Evaluation of the Oncology Care Model

Final Report

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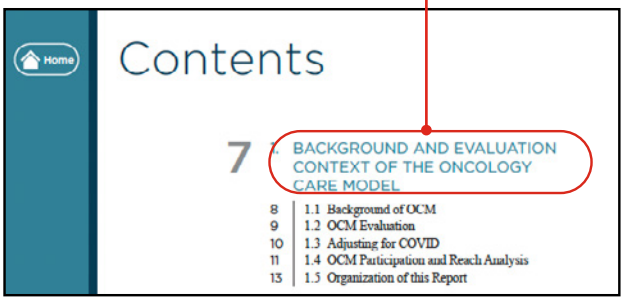

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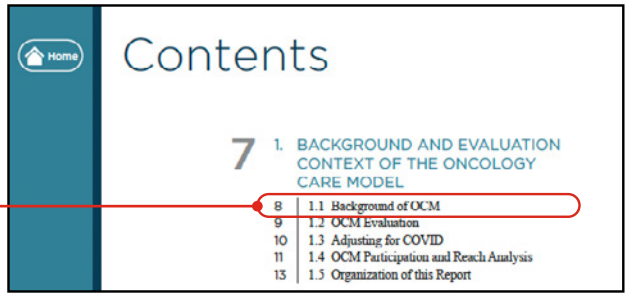

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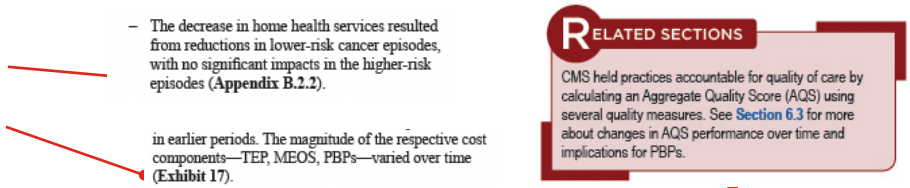

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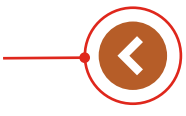


Executive Summary

Model Background

In February 2015, the Centers for Medicare & Medicaid Services (CMS) invited oncology physician group practices to participate in the Oncology Care Model (OCM), an alternative payment model (APM) based on six-month episodes for cancer care for Medicare fee-for-service (FFS) beneficiaries undergoing chemotherapy treatment.[1] The six-year OCM began with six-month chemotherapy treatment episodes, starting on July 1, 2016, and operated for 11 consecutive performance periods (PPs). The last episodes ended on June 30, 2022.

This report covers the entire OCM period of performance. OCM tested whether payment reform and health care delivery redesign can improve quality and reduce Medicare spending, by combining attributes of medical homes—patient-centeredness, care coordination, accessibility, evidence-based guidelines, and continuous quality improvement—with financial incentives for providing services efficiently and with high quality.[2]

SUMMARY OF KEY FINDINGS

The Oncology Care Model (OCM) included 1 in 4 people undergoing treatment for cancer who were covered under Traditional Medicare fee-for-service. Participating oncology practices focused on improving clinical and quality outcomes, while finding opportunities for efficiencies to reduce healthcare expenditures.

OCM resulted in lower healthcare expenditures during the six- month episode of care, driven by higher-value (more cost-conscious and guideline adherent) use of supportive care drugs to prevent neutropenia and cancer-related bone fractures. While chemotherapy drug spending is the single largest contributor to expenditures, we found limited evidence for increased adoption of higher-value chemotherapy. Despite the modest payment reductions, OCM resulted in net losses for Medicare exceeding $600M, after accounting for monthly payments and performance-based payments to participating oncology practices.

Practices focused on things they could directly impact including: extended clinic hours, access to same-day appointments, and outreach telephone calls to patients to address symptoms and reduce emergency department visits, and increased communication about treatments and financial counseling. While practices reported substantial efforts to transform care, these changes did not always lead to improvement in clinical and quality outcomes relative to non-participating practices.

Model Incentives

OCM featured a two-pronged financial incentive strategy. First, participating practices were able to bill Medicare a $160 Monthly Enhanced Oncology Service (MEOS) fee for Medicare FFS beneficiaries, which was intended to support practices in providing enhanced oncology services, such as increased access to timely ambulatory care and patient navigation. Second, practices were made accountable for the total episode payments during each six-month episode (episode payments included payments for all Medicare-services, including drugs, provided during the episode). Practices could earn money in the form of retrospective performance-based payments (PBPs) if they were able to meet OCM payment and quality goals. The intent of the performance-based payments was to incentivize practices to reduce episode payments while enhancing quality.

IMPORTANT ACRONYMS

MEOS: Monthly Enhanced Oncology Services payment. The additional $160 per-beneficiary monthly fee that participating practices may bill for, to help support their transformation efforts.

PBP: Performance-based payments. Incentive payments that participants can earn based on their success in achieving quality goals and reducing expenditures enough to meet OCM requirements.

PP: Performance period. Six-month windows into which episodes were assigned based on chemotherapy start date.

PHE: COVID-19 public health emergency, affecting PP7–11.

TEP: Total episode payments. Total of all payments for Medicare-covered services provided to chemotherapy patients during six-month chemotherapy episodes. Does not include MEOS, PBP, or beneficiary copayments (other than beneficiary cost-sharing for Part D drugs).

[1] Chemotherapy is defined for OCM purposes as cytotoxic chemotherapy, biologic therapy, immunotherapy, or hormonal therapy for cancer

[2] More information about OCM can be found at https://innovation.cms.gov/initiatives/oncology-care/.

Participating OCM practices were paid under Medicare's FFS billing rules. CMS then calculated total expenditures for all Medicare-covered services provided to chemotherapy patients during six-month episodes. If practices' total expenditures were below a risk-adjusted historical benchmark, and they met performance quality goals, they were able to receive a performance-based payment. These reconciled payments were calculated for each six-month performance period.

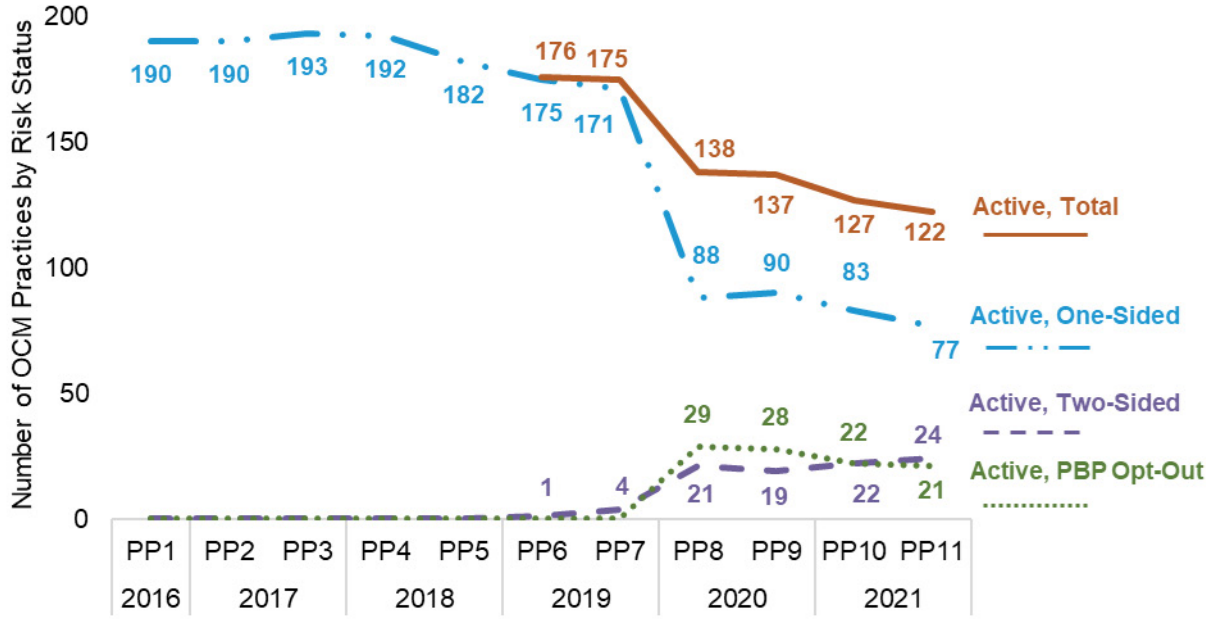
OCM Participation

Participation in OCM changed in response to model risk sharing requirements and COVID flexibilities.

Exhibit ES-1 shows the status of OCM participants across each of the 11 performance periods covered in this report. A total of 202 unique practices joined OCM, and all OCM practices began participation in a one-sided risk status. Practices with one sided risk could earn performance-based payments if total expenditures (including MEOS payments from CMS) were below the benchmark, but were not responsible for recoupments if their total expenditures for episodes exceeded the benchmark. **Practices that were unable to earn at least one performance-based payment by the end of PP4 (early 2018) were required to terminate participation by PP8 (early 2020) or take on two-sided risk effective in PP8.** Practices that believed they could succeed under two-sided risk were encouraged to select that risk status early in OCM. Because of the COVID-19 public health emergency (PHE), CMS offered a third option, beginning in 2020, where practices could continue to submit monthly bills for MEOS but waive their eligibility for any performance-based payments by opting out of financial reconciliation and performance measurement. By opting out of reconciliation, practices that otherwise would have been required to take two-sided risk were able to continue receiving the OCM MEOS payments, without concerns of owing a recoupment as they might have under the two-sided risk arrangement.

The COVID-19 PHE began on January 31, 2020. Roughly 85 percent of episodes in PP7, which began in the latter half of 2019, ended during the PHE. While all PP8 episodes (which began in early 2020) overlapped the PHE, roughly 85 percent of episodes occurred entirely within the PHE, and all episodes in the last 18 months of the Model began and ended during the PHE. In total, 122 practices remained in OCM through the end of the Model. In PP11 (late 2021), 24 practices (including several of the largest) were taking two-sided risk, covering 43.4 percent of all OCM episodes initiated, while 21 practices had opted out of performance-based payments, covering 20.9 percent of all episodes initiated in PP11.

Exhibit ES-1: Over Half of OCM Practices Changed Their Participation Status or Risk Status in Performance Period 8



Source: OCM program data.
Notes: PP: Performance period. PBP: Performance-based payment. Active "one-sided practices" are eligible for PBPs under one-sided risk (no repayments to CMS if total episode payments exceed benchmark target). Active "two-sided practices" are eligible for PBPs under two-sided risk: potential earnings are higher, but practices repay CMS a recoupment if total payments exceed target. Active PBP opt-out practices are those that exercised a COVID flexibility allowing them to bill for monthly payments and not owe a recoupment, but not be eligible for PBPs . Terminated practices are those that no longer participate in OCM.

MODEL REACH

OCM participants treated roughly a quarter of all eligible FFS Medicare chemotherapy episodes, both prior to and during OCM (analyses examined the period through PP6, before the PHE). In general, patients in OCM and non-OCM episodes had similar demographic characteristics, and poverty/socioeconomic status.

OCM practices were larger, more likely to be affiliated with an academic medical center and had a larger share of high-risk cancer episodes than non-OCM practices.

The geographic markets served by OCM participants were similar to markets served by non-OCM practices but had more physicians per capita.

Brief Overview of Evaluation Methods and Approach

The OCM evaluation summarizes OCM impacts using mixed methods, integrating comprehensive quantitative and qualitative data analyses based on Medicare administrative data and claims, patient surveys, case study interviews, and other inputs. The ***First Annual Report from the Evaluation of the Oncology Care Model: Baseline Period*** explained the construction of the evaluation comparison group and described the trends during a multi-year baseline period for both the OCM and comparison groups. Detailed methodology for baseline comparison group selection can be found in the ***First Annual Report from the Evaluation of the Oncology Care Model: Baseline Period Appendix***. **Five subsequent evaluation reports** assessed care delivery changes and impacts during episodes through 2020, which included three performance periods overlapping the PHE. This report, the **Evaluation of the Oncology Care Model: Final Report,** presents Model impacts through the end of the Model and includes six-month episodes that began between July 1, 2016, and December 31, 2021, all of which had ended by June 30, 2022.

The evaluation compares changes over time in OCM episodes with changes over time in a matched group of comparison episodes that were attributed to oncology physician practices that did not participate in OCM. Our impact estimates reflect conservative impacts across both practices that opted to remain in OCM and those that dropped out. **We apply an intent-to-treat (ITT) approach that retains episodes for practices that terminated their participation in OCM.** We do this to avoid a case where only the most successful practices remained in OCM, such that analyses only reflect a very specific set of high-performing practices ("survivor bias"). Such bias would substantially affect the generalizability of our results, limiting their use for policymakers. However, the tradeoff is that we count as "treated" patients whose practices had opted out of the Model, which may bias evaluation impact estimates toward zero (against identifying an impact).

Cancer is not a single disease, and each type of cancer has different treatments, side effects, episode costs, and potential for savings. CMS assigns each cancer episode to one of 24 cancer types. Three types of cancer are categorized for OCM as lower-risk (low-intensity prostate cancer, low-risk breast cancer, and low-risk bladder cancer) and make up about one-third of all OCM episodes. These cancers are treated with hormonal therapies or intra-bladder infusions in the case of bladder cancer. Patients typically have relatively few side effects from their cancer or treatment and episode costs tend to be modest. The remaining 21 cancers are considered higher-risk, making up the remaining two-thirds of OCM episodes; episode costs tend to be much higher than for lower-risk cancer types, because treatment typically involves cytotoxic chemotherapy, targeted therapy, and/or immunotherapy. Treatments for higher-risk cancer types typically have high prices, and patients who receive these treatments more often experience adverse side effects. Many analyses in this report separately assessed lower- and higher-risk episodes, since the two categories tend to have different treatments, severity, and costs. We also separately analyzed the 10 most common cancer categories for payment and utilization outcomes to understand potential differences in OCM impacts across cancer types.

In our analysis, we adjusted for the influence of the COVID-19 PHE by excluding OCM and comparison episodes with a COVID-19 diagnosis (consistent with Model rules) and controlling for local COVID incidence and death rates in our regressions.

Over the course of OCM, costs for cancer treatment increased by about 25 percent in both OCM and comparison episodes due primarily to increased costs of chemotherapy and immunotherapy treatments. OCM episode expenditures averaged about $29,207 during the OCM baseline (July 2014–December 2015) and had increased to $40,013 by PP11 (July–December 2021). This report addresses whether that increase was lower in OCM episodes than in comparison episodes, and whether OCM had differential impacts by cancer type or for specific cancer services, and if so, how these impacts were achieved.

In the *Evaluation Report for PP1–PP9* we assessed at baseline how well OCM episodes reflected all Medicare FFS chemotherapy episodes (i.e., OCM reach). Assessing Model generalizability is particularly important for voluntary models like OCM, because some types of oncology practices might have been more likely to participate than others. The more representative OCM's "reach" is into its target population, the more confident we can be that impacts could be replicated if OCM were expanded more broadly to other FFS Medicare beneficiaries. We found that OCM participants treated roughly a quarter of all eligible FFS Medicare chemotherapy patients. In general, patients in OCM and non-OCM episodes had similar demographic characteristics and lived in areas with similar levels of poverty and other socioeconomic characteristics. OCM practices were larger and more likely to be affiliated with an academic medical center, and had a larger share of high-risk cancer episodes than non-OCM practices. The geographic markets served by OCM participants were similar to markets served by non-OCM practices but had more physicians per capita.

