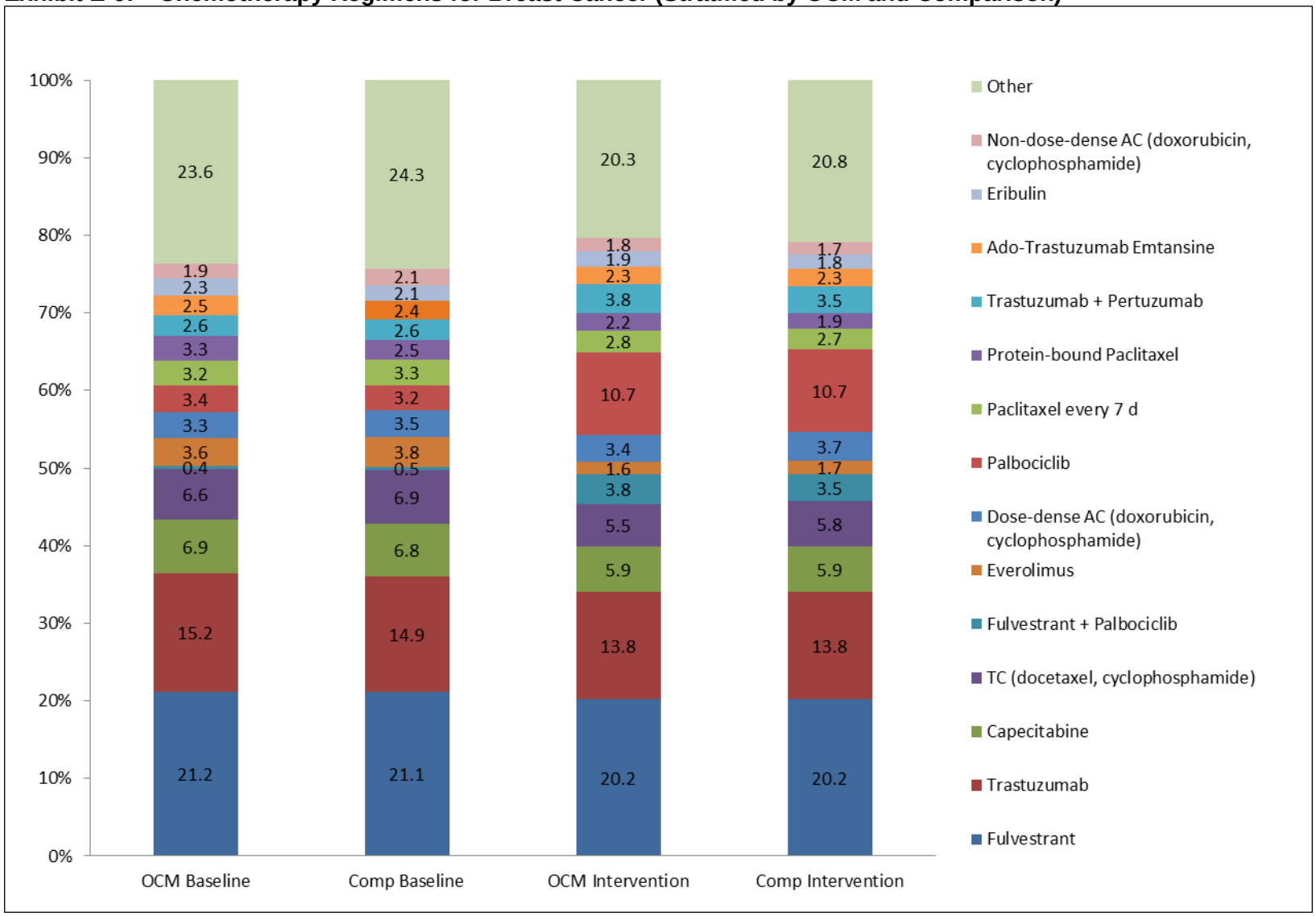
Source: Medicare claims 2014–2018.

Exhibit E-8: Chemotherapy Regimens for Colorectal Cancer (Stratified by OCM and Comparison)



Source: Medicare claims 2014–2018.

Exhibit E-9: Chemotherapy Regimens for Breast Cancer (Stratified by OCM and Comparison)



Source: Medicare claims 2014–2018.

E.2.2 Use of Immunotherapy for Lung Cancer

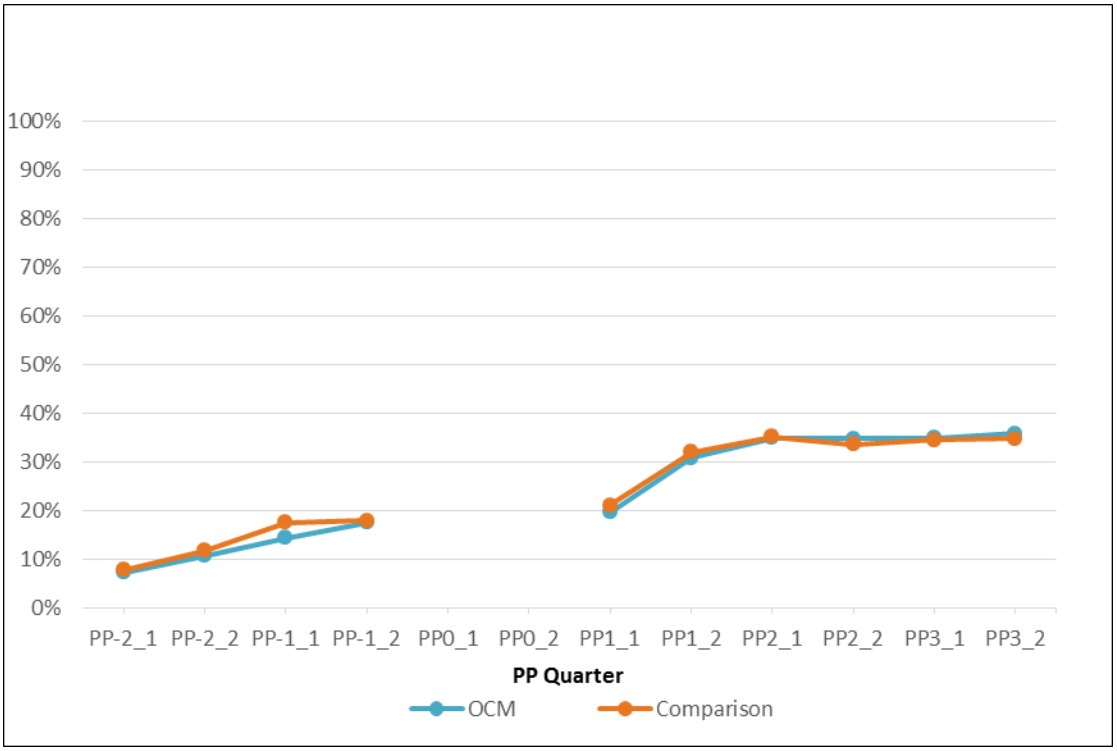
Measures and Analytic Approach

We identified patients triggering a lung cancer bundle with no chemotherapy in the prior 12 months. We examined any use of immunotherapy (atezolizumab, ipilimumab, nivolumab, pembrolizumab, avelumab, durvalumab, and cemiplimab-rwlc) in the 12 months following the episode trigger (or until the time of death if a patient did not survive the full 12 months).

Baseline and Intervention Trends

Exhibit E-10 shows the quarterly trends in use of immunotherapy for patients in OCM and comparison practices in the baseline and intervention periods. Trends were similar in OCM and comparison practices in the baseline period and in the intervention period.

Exhibit E-10: Use of Immunotherapy for Lung Cancer by Quarter, Unadjusted



Source: Medicare claims 2014–2018.
Notes: Quarter*OCM versus comparison group baseline trend: -0.3% (95% CI: -1.0%, 0.4%)

E.3. Adherence to Part D Drugs

Part D payments rose considerably for both OCM and comparison episodes, but payments rose more for OCM episodes, with a relative increase of $160 (see section 4.2 in the main report). The increase was particularly large for high-intensity prostate cancer (+$630, see Appendix Exhibit B-13). This could be due to greater use of Part D (vs. Part B) chemotherapy drugs, use of more costly Part D drugs, and/or longer or more consistent use of Part D drugs. If OCM practices are improving adherence to oral treatment regimens, then beneficiaries will take more of their oral drugs. This would lead to more prescription fills during the episode and higher Part D payments. We assessed the impact of OCM on adherence to Part D drugs for two clinical scenarios for which oral cancer drugs play a key role: chronic myelogenous leukemia (CML) and high-intensity prostate cancer.

We first examined tyrosine kinase inhibitors (TKIs) for CML. TKIs may be the most successful class of targeted therapies, transforming CML from a condition with a median survival of 5–6 years, to a condition with a near normal life expectancy.[25] Long-term adherence to CML drugs is important because non-adherence may lead to the development of treatment-resistant disease. Prior studies have shown suboptimal adherence to CML therapies, including in the Medicare population. For example, a study using SEER-Medicare data assessed adherence to TKIs among Medicare beneficiaries newly diagnosed with CML during 2007–2011—only 61 percent of patients had optimal adherence (defined as having medication available for more than 80 percent of days in a six-month period).

The second clinical scenario we examined to understand changes in oral drug adherence is the use of abiraterone or enzalutamide for prostate cancer. These drugs were initially approved for the treatment of castration-resistant metastatic prostate cancer. More recently, the FDA expanded treatment indications to include metastatic high-risk castration-sensitive prostate cancer (abiraterone in February 2018) and non-metastatic castration-resistant prostate cancer (enzalutamide in July 2018) due to research showing substantial improvement in survival.[26] Patients typically continue taking these drugs until their cancer progresses, and are often switched to one of the other drugs if progression occurs.

Measures and Analytic Approach

For the analysis of adherence to TKIs, we focused on patients with chronic leukemia who had Part D coverage for all months of the episode, and who had a diagnosis of CML, including the following codes: ICD9 codes 205.10, 205.11, 205.12 or ICD10 codes C92.10, C92.11, C92.12. We then assessed for use of any of the TKIs (including imatinib, dasatinib, nilotinib, bosutinib, and ponatinib). We also looked at adherence individually for the three most frequently prescribed TKIs, imatinib, dasatinib, and nilotinib. We calculated the proportion of days covered by summing the number of actual days' supply dispensed from the date of the first occurrence of a TKI until the last day of the episode, or the day of death if a patient died before the end of the episode.

For the analysis of adherence to abiraterone or enzalutamide, we focused on patients with high-risk prostate cancer who had Part D coverage for all months of the episode. We calculated the proportion of days covered by summing the number of actual days' supply dispensed from the date of the first occurrence of a drug of interest until the last day of the episode or the day of death if the patient died before the end of the episode, or until evidence of a switch to a different drug for treating metastatic prostate cancer, which would suggest progression of disease on the abiraterone or enzalutamide. Thus, we

[25] Gambacorti-Passerini C, Antolini L, Mahon FX, et al. Multicenter independent assessment of outcomes in chronic myeloid leukemia patients treated with imatinib. *J Natl Cancer Inst.* 2011;103(7):553–561.

[26] Apalutamide, another androgen receptor inhibitor, was approved in February 2018 for treating non-metastatic castrate-resistant prostate cancer. Only 29 episodes in the intervention period used apalutamide, so it was not included it in this analysis.

looked for a switch to enzalutamide (if on abiraterone), abiraterone (if on enzalutamide), docetaxel, cabazitaxel, sipuleucel-T, or mitoxantrone.

Results

As shown in **Exhibit E-11**, OCM had no impact on adherence to TKIs for CML or adherence to enzalutamide or abiraterone for patients with high-risk prostate cancer.

Exhibit E-11: OCM Did Not Affect Oral Drug Therapy Adherence (Proportion of Days Covered) among Patients Taking Tyrosine Kinase Inhibitors for Chronic Myeloid Leukemia or Abiraterone or Enzalutamide for High-Intensity Prostate Cancer[27]

Proportion of Days Covered (PDC)	# of Episodes		OCM		COMP		Impact Estimates Through PP3			
	OCM	COMP	Baseline Mean PDC	Int. Mean PDC	Baseline Mean PDC	Int. Mean PDC	DID Percentage Point Impact	90% LCL	90% UCL	Percent Change
All TKIs for CML	9,167	10,187	87.7%	87.3%	88.3%	87.9%	0.1%	-0.8%	0.9%	0.1%
Enzalutamide or abiraterone for prostate cancer	16,486	20,701	88.7%	84.6%	89.1%	84.8%	0.2%	-0.6%	1.0%	0.2%

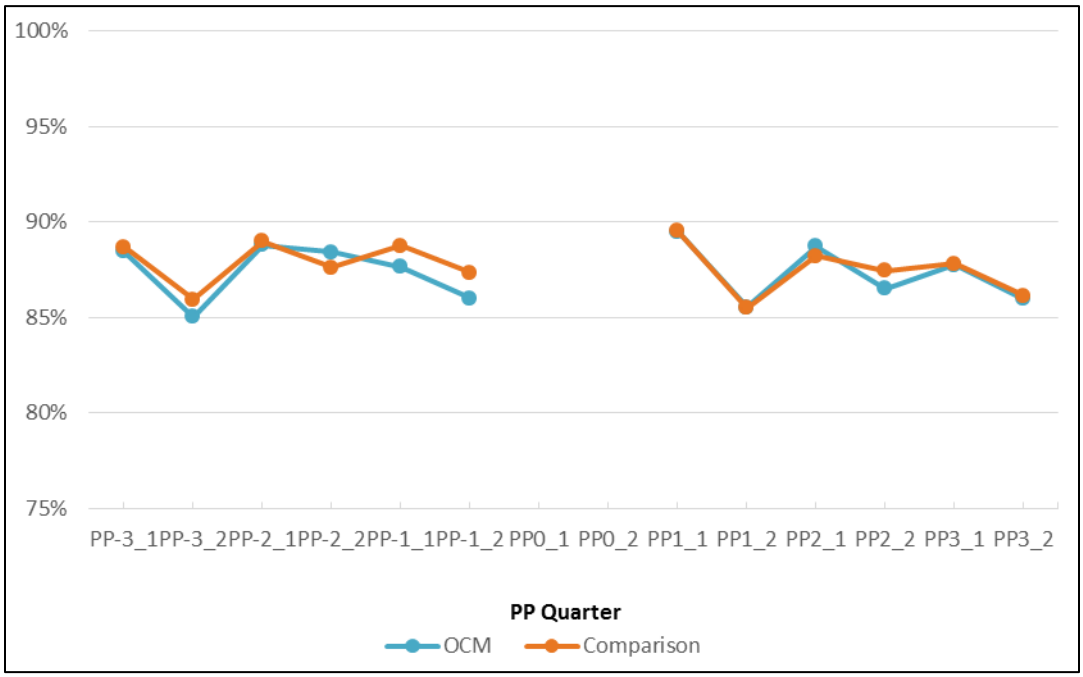
Source: Medicare claims 2014–2018.
Notes: OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period. Asterisks denote statistically significant impact estimates at *p≤0.10, **p≤0.05, ***p≤0.01. LCL: Lower confidence limit; UCL: Upper confidence limit, PDC=proportion of days covered.

Baseline and Intervention Trends in Adherence

Exhibit E-12 and E-13 show the quarterly trends in adherence to TKIs for patients with CML, and adherence to enzalutamide or abiraterone for high-intensity prostate cancer, for OCM and comparison episodes.