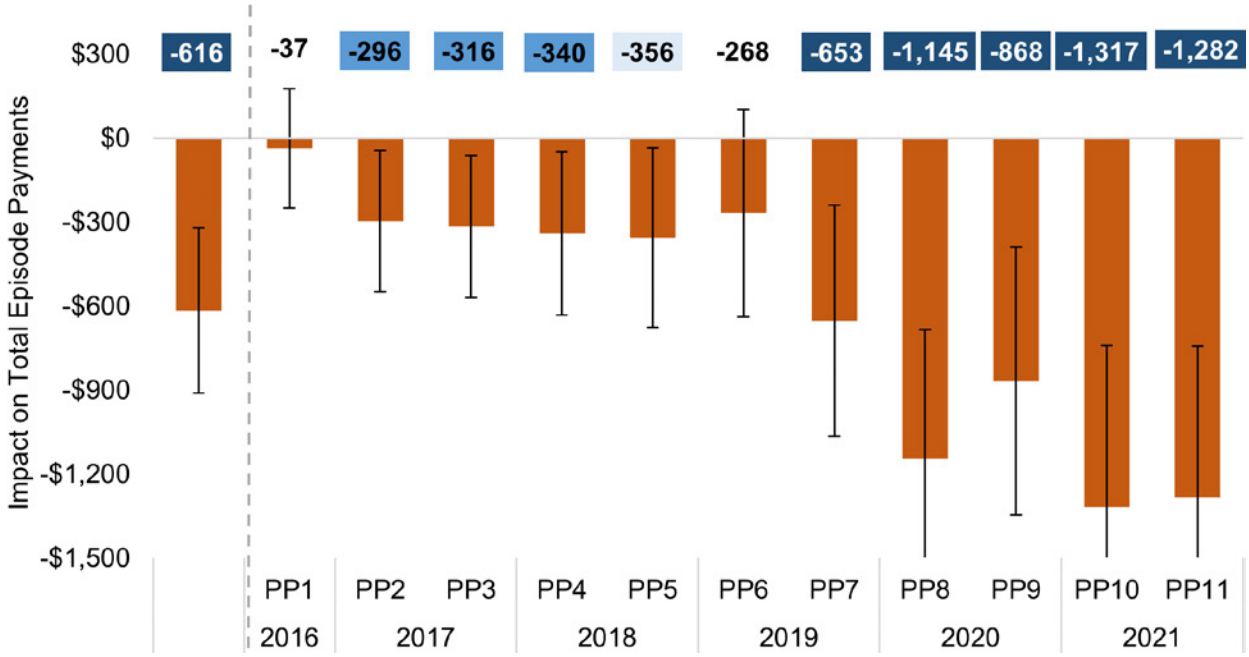
Summary of Key Findings

Medicare Payments and Net Savings/Losses

Performance-based payments through OCM directly incentivized practices to reduce unnecessary acute care and substitute higher-value treatments. CMS designed OCM with the goal of reducing total episode payments sufficiently to cover the costs of the performance-based and MEOS payments. For additional information on Medicare payments and net savings/losses, see Section 2.3 "Net Impact on Medicare Spending" in the main report.

Total episode payments increased rapidly in both OCM and comparison episodes during OCM. They rose, on average, $616 less ($p<0.05$) in OCM episodes than comparison episodes across all 11 performance periods. This means that OCM practices achieved a relative reduction in spending of 2.1 percent (Exhibit ES-2).

Exhibit ES-2: OCM Significantly Reduced Total Episode Payments in Nearly All Performance Periods



Shading indicates statistically significant estimates at $p \leq 0.01$, $p \leq 0.05$, and $p \leq 0.10$, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: Whisker bars represent 90% confidence intervals. PP: Performance period. PP1 began July 1, 2016. Each subsequent calendar year had two six-month performance periods, from January through June, and July through December.

This represents a reduction in Medicare payments (before accounting for MEOS payments) due to OCM. Reductions were largest in PP10 ($1,317), the first half of 2021. This period is about a year after many OCM practices took on two-sided risk, as well as a year after the PHE began and CMS's implementation of related changes to OCM policy.

The relative reduction in total episode payments was driven by reduced Medicare payments in higher-risk episodes, averaging $898, or 2.2 percent (Exhibit ES-3).

Reductions were largest in episodes for high-risk breast cancer, lymphoma, lung cancer, and colorectal cancer. We found no significant overall OCM payment impact for episodes with lower-risk cancers, but the OCM impact varied across performance periods. Total episode payments increased in PP1–PP7 (mid-2016 through 2019). This included significant increases from 2017 through the middle of 2018 (PP2-4). However, OCM reduced total episode payments in each of the last four performance periods, including significant reductions in the last year of the Model (-$198 in PP10, $p<0.10$; and -$350 in PP11, $p<0.05$).

Payment reductions were greatest in Part B payments (Exhibit ES-3), especially for non-chemotherapy drugs, which are mainly for supportive care.

There were also relative reductions in Part A payments, although there was no impact on payments for acute-care hospitalizations. Estimated relative reductions in Part D payments increased over time (including significant reduction in two of the last three performance periods) but were not statistically significant overall. Part A and Part B payment reductions were driven by reductions observed in higher-risk episodes.

After including OCM MEOS and performance-based payments to practices, OCM resulted in net losses for Medicare.

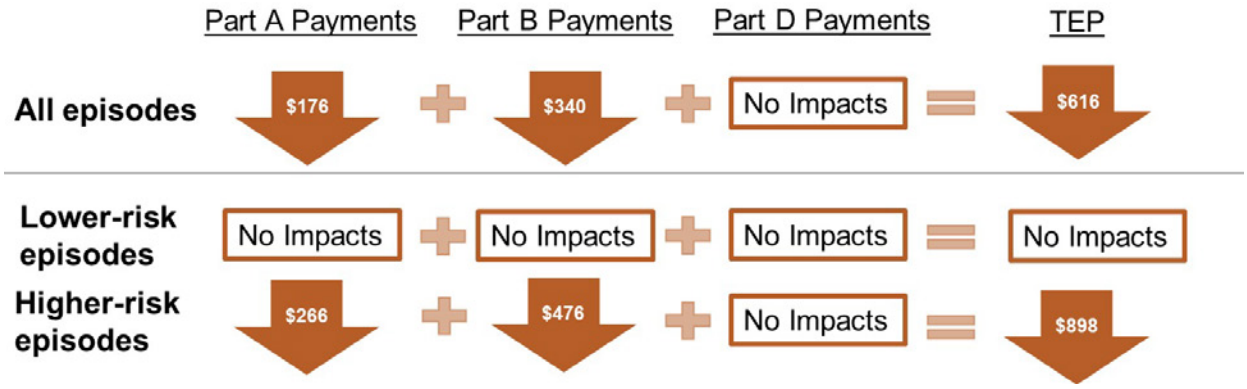
Across the full Model, OCM led to cumulative net losses for Medicare of $639M (Exhibit ES-4). Net losses were largest in the first performance period ($108M) and smallest in the last ($1M). Gross savings (from reductions in total episode payments) were not sufficient to cover both MEOS and performance-based payments in any period, for either higher-risk or lower-risk cancer episodes. Gross savings for higher-risk cancer episodes covered the cost of the monthly payments only (but not performance-based payments) in the last two and a half years of the Model (mid-2019 through 2021). Performance-based payments rose sharply at the beginning of 2020, offsetting the larger gross savings in total episode payments.

Calculations for performance-based payments beginning in 2020 were influenced by several changes, including:

- Practices could choose to opt out of reconciliation, an option CMS offered because of the PHE.
- Changes to quality measure reporting related to the PHE made it easier to meet performance benchmarks, resulting in higher performance-based payments.
- Higher adoption of two-sided risk meant that performance-based payments were larger when practices achieved payment reductions.

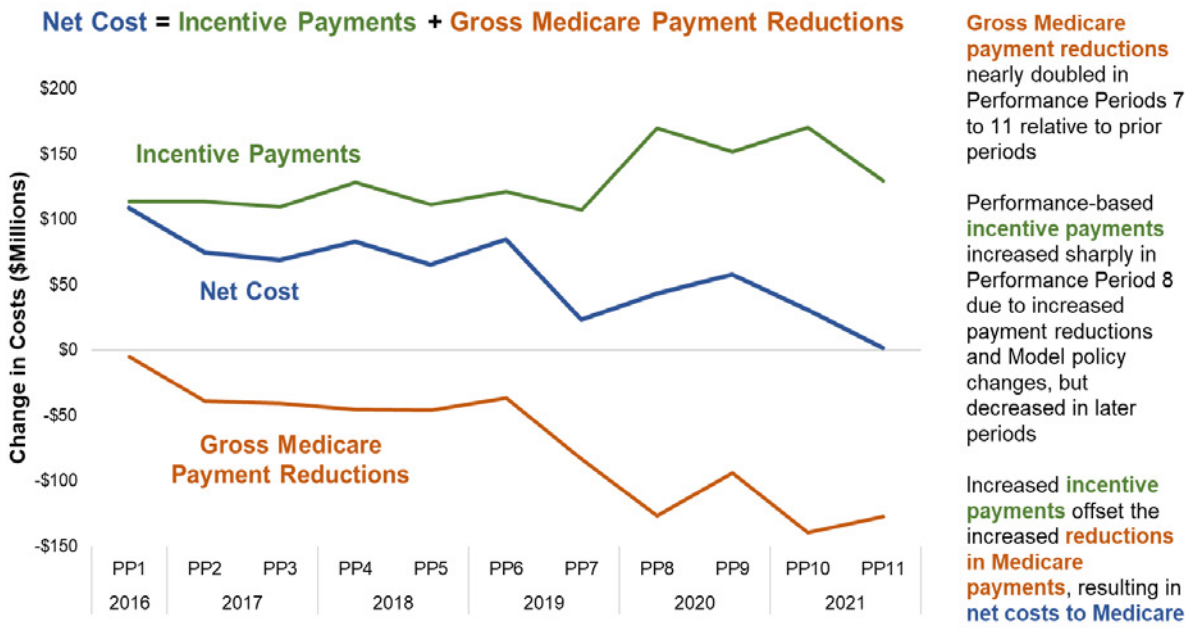
Beginning in PP2 (early 2017), any practice that wished to take on two-sided risk could do so. Given the lower discount retained by CMS applied for practices in two-sided risk relative to one-sided risk, taking two-sided risk would have resulted in higher target amounts, opening the possibility for larger performance-based payments. Starting in PP8 (early 2020), practices that

Exhibit ES-3: OCM Led to an Overall Relative Reduction in Payments for Higher-Risk Episodes, but Not for Lower-Risk Episodes



Source: Medicare claims 2014–2022.
Notes: TEP: Total episode payments.

Exhibit ES-4: Despite Reductions in Gross Medicare Spending, OCM Yielded Net Losses for Medicare



Source: Medicare claims 2014–2022 and OCM program data

Notes: PP: Performance period. Incentive payments included $160 per-beneficiary in Monthly Enhanced Oncology Services payments, as well as performance-based payments for achieving payment and quality thresholds. Gross payment reductions were equal to the average reduction in total episode payments multiplied by the total number of episodes

remained in reconciliation, and were therefore eligible for performance-based payments, either took two-sided risk (i.e., were likely confident of earning performance-based payments) or had achieved one or more performance-based payments in the first two model year and elected to remain in one-sided risk, as OCM rules permitted. All of these factors likely contributed to higher performance-based payments being paid by CMS in the last two and a half years of the Model, offsetting Medicare savings attributable to relative reductions in total episode payments.

Hospital-based Care, Chemotherapy, and Supportive Care

OCM aimed to provide higher-quality and better-coordinated cancer care and reduce avoidable hospitalizations and emergency department (ED) visits. ED visits that did not lead to an inpatient stay were part of practices' quality scores, and during practice interviews, many practices indicated a focus on reducing costly inpatient care. We provide additional detail regarding acute-care utilization in Chapter 3.

No impact for most measures of hospital-based care.

Despite the emphasis on reducing unnecessary hospital-based care, OCM did not affect the likelihood of ED visits that did not lead to an inpatient stay, inpatient stays, readmissions, nor intensive care unit admissions.

Reduction in the likelihood of ED visit leading to an inpatient stay.

OCM led to a small but statistically significant decrease in the likelihood of ED visits that led to an inpatient stay: a reduction equivalent to 1.8 percent of baseline values. Despite this, OCM had no impact on the likelihood of an inpatient stay, which may suggest that increased care coordination was helping more patients to be admitted directly without intervening ED visits, but was not keeping people out of the hospital altogether.

Little impact on ED visits or hospitalizations for chemotherapy-related toxicity.

We separately analyzed acute-care use for chemotherapy-related toxicity. OCM practices specifically focused on preventing ED visits and hospitalizations for chemotherapy-related toxicity, to improve quality of care and reduce episode payments. They may also have had more direct control over preventing this type of acute care use, relative to other ED visits and hospitalizations. However, OCM had no impact on chemotherapy-associated hospitalizations or chemotherapy-associated ED visits leading to an inpatient stay. OCM did reduce chemotherapy-associated ED visits not leading to an inpatient stay for some patients, equivalent to roughly two ED visits avoided for every 1000 patient episodes.

The opportunity to earn performance-based payments was intended to motivate participating practices to avoid low-value, costly treatments that have little likelihood of benefiting patients, and to emphasize higher-value care. Key findings about the impact of OCM in these areas included:

Little evidence of value-oriented changes in chemotherapy drug treatments, except for faster adoption of three lower-cost biosimilar cancer treatments.

The chemotherapy drugs used to treat common cancers were very similar in OCM and comparison episodes, and changed similarly over time, with no savings to Medicare, due to more-efficient treatment patterns (i.e., using similarly effective but less expensive drugs). One exception was in use of three biosimilar cancer treatments, which cost less than originator drugs and which were used significantly more in OCM episodes than in comparison episodes following their availability in 2019 with roughly 20-40 percent higher rates of use. There was also evidence that OCM led to greater use of higher-value paclitaxel over protein-bound paclitaxel.

There was no evidence that OCM impaired access to beneficial high-cost treatments.

We found similar use of immunotherapies and novel therapies in OCM and comparison practices; OCM was associated with a modest increase in use of costly but effective immunotherapies, and OCM had no overall impact on use of novel therapies broadly. These results mitigate concerns that OCM incentives would prevent patients from receiving cutting-edge therapies with higher costs.

More value-oriented supportive care.

Episode payments for Part B non-chemotherapy drugs increased significantly less in OCM episodes than in comparison episodes, reflecting more value-oriented use of costly supportive therapies to prevent neutropenia, nausea, and cancer-related bone fractures. OCM also had greater use of biosimilar white blood cell growth factors (granulocyte colony stimulating factors, [GCSFs]). This result is consistent with the substitution of biosimilar anti-cancer treatments described above.

A full discussion of chemotherapy and supportive care drug regimens is provided in Chapters 5 and 6, respectively.

Patient-Centered Care

OCM practices implemented strategies to enhance care coordination and symptom management, and expanded clinic access, financial counseling, and palliative care, a topic we explored more thoroughly in the Participants' Perspective Report. These changes were intended to improve patient care experiences, improve adherence to oral treatment regimens, and foster more-appropriate care at the end of life.

Observations about patient-centered care during OCM include the following:

Continued high rating of patient care experience.

Most cancer patient respondents rated their cancer care very highly at the start of OCM, and there were no significant changes over time.

Improvements in screening for pain and depression.

Practice-reported measures of pain assessment and management, and depression screening with follow-up plan, showed marked improvement over time.

Symptom management declined in the second half of the Model.

Patient-reported measures of getting help from their cancer treatment team for symptoms they were experiencing were level over the first three years of the Model. During the PHE, which began affecting episodes initiated in the latter half of 2019 and continued throughout the remainder of the Model, scores for patient-reported help for symptoms significantly declined for five of eight measures. Analyses included OCM patients only (no comparison group) and cannot be considered causal. It is possible that changes caused by, or that coincided with, the COVID-19 PHE were associated with reductions in patient perceptions of symptom management for both OCM and non-OCM patients.

Continued high patient adherence to oral treatment regimens.

OCM practices redesigned care processes to identify financial and other barriers to oral cancer treatment and to educate patients about how to take oral drugs and manage side effects. Patient adherence exceeded 85 percent in both OCM and comparison episodes. While OCM did not improve adherence relative to the comparison group overall, OCM was associated with significantly improved adherence for patients who are Black, Hispanic, or dually eligible for Medicaid.

No impact on hospice care use or timing or high-intensity end-of-life care.

Many OCM practices attempted to improve end-of-life care by hiring palliative care specialists and enhancing access to palliative care, encouraging patients and their families to engage in advance care planning, and documenting patient wishes and proxy decision makers. However, OCM had no observable impact on the use of hospice care or the duration or timing of hospice care or on other measures of high-intensity care at the end of life.

Additional information on patient care experience, screening, and symptom management, is provided in Chapter 4. Details around adherence to oral treatment regimens can be found in Section 5.4. Full results for analysis of end-of-life care are available in Section 3.3.

Health Equity

Although OCM did not include explicit design elements focused on improving health equity, it is possible that efforts participants made to improve care quality may have disproportionately benefited patients from historically underserved communities by helping to address needs that are not met under standard Medicare FFS care. Conversely, OCM may have disproportionately benefited other patients if systemic barriers faced by historically underserved populations prevented them from acquiring the full benefits of the Model. We investigated these possibilities by conducting analyses focused on patients who were Black, Hispanic, dually eligible for Medicare and Medicaid, or living in areas of high neighborhood deprivation, relative to patients who were White, patients with Medicare-only coverage, and those living in less deprived areas. We report full results for these analyses in Chapter 7.

This investigation yielded the following findings.

During the OCM baseline period (July 2, 2014, to January 1, 2016), patients from these four historically underserved populations had higher episode payments and indications of worse quality, relative to reference populations that were not historically underserved.

Patients from each of the underserved populations were more likely to use hospital-based care-less likely to have timely initiation of chemotherapy after surgery, had lower adherence to oral medications, and were less likely to receive hospice care at the end of life than patients in their reference populations.

OCM did not decrease pre-existing differences in outcomes in general, but there were a few significant differential changes.

OCM was associated with small differential increases in use of acute care service utilization among patients living in high-disadvantage neighborhoods, which increased pre-existing differences relative to patients living outside of those neighborhoods. While episode payments increased less slowly for all four subpopulations we analyzed during OCM, episode payments differentially decreased among patients who were Hispanic relative to patients who were White. Clinical analyses showed that OCM eliminated baseline differences in adherence to oral medications by improving adherence among historically underserved populations relative to corresponding reference populations. However, results did not show consistent evidence of improved care quality for the four historically underserved populations across other quality measures included in the analysis, such as timely initiation of chemotherapy after surgery and use of recommended supportive care medications.

Patient-reported care experience remained high for all four underserved populations.

At the start of the Model, patient-reported outcomes were similarly high across all subpopulations analyzed. Our results did not show that any of these subpopulations had differentially better or worse trends in care experience over the intervention period, leaving experience scores consistently high.

Looking Ahead to EOM: Lessons Learned from OCM

The ongoing EOM began on July 1, 2023, and uses a similar episode-based design to that of OCM. Our evaluation thus provides several lessons for EOM participants. These include strategies for achieving reductions in episode payments successfully implemented under OCM, as well as areas where OCM practices did not achieve significant change, which may signal opportunities for improvement. We discuss each of these categories below.

Strategies for Success Demonstrated by OCM

OCM participants demonstrated that substitution of higher-value supportive care drugs is an effective strategy for reducing episode payments: although supportive care drugs comprised only 8 percent of payments at baseline, they accounted for roughly one-third of reductions in episode payments. Practices also successfully substituted several higher-value anti-cancer therapies. In aggregate, this did not translate to reduced payments for anti-cancer therapies, but substitution of biosimilar drugs in high-

risk breast cancer episodes was associated with greater payment reductions. New participants adopting these strategies should provide immediate reductions in episode payments relative to their episode benchmark prices. Staying apprised of new higher-value drugs, tracking how costs for supportive care drugs change over time, and developing processes to enable rapid shifts toward cheaper alternatives may allow participants to achieve continued payment reductions as new biosimilar drugs are developed.

Remaining Opportunities Identified by OCM

Chemotherapy Drugs: Although Part B and D chemotherapy drugs were the two biggest contributors to episode payments, and contributed the most to growth in payments, OCM had virtually no impact on chemotherapy drug payments outside of high-risk breast cancer episodes. Advancements in care may provide more biosimilar or other higher-value alternatives, and more generic drugs may become available over time. Infrastructure, staffing, and processes to help identify and substitute new drugs (e.g., establishing pathway programs, having staff identify higher-value treatments and obtain prior authorization, etc.) will allow participants to take advantage of these advances if and when they become available.

Radiation: While radiation therapy only accounts for roughly 2 percent of episode payments, versus the 33 percent attributable to chemotherapy drugs, it is also an area with a known path to reducing payments: reducing the number of fractions for palliative treatment of bone metastases or prescribing higher-value treatment modalities. Our evaluation found that OCM had no impact on radiation therapy. Practices that employ radiation oncologists may have a financial incentive toward the status quo, since reduced payments for radiation therapy would directly reduce FFS revenue. Moreover, during our case studies, both medical and radiation oncologists at participating practices noted that radiation oncologists were not part of OCM, did not share in performance-based payments, and were not involved in OCM-related care process changes. Finding ways to improve engagement with radiation oncologists may provide EOM participants with another strategy to modestly increase reductions in episode payments.

End of Life: Several EOM quality measures also showed additional room for improvement even at the end of OCM. For instance, timely use of hospice care at the end of life showed little change over the course of the Model and was just over 50 percent in the final performance period. Greater focus on improved end-of-life care from practices participating in EOM could yield higher AQS values and performance-based payments.

Exhibit ES-5: Patients Rated Cancer Care Team Highly, but There Is Room for Improvement in Shared Decision Making, Symptom Management, and Patient Self-Management

Source: OCM Patient Survey. Includes episodes initiated from April 2016 to December 2020; data collection for these episodes occurred from January 2017 to August 2022.

Patient Experiences: Similarly, while practices scored very high on some patient care experience measures (particularly the rating of cancer care team), other measures such as shared decision making, symptom management, and patient self-management all have clear room for improvement. During patient interviews (summarized in greater detail in Chapter 8), patients described a variety of preferences regarding treatment planning and how to make decisions with their cancer care team. They also highlighted the importance of strong communication with their cancer care time. Finding ways to improve engagement with patients—to ensure that patients and clinicians are on the same page, manage patient symptoms, and equip patients to manage their needs—is a potential area of improvement for EOM participants seeking to improve quality of care (Exhibit ES-5).

Better Targeted ED/Hospital admission initiatives: Lastly, payments for Part A services remained high throughout OCM despite modest reductions in acute- and post-acute care use achieved by both the OCM and comparison groups. As discussed above, achieving impacts relative to a comparison group may prove challenging given external trends in hospital-based care, and other value-based payment approaches, such as ACOs, have encountered similar difficulties in reducing use of hospital services among oncology patients.[i-iii] However, innovations that succeed in keeping patients out of EDs and hospitals will allow participants to reduce TEP and improve their quality scores.

Equity: A focus on health equity may enable EOM participants to make progress on equity goals. The OCM evaluation documented substantive differences in quality and use of hospital-based services between historically underserved populations and reference populations that are not underserved, such as higher rates of hospital admissions and lower rates of timely hospice receipt. Historically underserved populations therefore have greater room for improvement. Focusing on eliminating differences between historically underserved populations and other populations will yield improvements in aggregate. For example, OCM patients with dual eligibility were 10 percentage points more likely than those without dual eligibility to have an ED visit that did not result in a hospitalization. Patients with dual eligibility comprised roughly 13 percent of OCM episodes. Therefore, eliminating differences between patients with and without dual eligibility would yield an aggregate reduction of 1.3 percentage points: more than 5 percent of the baseline probability of an ED visit. Additional MEOS payments for patients with dual eligibility, and an emphasis on documenting and addressing health-related social needs, may help position EOM participants to achieve joint goals of improved quality and improved health equity.

Conclusion

OCM reduced episode payments by 2.1 percent, on average, with reductions notably increasing in the last two years of the Model. The OCM evaluation found these reductions despite using an intent-to-treat study design that included episodes from practices even after they had terminated their participation in the Model. The impact achieved by practices that remained active through the end of the Model could be higher (which this report did not explore). Reductions in episode payments were limited to higher-risk cancer types, which collectively made up 67 percent of all OCM episodes. In particular, reductions were concentrated in episodes for high-risk breast cancer, lung cancer, colorectal cancer, and lymphoma. Most reductions in episode payments were attributable to reductions in Part B spending, due primarily to reductions in spending on non-chemotherapy drugs. Although Part B chemotherapy and Part D drug spending (predominantly oral chemotherapy medications) account for the bulk of episode payments, OCM did not generate reductions in spending for such care.

Despite modest reductions in episode payments, OCM resulted in net losses for Medicare exceeding $600M, after accounting for MEOS and performance-based payments to participating practices. Net losses were lower in the last two years than in prior periods (nearly breaking even in the final performance period), and episode payment reductions for higher-risk cancers did cover the MEOS payments in the last two and a half years of the model (performance periods 7-11). Greater reductions in the last two years suggest that it takes time for changes to be fully implemented, while reductions for specific cancer types highlight the fact that opportunities for reductions may vary across cancers. The ongoing Enhanced Oncology Model (EOM) focuses on patients receiving systemic chemotherapy for seven cancer types, which tend to have higher risk of side effects and higher episode costs relative to cancers treated by hormonal therapy only. That higher-risk episodes broke even in the most recent OCM performance periods indicates promise of net savings for EOM.

OCM was intended to transform cancer treatment by incentivizing substitution of higher-value treatment alternatives and encouraging better adherence to clinical guidelines. OCM increased the use of higher-value supportive care therapies to prevent neutropenia and cancer-related bone fractures. These changes in supportive care accounted for nearly 1/3 of the reductions in episode payments attributable to OCM. OCM was also associated with greater adoption of three higher-value biosimilar anti-cancer treatments and biosimilar growth factors, which also contributed to reductions in episode payments. While chemotherapy drug spending is the single largest contributor to episode payments, we found limited other evidence for increased adoption of higher-value chemotherapy. OCM also did not affect the timeliness of chemotherapy initiation following surgery nor patient adherence to oral cancer regimens.

By offering MEOS payments to OCM participants, CMS intended to support participating practices in improving the quality of care provided to OCM patients. Practices reported substantial efforts to transform care and improve quality. However, we found no evidence of significant improvement, relative to the comparison group, among OCM participants in the quality measures on which practices were held accountable (including ED visits not resulting in an inpatient stay, timely receipt of hospice care, and patient-reported care experience from survey data). For some measures (such as ED visits and inpatient admissions) both OCM and comparison practices achieved substantial improvements: in this case, lack of impacts were attributable to improved quality among comparison practices, rather than lack of improvement among OCM practices. For other measures (such as timely receipt of hospice care and patient-report experience) neither group demonstrated meaningful improvement. This may suggest limited room for improvement on these specific measures, at least without further innovations in care delivery. EOM continues to incentivize such innovations, as many of these measures are included in the new Model.

To explore the potential impact of OCM on health equity, we assessed outcomes for four historically underserved populations, including patients who were Black, Hispanic, had dual eligibility for Medicare and Medicaid, or lived in high-disadvantage neighborhoods, relative to patients who were White, only enrolled in Medicare, or lived in less disadvantaged areas. We found that, prior to OCM, patients from historically underserved populations had higher acute-care utilization and episode payments but were less likely to have timely initiation of chemotherapy after surgery, adhere to oral treatment, or receive hospice care at end of life. While OCM improved adherence to oral treatment for all four historically underserved populations, in absolute terms and relative to their reference populations, we did not find consistent evidence of improved care quality for the four historically underserved populations across the other measures included in the analysis. We estimated reductions in episode payments for all subpopulations analyzed; only for patients who were Hispanic were reductions differentially larger than in their reference population.

Overall, OCM did not achieve CMS's goals of net savings or improved care quality.

Practices reported that they introduced or expanded efforts to extend clinic hours, increase access to same-day appointments, and implement outreach telephone calls to patients to address symptoms and reduce emergency department visits, and increase communication about treatments. Practices also made measurable progress in expanding screening for pain and depression, and substituting higher-value supportive care treatments. Despite these changes, OCM practices did not demonstrate meaningful improvements in most dimensions of quality we measured, relative to a comparison group. Estimated reductions in episode payments were not sufficient to cover the cost of Model incentives. However, areas where we did find evidence of success hold promise for more success with the new EOM.

For example, reductions in episode payments increased substantially over time such that OCM had nearly broken even by the last performance period. Lessons learned under OCM may allow these types of reductions to occur earlier in EOM.

EOM's focus on the higher-risk cancer types, most of which generated larger episode payment reductions than other cancer types in OCM, may enhance the financial impact of EOM, while providing smaller MEOS payments and requiring mandatory two-sided risk may better facilitate achieving net savings. Moreover, design elements encouraging participants to engage with underserved populations and address social determinants of health are intended to achieve greater impacts on health equity than OCM. Future CMS evaluation reports covering EOM will continue to refine our knowledge of oncology-focused episode-based payment models.

RELATED CHAPTERS

For additional information see:

Chapter 1 – OCM Background and Evaluation Summary
Chapter 2 – Did OCM Lower Medicare Payments and Generate Net Medicare Savings?
Chapter 3 – Did OCM Affect Service Use Patterns?
Chapter 4 – Did Quality of Care Improve Over Time Among OCM Patients?
Chapter 5 – Did OCM Affect Cancer Treatment?
Chapter 6 – Did OCM Incentivize High-Value Use of Supportive Care Medications?
Chapter 7 – How Did Outcomes Change for Historically Underserved Populations?
Chapter 8 – How Did Patients Describe Their Cancer Care Journeys?

Oncology Care Model Background and Evaluation Summary

In February 2015, the Centers for Medicare & Medicaid Services (CMS) invited oncology physician group practices to participate in the Oncology Care Model (OCM), an alternative payment model based on six-month episodes for cancer care for Medicare fee-for-service (FFS) beneficiaries undergoing chemotherapy treatment.[3] Through a combination of requirements and financial incentives, CMS designed the Model to improve quality of care and health outcomes while reducing spending,[iv] as described further in Section 1.2 below. The six-year OCM began with six-month chemotherapy treatment episodes, starting on July 1, 2016, and operated for 11 consecutive performance periods (PPs). The final episodes ended on June 30, 2022.