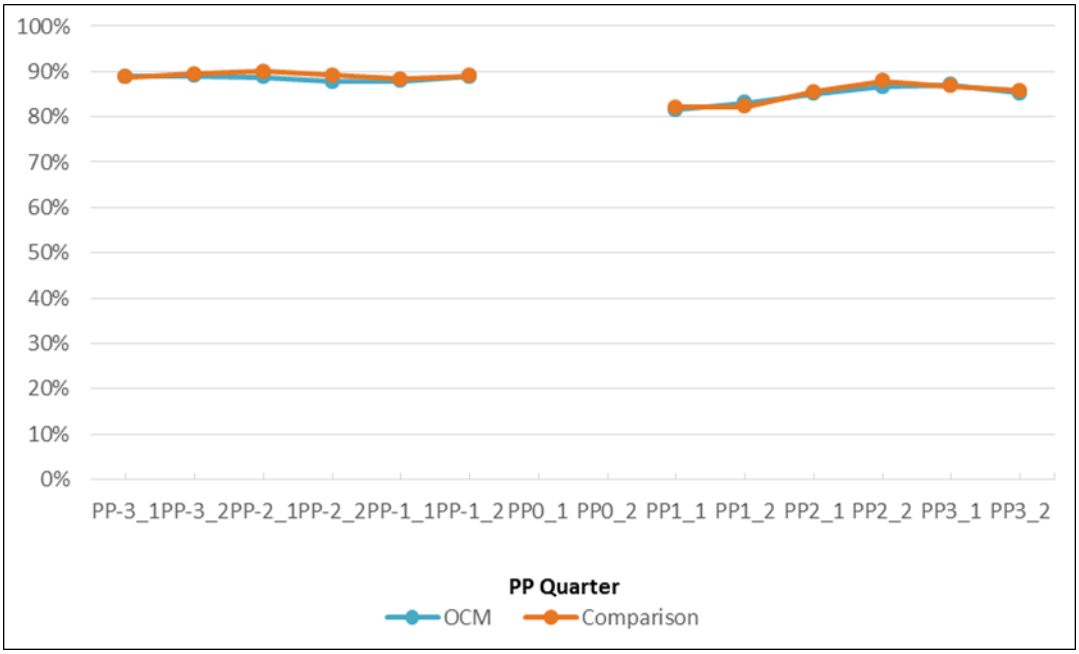
[27] In sensitivity analyses, results were similar after excluding the two very large OCM practices.

Exhibit E-12: Adherence to TKIs for CML in OCM and Comparison Episodes by Quarter, Unadjusted



Source: Medicare claims 2014–2018.
Notes: Pre-trend estimate -0.2% per quarter in OCM relative to comparison episodes (95% CI -0.6%, 0.2%)

Exhibit E-13: Adherence to Abiraterone or Enzalutamide in OCM and Comparison Episodes by Quarter, Unadjusted



Source: Medicare claims 2014–2018.
Notes: Pre-trend estimate 0.0% per quarter in OCM relative to comparison episodes (95% CI -0.3%, 0.3%)

Exhibit E-14 shows less use of imatinib (first generation TKI) vs. nilotinib/dasatinib/bosutinib (second generation TKIs) for OCM vs. comparison episodes in the intervention period, with statistically significantly larger decreases in use of first generation TKIs in OCM relative to comparison episodes.

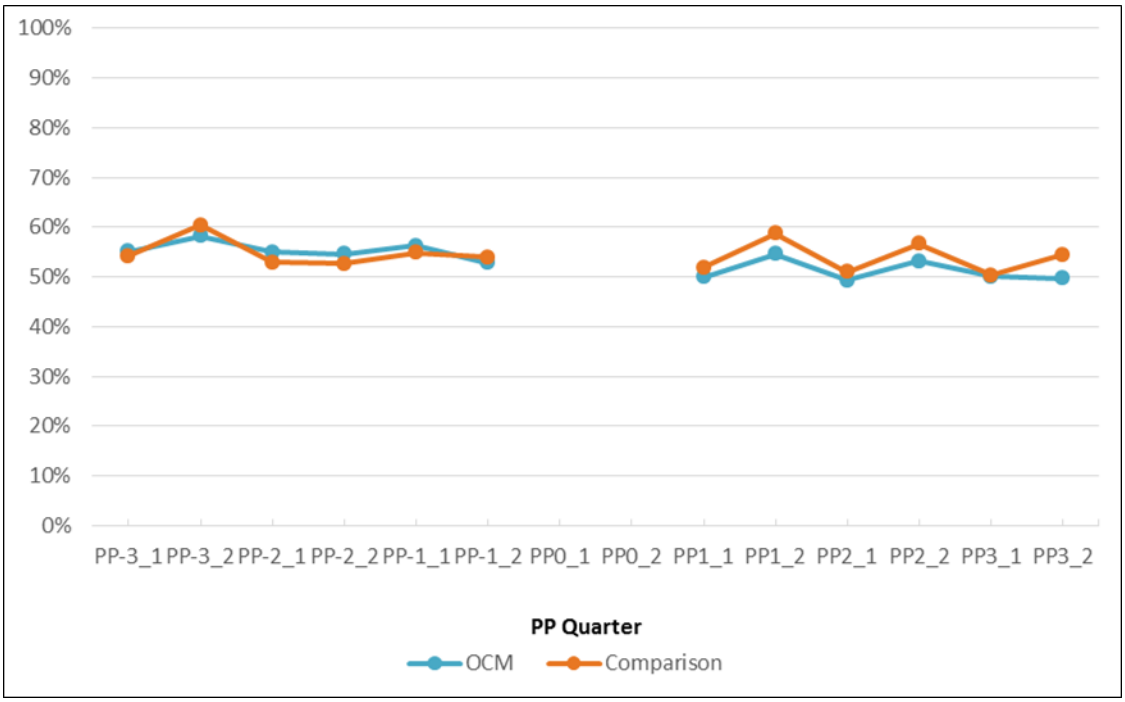
Exhibit E-14: OCM Episodes Used Less Imatinib versus Nilotinib/Dasatinib/Bosutinib

TKI Use	# of Episodes		OCM		COMP		Impact Estimates Through PP3			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Percentage Point Impact	90% LCL	90% UCL	% Change
Use of imatinib vs. nilotinib/ dasatinib/ bosutinib	9,029	10,073	55.9%	51.0%	54.4%	52.5%	-2.9%*	-5.6%	-0.3%	-5.3%

Source: Medicare claims 2014–2018.
Notes: *p≤0.10, **p≤0.05, ***p≤0.01. LCL: Lower confidence limit; UCL: Upper confidence limit.

In sensitivity analyses that excluded the two largest OCM practices (**Exhibit E-15**), the DID impact estimate was no longer statistically significant (DID -2.0 percent, P=0.23).

Exhibit E-15: Use of First Generation versus Second Generation TKIs

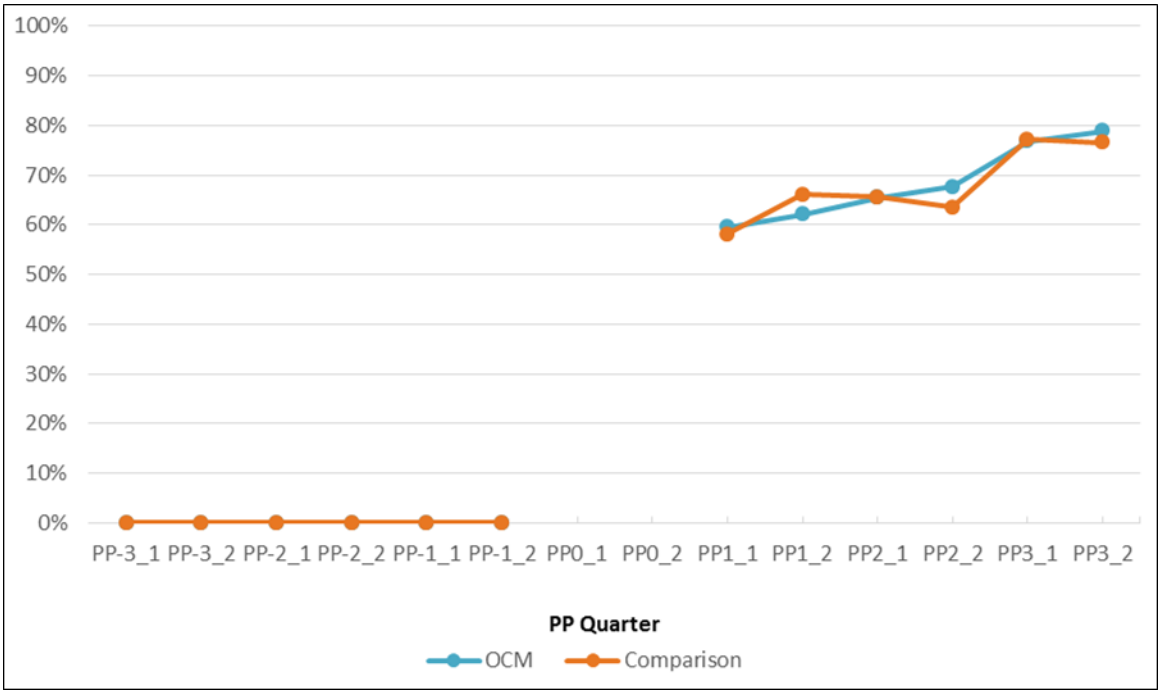


Source: Medicare claims 2014–2018.
Notes: Pre-trend estimate -0.1% (CI -1.0%, 0.7%)

We also assessed whether OCM and comparison episodes differed in their use of generic imatinib, which became available in early 2016. **Exhibit E-16** shows no use of generic imatinib in the baseline period (before it was approved) and generally similar use during the intervention period in OCM and comparison episodes (DID analysis is not possible because there was no use in the baseline period). We compared the

linear trend during the intervention period for OCM and comparison episodes and found no difference in the rate of adoption of generic imatinib over time for OCM and comparison episodes (adjusted average use of generics 66.9 percent in OCM episodes and 67.9 percent in comparison episodes; difference=-1.0 percentage points, 90 percent CI=-5.3, 3.2; estimate = .003; P=.66 for OCM versus comparison trend).

Exhibit E-16: Adoption of Generic Imatinib Did Not Differ in OCM versus Comparison Episodes



Source: Medicare claims 2014–2018.

In summary, as described in the main report, OCM had no impact on adherence to oral antiandrogen therapies for high-intensity prostate cancer or TKIs for CML. OCM episodes had relatively more use of (more costly) second generation versus (less costly) first generation TKIs. This could reflect a tendency of OCM practices to be earlier adopters, but also suggests that they did not see use of first generation TKIs as an opportunity for value based care. We found no evidence that OCM led to more rapid adoption of generic (i.e., less costly) imatinib.

E.4. Guideline-Consistent Symptom Management

E.4.1 Guideline-Recommended Use of Prophylactic Antiemetics during Intravenous Chemotherapy

We assessed guideline-recommended use of antiemetics for chemotherapy regimens that carry high, moderate or low risk of nausea and vomiting. Further, among patients receiving guideline-concordant antiemetics, we assessed differences in use of higher- vs. lower-intensity antiemetics because in some situations, use of higher-intensity antiemetics may reflect low-value care.

Measures and Analytic Approach

We used National Comprehensive Cancer Network (NCCN) and American Society of Clinical Oncology (ASCO) supportive care guidelines to characterize guideline-recommended prophylactic antiemetic use among patients receiving intravenous chemotherapy. We assigned an emetogenicity risk (risk of

vomiting) to each individual chemotherapy agent as outlined in the guidelines. We identified treatment episodes for OCM and comparison patients, and the dates of chemotherapy infusion in each episode. We then assigned each episode to the emetogenicity risk class for the highest emetogenic risk chemotherapy agent given during the episode. We excluded episodes with hormonal agents only as well as episodes with moderate-risk agents where there was also a high-risk oral agent because we could not be certain what date the oral agent was started. We then selected the first infusion date within a given risk class for each patient. This was done so that patients were not represented more than once in each risk-class analysis, and also to reduce the likelihood of under-ascertainment of oral antiemetic use (as patients receiving subsequent episodes of chemotherapy may already have Part D antiemetic medications at home and may not need medication refills).

Within the episodes described above, we measured the use of oral and intravenous antiemetics, stratified by emetogenicity risk category. Specifically, we looked for antiemetic dispensing in Part D and in claims for office-administered Part B medications. The following antiemetics were included: NK1 receptor antagonists (aprepitant, fosaprepitant, rolapitant, and the combination medication netupitantpalonosetron), 5-HT3 receptor antagonists (ondansetron, dolasetron, granisetron, and palonosetron), olanzapine, dronabinol, and nabilone. We did not measure the use of prochlorperazine, dexamethasone, and other frequently used antiemetics because we assumed the wide use of these adjunctive and low-cost agents. The window for identification of primary prophylactic antiemetic use was within 14 days before through one day after the first chemotherapy date during the episode for that emetogenic drug.

We defined guideline-recommended antiemetic use, per the NCCN and ASCO antiemesis guidelines (current as of the end of 2018), as depicted in **Exhibit E-17**. Antiemetic regimens other than those included in the table were considered not guideline-recommended, including antiemetics that were either less intensive or more intensive than recommended by guidelines. Within the guideline-recommended prophylactic antiemetics for moderate- and low-risk categories, we also designated certain guideline-recommended regimens as “high-intensity” antiemetic regimens. The purpose of this designation was to evaluate changes in the intensity of antiemetic use from among the range of potential agents recommended in the guidelines, which differ in efficacy and cost.

Exhibit E-17: Guideline-Recommended Antiemetic Regimens for Intravenous Chemotherapy, by Emetogenicity Risk Category

Emetogenicity Risk Category	Drug 1	Drug 2 (Required in Addition to Drug 1)
High	Netupitant-palonosetron	(none)
High	NK1 receptor antagonist (any)	5-HT3 receptor antagonist (any)
High	Palonosetron	Olanzapine
Moderate*	5-HT3 receptor antagonist (any)	Olanzapine
Moderate*	NK1 RA-palonosetron	(none)
Moderate*	NK1 receptor antagonist (any)	5-HT3 receptor antagonist (any)
Moderate	5-HT3 receptor antagonist (any)	(none)
Low*	Ondansetron, dolasetron, or granisetron	(none)
Low	(none)	(none)

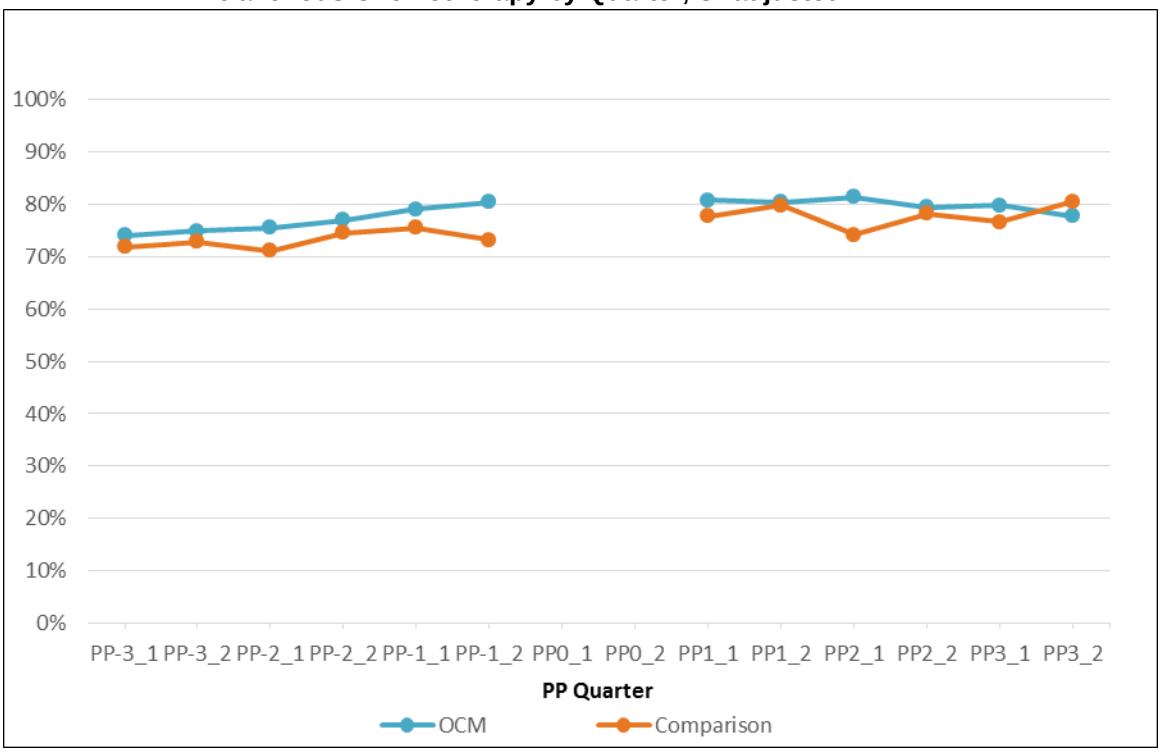
Notes: *Antiemetic regimens marked with an asterisk were considered “high-intensity” guideline-recommended antiemetics for the purposes of this analysis; (none) includes no antiemetic drugs or less-potent antiemetic drugs that we did not study. These other less-potent antiemetic drugs may still be appropriate to address symptoms a patient may have.