In December 2015, CMS funded Abt Global, along with its partners Harvard Medical School, GDIT, and the Geisel School of Medicine at Dartmouth, to conduct a comprehensive evaluation of OCM. The goal of the evaluation was to assess the extent to which OCM achieved CMS's stated goals of improving care and reducing costs. This represents the final Model evaluation report and covers Model impacts and lessons learned throughout the entire six-year period of performance. In this chapter we provide a comprehensive summary of the following:

- The state of oncology care immediately preceding OCM
- Model goals and design elements
- Model participation and reach
- Brief overview of evaluation methods
- Changes in the oncology and broader value-based payment environments that occurred concurrent with OCM
- Care transformation and Model impacts
- Lessons learned for future payment models

Chapters 2–7 provide more details about the impact results summarized in this chapter. In Chapter 8, we summarize themes from interviews conducted with 30 Medicare beneficiaries who had chemotherapy episodes about their cancer treatment journeys. These interviews included both patients treated by OCM participants and patients treated by non-participating practices.

1.1 State of Cancer Care Prior to OCM

Cancer is the second leading cause of death in the United States, resulting in approximately 600,000 deaths per year.[v] The costs of cancer treatment have grown rapidly in recent years; a 2011 study projected that spending for cancer care in the United States could increase by 39 percent from 2010 to 2020, from $124 billion to $173 billion.[vi] A subsequent, updated study estimated 2020 spending for cancer care at greater than $200 billion.[vii] Meanwhile, a 2013 report from the Institute of Medicine estimated that up to 30 percent of health care spending was potentially unnecessary, and other studies show substantial regional variation in spending for health care (broadly) and cancer care (specifically).[ix-xi] In the context of rising spending, policymakers sought strategies to identify and reduce inefficient and low-value care. Following the passage of the Affordable Care Act in 2010, CMS was charged with designing and testing alternative payment models seeking to lower Medicare spending while maintaining or improving quality of care. CMS designed OCM "as an effort to test improvements in the oncology delivery system by incentivizing physicians to provide efficient, coordinated care."[xii]

At the time that CMS designed OCM, chemotherapy and acute hospital care were commonly cited as leading drivers of spending for cancer care. In a study of Medicare patients attributed to medical oncology practices in 2011 and 2012, median annual payments for chemotherapy and inpatient care were $14,863 and $5,528, respectively.[viii] Out-of-pocket costs were substantial for many patients, especially for those taking high-cost oral cancer therapies. Among patients receiving oral anti-cancer medications under Medicare Part D, average annual out-of-pocket costs in 2010 were nearly $9,000.[xiii]

Disparities in cancer care for historically underserved populations were common in the years leading up to OCM. For example, prior evidence suggests that individuals who are Black or Hispanic versus White and those insured by Medicaid versus other insurance types (reflective of poverty associated with Medicaid eligibility) may experience worse access to care, greater delays in receipt of care, lower quality of care, and have worse cancer treatment outcomes.[xiv-xviii] In this report we describe baseline care disparities for a range of historically underserved populations in adherence to high-cost oral cancer therapies, timely initiation of chemotherapy after cancer-directed surgery, and use of recommended supportive care medications. OCM was not designed with the specific objective of addressing these disparities; however, Chapter 7 will address OCM impacts on evaluable baseline care disparities for historically underserved populations defined by race,

[3] Chemotherapy is defined for OCM purposes as cytotoxic chemotherapy, biologic therapy, immunotherapy, or hormonal therapy for cancer.

ethnicity, Medicare-Medicaid dual eligibility, and area-level socioeconomic deprivation.

Systemic anti-cancer therapies expanded rapidly in the years leading up to OCM, with the development of new biologic and immune-based therapies. Many novel treatments were both highly effective and less toxic than traditional chemotherapy regimens, expanding both the proportion of patients eligible for treatment and the duration of time that a patient could continue treatment, over multiple lines of therapy. Most of the new and emerging therapies also had high prices that increased over time.[xiii] Studies of real-world cancer care delivery around the same time described substantial variation in spending for both acute hospital care and chemotherapy, suggesting opportunities for savings related to care coordination and choice of systemic anti-cancer treatments.[xi,xx]

1.2 OCM Design and Goals

Model Design to Improve Quality and Reduce Costs

In the midst of the oncology care environment described in Section 1.1., CMS operated OCM to test whether fostering coordinated, and value-based cancer care could reduce Medicare payments and improve the quality of care for patients with cancer. OCM focused on Medicare FFS patients with cancer who underwent chemotherapy treatment.[4] OCM combined attributes of medical homes (patient-centeredness, accessibility, evidence-based guidelines, and continuous monitoring for improvement opportunities) with financial incentives to provide services efficiently and with high quality.[xxi,xxii]

The goal of OCM was to utilize appropriately aligned financial incentives to enable improved care coordination, appropriateness of care, and access to care for beneficiaries undergoing chemotherapy. OCM featured a two-pronged financial incentive strategy to support enhanced services for patients and encourage practices to identify opportunities to lower treatment costs. First, practices were able to bill Medicare a $160 Monthly Enhanced Oncology Services (MEOS) fee the duration of the six-month episode, or up to $960 for each Medicare FFS beneficiary with a chemotherapy episode who was attributed to the practice. These MEOS payments were intended to support enhanced oncology services, including 24/7 clinician access, patient navigation, a documented care plan covering recommended items from the Institute of Medicine, and adherence to nationally recognized clinical guidelines. Second, practices had the potential to receive performance-based payments if they were able to meet Model cost and quality goals.[5]

The OCM design also encouraged multi-payer alignment. CMS invited other payers to institute OCM-aligned value-based payment models for OCM practices. Through such multi-payer alignment, CMS hoped to both reduce the practice burden associated with differing cost and quality models, and to better incentivize practice transformation.

Through these enhanced services and financial incentives, CMS intended OCM to improve care quality, including more screening for pain and depression; improved patient-reported outcomes (care ratings, mental health, and symptom management); and more timely access to hospice. CMS also intended for financial incentives to facilitate higher-value treatment choices (e.g., substituting cheaper alternatives with similar efficacy to originator drugs) that would directly lead to reduction in total episode payments. Lastly, OCM encouraged reductions in unnecessary ED visits and hospital stays, as well as reductions in high-intensity end-of-life care, and improved adherence to evidence-based guidelines, which would both improve quality and reduce episode payments. CMS expected that as quality improved, reductions in total episode payments (TEP), would yield net savings to Medicare over and above the cost of the incentive payments.

All participating OCM practices joined the model voluntarily and could terminate any time throughout the life of the Model. Initially all OCM practices were in a one-sided risk arrangement where practices could earn performance-based payments if episode payments were below the target amount, but were not responsible for recoupment if their episode payments exceeded the target amount. Beginning in PP2 (early 2017), practices could voluntarily remain in a one-sided risk arrangement or adopt two-sided risk (**see Box below**). In exchange for taking on more risk, high-performing practices could earn a larger performance-based payment under two-sided risk

CHEMOTHERAPY EPISODE

Chemotherapy is defined for OCM purposes as systemic therapies including cytotoxic chemotherapy, hormonal therapy, biologic therapy, immunotherapy, and combinations of these therapies. An OCM episode is initiated when a beneficiary receives a qualifying chemotherapy drug. The episode extends six months from the initiating chemotherapy treatment, during which practices are responsible for patient quality of care, and for all Part A, Part B, and Part D Medicare expenditures incurred by the patient.

[4] **Appendix Exhibit A-3** lists the reconciliation-eligible cancers covered by OCM.

than under one-sided risk. Beginning at the start of 2020, two-sided risk was required for those practices that did not earn at least one performance-based payment in the first two years of the Model, or else their participation was terminated. Adoption of two-sided risk, which some practices opted into starting at the beginning of 2019, helped increase the performance-based payments earned by participants relative to prior performance periods, particularly when combined with overlapping policy changes related to the COVID-19 public health emergency (PHE).

OCM RISK ARRANGEMENTS

The Model featured three risk arrangements for Oncology Care Model (OCM) practices and pools:

Initially, all OCM practices and episodes had a **one-sided risk arrangement** with a **4 percent Medicare discount.** OCM practices received a performance-based payment if total expenditures for episodes (including Monthly Enhanced Oncology Services) were below the target price, and they achieved quality targets. Under one-sided risk, practices were **not responsible** if their total expenditures for the episodes exceeded the target price. Practices could continue indefinitely in one-sided risk if they had earned at least one performance-based payment through the first two years of the Model.

Beginning in 2017, practices could elect **a two-sided risk arrangement** with a **2.75-percent Medicare discount.** OCM practices received a performance-based payment if total expenditures for episodes were below the target price. They received no performance-based payment and **were responsible** for expenditures that exceeded the target price. Gains and losses were **capped at 20 percent of their average episode benchmark prices.**

Beginning in 2019, practices could elect an **alternative two-sided risk arrangement** with a **2.5-percent Medicare discount.** Gains and losses **were capped at 8 percent of the benchmark.** They received no performance-based payments but were **not responsible** for repayment if expenditures were greater than the target price but lower than the benchmark.

Model flexibilities during the COVID-19 public health emergency

CMS made three notable policy changes to provide support for OCM practices during to the PHE. First, starting at the beginning of 2020 and continuing through the end of the Model, participating practices were allowed to opt out of performance-based payment reconciliation and simply receive MEOS payments. Second, CMS made reporting of two practice-reported quality measures voluntary, leaving three required quality measures that factored into the calculation of performance-based payments.[6] Simultaneously, reductions in ED visits attributable to the PHE improved practices' scores on the quality measure related to ED visits. These two factors – making practice-reported quality measures voluntary and the secular reduction in ED visits attributable to the PHE – combined to make it easier for practices that did not opt out of reconciliation to achieve the quality threshold necessary to receive the 100 percent multiplier on performance-based payments. In the first half of 2020, for the first time since OCM began, a majority of practices received an Aggregate Quality Score (AQS) sufficiently high to earn a maximum performance-based payment, and this continued through the remainder of the Model. Third, episodes with a COVID-19 diagnosis were removed from reconciliation.

While the first two changes (ability to opt out of performance-based payment reconciliation and allowing voluntary submission of certain quality measures) became effective starting in 2020, the third (removing episodes with a COVID-19 diagnosis from reconciliation) became active starting in the middle of 2019, since episodes initiated in the latter half of this year would overlap with the PHE.[xxii]

Additional details about OCM, including previous evaluation reports, are available on the **CMS website**.

RELATED SECTIONS

As shown in **Section 4.2**, the proportion of practices receiving 100 percent of their Aggregate Quality Score multiplier ranged from 33 to 52 percent in the first two years of OCM, and declined between 18 and 25 percent in the subsequent 18 months. The proportion increased to between 67 and 74 percent in the last two years of the Model.

[5] For additional information on the OCM quality measures and how the quality measures factored into the performance-based payments amounts, see **Chapter 4**.
[6] Additional information on the OCM quality measures, the AQS, and how the AQS relates to PBPs can be found in **Section 4.2**.

1.3 Model Participation and Reach

Broad Reach and Generalizability

In a prior OCM Evaluation report, ***Evaluation of the Oncology Care Model: Performance Periods 1–9***, we assessed the scope of OCM and the extent to which the Model represented the national FFS landscape at the market, practice, and episode level. At the beginning of the Model, **OCM participants treated over one-quarter of all chemotherapy-initiated cancer treatment episodes among FFS Medicare beneficiaries,** across 33 states, indicating that OCM had substantial national reach. Markets with participating OCM practices were broadly similar to other markets, with slight differences in physician supply. Markets with participating OCM practices were also more likely to be metropolitan rather than micropolitan relative to non-participant markets, though neither group had any substantial presence in rural areas.

Despite the large scope of the Model, participating practices only comprised 5 percent of all practices providing oncology care, indicating that average OCM participants were larger than non-participants. In particular, the three largest oncology practices in the United States all participated in OCM. OCM practices were also more likely to be affiliated with academic medical centers, and to treat a higher proportion of higher-risk cancers.

OCM episodes and non-participant episodes had similar proportions of patients who were Black, Hispanic, Asian/Pacific Islander, or American Indian/Native Alaskan. This alleviates concerns that the Model may have increased disparities in access to CMS innovation models. Patients treated by both groups also lived in neighborhoods with similar levels of socioeconomic disadvantage and were similarly likely to have dual eligibility for Medicaid.

Compared to patient-level clinical and demographic factors, practice- and market-level characteristics only weakly predicted measures of cost and utilization. This, combined with the similarities described above, suggests that OCM impacts can reasonably generalize to non-participants when considering a national expansion of the Model. However, some types of eligible practices (e.g., practices with only one oncologist) were completely absent from OCM, and so our results may not generalize well to practices that were unrepresented in the Model. Moreover, the voluntary nature of the Model means we must be cautious in assuming that otherwise similar practices that opted not to participate would achieve identical outcomes. Despite these caveats, the similarity of participants to non-participants on a number of episode-, practice-, and market-level characteristics makes extrapolation outside of the model reasonable.

Practice Participation Changed Over Time

In total, 202 unique oncology practices participated in the Model, although no more than 193 participated at the same time (Exhibit 1). In some cases, mergers led to the number of unique practices being smaller even though the participants did not change; in other cases, mergers led to physicians from previously non-participating practices to begin participating. There was a trickle of practice terminations after the first year of the Model, with four practices leaving in the latter half of 2018 and a total of 27 practices terminating their participation in OCM by the middle of 2019. Interviews with the early-terminating practices indicated that the majority terminated due to difficulty meeting Model requirements (in particular, lacking the capability to provide all enhanced oncology services), and reporting burden. Model exit accelerated at the beginning of 2020 with the introduction of mandatory two-sided risk for practices that had not achieved performance-based payments in the first two Model years: overall, 37 additional practices exited the Model between in the second half of 2019. Survey data confirmed that nearly all of these late terminators exited due to concerns related to two-sided risk. An additional 16 practices terminated participation after 2019, though we did not collect data from the practices about their reasons for leaving OCM at that time.

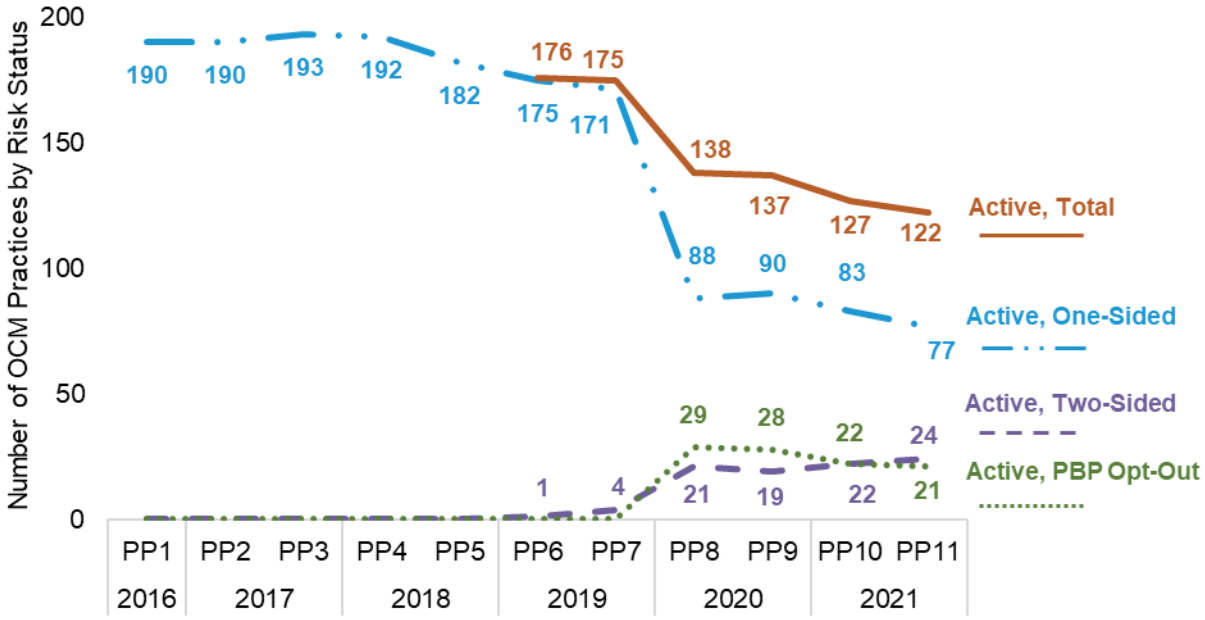
Among the 122 practices that remained in the Model through the end, 24 had adopted two-sided risk by the final performance period. However, only four practices did so prior to 2020 when it became mandatory for some practices. By the end of the Model, roughly 43 percent of all OCM episodes were covered by two-sided risk.

The last two years of OCM also included participants who received MEOS payments but had opted out of reconciliation: an option made available to practices due to the PHE. Twenty-nine practices availed themselves of this option in the first half of 2020, when the PHE was at its most disruptive. This number had decreased to 21 by the end of the Model, covering roughly 20 percent of all OCM episodes.

The estimates in this report may be lower than the impacts achieved by practices that were subject to full OCM incentives for the entire Model.

This is because Model exit was selective. Practices that terminated prior to 2020 had lower aggregate quality scores and were less likely to have earned performance-based payments. This does not affect the generalizability of our estimates given our evaluation's intent-to-treat design, as described in Section 1.4. The intent-to-treat design produces estimates that tend to be more conservative. By limiting selection bias, this design provides a closer approximation to the impacts that could

Exhibit 1: Over Half of OCM Practices Changed Their Participation Status or Risk Status in Performance Period 8



Source: OCM program data.

Notes: PP: Performance period. PBP: Performance-based payment. Active, one-sided practices are eligible for PBPs under one-sided risk (no repayments to CMS if total episode payments exceed benchmark target). Active, two-sided practices are eligible for PBPs under two-sided risk: potential earnings are higher, but practices repay CMS some amount if total payments exceed target. Active, PBP opt-out practices are those that exercised a COVID flexibility allowing them to receive monthly payments, but not be eligible for PBPs. Terminated practices are those who no longer participate in OCM.

be achieved through an expanded Model. However, after OCM termination, practices were no longer eligible to receive MEOS payments and may not have continued implementing practice redesign elements required under OCM. In that case, impacts for these practices will be small or nonexistent, but will still be included in our intent-to-treat estimates, watering down the impacts we observe.

Multi-Payer Alignment Proved to be a Challenge

By 2017, 16 payers had signed a Memorandum of Understanding with CMS and 13 had signed agreements with at least one practice. A total of 51 practices had an agreement with at least one other payer, and nine practices had agreements with multiple payers. However, most other payers had only reached agreements with a single participating practice. The number of other payers fell to 10 by 2018, and only five remained through the end of the Model. Our evaluation did not collect data on the number of practices that remained in arrangements with other payers beyond 2017.

During two rounds of interviews with other payers, our team identified several barriers to participation that likely precluded more widespread alignment by other payers. These included:

- Many practices had relatively few patients covered by the payer, which made it difficult to produce stable cost estimates.
- Small payers had trouble with the complexity of developing and managing value-based payment models. This was exacerbated by the difficulty of aligning products and negotiating contracts across multiple lines of business (e.g., Medicare Advantage and commercial products), each of which faces different regulatory and contractual requirements.
- Patient flux tended to be greater in commercial and Medicare Advantage plans than in FFS, which increased challenges for attribution, case-mix adjustment, calculating benchmarks, and evaluating impacts.

Assistance in overcoming these hurdles may be necessary to encourage expanded multi-payer alignment in future models.

1.4 Changes in Cancer Care Delivery, Value-Based Payments, and Outcomes, Concurrent with OCM

The Cancer Care Landscape Changed Concurrent with OCM, While New Treatments Were Introduced

Since the start of OCM in the summer of 2016, advances in cancer care have increased the average cost of treating cancer overall, while also increasing opportunities for substitution of higher-value alternatives within certain drug categories.

Over the course of OCM, there was considerable growth in new cancer therapies: most notably, the therapeutic role of checkpoint inhibitor immunotherapies (e.g., nivolumab, pembrolizumab, and several other related drugs) has expanded greatly in this time. Highlighting this, the American Society of Clinical Oncology (ASCO) named immunotherapy as the Cancer Advance of the Year in both 2016 and 2017.[xxiv] While checkpoint inhibitor immunotherapies were approved for a limited number of indications prior to 2016, the number of approved indications has since expanded and the number of patients eligible to receive these costly but transformative therapies increased dramatically in 2016 and beyond. Even beyond the category of checkpoint inhibitor immunotherapies, the rapid pace of new drug approvals in oncology has continued, with most of these new drug approvals carrying price tags of several thousand dollars per month of treatment. Some notable categories of newer novel cancer therapies include antibody-drug conjugates (e.g., fam-trastuzumab deruxtecan, granted accelerated approval for trastuzumab-refractory metastatic breast cancer in 2019), oral CDK4/6 inhibitors (e.g., palbociclib, granted full Food and Drug Administration approval in 2016 for treatment of hormone receptor-positive metastatic breast cancer) and chimeric antigen receptor (CAR) T-cell therapies for hematologic malignancies (e.g., tisangenlecleucel, first approved in 2017).

As more and more patients become eligible for treatment with new, effective, and costly anti-cancer therapies, Medicare payments during cancer treatment episodes have increased accordingly. On average, TEP at OCM participating practices increased from $29,207 in the 2014–2015 baseline period to $36,190 during the OCM period, representing a 23.9-percent relative increase between these periods. Part B chemotherapy drugs and Part D drugs were the principal drivers of growth in payments during cancer treatment episodes (most Part D payments in cancer treatment episodes were for oral chemotherapy drugs). The share of episode payments for Part B chemotherapy drugs grew from 26 percent to 32 percent of TEP from the baseline to intervention period. The share of Part D payments increased from 23 percent to 29 percent; due to the Part D benefit design, this growth in Part D payments necessarily leads to increased patient out-of-pocket expenditures as well.[xxv] Other payment categories declined in relative share; total Part A acute care payments declined in share of TEP from 22 percent to 16 percent, representing an absolute reduction in per-episode Part A payments. Part B non-chemotherapy payments also declined in share of TEP, from 33 percent to 27 percent (while remaining roughly stable in absolute payments).

RELATED SECTIONS

As shown in Section 2.1, total payments per six-month OCM episode increased substantially (Exhibit 3) and changed in composition (Exhibit 9) over the course of OCM.

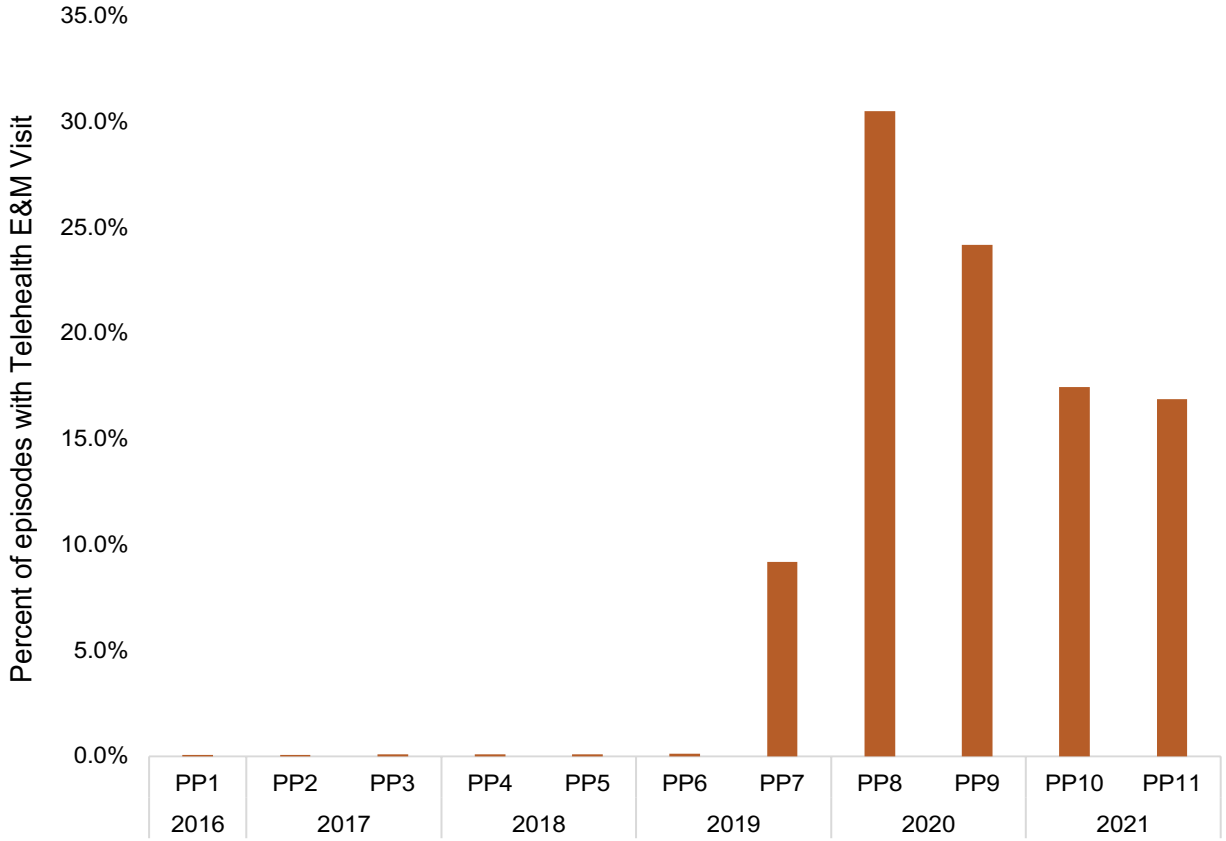
Not all market forces during OCM contributed to growth in cancer payments, as emergence of new generic and biosimilar drugs led to declining payments for certain drug categories during the intervention period. Several biosimilar drugs became available during the intervention period, including biosimilar supportive care medications (e.g., biosimilar versions of the white blood cell growth factors filgrastim and pegfilgrastim) and biosimilar anti-cancer therapies (including biosimilar trastuzumab, rituximab, and bevacizumab). After market equilibration, biosimilar agents are typically priced at a substantial discount to the originator product, and in some cases market entry of biosimilars leads to reduced prices for the originator product as well.[xxvi] Emergence of new generic medications had a significant impact on the price of several commonly used, costly medications, including palonosetron and fosaprepitant (both intravenous anti-nausea medications) and imatinib (an oral targeted therapy used for the treatment of chronic myeloid leukemia).

The COVID-19 PHE was an unanticipated and consequential shock to the cancer care delivery system. In the early "lockdown" phase of the pandemic, outpatient cancer care ground to a temporary halt in many areas—as did routine cancer screening and the diagnostic workups of patients presenting with symptoms of undiagnosed cancer. While cancer care resumed relatively quickly after early lockdowns were lifted, the PHE continued to disrupt cancer care in manifold ways in the second half of 2020 and through the end of OCM. While many early disruptions to the health care system from the COVID-19 pandemic resulted directly from viral infections (e.g., patient and provider illness interrupted scheduled treatments), later disruptions stemmed from health care worker staff shortages and medication shortages.

One of the few "silver linings" of the PHE in cancer care was the emergence of telemedicine as an alternative to in-person provider visits for patients with cancer. The viability of telemedicine was facilitated by changes to regulatory policy that allowed oncology practices to bill for telehealth evaluation and management (E&M) visits with reimbursement on par with an in-person office visit. Use of telemedicine in oncology increased to unprecedented levels during the PHE (Exhibit 2).

While telemedicine use has declined since that initial peak, use of telemedicine in cancer care remains dramatically higher than in the pre-pandemic period, when use was minimal. The precise role of telemedicine in cancer treatment is still being defined; however, it seems likely that telemedicine will have at least some role in care for patients with cancer in the future.[xxvii]

Exhibit 2: Telehealth E&M Visits Were Negligible Before the PHE, and Remained High Through the End of OCM



Source: Medicare claims 2014–2022.
Notes: E&M: Evaluation and management. PHE: Public health emergency. PP: Performance period.

Outside of OCM, Value-Based Payment Programs Increased in Reach While Utilization of Acute and Post-Acute Care Services Declined

In addition to substantial changes in cancer treatment, the eight-year span covered by our evaluation included several substantial changes in the array of incentives faced by providers that deviated from the standard FFS reimbursement structure. For example, national rates of Medicare Advantage enrollment increased from 31 percent in 2014 to 46 percent in 2021.[xxvii] In 2014, the average OCM patient resided in a ZIP code with 27 percent Medicare Advantage penetration, which increased to 40 percent in 2021, with similar increases among comparison group patients.

CMS's Shared Savings Program, the largest CMS accountable care organization (ACO) model, similarly expanded from 338 ACOs serving 4.9 million FFS beneficiaries in 2014 to 477 ACOs serving 10.7 million FFS beneficiaries in 2021. Next Generation ACOs and Direct Contracting Model[7] Entities enrolled hundreds of thousands of additional beneficiaries into accountable care relationships over this period. In terms of direct influence on the Model, 36 percent of episodes initiated by OCM practices in 2014 included a patient attributed to an ACO. This increased to 53 percent of episodes by the end of the Model.

During this time there was also increased coverage of Medicare FFS care by other episode-based payment incentives implemented by CMS for several conditions and procedures that were not directly related to oncology.

[7] The subsequent ACO REACH Model that replaced Direct Contracting did not begin until January 2023, and thus did not overlap with OCM.

The Bundled Payment for Care Improvement (BPCI) Initiative, which covered 1.4 million episodes of acute and post-acute care across hundreds of hospitals and physician group practices in 2013–2018, overlapped with the first two years of OCM. The subsequent BPCI Advanced Model overlapped with the final three years of OCM, enrolling more than 1,000 participating hospitals and physician group practices, and covering more than 1 million episodes of hospital-based care through the end of 2020.