We used a DID framework to access OCM impact on antiemetic prescribing comparing care during the six baseline quarters with care in the intervention period through the first three PPs. All impact estimates were adjusted for the same covariates as in other claims-based analyses.

Trends in Guideline-Recommended Use of Prophylactic Antiemetic Therapy

The exhibits below show the raw trends for the baseline period and the intervention period, in use of antiemetic therapy, for each of the five clinical scenarios: guideline-recommended antiemetic use for high, moderate, and low emetogenic risk intravenous chemotherapy; and high-intensity antiemetic use among patients receiving guideline-recommended antiemetic regimens (for moderate and low emetogenic risk only). Baseline trends are generally similar for OCM and comparison episodes, although for high-risk regimens, the quarter*OCM vs. comparison group trend estimate in the baseline period is 1.2 percent per quarter (95 percent CI: 0.3 percent, 2.2 percent) Among patients receiving moderate emetic risk chemotherapy the OCM impact estimate indicated a small, statistically significant relative decrease in the very high rates of guideline-recommended antiemetic therapy for OCM patients, which is appreciable in the trend in **Exhibit E-19**.

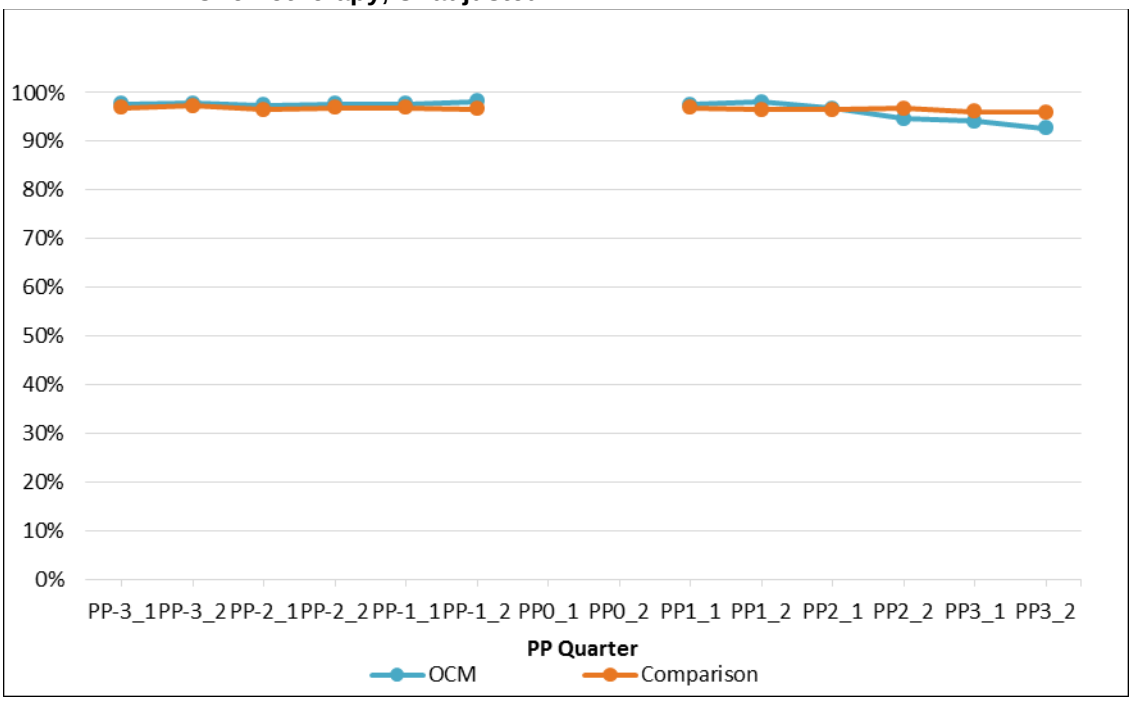
Exhibit E-18: Receipt of Guideline-Recommended Antiemetic Use for High-Emetic Risk Intravenous Chemotherapy by Quarter, Unadjusted



Source: Medicare claims 2014–2018.

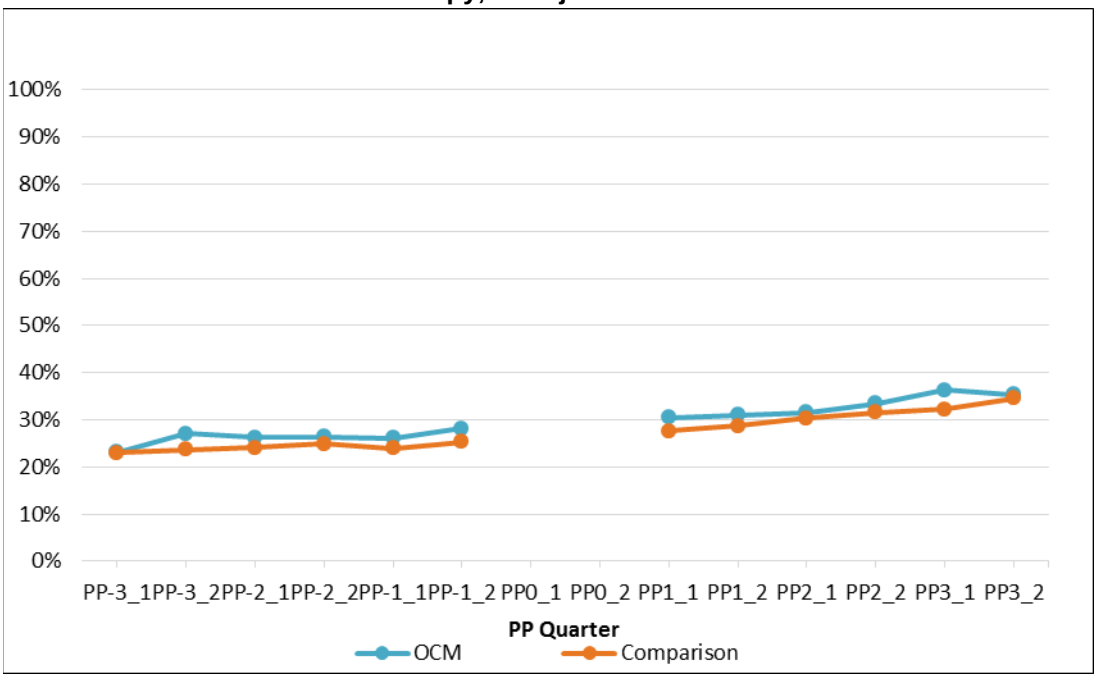
Notes: *Quarter*OCM versus comparison group trend estimate in the baseline period is 1.2% per quarter (95% CI 0.3%, 2.2%)

Exhibit E-19: Receipt of Guideline-Recommended Antiemetic Use for Moderate-Emetic Risk IV Chemotherapy, Unadjusted



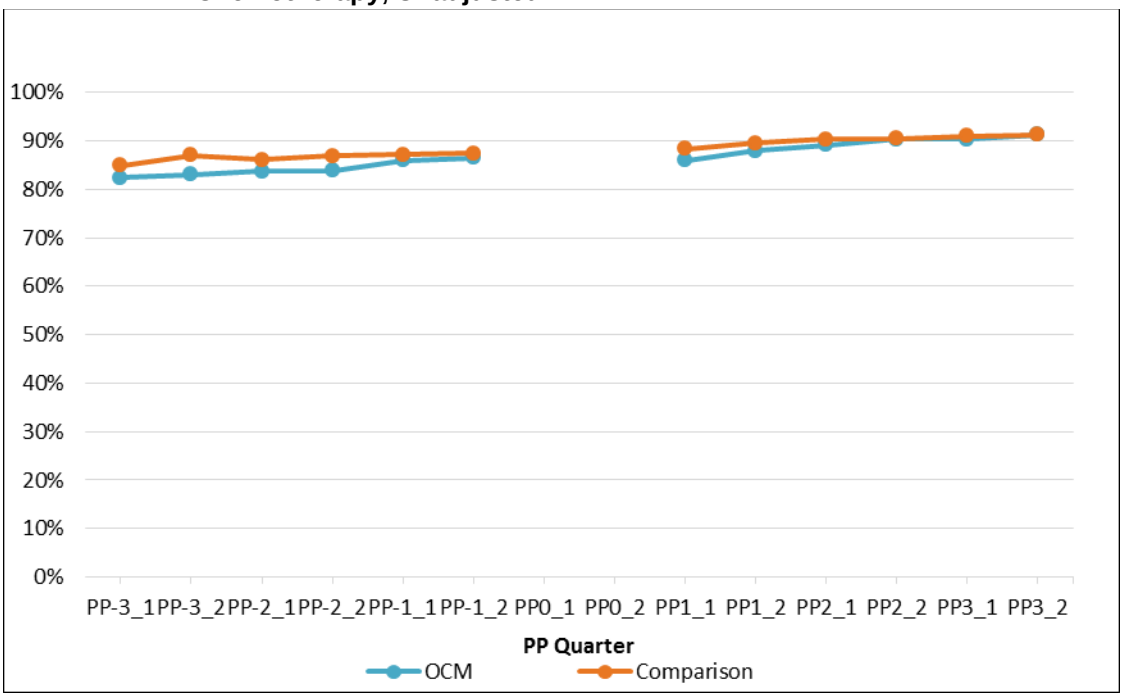
Source: Medicare claims 2014–2018.
Notes: *Quarter*OCM versus comparison group trend estimate in baseline period: 0.1% per quarter (95% CI -0.1%, 0.4%)

Exhibit E-20: Receipt of High versus Low Intensity Antiemetic Use for Moderate-Emetic Risk IV Chemotherapy, Unadjusted



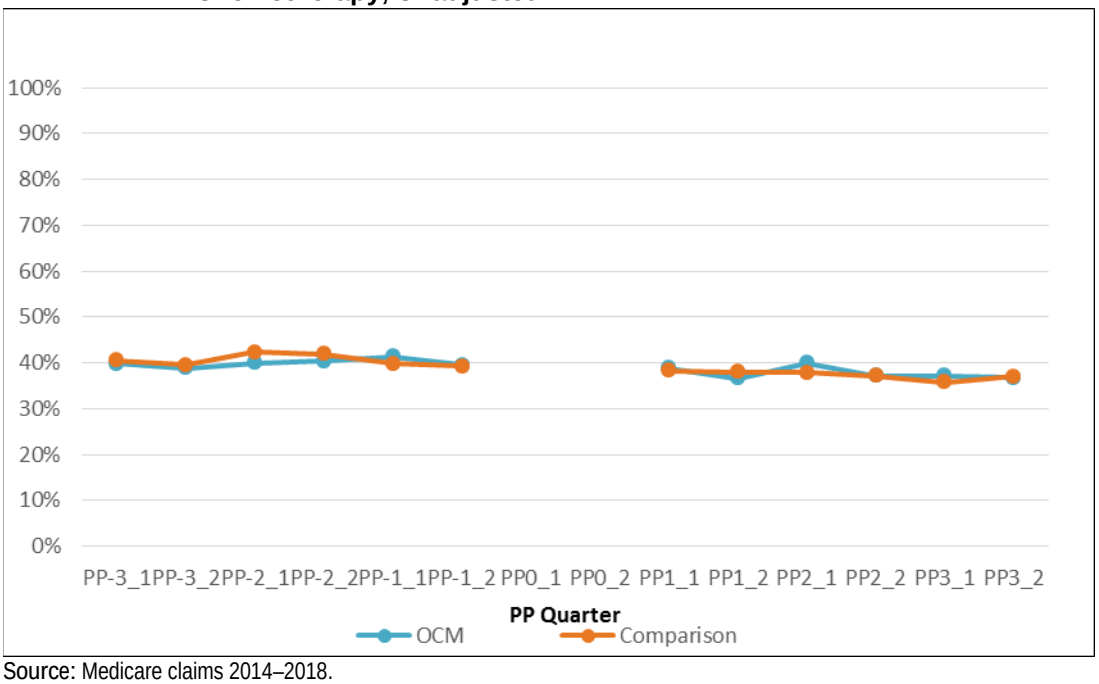
Source: Medicare claims 2014–2018.
Notes: *Quarter*OCM versus comparison group trend estimate in baseline period: 0.4% per quarter (95% CI -0.2%, 1.0%)

Exhibit E-21: Receipt of Guideline-recommended Antiemetic Use for Low-Emetic Risk IV Chemotherapy, Unadjusted



Source: Medicare claims 2014–2018.
Notes: *Quarter*OCM versus comparison group trend estimate in baseline period: 0.5% per quarter (95% CI 0.04%, 0.9%)

Exhibit E-22: Receipt of High versus Low Intensity Antiemetic Use For Low-Emetic Risk IV Chemotherapy, Unadjusted



Source: Medicare claims 2014–2018.
Notes: *Quarter*OCM versus comparison group trend estimate in baseline period: 0.1% per quarter (95% CI -0.4%, 0.7%)

Low-value antiemetic use. Among patients receiving guideline-recommended antiemetic therapy for low- or moderate-risk emetic risk chemotherapy regimens, we assessed the low-value use of high-intensity (and more costly) antiemetic regimens. Reducing use of low-value antiemetics for these patients can be an opportunity to reduce Medicare payments. There was, however, no statistically significant impact of OCM on the use of low-value antiemetic drugs in these situations.

Exhibit E-23: No Estimated OCM Impact on Discretionary Use of High-Intensity Antiemetic Regimens

Measure	# of Episodes		OCM		COMP		Impact Estimates Through PP3			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Percentage Point Impact	90% LCL	90% UCL	Percent Change
Use of Antiemetics										
Moderate emetogenic risk episodes with high-intensity antiemetic regimens (lower-value care)	66,736	77,227	25.8%	32.5%	24.1%	31.8%	-1.0%	-3.9%	2.0%	-3.8%
Low emetogenic risk episodes with high-intensity antiemetic regimens (lower-value care)	54,661	65,156	41.5%	37.8%	40.5%	36.4%	0.5%	-1.0%	1.9%	1.1%

Source: Episode analytic file (2014-2018)
Notes: OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period. LCL: Lower confidence limit; UCL: Upper confidence limit.