Additionally, of 47 in-person case studies we conducted with OCM practices, roughly two-thirds indicated that they joined OCM, in part, to gain experience operating in a value-based payment environment. The expansion of value-based reimbursement methods has encouraged practices to develop the capabilities required to operate in a value-based environment, a sentiment that has been shared by participants in other CMS models.[xxix]

These changes all incentivize care transformation external to OCM, with particular emphasis on reducing unnecessary and low-value care and improving care quality. The combined influence of these changes may have affected outcomes for both OCM and comparison patients and may have, in some cases, mirrored some of the care transformation that OCM practices undertook to achieve Model goals. Outcomes in the OCM comparison group provide suggestive evidence that some oncology care transformation may be occurring more broadly, driven by factors outside of OCM (though we do not have any direct data on care transformation activities among non-participating practices). For example, in comparison episodes during OCM, the probability of an inpatient admission fell roughly 4 percentage points (much of which occurred prior to the COVID-19 PHE),[8] a decline of nearly 14 percent relative to the baseline average. Similarly, the probability of receiving care in a skilled nursing facility declined 23 percent for comparison episodes during OCM. Even the number of E&M visits declined for comparison episodes during OCM, by roughly 12 percent, indicating fewer physician visits over time as well.

While these changes illustrate the need for a comparison group to capture external trends in outcomes, they also demonstrate the challenge of achieving impacts relative to an environment that is quickly moving away from a pure FFS reimbursement approach.

1.5 OCM Evaluation Approach

The OCM evaluation uses a mixed methods approach incorporating data from many sources to provide a holistic picture of OCM's impact on participating practices, Medicare payments, utilization, quality of care, clinician perceptions, and patient experiences. **Appendix A** provides detailed information on the collection of data from surveys, case studies, secondary data sources and construction of measures.

The OCM evaluation used an intent-to-treat (ITT) approach, meaning that practices that discontinued OCM participation before the end of OCM are still included in the analysis. This design avoids biases that might arise when impact is measured only for those that remain in OCM for its full duration, as these participants are likely to have been the most successful. Therefore, the impacts in this report represent a conservative estimate of effects attributable to OCM.

This report covers the full course of Model performance. We used a difference-in-difference study design to evaluate OCM impact. The strength of this approach is that it accounts for changes in outcomes during the intervention period that are external to OCM (e.g., if new, cheaper drugs become available driving costs down for all chemotherapy episodes nationwide). The comparison group thus serves as a counterfactual for the OCM group in the absence of OCM. The DID design measured whether changes over the course of OCM differed for OCM episodes relative to episodes initiated by a matched comparison group. To construct a matched comparison group, we used propensity score matching to identify physician practices comparable on observable characteristics to those participating in OCM during the baseline period (see **Appendix A.2.5** for more detail).

The intervention period includes all six-month episodes that started on July 1, 2016, through December 31, 2021, and ended by June 29, 2022, at the participating practices and the matched comparison group. The baseline period included the year and a half prior to the start of OCM and comprised episodes that began from July 2, 2014, through January 1, 2016.To ensure no overlap between baseline and intervention episodes, the evaluation omitted episodes that started in the six months prior to the start of OCM. For additional information on the timing of episodes across OCM Performance Periods, see **Appendix Exhibit A-2.**

We conducted sensitivity analyses for selected key outcome measures to confirm that results were robust to adjustments to our empirical design (e.g., switching the control variables included in regression; dropping the two largest OCM practices, which did not have a comparison analog).

Findings from the sensitivity analyses were broadly consistent with the main analyses, increasing our confidence that the estimates in this report reflect real OCM impacts and are not an artifact of the evaluation design (see **Exhibits B-10** and **B-11**).

[8] While these trends accelerated during the COVID-19 PHE, downward trends in admissions, skilled nursing facility use, and E&M visits preceded the PHE, as shown in ***Evaluation Report: Performance Periods 1-5***. This suggests that successful efforts in both OCM and comparison practices may have reduced unnecessary care. Observed declines in other outcomes such as ED visits (down 7 percent) and ICU admissions (down 9 percent) appear to be wholly attributable to the PHE.

Did OCM Lower Medicare Payments and Generate Net Medicare Savings?

CONTEXT AND KEY FINDINGS

A key objective of OCM is to lower Medicare spending while maintaining or improving quality of care. This chapter focuses on OCM's impact on Medicare payments.

OCM reduced total episode payments by 2.1 percent (-$616 per six-month episode).

OCM reduced total episode payments in all performance periods. Reductions increased notably around Performance Period 8, which coincided with a substantial number of OCM practices making changes in risk arrangements.

The relative reduction in total episode payments was driven by savings in higher-risk episodes.

Higher-risk episodes are treatment-intensive and make up two-thirds of all episodes. The largest reductions were observed for breast cancer, lymphoma, lung cancer, and colorectal cancer.

These was no change in payments for lower-risk episodes. These cancers are medically less complex and are typically treated with lower-cost drugs and fewer expensive services. Thus, these episode types may afford practices fewer opportunities to reduce payments and improve value.

Reduced payments for supportive care drugs were a major contributor to payment reductions.

OCM reduced Part B non-chemotherapy drug payments relative to comparison episodes.

This reduction in Part B non-chemotherapy drug payments was largely due to spending on supportive care drugs. Non-chemotherapy drugs make up 9 percent of total episode payments but accounted for over one-third of the overall relative reductions generated by OCM.

OCM had no impact on chemotherapy payments, which were a larger component of spending and were a focus of the model. OCM also had no impact on acute care hospitalization payments, which were the largest contributor to Part A payments.

There were gross reductions in total episode payments in each performance period, but OCM still resulted in net losses through Performance Period 11 due to incentive payouts. Greater payment reductions in recent performance periods came closer to balancing out model payments to participants.

Across 11 performance periods, OCM led to cumulative savings of over $785 million, payouts of over $1.4 billion, and net losses of approximately $639 million. From Performance Periods 3 through 11, OCM generated net losses in both higher-risk and lower-risk episodes. However, higher-risk episodes generated net savings that were sufficient to cover Monthly Enhanced Oncology Services payments in Performance Periods 7 through 11.

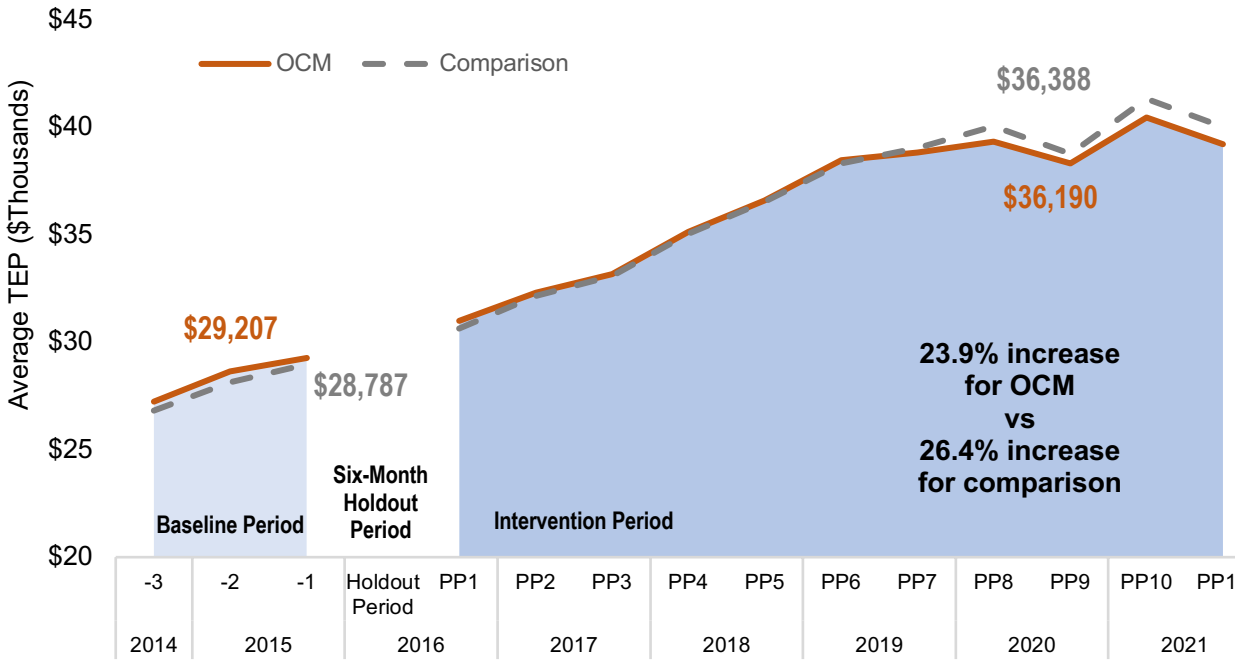
The Oncology Care Model (OCM) aimed to lower Medicare spending while maintaining or improving quality of care. The main measure of Medicare spending used in this evaluation is total episode payments (TEP), which includes total Medicare fee-for-service (FFS) payments attributed to an OCM episode, but not Monthly Enhanced Oncology Services (MEOS) or performance-based payments (PBPs). We conducted difference-in-differences (DID) analyses to assess the impact of OCM on TEP, and which components of Medicare payment (Part A, B, or D) contributed to any relative changes. The DID analyses estimate the OCM impact as the change in average payments between the baseline and intervention periods for OCM episodes, relative to the change in payments for comparison episodes. We also explored whether the OCM impact differed over time across performance periods (PPs) through PP11, by cancer episode risk group, or by individual cancer episode type. We end the chapter with an assessment of whether OCM yielded net reductions or net increases in Medicare spending.

ANALYTIC APPROACH USED TO ASSESS THE IMPACT OF OCM

The analyses in Chapters 2–3 and 5–6 we used difference-in-differences (DID) regression analyses to estimate Model impacts on important payment and utilization outcomes. The DID design quantifies the impact of an intervention by comparing changes in outcomes of OCM episodes to changes in outcomes for episodes in a matched comparison group, from before to after Model implementation. DID estimates can be interpreted as the change attributable to OCM relative to the change that would have occurred in the absence of OCM (i.e., impacts). Given this framework, it is possible to observe substantial changes in OCM outcomes, that we nevertheless interpret as "no impact", if changes in comparison outcomes are similar.

See Appendix A.2.8 for additional detail on the DID analysis framework.

Exhibit 3: OCM Slowed the Increase in Total Episode Payments by $616 or 2.1% Relative to Baseline Payments



Source: Medicare claims 2014–2022.

Notes: To ensure no overlap between baseline and intervention episodes, the evaluation omitted episodes in a six-month hold-out period, including episodes that started from January 2, 2016, through June 30, 2016. TEP: Total episode payment. PP: Performance period.

2.1 OCM Impacts on Payments

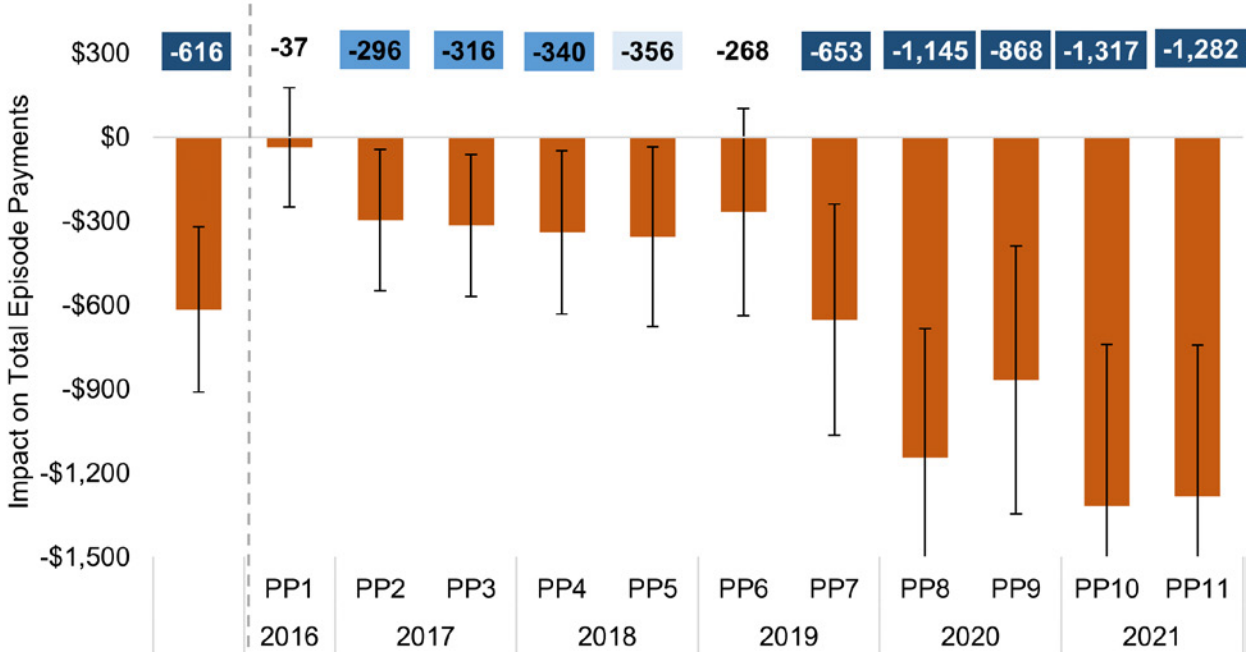
OCM had larger impacts on total episode payments in recent performance periods; reductions were limited to higher-risk episodes.

In the Evaluation Report for PP1–PP9, we showed that, on average, OCM led to a relative reduction in TEP of $499 (1.7 percent). After including the final two PPs in analyses, we found that, across all PPs, OCM reduced TEP by $616 relative to comparison episode payments, or 2.1 percent of baseline—a slightly larger impact.

Exhibit 3 shows the trajectory of episode payments over the baseline and intervention period and illustrates OCM's impact on TEP. During the baseline period, OCM payments exceeded comparison group payments by 1.5 percent: average risk-adjusted TEP for OCM equaled $29,207, while average risk-adjusted TEP for the comparison group equaled $28,787. Payments rose rapidly during the OCM intervention period, for both OCM and comparison episodes of care, but more slowly for OCM episodes. Average risk-adjusted TEP for OCM episodes rose to $36,190 during the OCM intervention period (a 23.9-percent relative increase between the baseline and the intervention periods), while TEP for comparison episodes rose to $36,388 (a 26.4-percent relative increase). TEP for both OCM and comparison episodes peaked in PP10 and declined during PP11. On average, the relative increase in TEP was slightly greater for the comparison group than for OCM, yielding an estimated relative reduction of $616 per episode.

The OCM impact on TEP was larger in the two most recent PPs (PP10–PP11) than in prior PPs (Exhibit 4). While PP2–PP6 had impact estimates ranging from -$268 to -$356, the impact estimates in PP7–PP11 were two to three times larger (ranging from -$653 to -$1,317). The four largest reductions occurred in PP8 or later. This followed periods in which a substantial number of practices changed from one-sided to two-sided risk and other practices opted out of reconciliation entirely, as permitted during the COVID-19 public health emergency (PHE). These savings over the last two years were evident despite our intent-to-treat evaluation design, which included episodes from practices that dropped out of OCM or opted out of reconciliation. Our risk-adjustment method was designed to account for potential differences related to the COVID-19 PHE, by excluding episodes with a COVID-19 diagnosis during the episode from the analysis (consistent with the program rules). For additional detail on the approach used to account for potential bias to our estimates from the COVID-19 PHE, see Appendix A.2.9.

Exhibit 4: The Impact of OCM on Reductions in Total Episode Payments More Than Doubled in Performance Periods 7-11



Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: Whisker bars represent 90% confidence intervals. TEP: Total episode payment. PP: Performance period. PP1 began July 1, 2016. Each subsequent calendar year had two six-month PPs, from January through June, and July through December.

The impact of OCM varied by risk group and cancer type.