Exhibit E-24 shows that among regimens with guideline-concordant use of antiemetics, but with options for higher- versus lower-intensity antiemetics (which reflect lower- vs. higher-value care), there was no OCM impact on choice of antiemetic.

Exhibit E-24: No OCM Impact on Discretionary Use of High-Intensity Antiemetic Regimens

Measure	# of Episodes		OCM		COMP		Impact Estimates Through PP3			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Percentage Point Impact	90% LCL	90% UCL	Percent Change
Use of Antiemetics										
Moderate emetogenic risk episodes with high-intensity antiemetic regimens	66,736	77,227	25.8%	32.5%	24.1%	31.8%	-1.0%	-3.9%	2.0%	-3.8%
Low emetogenic risk episodes with high-intensity antiemetic regimens	54,661	65,156	41.5%	37.8%	40.5%	36.4%	0.5%	-1.0%	1.9%	1.1%

Source: Episode analytic file (2014-2018)
Notes: OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period. LCL: Lower confidence limit; UCL: Upper confidence limit.

E.4.2 Use of White Blood Cell Growth Factors

We assessed guideline-recommended use of white blood cell growth factors (GCFSs) for patients with colorectal, breast, and lung cancers, for chemotherapy regimens with varying risk of neutropenia (high, intermediate or low). Prophylactic GCFSs should be given with the first treatment cycle, for all patients receiving regimens with high neutropenic risk, and should generally not be given for regimens with low neutropenic risk. Patients receiving intermediate neutropenic risk chemotherapy regimens may benefit from prophylactic GCSFs if patient characteristics indicate increased risk for fever and neutropenia, but in many cases such use may reflect low-value care.

Measures and Analytic Approach

We identified patients with colorectal, breast, and lung cancer who were initiating new intravenous chemotherapy treatment episodes. We restricted our analysis to patients who had not received chemotherapy in the previous 12 months to identify patients who were candidates for *prophylactic* growth factors. Using the date of the first chemotherapy claim as the index date, we assigned patients to treatment regimens by identifying all chemotherapy agents received within 8 days of the index date. For regimens that can be given at standard or "dose-dense" intervals, we identified dose-dense regimens by counting the days until the second treatment cycle. We assigned all chemotherapy regimens as high, intermediate, or low risk for fever and neutropenia, using the NCCN guideline categorization; when a regimen was not specifically listed in the NCCN guideline, we used other published sources to classify the regimen's fever and neutropenia risk. Chemotherapy regimen classification is shown in **Exhibit E-25 to E-27**. Patients receiving filgrastim, pegfilgrastim, or related biosimilars within 8 days of the index date were classified as receiving prophylactic GCSF therapy. We then performed a DID analysis of GCSF therapy use in OCM and comparison practices, stratified by cancer type and regimen-associated risk for fever and neutropenia. We performed additional DID analyses to investigate the use of pegfilgrastim versus filgrastim (among patients receiving either agent) and to investigate the use of biosimilar vs originator filgrastim (among patients receiving any form of filgrastim). Among patients receiving pegfilgrastim, we evaluated trends in use of the on-body injector during the intervention period (reliable coding for use of the on-body injector was not available during the baseline period). This set of analyses was performed on the episode level, using the first GCSF claim from the episode.

Chemotherapy regimens for breast cancer, lung cancer, and colorectal cancer are presented in **Exhibits E-25, E-26**, and **E-27**, stratified by risk of neutropenia.

Exhibit E-25: Breast Cancer Regimens Classified by Neutropenia Risk

High Neutropenic Risk Regimens	Intermediate-Risk Regimens	Low-Risk Regimens
Dose-dense AC (doxorubicin, cyclophosphamide) TAC (docetaxel, doxorubicin, cyclophosphamide) TC (docetaxel, cyclophosphamide) TC (docetaxel, cyclophosphamide) + trastuzumab TCH (docetaxel, carboplatin, trastuzumab) TCH (docetaxel, carboplatin, trastuzumab) + pertuzumab Docetaxel + carboplatin	Non-dose-dense AC (doxorubicin, cyclophosphamide) Docetaxel Docetaxel + trastuzumab Docetaxel + trastuzumab + pertuzumab Paclitaxel every 21 d Paclitaxel every 21 d + trastuzumab Paclitaxel every 21 d + trastuzumab + pertuzumab Paclitaxel + carboplatin Paclitaxel + carboplatin + trastuzumab Paclitaxel + carboplatin + trastuzumab + pertuzumab CMF Classic (cyclophosphamide, methotrexate*, fluorouracil) FEC (fluorouracil, epirubicin, cyclophosphamide)	All other regimens

Exhibit E-26: Lung Cancer Regimens Classified by Neutropenia Risk*

Intermediate Neutropenic Risk Regimens	Low-Risk Regimens
Docetaxel monotherapy Carbo-paclitaxel Carbo-etoposide Cisplatin-paclitaxel Cisplatin-docetaxel Cisplatin-vinorelbine Cisplatin-etoposide	All other regimens

Notes: *Topotecan and carboplatin-docetaxel were categorized as high neutropenic risk, but these regimens were very infrequently used and were omitted from analyses.

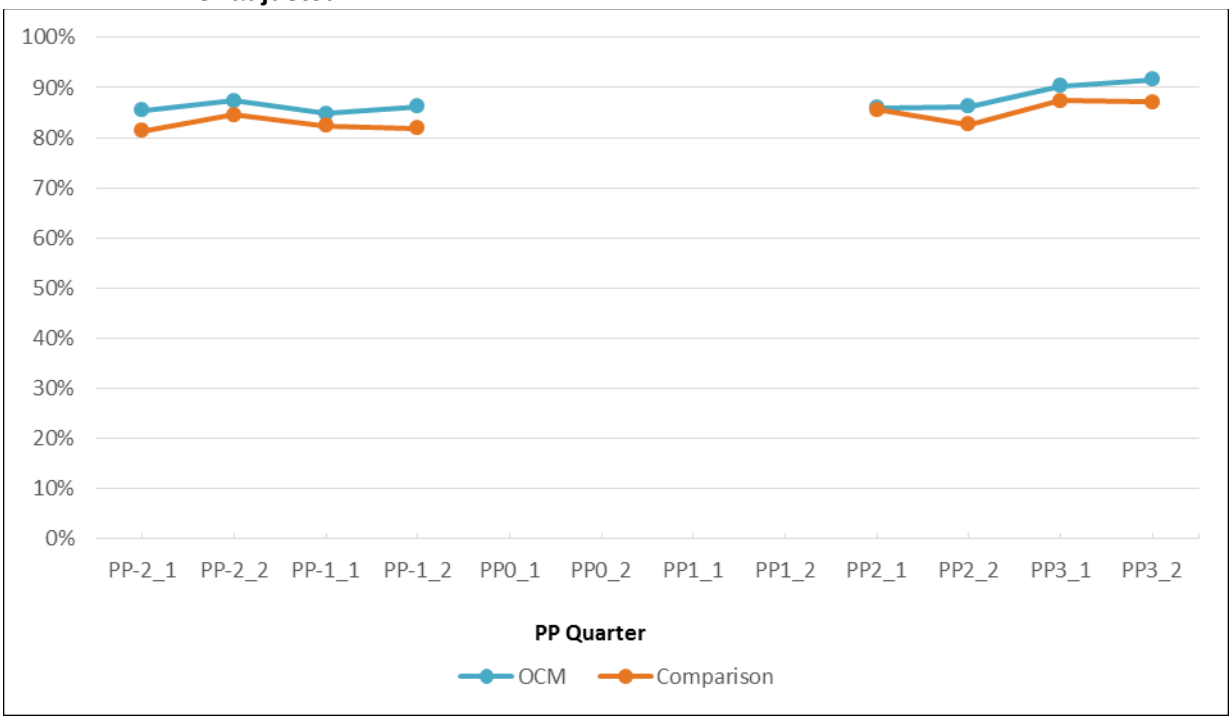
Exhibit E-27: Colorectal Cancer Regimens Classified by Neutropenia Risk

Intermediate Neutropenic Risk Regimens	Low-Risk Regimens
FOLFOX (5-FU + oxaliplatin) FOLFOX (5-FU + oxaliplatin) + bevacizumab FOLFOX (5-FU + oxaliplatin) + cetuximab FOLFOX (5-FU + oxaliplatin) + panitumumab FOLFOXIRI (5-FU + oxaliplatin + irinotecan) FOLFOXIRI (5-FU + oxaliplatin + irinotecan) + bevacizumab	All other regimens

Trends in GCSF Use

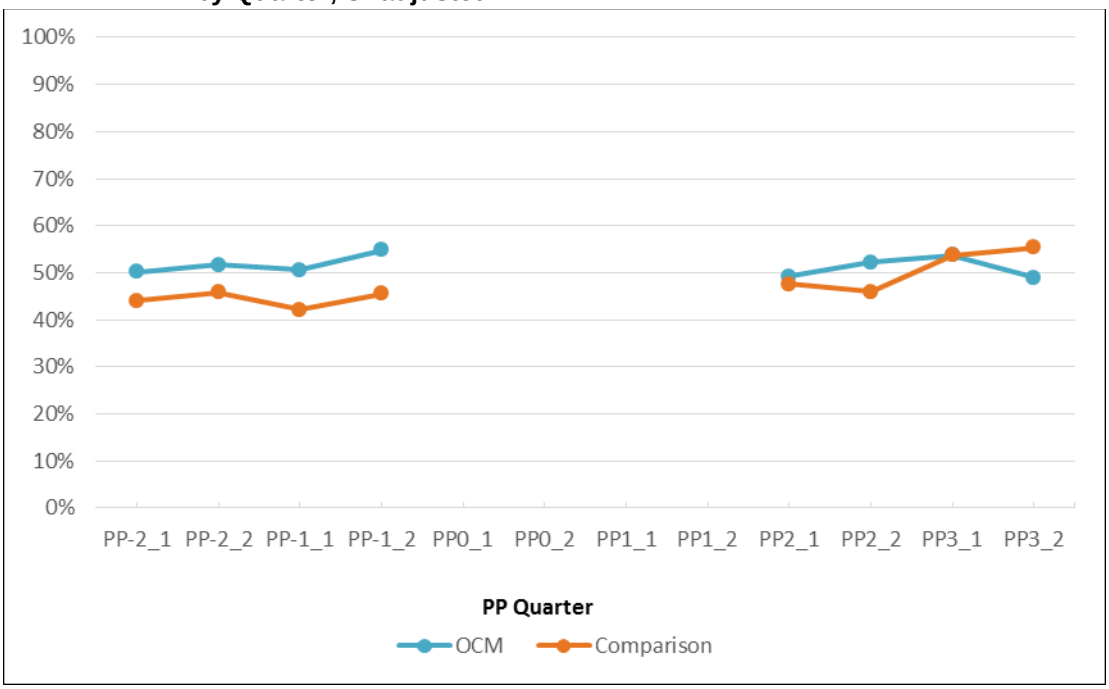
Exhibit E-28 through E-34 show quarterly rates of GCSF use by cancer type and category of neutropenia risk. Note that the time periods differ for these analyses, because we required that patients included in the analyses were starting a new regimen and had no chemotherapy in the prior year. Baseline trends in GCSF use are similar for OCM and comparison episodes. Among breast cancer patients receiving chemotherapy with intermediate risk for febrile neutropenia the OCM impact estimate indicated a small, statistically significant decrease in GSCF use for OCM patients, which is appreciable in the trend in **Exhibit E-29**. Because only some patients receiving intermediate-risk regimens are likely to benefit from prophylactic GCSFs, this decrease suggests that OCM may be reducing potentially lower value care (although use in this circumstance remained relatively high).

Exhibit E-28: Receipt of GCSF for Breast Cancer – High Neutropenic Risk Regimens by Quarter, Unadjusted



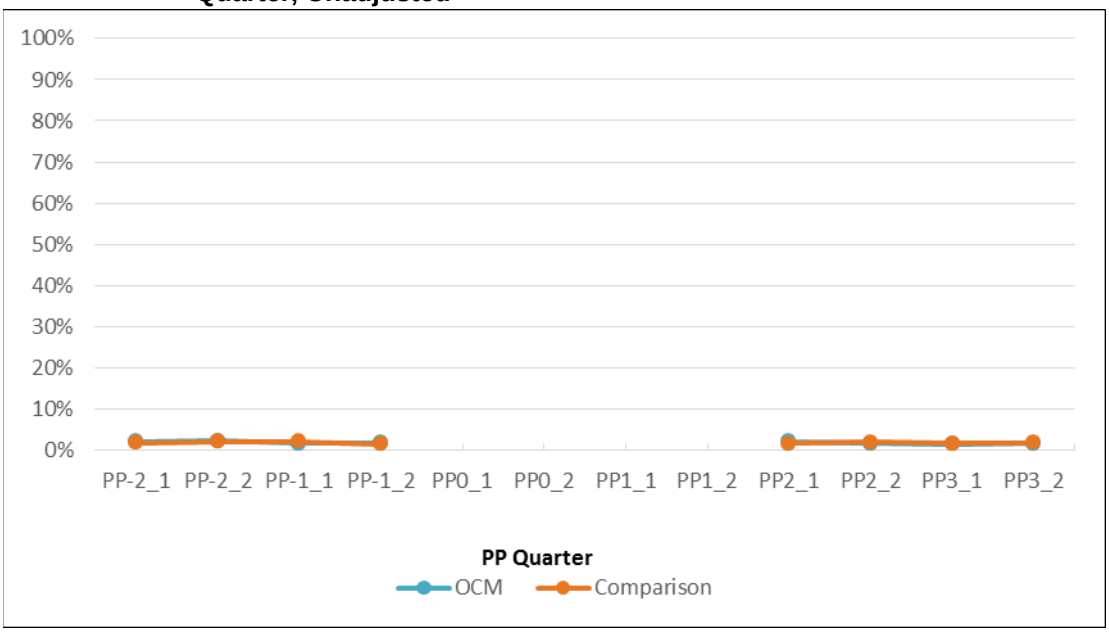
Source: Medicare claims 2014–2018.
Notes: *Quarter*OCM versus comparison group trend estimate in baseline period: 0.3% per quarter (95% CI -1.4%, 2.0%)

Exhibit E-29: Receipt of GCSF use for Breast Cancer – Intermediate Neutropenic Risk Regimens by Quarter, Unadjusted



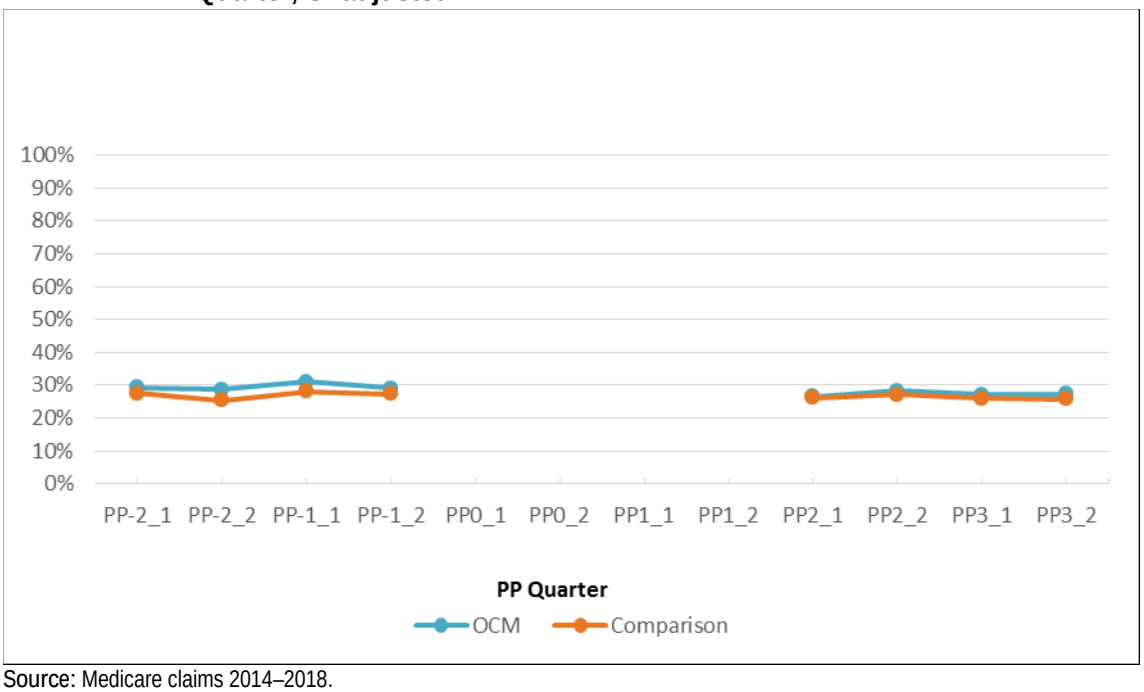
Source: Medicare claims 2014–2018.
Notes: *Quarter*OCM versus comparison group trend estimate in baseline period: 0.2% per quarter (95% CI -3.2%, 3.6%)

Exhibit E-30: Receipt of GCSF Use for Breast Cancer – Low Neutropenic Risk Regimens by Quarter, Unadjusted



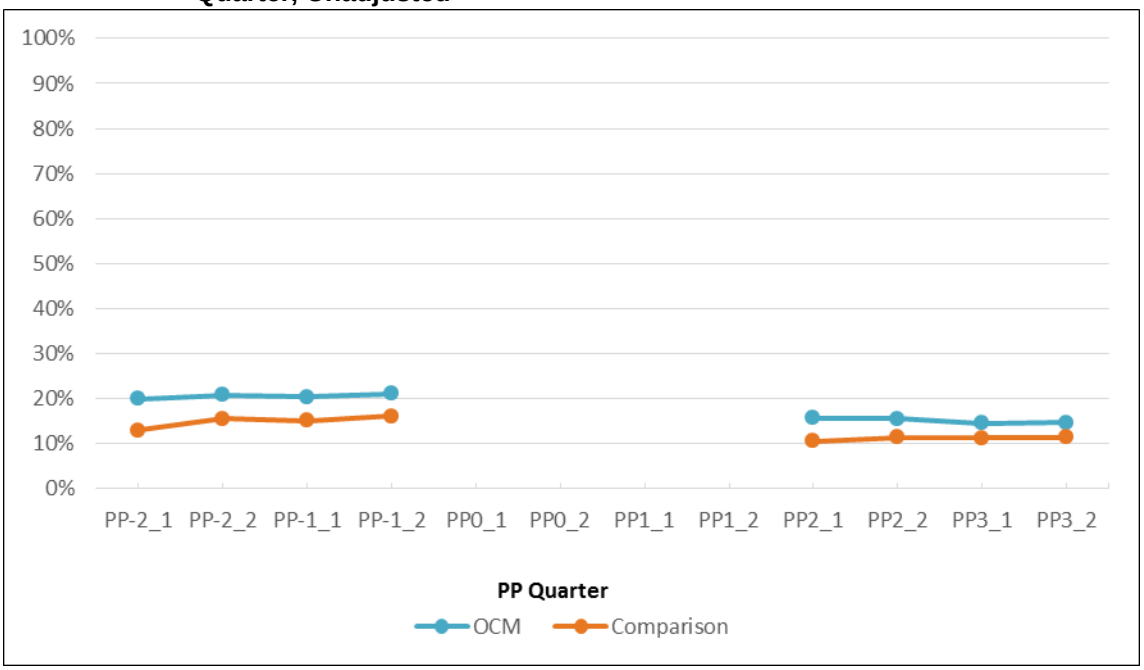
Source: Medicare claims 2014–2018.
Notes: *Quarter*OCM versus comparison group trend estimate in baseline period: -0.1% per quarter (95% CI -0.5%, 0.4%)

Exhibit E-31: Receipt of GCSF for Lung Cancer – Intermediate Neutropenic Risk Regimens by Quarter, Unadjusted



Source: Medicare claims 2014–2018.
Notes: *Quarter*OCM versus comparison group trend estimate in baseline period: 0.1% per quarter (95% CI -1.4%, 1.6%)

Exhibit E-32: Receipt of GCSF Use for Lung Cancer – Low Neutropenic Risk Regimens by Quarter, Unadjusted

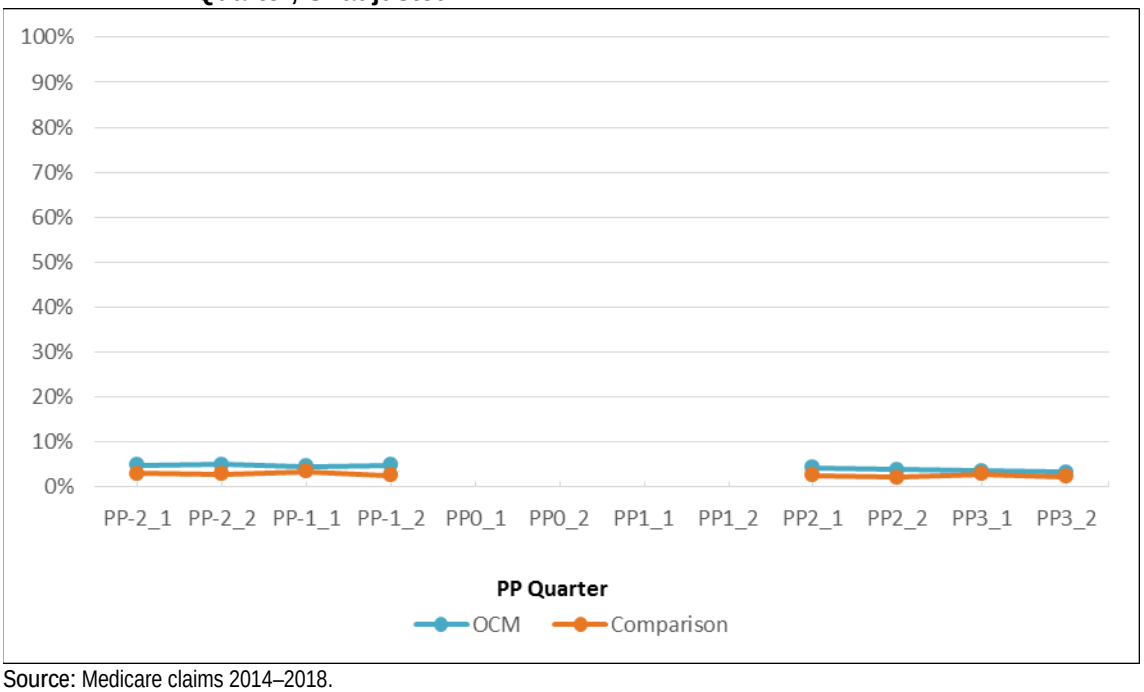


Source: Medicare claims 2014–2018.
Notes: *Quarter*OCM versus comparison group trend estimate in baseline period: -0.5% per quarter (95% CI -1.7%, 0.7%)

Exhibit E-33: Receipt of GCSF for Colorectal Cancer – Intermediate Neutropenic Risk Regimens by Quarter, Unadjusted

Source: Medicare claims 2014–2018.
Notes: *Quarter*OCM versus comparison group trend estimate in baseline period: 0.6% per quarter (95% CI -1.1%; 2.2%)

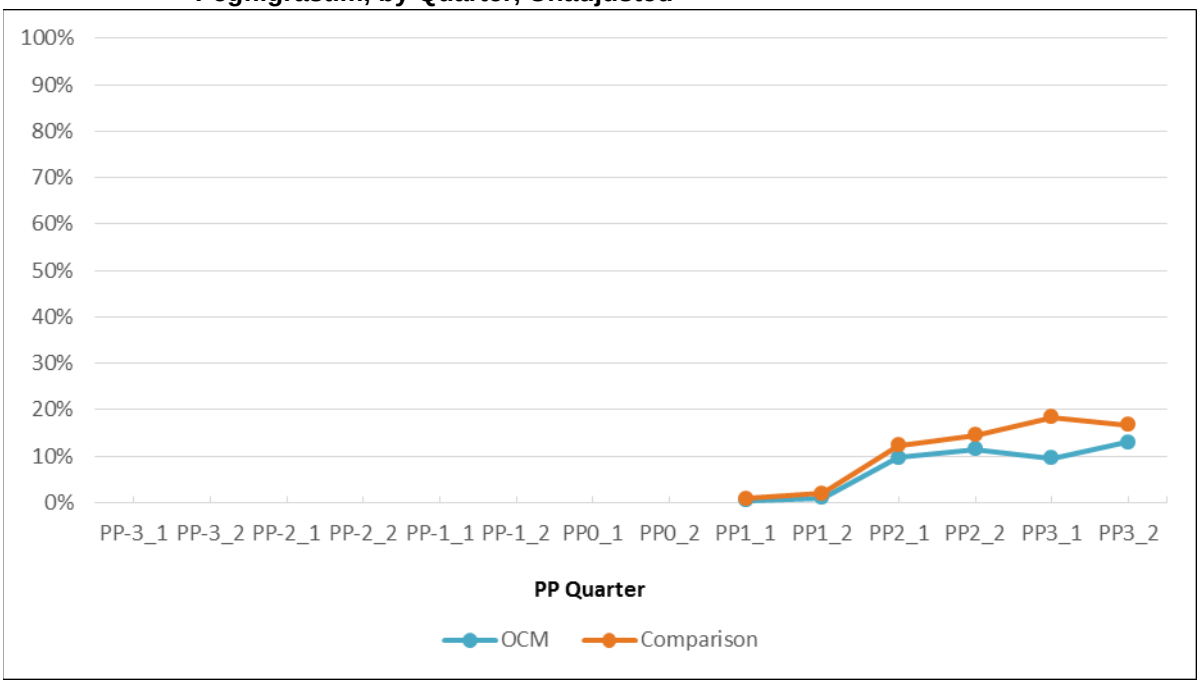
Exhibit E-34: Receipt of GCSF Use for Colorectal Cancer – Low Neutropenic Risk Regimens by Quarter, Unadjusted



Source: Medicare claims 2014–2018.
Notes: *Quarter*OCM versus comparison group trend estimate in baseline period: 0.0% per quarter (95% CI -0.8%, 0.9%)

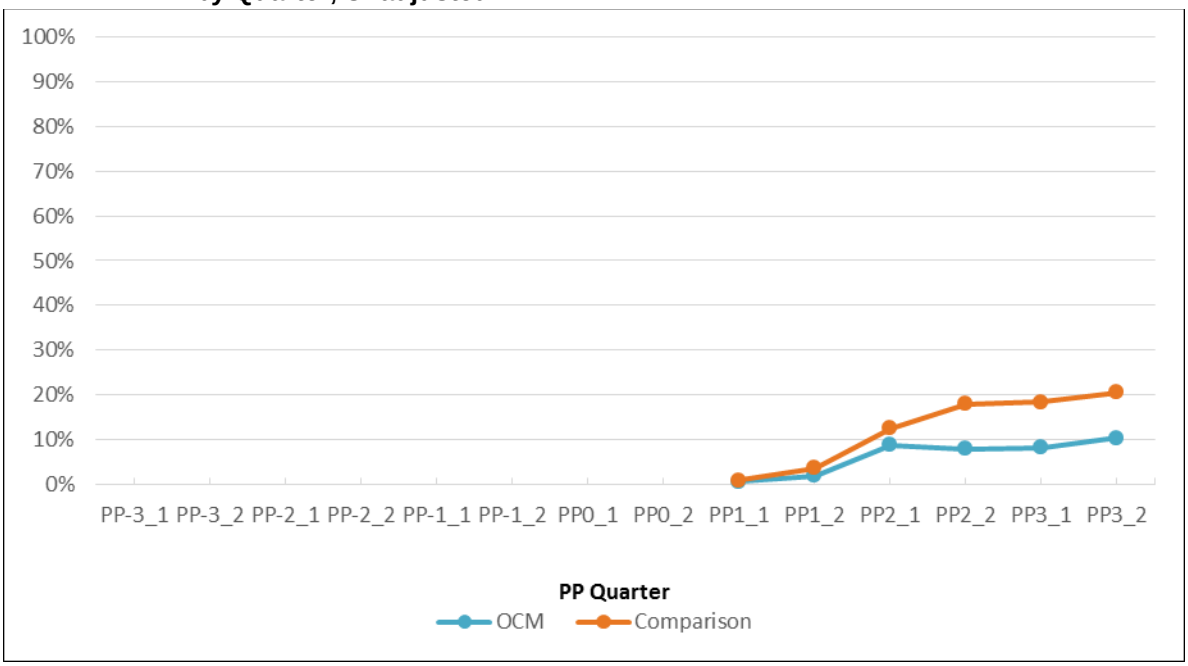
Exhibits E-35 through E-37 show use of on-body injector pegfilgrastim among patients receiving pegfilgrastim. There was no use of on-body pegfilgrastim in the baseline period. For patients with breast cancer, lung cancer, and colorectal cancer, we found a slower trend over time for use of the on-body injector among OCM versus comparison practices. For breast cancer the quarter*OCM versus comparison group trend was -1.4 percent per quarter (95 percent CI: -2.7 percent, -0.1 percent). The trend was -2.4 percent per quarter (95 percent CI: -3.8 percent, -1.0 percent) for lung cancer and -0.6 percent per quarter (95 percent CI: -1.4 percent, 0.2 percent) for colorectal cancer.