OCM impact differed by cancer episode risk group (Exhibit 5). Lower-risk episodes had a slight increase in TEP, while reductions in TEP were concentrated in higher-risk episodes, and specifically in high-risk breast cancer, lung cancer, lymphoma, and colorectal cancer.

HIGHER-RISK AND LOWER-RISK EPISODES:

Cancer is not a single disease, and each type of cancer has different treatments, side effects, costs, and potential for savings. CMS assigns each cancer episode to 1 of 24 cancer types. Twenty-one cancers are considered higher-risk, and episode costs are much higher because treatment typically involves cytotoxic chemotherapy, targeted therapy, and/or immunotherapy, which often have side effects.

The three remaining types of cancer are categorized for OCM as lower-risk (low-intensity prostate cancer, low-risk breast cancer, and low-risk bladder cancer). These cancers are treated with hormonal therapies or local therapies, and patients typically have fewer side effects from their cancer or treatment; episode costs tend to be modest.

For higher-risk OCM and comparison episodes, average TEP increased over time, from the baseline period up through PP6, flattening out in PP7–PP9, and then increasing in PP10, before decreasing in PP11 (Exhibit 6). For lower-risk-episodes, which make up 33 percent of all episodes, TEP was relatively flat throughout the baseline and intervention periods. For both higher- and lower-risk cancers, average TEP was higher for OCM practices than comparison practices in the baseline. For higher-risk cancers, the difference narrowed and then reversed in the intervention period, thereby generating the $898 reduction in TEP, representing -2.2 percent of baseline.

Exhibit 7 breaks out the trajectory of risk-adjusted TEP by PPs for lower- and higher-risk episodes. On average, OCM led to a relative reduction in TEP for higher-risk episodes in all PPs through PP11. Until PP7, relative reductions for higher-risk episodes were approximately $400–600 per episode and increased after PP7. In contrast, for lower-risk episodes, OCM contributed to an average 0.2-percent increase in TEP. Looking at individual PPs, there were small, but statistically significant, relative increases in payments concentrated in PP2–PP4. From PP8 through PP11, TEP was slightly lower for lower-risk OCM episodes relative to comparison episodes, and the impact was statistically significant for the last two PPs (PP10 and PP11). Relative to higher-risk cancers, lower-risk cancers are medically less complex and typically treated with lower-cost drugs and fewer expensive services, and thus there may be fewer opportunities for savings. The savings in later PPs suggest practices may have identified opportunities for savings by the end of OCM.

Exhibit 5: OCM Reduced Total Episode Payments for Higher-Risk Episodes But Not for Lower-Risk Episodes, PP1–PP11

Episode Group	PP1–PP11 OCM Impact on TEP Relative to Comparison Group	Size of Impact
All episodes	$616 reduction	-2.1% of baseline
Higher-risk episodes	$898 reduction	-2.2% of baseline
Lower-risk episodes	$18 increase	+0.2% of baseline

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: TEP: Total episode payment. PP: Performance period.

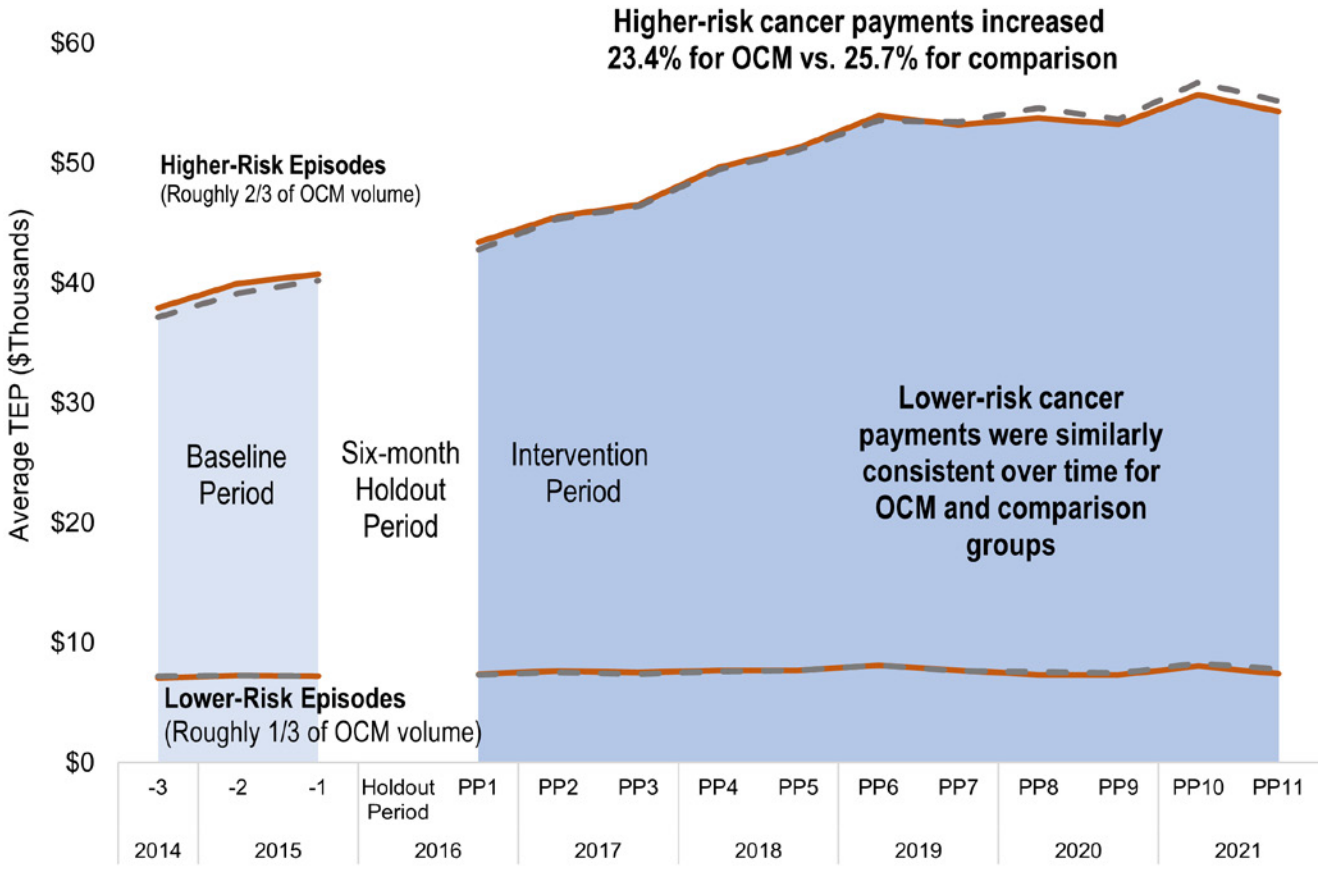
The relative reduction in total episode payments was concentrated in episodes for high-risk breast cancer, lymphoma, lung cancer, and colorectal cancer.

The significant relative reduction in TEP by episode cancer type was concentrated in four high-risk cancer bundles (high-risk breast cancer, lung cancer, lymphoma, and colorectal cancer) (Exhibit 8). These cancers collectively accounted for approximately 30 percent of all episodes and approximately 45 percent of higher-risk episodes through PP11.

OCM impact on Medicare payments varied across Part A, Part B, and Part D.

TEP includes payments for hospital inpatient and outpatient services, chemotherapy and non-chemotherapy drugs, physician services, diagnostic testing, and various ancillary services. These are paid by Medicare under Part A, Part B, and Part D. We assessed the impact of OCM payments across these Medicare parts to understand the underlying drivers behind observed reductions in payments. Section 3.1 reports on changes in the use of select services that are covered under each of the Medicare payment Parts A and B.

Exhibit 6: OCM Reduced Total Episode Payments for Higher-Risk Episodes But Not for Lower-Risk Episodes, PP1–PP11



Source: Medicare claims 2014–2022.

Notes: To ensure no overlap between baseline and intervention episodes, the evaluation omitted episodes in a six-month hold-out period, including episodes that started from January 2, 2016, through June 30, 2016. PP: Performance period. TEP: Total episode payment.

Exhibit 9 presents the share of Medicare spending by Part A, Part B, and Part D components, for OCM in the baseline and intervention periods. TEP increased cumulatively by 23.9 percent for OCM episodes and by 26.4 percent for comparison episodes between the baseline and intervention periods (PP1–PP11). Overall results include the following, with a detailed discussion in the sections below:

Part B payments represent the largest portion of TEP, accounting for approximately 60 percent of overall TEP. The overall share of Part B payments remained relatively consistent at around 60% over the evaluation period for OCM and comparison episodes, while different payment components within Part B shifted. Most notably, payments for Part B chemotherapy drugs rose substantially for both OCM episodes and comparison episodes, rising from 26 percent of TEP in baseline to 32 percent for OCM in the intervention period and from 26 percent of TEP at baseline to 40 percent for comparison payments in the intervention period.

Part D expenditures rose from approximately 23 percent of TEP during the baseline to 29 percent during the intervention period for both OCM and comparison practices.

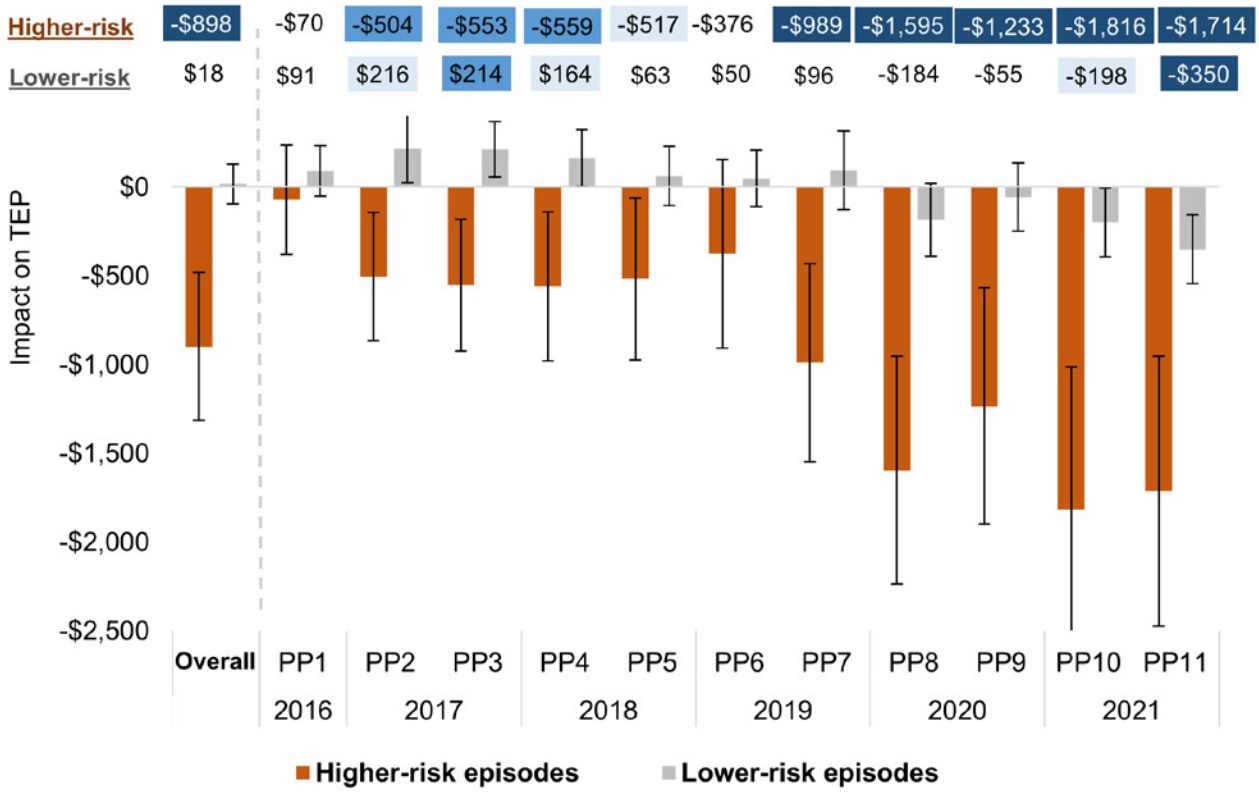
Part A payments declined both in absolute dollar terms and as a share of TEP. Part A payments declined from approximately 22 percent of episode cost in the baseline period to 16 percent during the intervention period for both OCM and comparison practices.

Exhibit 10 shows the estimated impact of OCM on Part A, Part B, and Part D payments for PP1–PP11.

INSIGHT FROM THE FIELD

In case studies, OCM practices reported they were focusing on reducing preventable emergency department visits that could, in turn, generate savings on hospitalizations. While acute-care hospitalization payments fell over the intervention period, they fell for both OCM and comparison practices, and the decline among OCM practices was no greater. Instead, the relative reductions in Part A payments observed for OCM practices were primarily attributed to Other Inpatient Payments (Appendix Exhibit B-3).

Exhibit 7: Relative Reductions in Total Episode Payments Were Driven by Higher-Risk Episodes; Impact Grew Larger in Performance Periods 7-11



Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: Whisker bars represent 90% confidence intervals. TEP: Total episode payment. PP: Performance period. PP1 began July 1, 2016. Each subsequent calendar year had two six-month PPs, from January through June, and July through December.

OCM had a small impact on Part A payments.

On average, OCM led to a reduction of $176 per episode in Part A payments. This statistically significant relative reduction represents 2.8 percent of OCM baseline Part A average payments. Part A payments include payments for inpatient admissions, institutional post-acute care, and certain types of home health care. Inpatient admissions comprise the largest component of Part A payments, but OCM had no impact on payments for inpatient admissions.

OCM led to a small relative reduction in Part B payments, driven by changes in non-chemotherapy drug payments.

OCM Part B payments declined relative to comparison payments by $340 per episode, representing 2 percent of the OCM baseline average value for Part B payments.

The relative reductions in Part B payments were concentrated in Part B non-chemotherapy drugs, which are typically used for supportive care during cancer treatment, for example, antiemetic medications to prevent nausea or white blood cell growth factors to prevent neutropenia (Exhibit 11). There were no significant changes in Part B chemotherapy payments, evaluation and management payments, lab, or radiation therapy payments despite opportunities to improve value under OCM.

Non-chemotherapy drugs made up 9 percent of total episode payments but accounted for just under half of the overall relative reductions generated by OCM.

The evaluation investigated how OCM created clinical opportunities to improve value in the number and types of supportive care drugs prescribed to patients. OCM practices increased their use of less costly white blood cell growth factors and bone-modifying agents relative to the comparison group, as described in Chapter 6 below. These shifts in use of supportive care drugs could explain the relative reductions observed in Part B non-chemotherapy spending.