Exhibit E-35: Use of the On-Body Injector in Patients with Breast Cancer Receiving Pegfilgrastim, by Quarter, Unadjusted



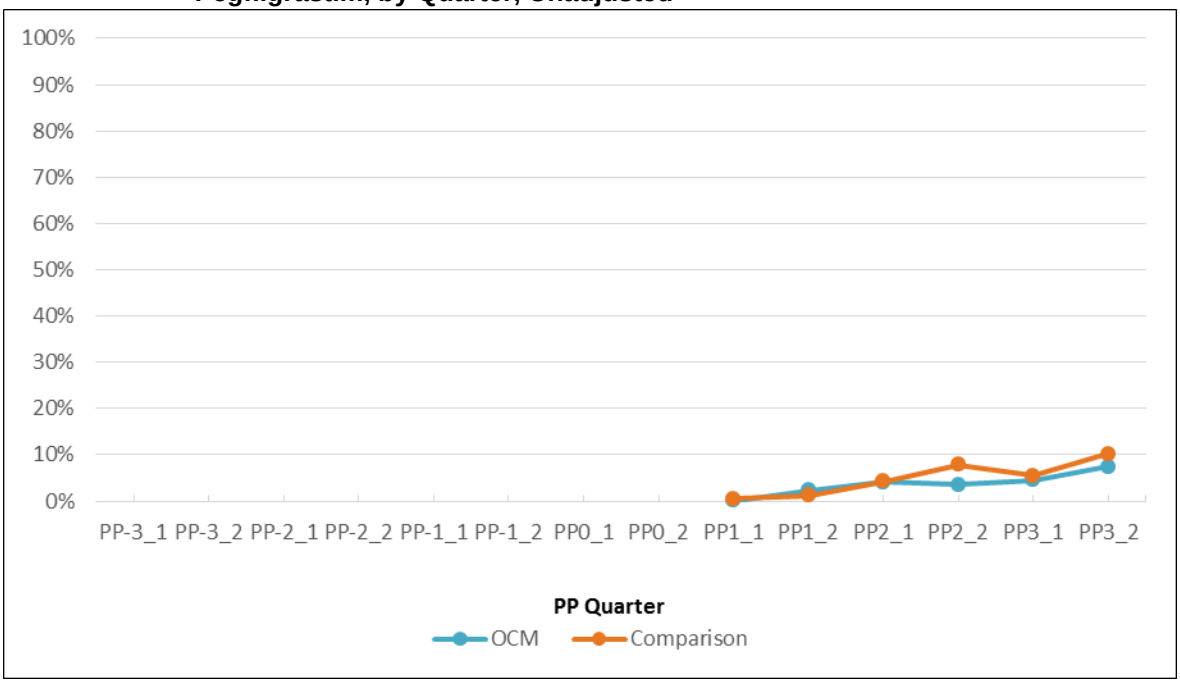
Source: Medicare claims 2014–2018.

Exhibit E-36: Use of the On-Body Injector in Patients with Lung Cancer Receiving Pegfilgrastim, by Quarter, Unadjusted



Source: Medicare claims 2014–2018.

Exhibit E-37: Use of the On-Body Injector in Patients with Colorectal Cancer Receiving Pegfilgrastim, by Quarter, Unadjusted



Source: Medicare claims 2014–2018.

E.5. Validation of Stage Classification for Colorectal Cancer and Assessment for OCM-Related Shifts in Case Mix (Cancer Stage)

We assessed whether OCM is leading to changes in the case mix and disease stage of cancer patients treated by participating practices, relative to comparison practices. To do this, we imputed stage based on stage prediction algorithms that we developed using SEER-Medicare data in 2010-2013.[28] We validated our approach using Medicare claims linked with OCM practice-reported data on patient stage for OCM episodes.

Measures and Analytic Approach

The clinical stage classification algorithms were developed using SEER-Medicare data for patients diagnosed with cancer in 2010-2011 and were validated using data for patients diagnosed during 2012-2013. We sought to assess the performance of the clinical algorithms using more current data on cancer stage reported by OCM practices. This was important for two reasons. First, new cancer treatments are available that were not available in 2010-2013. Second, since 2015, ICD-10 codes have replaced ICD-9 codes. We used the OCM practice-reported stage data for OCM episodes in PP1-3 to validate our stage classification algorithms.

In the OCM practice-reported data, some patients with multiple episodes had more than one record; we focused on patients with a single record in the registry data. We considered patients to have metastatic disease if the metastasis variable reflected M1, M1a, M1b, or M1c disease or if "distant CNS spread" or "extra-neural spread" was indicated. Additionally, we considered patients to have metastatic disease if "current clinical status" was coded as "recurrent or progressive disease."

Validation of Colorectal Cancer Stage Classification Clinical Algorithm

Among the 20,073 OCM patients with episodes from the "small intestine and colon cancer" bundle in the intervention period, 16,357 (81.5 percent) could be matched to OCM practice-reported stage data with a single entry (552 episodes had multiple entries). Of these, 14,862 (74.0 percent) had non-missing data for stage/clinical status. **Exhibit E-38** displays the number of patients with metastatic or non-metastatic disease based on the practice-reported stage data versus the stage classification clinical algorithm.

Exhibit E-38: Colorectal Cancer Metastatic versus Non-metastatic Cancers Based on OCM Practice-Reported Stage Data versus the Stage Classification Clinical Algorithm

OCM Practice-Reported Stage	Stage Classification Clinical Algorithm	
	Non-Metastatic	Metastatic
Non-Metastatic	2,985	1,927
Metastatic	797	9,153

Source: OCM Clinical Registry Data

Exhibit E-39 presents the sensitivity, specificity, and accuracy of the stage classification clinical algorithm for metastatic colorectal cancer (small intestine and colon cancer bundle) using the OCM registry data as a gold standard. The accuracy of 81.7 percent suggests very good performance; the performance is quite similar to the 82.7 percent accuracy obtained in the original SEER-Medicare analysis.

[28] Brooks GA, Bergquist S, Landrum MB, Rose S, Keating NL. Classifying lung cancer stage from health care claims: A comparison of multiple analytic approaches. JCO Clin Informatics 2019. In press. *JCO Clin Cancer Inform* 2019:3:1–19.

Exhibit E-39: Performance of Colorectal Cancer Stage Classification Clinical Algorithm in the OCM Practice-Reported Disease Stage Data

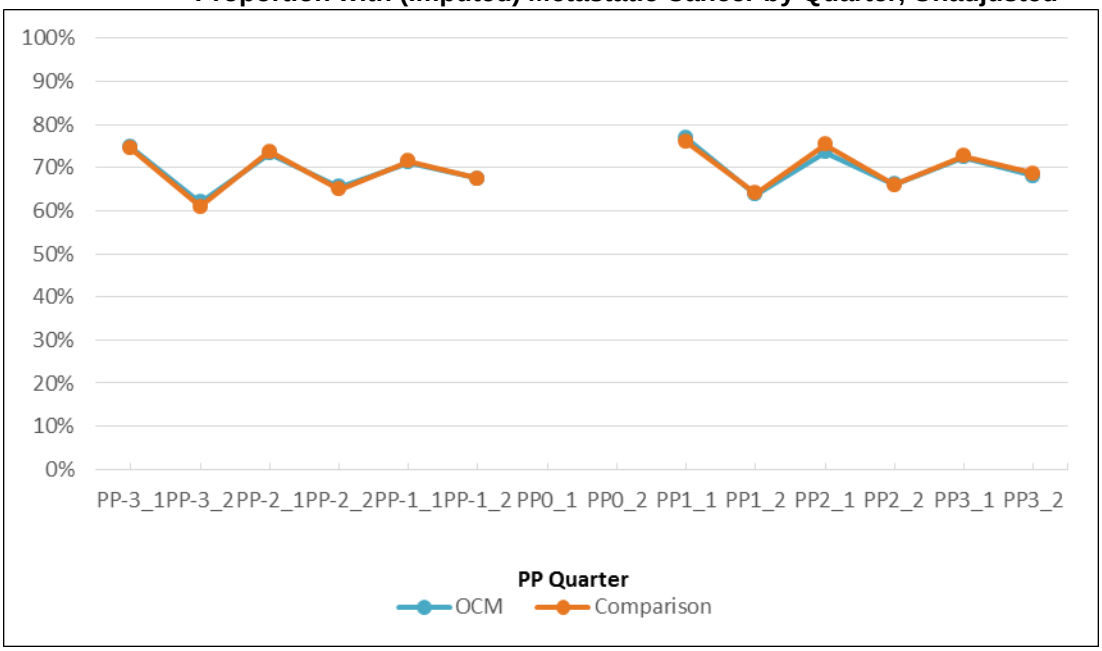
Performance of Colorectal Cancer Stage Classification Clinical Algorithm in the OCM Registry Data		
Sensitivity	92.0%	(95%CI: 91.5–92.5%)
Specificity	60.8%	(95%CI: 59.4–62.1%)
Accuracy	81.7%	(95%CI: 81.1–82.3%)

Source: OCM Clinical Registry Data

(Imputed) Metastatic Stage Using Stage Classification Clinical Algorithm for Colorectal Cancer

As reported in the main text of the report, we found no OCM impact on the proportion of patients initiating chemotherapy with (imputed) metastatic stage colorectal cancer. **Exhibit E-40** shows baseline trends of (imputed) metastatic stage for colorectal cancer episodes.

Exhibit E-40: Baseline Trends of (Imputed) Metastatic Stage, Colorectal Cancer Episodes—Proportion with (Imputed) Metastatic Cancer by Quarter, Unadjusted



Source: Medicare claims 2014–2018.
Notes: Baseline Trend: -0.11% per quarter in OCM relative to comparison practices (95% CI: -0.56%, 0.34%)

F. Findings on End-of-Life Care

The tables in this section present claims- and patient-survey based end-of-life (EOL) findings supplemental to those which we included in the report covering PP1-3. Additionally, we also present the findings from several specificity/robustness and subgroup analyses which we had noted in the discussion in the body of our report.

Exhibit F-1 and F-2 present additional findings to what is presented in the body of the report for end-of-life measures for the EOL health care utilization and patient/caregiver survey response outcomes in our evaluation. **Exhibit F-3 and F-4** present results of sensitivity analyses for claims-based EOL measures of health care utilization, after omitting very large practices, and also with the hospice utilization outcome (of 3-180 days) disaggregated into 1-2, 3-6, 7-13, 14-29, 30-44, 45-59, 60-180, and 180+ days, in each respective table. **Exhibits F-5 through F-11** present estimates for subgroup analyses of our EOL health care utilization measures: by race, dual eligibility, age, practice affiliation, and practice size, respectively. We employ more than one conceptual definition of practice affiliation ("Hospital / Health System Affiliated versus Independent" and "Academic Affiliated versus Independent") and practice size ("Practice with over 100 episodes versus Practice with 100 or fewer episodes" and "Practice with > 3 Oncologists versus Practice with ≤ 3 Oncologists").

F.1. Utilization and Patient/Caregiver Survey Findings

Exhibit F-1: Impacts of Participating in the Oncology Care Model on Claims-Based End-of-Life Health Care Utilization Measures

Measure	Number of Episodes		OCM		COMP		Cumulative Impact Estimates Through PP3			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change
Any chemotherapy during the last 14 days of life	88,831	100,059	11.9%	10.8%	11.6%	10.5%	-0.1%	-0.6%	0.4%	-0.6%
Any inpatient admissions in the last 30 days of life	88,831	100,059	53.5%	52.4%	53.6%	53.5%	-1.1%**	-2.0%	-0.3%	-2.1%
Emergency Department (ED) use (2+ visits) in the last 30 days of life	88,831	100,059	15.1%	15.4%	15.8%	16.6%	-0.6%	-1.2%	0.0%	-3.8%
Hospice stay of 3-180 days and dying on hospice	88,831	100,059	58.4%	59.7%	57.2%	58.1%	0.4%	-0.5%	1.3%	0.7%
Hospice stay of 1-2 days and dying on hospice	88,831	100,059	7.4%	7.7%	7.2%	7.5%	0.0%	-0.5%	0.5%	0.3%
Never used hospice	88,831	100,059	32.6%	30.7%	33.8%	32.5%	-0.5%	-1.3%	0.3%	-1.6%

Source: Medicare claims 2014–2018.

Note: OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period. Means and DID impact estimates are regression-adjusted. *p≤0.10, **p≤0.05, ***p≤0.01. LCL: Lower confidence limit; UCL: Upper confidence limit.

Exhibit F-2: Linear Trends in Patient Survey-Based End-of-Life Outcomes for the Oncology Care Model

Palliative Care Measures	Baseline Survey Wave	Intervention Survey Waves							Linear Time Trend between Baseline and Wave 8		
	4/16-9/16	7/16-12/16	10/16-3/17	1/17-6/17	4/17-9/17	7/17-12/17	10/17-3/18	1/18-6/18	Average change per wave	90% LCL	90% UCL
N	687	707	543	577	586	587	594	631			
Percent of Respondents Saying Deceased Patient Preferred Comfort Care Rather than Extending Life as Long as Possible	0.69	0.74	0.73	0.73	0.71	0.77	0.74	0.74	0.005	-0.001	0.011
Percent of Respondents Saying Deceased Patient's Care preferences were followed	0.82	0.84	0.81	0.82	0.83	0.80	0.83	0.83	0.000	-0.005	0.005
Any provider discussed hospice	0.82	0.80	0.83	0.87	0.79	0.81	0.79	0.84	0.000	-0.004	0.004
Cancer team discussed hospice	0.76	0.75	0.74	0.79	0.72	0.69	0.73	0.77	-0.002	-0.007	0.004
Received hospice care	0.84	0.83	0.85	0.85	0.83	0.86	0.85	0.84	0.001	-0.004	0.006
Started hospice at the right time	0.78	0.80	0.75	0.76	0.81	0.75	0.80	0.80	0.002	-0.003	0.008
Percent of Respondents Saying Deceased Patient Died in Preferred Setting (institution vs home)	0.75	0.68	0.72	0.76	0.74	0.71	0.71	0.74	0.001	-0.004	0.007

Source: Caregiver Surveys, April 2016–June 2018.

Notes: LCL: Lower confidence limit; UCL: Upper confidence limit. Estimates weighted for sampling and non-response and adjusted for age, education level, dual eligibility, race, type of cancer, month within survey period, radiation, surgery, and provider characteristics.

F.2. Sensitivity Tests

Exhibit F-3: Sensitivity Test—DID Impacts after Removing Very Large Practices

Measure	Number of Episodes		OCM		COMP		Cumulative Impact Estimates Through PP3			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change
Any chemotherapy during the last 14 days of life	71,395	87,248	11.80%	10.83%	11.35%	10.43%	-0.05%	-0.61%	0.52%	-0.39%
Any inpatient admissions in the last 30 days of life	71,395	87,248	53.51%	52.27%	53.52%	53.42%	-1.14%**	-2.00%	-0.28%	-2.13%
Emergency Department (ED) use (2+ visits) in the last 30 days of life	71,395	87,248	15.03%	15.32%	15.82%	16.74%	-0.63%*	-1.26%	0.00%	-4.20%
Hospice stay of 3-180 days and dying on hospice	71,395	87,248	57.70%	59.32%	56.77%	57.65%	0.74%	-0.20%	1.67%	1.28%
Hospice stay of 1-2 days and dying on hospice	71,395	87,248	7.38%	7.47%	6.90%	7.19%	-0.20%	-0.73%	0.33%	-2.70%
Never used hospice	71,395	87,248	33.24%	31.25%	34.59%	33.24%	-0.64%	-1.50%	0.22%	-1.92%

Source: Medicare claims 2014–2018.

Notes: OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period. Means and DID impact estimates are regression-adjusted. *p≤0.10, **p≤0.05, ***p≤0.01. LCL: Lower confidence limit; UCL: Upper confidence limit.

Exhibit F-4: Sensitivity Test—DID Impacts by Varying Hospice Length of Stay

Measure	Number of Episodes		OCM		COMP		Cumulative Impact Estimates Through PP3			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change
Hospice stay of 3-180 days and dying on hospice	88,831	100,059	58.36%	59.68%	57.20%	58.14%	0.39%	-0.50%	1.28%	0.67%
Hospice stay of 1-2 days and dying on hospice	88,831	100,059	7.42%	7.67%	7.23%	7.45%	0.02%	-0.45%	0.50%	0.31%
Hospice stay of 3-6 days and dying on hospice	88,831	100,059	15.67%	15.52%	15.00%	15.29%	-0.44%	-0.99%	0.12%	-2.78%
Hospice stay of 7-13 days and dying on hospice	88,831	100,059	14.13%	14.23%	13.88%	13.50%	0.48%	-0.05%	1.01%	3.37%
Hospice stay of 14-29 days and dying on hospice	88,831	100,059	13.87%	13.56%	13.59%	13.70%	-0.42%	-0.95%	0.11%	-3.03%
Hospice stay of 30-44 days and dying on hospice	88,831	100,059	5.80%	6.13%	5.81%	6.05%	0.09%	-0.29%	0.47%	1.53%
Hospice stay of 45-59 days and dying on hospice	88,831	100,059	3.49%	3.67%	3.42%	3.48%	0.12%	-0.16%	0.39%	3.34%
Hospice stay of 60-180 days and dying on hospice	88,831	100,059	5.37%	6.58%	5.51%	6.13%	0.59%**	0.16%	1.02%	10.99%
Hospice stay of 180+ days and dying on hospice	88,831	100,059	0.23%	0.33%	0.17%	0.32%	-0.05%	-0.17%	0.07%	-22.74%

Source: Medicare claims 2014–2018.

Notes: OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period. Means and DID impact estimates are regression-adjusted. *p≤0.10, **p≤0.05, ***p≤0.01. LCL: Lower confidence limit; UCL: Upper confidence limit.

F.3. Subgroup Analyses

Exhibit F-5: Subgroup Analysis—DID Impacts (White versus Non-White)

Measure	Number of Episodes				OCM				COMP				Cumulative Impact Estimates Through PP3		
	OCM		COMP		Baseline Mean		Int. Mean		Baseline Mean		Int. Mean		DID	90% LCL	90% UCL
	White	Non-White	White	Non-White	White	Non-White	White	Non-White	White	Non-White	White	Non-White			
Any chemotherapy during the last 14 days of life	73,930	14,901	83,065	16,994	12.16%	11.76%	11.15%	10.34%	11.41%	11.21%	10.53%	10.08%	0.36%	-0.91%	1.63%
Any inpatient admissions in the last 30 days of life	73,930	14,901	83,065	16,994	53.42%	59.75%	52.03%	57.52%	52.14%	57.68%	51.90%	56.94%	0.55%	-1.59%	2.69%
Emergency Department (ED) use (2+ visits) in the last 30 days of life	73,930	14,901	83,065	16,994	14.73%	18.65%	14.95%	19.09%	15.00%	18.29%	15.73%	19.51%	0.27%	-1.08%	1.63%
Hospice stay of 3-180 days and dying on hospice	73,930	14,901	83,065	16,994	59.37%	52.62%	61.35%	54.29%	57.48%	52.87%	59.37%	52.16%	-2.25%**	-4.09%	-0.41%
Hospice stay of 1-2 days and dying on hospice	73,930	14,901	83,065	16,994	8.03%	6.99%	8.30%	7.47%	7.00%	6.05%	7.12%	6.60%	0.36%	-1.06%	1.77%
Never used hospice	73,930	14,901	83,065	16,994	31.21%	37.28%	28.75%	35.56%	33.92%	38.08%	31.79%	38.20%	1.25%	-0.44%	2.95%

Source: Medicare claims 2014–2018.

Notes: OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period.*p≤0.10, **p≤0.05, ***p≤0.01. LCL: Lower confidence limit; UCL: Upper confidence limit.

Exhibit F-6: Subgroup Analysis—DID Impacts (Dual Eligible versus Non-Dual Eligible)

Measure	Number of Episodes				OCM				COMP				Cumulative Impact Estimates Through PP3		
	OCM		COMP		Baseline Mean		Int. Mean		Baseline Mean		Int. Mean		DID	90% LCL	90% UCL
	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual			
Any chemotherapy during the last 14 days of life	13,944	74,887	18,178	81,881	11.74%	12.16%	10.35%	11.13%	11.48%	11.35%	10.98%	10.34%	-1.07%*	-2.10%	-0.04%
Any inpatient admissions in the last 30 days of life	13,944	74,887	18,178	81,881	55.94%	54.20%	54.79%	52.61%	55.35%	52.54%	54.02%	52.50%	1.34%	-0.66%	3.33%
Emergency Department (ED) use (2+ visits) in the last 30 days of life	13,944	74,887	18,178	81,881	17.93%	14.91%	18.56%	15.10%	19.44%	14.67%	19.13%	15.78%	2.14%**	0.36%	3.93%
Hospice stay of 3-180 days and dying on hospice	13,944	74,887	18,178	81,881	54.19%	59.00%	54.75%	61.17%	51.65%	57.85%	53.91%	59.05%	-2.27%*	-4.23%	-0.31%
Hospice stay of 1-2 days and dying on hospice	13,944	74,887	18,178	81,881	7.11%	8.00%	7.88%	8.21%	6.19%	6.98%	6.58%	7.13%	0.32%	-0.78%	1.43%
Never used hospice	13,944	74,887	18,178	81,881	35.84%	31.55%	34.40%	29.06%	39.14%	33.60%	36.55%	32.09%	1.71%	-0.10%	3.51%

Source: Medicare claims 2014–2018.

Notes: OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period.*p≤0.10, **p≤0.05, ***p≤0.01. LCL: Lower confidence limit; UCL: Upper confidence limit.

Exhibit F-7: Subgroup Analysis—DID Impacts (80 or Older versus Under 80)

Measure	Number of Episodes				OCM				COMP				Cumulative Impact Estimates Through PP3		
	OCM		COMP		Baseline Mean		Int. Mean		Baseline Mean		Int. Mean		DID	90% LCL	90% UCL
	80 or older	Under 80	80 or older	Under 80	80 or older	Under 80	80 or older	Under 80	80 or older	Under 80	80 or older	Under 80			
Any chemotherapy during the last 14 days of life	24,062	64,769	26,841	73,218	11.12%	12.46%	9.97%	11.40%	10.66%	11.63%	9.70%	10.73%	-0.06%	-0.96%	0.84%
Any inpatient admissions in the last 30 days of life	24,062	64,769	26,841	73,218	51.66%	55.51%	49.55%	54.22%	50.12%	54.12%	49.92%	53.83%	-0.85%	-2.52%	0.81%
Emergency Department (ED) use (2+ visits) in the last 30 days of life	24,062	64,769	26,841	73,218	14.19%	15.82%	13.93%	16.29%	14.09%	16.07%	14.42%	17.12%	-0.10%	-1.36%	1.17%
Hospice stay of 3-180 days and dying on hospice	24,062	64,769	26,841	73,218	58.45%	58.18%	60.77%	59.93%	56.99%	56.63%	58.34%	58.04%	0.65%	-0.87%	2.17%
Hospice stay of 1-2 days and dying on hospice	24,062	64,769	26,841	73,218	7.80%	7.88%	8.09%	8.18%	7.16%	6.72%	6.94%	7.06%	0.60%	-0.37%	1.58%
Never used hospice	24,062	64,769	26,841	73,218	32.15%	32.24%	29.11%	30.20%	34.10%	34.79%	32.90%	32.90%	-1.62%*	-3.01%	-0.22%

Source: Medicare claims 2014–2018.

Notes: OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period. *p≤0.10, **p≤0.05, ***p≤0.01. LCL: Lower confidence limit; UCL: Upper confidence limit.

Exhibit F-8: Subgroup Analysis—DID Impacts (Hospital / Health System Affiliated versus Independent)

Measure	Number of Episodes				OCM				COMP				Cumulative Impact Estimates Through PP3		
	OCM		COMP		Baseline Mean		Int. Mean		Baseline Mean		Int. Mean				
	Hospital Affiliated	Not Affiliated	Hospital Affiliated	Not Affiliated	Hospital Affiliated	Not Affiliated	Hospital Affiliated	Not Affiliated	Hospital Affiliated	Not Affiliated	Hospital Affiliated	Not Affiliated	DID	90% LCL	90% UCL
Any chemotherapy during the last 14 days of life	30,316	58,495	67,902	31,873	10.34%	12.90%	9.89%	11.64%	10.48%	13.13%	9.80%	11.95%	0.15%	-0.81%	1.10%
Any inpatient admissions in the last 30 days of life	30,316	58,495	67,902	31,873	54.41%	54.48%	53.30%	52.77%	52.41%	54.29%	52.31%	53.84%	0.50%	-1.29%	2.29%
Emergency Department (ED) use (2+ visits) in the last 30 days of life	30,316	58,495	67,902	31,873	15.66%	15.25%	15.55%	15.71%	15.54%	15.46%	16.20%	16.83%	0.37%	-0.89%	1.62%
Hospice stay of 3-180 days and dying on hospice	30,316	58,495	67,902	31,873	57.30%	58.69%	58.83%	60.90%	57.74%	54.73%	59.01%	56.16%	-0.84%	-2.77%	1.08%
Hospice stay of 1-2 days and dying on hospice	30,316	58,495	67,902	31,873	7.19%	8.17%	7.74%	8.39%	6.60%	7.31%	6.82%	7.49%	0.28%	-0.76%	1.32%
Never used hospice	30,316	58,495	67,902	31,873	33.56%	31.60%	31.33%	29.10%	33.75%	36.29%	32.22%	34.38%	0.24%	-1.53%	2.01%

Source: Medicare claims 2014–2018.

Notes: OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period. LCL: Lower confidence limit; UCL: Upper confidence limit.

Exhibit F-9: Subgroup Analysis—DID Impacts (Academic Affiliated versus Independent)

Measure	Number of Episodes				OCM				COMP				Cumulative Impact Estimates through PP3		
	OCM		COMP		Baseline Mean		Int. Mean		Baseline Mean		Int. Mean		DID	90% LCL	90% UCL
	Academic Affiliated	Not Affiliated	Academic Affiliated	Not Affiliated	Academic Affiliated	Not Affiliated	Academic Affiliated	Not Affiliated	Academic Affiliated	Not Affiliated	Academic Affiliated	Not Affiliated			
Any chemotherapy during the last 14 days of life	15,900	72,931	19,169	80,890	9.73%	12.59%	9.10%	11.44%	9.54%	11.78%	9.17%	10.78%	-0.39%	-1.55%	0.77%
Any inpatient admissions in the last 30 days of life	15,900	72,931	19,169	80,890	55.27%	54.30%	54.35%	52.64%	53.42%	52.98%	53.10%	52.69%	1.36%	-0.71%	3.44%
Emergency Department (ED) use (2+ visits) in the last 30 days of life	15,900	72,931	19,169	80,890	14.81%	15.50%	15.11%	15.77%	16.66%	15.29%	16.94%	16.25%	1.14%	-0.41%	2.68%
Hospice stay of 3-180 days and dying on hospice	15,900	72,931	19,169	80,890	55.84%	58.76%	57.95%	60.65%	57.84%	56.48%	58.90%	57.92%	0.25%	-2.16%	2.65%
Hospice stay of 1-2 days and dying on hospice	15,900	72,931	19,169	80,890	7.02%	8.04%	7.85%	8.23%	6.61%	6.89%	6.79%	7.09%	0.84%	-0.38%	2.05%
Never used hospice	15,900	72,931	19,169	80,890	34.94%	31.65%	32.07%	29.42%	33.45%	34.86%	31.97%	33.14%	-0.68%	-2.82%	1.46%

Source: Medicare claims 2014–2018.

Notes: OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period. LCL: Lower confidence limit; UCL: Upper confidence limit.

Exhibit F-10: Subgroup Analysis—DID Impacts (Practice with over 100 Episodes versus Practice with 100 or Fewer Episodes)

Measure	Number of Episodes				OCM				COMP				Cumulative Impact Estimates Through PP3		
	OCM		COMP		Baseline Mean		Int. Mean		Baseline Mean		Int. Mean		DID	90% LCL	90% UCL
	Large (>100 episodes)	Small (≤100 episodes)	Large (>100 episodes)	Small (≤100 episodes)	Large (>100 episodes)	Small (≤100 episodes)	Large (>100 episodes)	Small (≤100 episodes)	Large (>100 episodes)	Small (≤100 episodes)	Large (>100 episodes)	Small (≤100 episodes)			
Any chemotherapy during the last 14 days of life	85,011	3,820	81,216	18,843	12.08%	12.44%	11.00%	11.25%	11.10%	12.41%	10.32%	11.09%	0.15%	-1.95%	2.25%
Any inpatient admissions in the last 30 days of life	85,011	3,820	81,216	18,843	54.46%	54.74%	52.89%	54.55%	52.90%	53.62%	52.71%	53.09%	-0.99%	-4.03%	2.04%
Emergency Department (ED) use (2+ visits) in the last 30 days of life	85,011	3,820	81,216	18,843	15.30%	17.06%	15.62%	16.44%	15.36%	16.20%	16.28%	16.91%	1.24%	-1.21%	3.69%
Hospice stay of 3-180 days and dying on hospice	85,011	3,820	81,216	18,843	58.16%	60.22%	60.18%	59.61%	57.47%	53.95%	58.30%	57.22%	4.03%**	1.12%	6.95%
Hospice stay of 1-2 days and dying on hospice	85,011	3,820	81,216	18,843	7.91%	6.90%	8.17%	7.83%	6.98%	6.32%	7.01%	7.14%	0.43%	-1.56%	2.42%
Never used hospice	85,011	3,820	81,216	18,843	32.25%	31.53%	29.88%	30.42%	33.74%	37.83%	32.70%	33.90%	-3.12%*	-6.08%	-0.17%

Source: Medicare claims 2014–2018.

Notes: OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period. *p≤0.10, **p≤0.05, ***p≤0.01. LCL: Lower confidence limit; UCL: Upper confidence limit.

Exhibit F-11: Subgroup Analysis—DID Impacts (Practice with > 3 Oncologists versus Practice with ≤ 3 Oncologists)

Measure	Number of Episodes				OCM				COMP				Cumulative Impact Estimates Through PP3		
	OCM		COMP		Baseline Mean		Int. Mean		Baseline Mean		Int. Mean		DID	90% LCL	90% UCL
	Large (> 3 NPIs)	Small (≤ 3 NPIs)	Large (> 3 NPIs)	Small (≤ 3 NPIs)	Large (> 3 NPIs)	Small (≤ 3 NPIs)	Large (> 3 NPIs)	Small (≤ 3 NPIs)	Large (> 3 NPIs)	Small (≤ 3 NPIs)	Large (> 3 NPIs)	Small (≤ 3 NPIs)			
Any chemotherapy during the last 14 days of life	86,957	1,874	87,427	12,632	12.08%	12.75%	11.02%	10.78%	10.99%	13.70%	10.24%	12.12%	0.41%	-1.76%	2.59%
Any inpatient admissions in the last 30 days of life	86,957	1,874	87,427	12,632	54.40%	57.48%	52.89%	56.24%	52.94%	53.74%	52.70%	53.37%	-0.29%	-4.19%	3.61%
Emergency Department (ED) use (2+ visits) in the last 30 days of life	86,957	1,874	87,427	12,632	15.32%	17.89%	15.61%	17.67%	15.43%	16.20%	16.35%	16.73%	0.73%	-2.79%	4.25%
Hospice stay of 3-180 days and dying on hospice	86,957	1,874	87,427	12,632	58.31%	55.64%	60.22%	57.18%	57.43%	52.46%	58.48%	55.29%	2.51%	-1.83%	6.85%
Hospice stay of 1-2 days and dying on hospice	86,957	1,874	87,427	12,632	7.86%	7.97%	8.13%	9.55%	6.90%	6.47%	7.02%	7.06%	-0.14%	-2.64%	2.36%
Never used hospice	86,957	1,874	87,427	12,632	32.15%	35.05%	29.88%	31.29%	33.82%	39.37%	32.51%	35.92%	-1.32%	-5.09%	2.44%

Source: Medicare claims 2014–2018.

Notes: OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period. LCL: Lower confidence limit; UCL: Upper confidence limit.

G. Survey Instruments

G.1. Clinician Survey Instrument

The OCM Clinician Survey Instrument used for oncologists is shown below. The survey instruments for advance practice providers and care coordinators were very similar to the version used for oncologists.

DIRECTIONS

This survey is for oncologists in practices participating in the Centers for Medicare and Medicaid Services (CMS) Oncology Care Model (OCM). We would like to know more about your experiences during OCM, including the impact of OCM for you and your patients. Your participation in this survey is greatly appreciated!

Instructions:

Please answer the survey thinking about your Medicare fee-for-service/OCM patients.

When providing each response:

- Please read each question carefully and respond by shading the circle or box next to the response that most closely represents your opinion.
- For number boxes, please round to the nearest whole number (do not include decimals or fractions) or up to 1 if the answer is <1. Please enter your response as far to the right as possible.
- Please shade only one circle for each question.
- While you can use a pen, please use a PENCIL in case you want to change your answer.
- Please do NOT use felt tip pens.
- Please erase cleanly or white out any marks you wish to change.
- Please do not make any stray marks on the form.

Please Note: Questions in this survey do not necessarily correspond with CMS's OCM participation requirements.

Experience with new care process changes related to OCM

We are interested in care processes that may be new at your practice since the start of OCM in July 2016, and any impact that you see on quality of care.

Healthcare providers may think about quality of care in many different ways. In the questions that follow, we are interested in your individual sense of whether any aspects of OCM are affecting quality – whatever your definition of quality may be

Clinical care

1. Does your practice typically <u>use treatment pathways (in addition to national guidelines) to guide treatment decisions</u>?

- O Yes, pathways developed by our practice
- O Yes, pathways purchased from a vendor (e.g., Via Pathways or Clear Value Plus)
- O Yes, both pathways developed by our practice and pathways purchased from a vendor
- O No →Skip to Q2
- O Don't know →Skip to Q2

1A. Has your practice's use of treatment pathways changed since OCM began?

- O Yes, new since OCM began (no prior use of pathways)
- O Yes, existing use was expanded/ enhanced since OCM began
- O No change since OCM began
- O Don't Know

1B. What impact do you think your practice's use of treatment pathways has on quality of care?

- O Better
- O No change
- O Worse
- O Don't Know

2. Do patients in your practice have <u>access to outpatient palliative care</u>?

- O Yes
- O No →Skip to Q3

2A. Has your patients' access to outpatient palliative care changed since OCM began?

- O Yes, new since OCM began
- O Yes, existing access was expanded/enhanced since OCM began
- O No change since OCM began
- O Don't Know

2B. What impact do you think your patients' access to outpatient palliative care has on quality of care?

- O Better
- O No change
- O Worse
- O Don't Know

3. Has your practice <u>restructured care teams</u> since OCM began (e.g., added social workers, patient navigators, care coordinators)?

O Yes, change since OCM began

O No change since OCM began →Skip to Q4

O Don't know →Skip to Q4

3A. What impact do you think the restructuring of care teams has on quality of care?

O Better

O No change

O Worse

O Don't Know

Access to care

4. Does your practice offer <u>same day appointments during normal clinic hours</u>, to meet patients' urgent needs?

O Yes, we have capacity to see every patient needing same day support

O Yes, we set aside some schedule slots for same day needs, but cannot always see every patient needing same day support

O Yes, we do not set aside schedule slots for same day needs but can sometimes fit in same day appointments

O No, we are always fully booked and cannot offer same day appointments →Skip to Q5

O Don't know →Skip to Q5

4A. Has availability of these same day appointments changed since OCM began?

O Yes, new since OCM began

O Yes, existing availability was expanded/enhanced since OCM began

O No change since OCM began

O Don't know

4B. What impact do you think availability of same day appointments has on quality of care?

O Better

O No change

O Worse

O Don't know

5. Does your practice offer <u>evening or weekend appointments for patients with urgent needs</u>?

O Yes

O No →Skip to Q6

O Don't know →Skip to Q6

5A. Has availability of evening or weekend appointments changed since OCM began?

O Yes, new since OCM began

O Yes, existing availability was expanded/enhanced since OCM began

O No change since OCM began

O Don't know

5B. What impact do you think availability of evening or weekend appointments has on quality of care?

O Better

O No change

O Worse

O Don't know

Care coordination

6. Does your practice or in-house pharmacy routinely <u>telephone patients taking oral chemotherapy drugs (other than hormonal therapy) to monitor side effects and refill needs</u>?

- O Yes, all patients on oral chemotherapy drugs
- O Yes, some patients on oral chemotherapy drugs
- O No →Skip to Q7
- O Don't know →Skip to Q7

6A. Have these calls changed since OCM began?

- O Yes, new since OCM began
- O Yes, existing call program was expanded/enhanced since OCM began
- O No change since OCM began
- O Don't know

6B. What impact do you think these calls are having on quality of care?

- O Better
- O No change
- O Worse
- O Don't know

7. Does your practice educate all patients to <u>"call us first" before going to the emergency department</u>?

- O Yes
- O No →Skip to Q8
- O Don't know →Skip to Q8

7A. Has educating patients to "call us first" changed since OCM began?

- O Yes, new since OCM began
- O Yes, existing education was expanded/enhanced since OCM began
- O No change since OCM began
- O Don't know

7B. What impact do you think educating patients to "call us first" has on quality of care?

- O Better
- O No change
- O Worse
- O Don't know

8. Does your practice have a process for <u>identifying patients who are at high-risk for unplanned hospital care</u>?

- O Yes
- O No →Skip to Q10
- O Don't know →Skip to Q10

9. Does your practice routinely <u>initiate proactive outreach telephone calls to high-risk patients</u>?

- O Yes, all high-risk patients
- O Yes, some high-risk patients
- O No →Skip to Q10
- O Don't know →Skip to Q10

9A. Have proactive outreach calls to high-risk patients changed since OCM began?

- O Yes, new since OCM began
- O Yes, existing process was expanded/enhanced since OCM began
- O No change since OCM began
- O Don't know

9B. What impact do you think proactive outreach calls to high-risk patients has on quality of care?

- O Better
- O No change
- O Worse
- O Don't know

Sharing elements of a care plan in writing with patients

10. Does your practice routinely share the <u>expected prognosis</u> in writing with patients?

O Yes

O No →Skip to Q11

O Don't know →Skip to Q11

10A. Has sharing the prognosis in writing with patients changed since OCM began?

O Yes, new since OCM began

O Yes, existing process was expanded/enhanced since OCM began

O No change since OCM began

O Don't know

10B. What impact do you think sharing the prognosis in writing with patients has on quality of care?

O Better

O No change

O Worse

O Don't know

11. Does your practice routinely share the <u>goals of treatment</u> in writing with patients?

O Yes

O No →Skip to Q12

11A. Has sharing the goals of treatment in writing with patients changed since OCM began?

O Yes, new since OCM began

O Yes, existing process was expanded/enhanced since OCM began

O No change since OCM began

O Don't know

11B. What impact do you think sharing the goals of treatment in writing with patients has on quality of care?

O Better

O No change

O Worse

O Don't know

12. Does your practice routinely share the <u>expected response to treatment</u> in writing with patients?

O Yes

O No →Skip to Q13

12A. Has sharing the expected response to treatment in writing with patients changed since OCM began?

O Yes, new since OCM began

O Yes, existing process was expanded/enhanced since OCM began

O No change since OCM began

O Don't know

12B. What impact do you think the sharing expected response to treatment in writing with patients has on quality of care?

O Better

O No change

O Worse

O Don't know

13. Does your practice routinely share the potential harms from treatment in writing with patients?

O Yes
O No →Skip to Q14

13A. Has sharing the potential harms from treatment in writing with patients changed since OCM began?

O Yes, new since OCM began
O Yes, existing process was expanded/enhanced since OCM began
O No change since OCM began
O Don't know

13B. What impact do you think sharing the potential harms from treatment in writing with patients has on quality of care?

O Better
O No change
O Worse
O Don't know

14. Does your practice routinely discuss advance care planning with patients and families and include completed forms in the electronic health record?

O Yes
O No →Skip to Q15
O Don't know →Skip to Q15

14A. Has advance care planning changed since OCM began?

O Yes, new since OCM began
O Yes, existing process was expanded/enhanced since OCM began
O No change since OCM began
O Don't know

14B. What impact do you think advance care planning has on quality of care?

O Better
O No change
O Worse
O Don't know

15. Does your practice routinely advise patients about the estimated out-of-pocket costs for their cancer treatment? (Even for patients with zero out-of-pocket costs.)

O Yes, for all patients
O Yes, for some patients
O No →Skip to Q16
O Don't know →Skip to Q16

15A. Has advising patients about the estimated out-of-pocket costs changed since OCM began?

O Yes, new since OCM began
O Yes, existing process was expanded/enhanced since OCM began
O No change since OCM began
O Don't know

15B. What impact do you think advising patients about the estimated out-of-pocket costs has on quality of care? (Even for patients with zero out-of-pocket costs.)

O Better
O No change
O Worse
O Don't know

16. Does your practice use survivorship care plans?

O Yes, for all patients who have completed chemotherapy

O Yes, for some patients who have completed chemotherapy

O No →Skip to Q18

O Don't know →Skip to Q18

17. Does your practice routinely discuss survivorship plans with patients and share written survivorship plans with patients?

O Yes

O No →Skip to Q18

O Don't know →Skip to Q18

17A. Has use of survivorship plans changed since OCM began?

O Yes, new since OCM began

O Yes, existing process was expanded/enhanced since OCM began

O No change since OCM began

O Don't know

17B. What impact do you think use of survivorship plans has on quality of care?

O Better

O No change

O Worse

O Don't know

Psychosocial health

18. Does your practice routinely screen patients for depression?

O Yes

O No →Skip to Q19

O Don't know →Skip to Q19

18A. Has screening for depression changed since OCM began?

O Yes, new since OCM began

O Yes, existing process was expanded/enhanced since OCM began

O No change since OCM began

O Don't know

18B. What impact do you think screening for depression has on quality of care?

O Better

O No change

O Worse

O Don't know

19. Does your practice routinely screen patients for psychosocial distress?

O Yes

O No →Skip to Q20

O Don't know →Skip to Q20

19A. Has screening for psychosocial distress changed since OCM began?

O Yes, new since OCM began

O Yes, existing process was expanded/enhanced since OCM began

O No change since OCM began

O Don't know

19B. What impact do you think screening for psychosocial distress has on quality of care?

O Better

O No change

O Worse

O Don't know

End of Life Care

20. Do clinicians in your practice use <u>"trigger events" or another standard to decide when to discuss hospice care with cancer patients</u>?

O Yes

O No →Skip to Q21

O Don't know →Skip to Q21

20A. Has your practice's use of "trigger events" or another standard to decide when to discuss hospice care with cancer patients changed since OCM began?

O Yes, new since OCM began

O Yes, existing process was expanded/enhanced since OCM began

O No change since OCM began

O Don't know

20B. What impact do you think your practice's use of "trigger events" or another standard to decide when to discuss hospice care with cancer patients has on quality of care?

O Better

O No change

O Worse

O Don't know

Using data for continuous quality improvement

We are interested in your experiences with performance measurement and the use of data for continuous quality improvement, in the context of OCM.

21. Does your practice routinely share performance metrics with you, such as in scorecards or dashboards, in a way that allows you to compare yourself with other oncologists? (Please select all that apply.)

O Yes, information about how I compare with other physicians in my practice

O Yes, information about how I compare with other physicians regionally or nationally

O No, but planning to in the next year →Skip to Q26

No →Skip to Q26

22. Does your practice routinely share the following performance metrics, such as in scorecards or dashboards, about data that allow you to compare your practice outcomes with other oncologists?

a. Surveys about your patients' satisfaction/experiences with cancer care	O Yes	O No
b. Your adherence to guideline-recommended care	O Yes	O No
c. Your patients' emergency department visits, inpatient hospitalizations	O Yes	O No
d. Your patients' imaging, biomarker testing, or other ancillary services	O Yes	O No
e. Your patients' total episode costs of care	O Yes	O No

23. How much do you agree with the following statements?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
a. Information about my performance relative to peers is easy to understand	O	O	O	O	O
b. I change my behavior based on information that compares my performance with that of my peers	O	O	O	O	O

24. Has performance monitoring and use of data for quality improvement changed since OCM began?

O Yes, new since OCM began
O Yes, existing process was expanded/enhanced since OCM began
O No change since OCM began
O Don't know

25. What impact do you think performance monitoring and use of data for quality improvement has on quality of care?

O Better
O No change
O Worse
O Don't know

26. How much do you agree with the following statements?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
a. It is important to me to understand how my performance compares with that of other oncologists in my practice (my peers).	O	O	O	O	O
b. I would like more information about my performance relative to that of my peers.	O	O	O	O	O
c. It is important to me to understand how my performance compares with that of other oncologists outside of my practice.	O	O	O	O	O

We are also interested your practice's use of financial incentives.

27. Do you receive payment/bonus incentives related to patients' quality of care, or related care experiences (as measured in surveys)?

O Yes
O No →Skip to Q28

27A. Did these bonus payments begin or change specifically because of OCM?

O Yes, new since OCM
O Yes, expanded since OCM
O No
O Don't know

28. Do you receive payment/bonus incentives for reducing your patients' cost of care or for reducing utilization such as ED/hospital use?

O Yes
O No →Skip to Q29

28A. Did these bonus payments begin or change specifically because of OCM?

O Yes, new since OCM
O Yes, expanded since OCM
O No
O Don't know

Perspectives about OCM

29. Thinking about OCM as implemented at your practice, how much do you agree with the following statements?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
a. I have a clear understanding of the goals and objectives of the Oncology Care Model	O	O	O	O	O
b. There is a need for the Oncology Care Model	O	O	O	O	O
c. The Oncology Care Model helps improve patient care	O	O	O	O	O
d. My patients are better informed about the goals, potential benefits and potential harms of treatment because of the Oncology Care Model	O	O	O	O	O
e. Performing my duties related to the Oncology Care Model takes up too much of my time	O	O	O	O	O
f. The Oncology Care Model has helped me do my job more effectively	O	O	O	O	O
g. I feel a great deal of stress because of the Oncology Care Model	O	O	O	O	O
h. My overall job satisfaction has improved as a result of the Oncology Care Model	O	O	O	O	O

About you

Finally, please tell us a little about yourself.

30. What is your primary specialty or area of training?

- O Medical oncologist or hematologist
- O Gynecologic oncologist
- O Radiation oncologist
- O Surgical oncologist
- O Other, please specify:

_____

31. How long have you worked in your current practice, in your present role or another role?

- O Less than 3 years
- O 3 years up to 11 years
- O 11 years up to 20 years
- O More than 20 years

32. How long, in total, have you worked in your current specialty or area of training?

- O Less than 3 years
- O 3 years up to 11 years
- O 11 years up to 20 years
- O More than 20 years

33. Please indicate your gender.

- O Male
- O Female

34. Please indicate your age.

- O 18-30 years
- O 31-40 years
- O 41-50 years
- O 51-60 years
- O 61-70 years
- O 71 years or more

35. How many hours per week do you typically work in the practice that is participating in OCM?

- O Less than 20 hours per week
- O 20 to 29 hours per week
- O 30 to 39 hours per week
- O 40 or more hours per week

36. Do you have any additional comments for CMS about your experience with OCM or its impact on your patients and your work?

_____

_____

_____

_____

_____

Thank you very much.

We greatly appreciate your participation in this survey. Your participation will be important in helping CMS to understand how to improve the effectiveness and efficiency of care for patients undergoing chemotherapy or hormonal therapy.

Thank you for your participation!