RELATED SECTIONS

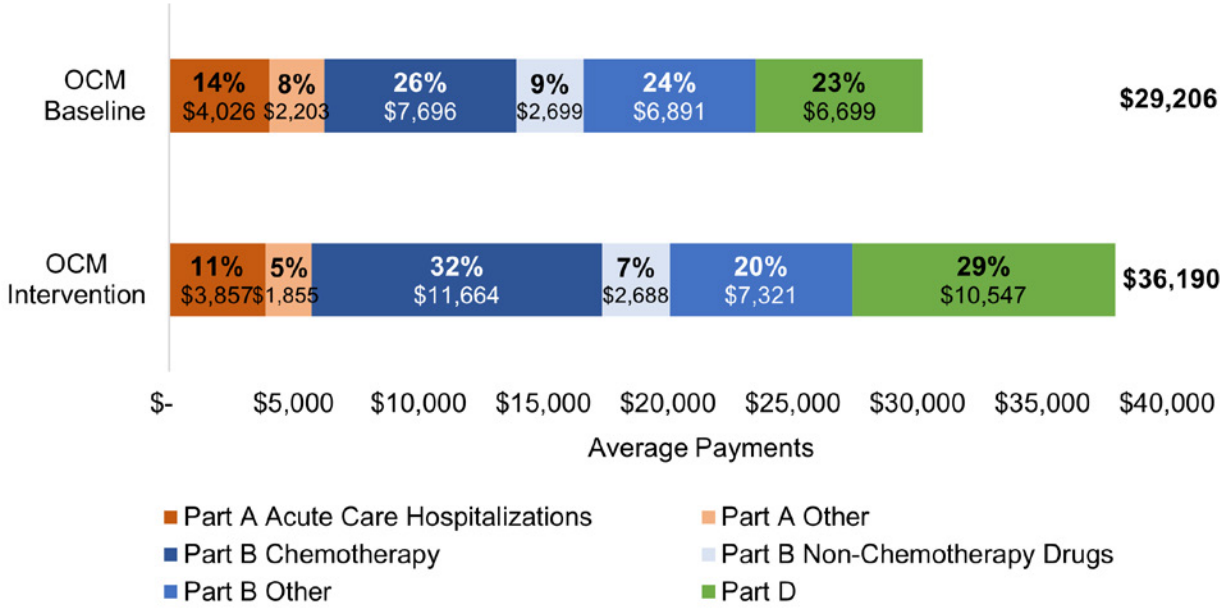
See Section 6.1 for more about use of bone-modifying agents, Section 6.2 for more about use of antiemetic medications, and Section 6.3 for more about use of white blood cell growth factors.

Exhibit 8: Four Higher-Risk Episode Types Generated the Largest Reductions in Total Episode Payments

Episode type	Number of Episodes		Impact Estimates	
	OCM	COMP	Estimated OCM Impact	Percent Change Relative to Baseline
Low-risk breast cancer	410,791	417,544	-$22	-0.4%
High-risk breast cancer	175,823	174,238	-$1,367	-3.8%
Low-intensity prostate cancer	145,974	215,930	-$45	-0.4%
Lung cancer	162,906	171,530	-$1,217	-3.1%
Lymphoma	100,418	99,393	-$1,704	-3.8%
Colorectal cancer	90,598	94,206	-$1,482	-4.1%
Multiple myeloma	106,252	109,443	-$477	-0.9%
Non-reconciliation eligible cancers	88,398	117,909	-$178	-0.5%
High-intensity prostate cancer	71,769	84,537	-$728	-1.7%
Chronic leukemia	61,152	62,890	$128	0.3%

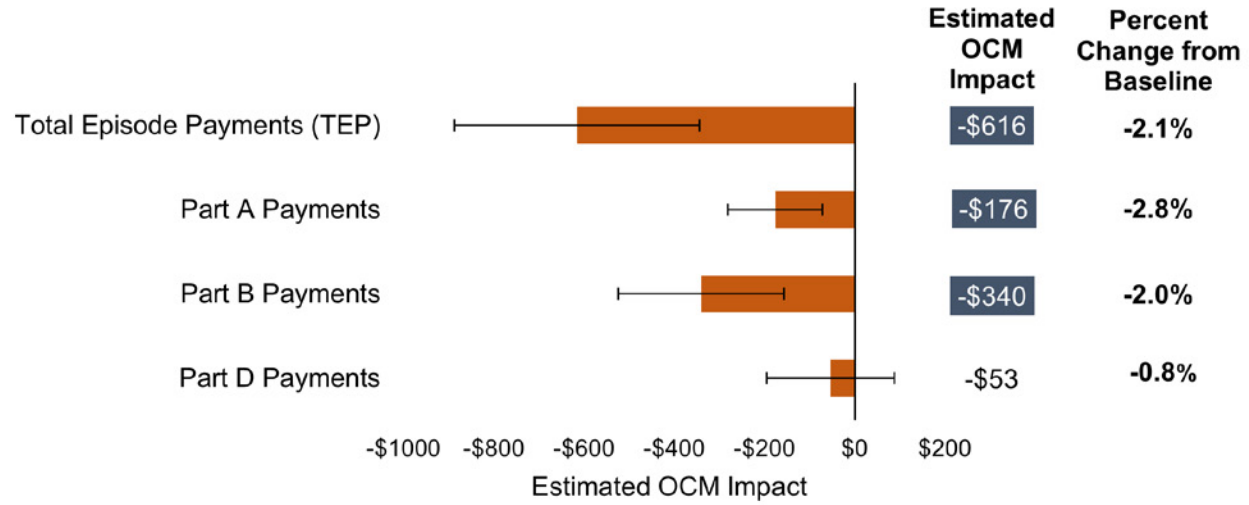
Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: Episode types are ordered from most to fewest OCM episodes. OCM: OCM intervention group. COMP: Comparison group.

Exhibit 9: Part B and Part D Drug Spending Drove the Growth in Payments Between the Baseline and Intervention Periods



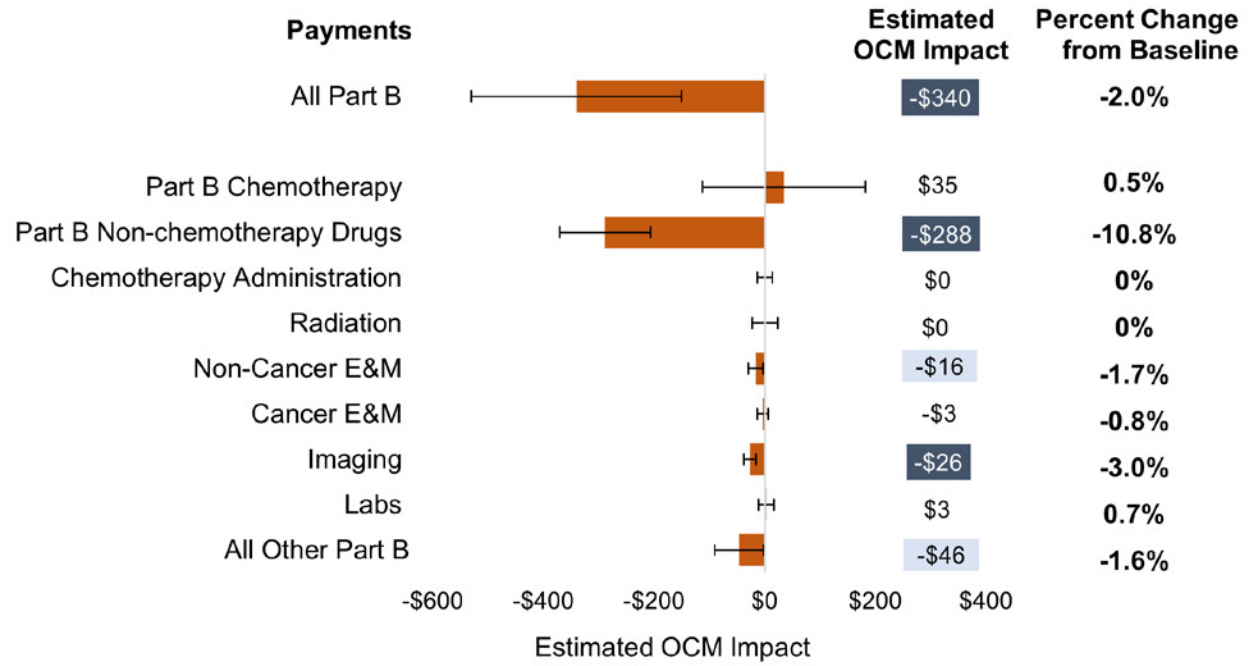
Source: Medicare claims 2014–2022.
Notes: See Appendix Exhibit B-5 for breakout of TEP categories for higher/lower-risk cancer types. All values are risk-adjusted. Part A Other includes:other inpatient hospital payments, skilled nursing facility payments, home health payments, inpatient rehab facility payments, long-term care facility payments, and hospice payments. Part B Other includes: chemotherapy administration payments, radiation payments, non-cancer evaluation and management (E&M) payments, cancer E&M payments, imaging payments, lab payments, and other Part B non-institutional payments without Monthly Enhanced Oncology Services.

Exhibit 10: OCM Led to a Relative Reduction in Part A and Part B



Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: Whisker bars represent 90% confidence intervals.

Exhibit 11: Reductions in Part B Payments Were Concentrated in Non-Chemotherapy Drugs



Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: Whisker bars represent 90% confidence intervals. E&M: Evaluation and management.

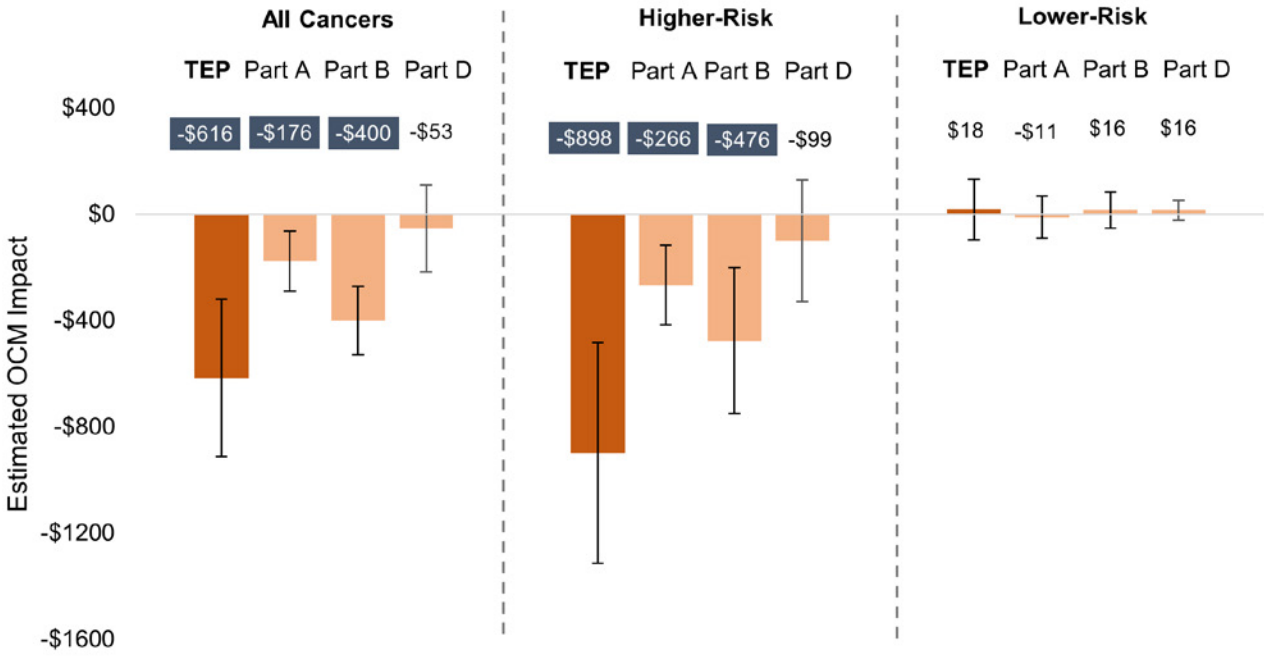
OCM had no impact on Part D payments.

Together with Part B chemotherapy drugs, Part D drugs contributed significantly to the overall growth in TEP. On average, OCM and comparison episodes show similar increases in Part D payments over the course of the evaluation period, with no significant impacts of OCM on Part D payments overall. However, as shown in Appendix Exhibit B-2, there was a marked change in PP8– PP11, when Part D spending increased less in OCM episodes than in comparisons by $140–$270 per episode.

Higher-risk episodes drove observed changes in Part A and Part B spending.

Exhibit 12 breaks out OCM's impact on Part A, B, and D spending by higher- and lower-risk episodes. The pattern of greater relative reductions in TEP among higher-risk episodes is similar when analyzing Part, A, Part B, and Part D as individual components of TEP. The observed reductions in total Medicare payments from OCM were driven almost entirely by reductions in payments in higher-risk episodes. OCM reduced Part A payments

Exhibit 12: OCM Reduced Part A and Part B Payments; Reductions Were Driven by Higher-Risk Episodes



Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: Whisker bars represent 90% confidence intervals. TEP: Total episode payment.

among higher-risk cancers by $266 (versus $176 overall) and Part B payments by $476 (versus $400 overall). There remained no impact on Part D for either higher- or lower-risk episodes overall.

2.2 Payment Impacts Among Chemotherapy and Non-Chemotherapy Drugs

Non-chemotherapy drugs drove reductions in Part B payments.

Non-chemotherapy drugs drove reductions in Part B payments overall and for higher-risk episodes. This reduction was particularly pronounced for four common higher-risk episode cancer types: high-risk breast cancer, lung cancer, colorectal cancer, and high-intensity prostate cancer (Exhibit 13). This effect is consistent with our understanding of where OCM practices perceived opportunities to change prescribing patterns for higher-value use of non-chemotherapy supportive care drugs. That is, given a fixed level of effort to redesign care for a given cancer, returns in the form of cumulative savings will be larger for higher-volume cancers than for lower-volume cancers.

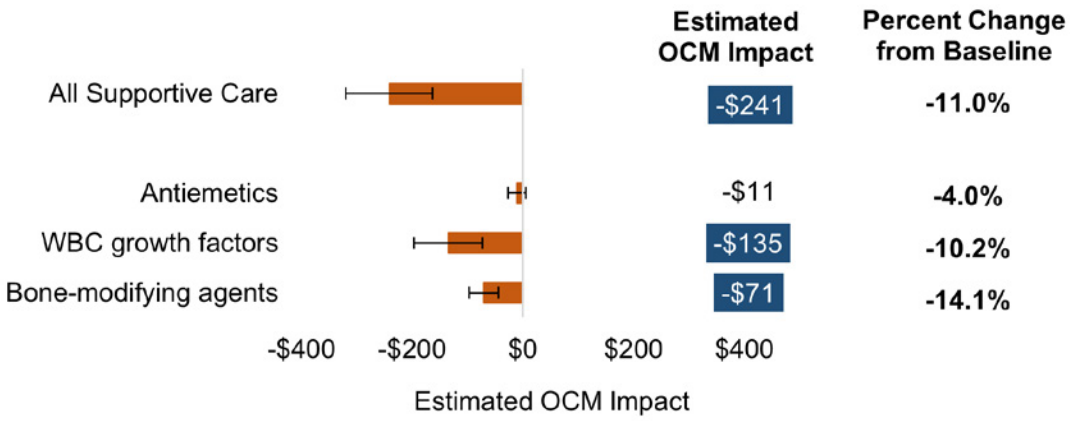
Part B non-chemotherapy drug payments accounted for most of the observed relative reductions in Part B spending. Yet, non-chemotherapy drugs comprised only 7–9 percent of the overall TEP for OCM practices. As noted above, OCM has not led to reductions in payments for chemotherapy drugs (see Appendix B.1.2 for additional findings for

Exhibit 13: Payments for Non-Chemotherapy Drugs Drove Part B Payment Reductions

Subgroup	Estimated OCM Impacts Through PP11		
	Part B Payments	Part B Chemo Payments	Part B Non-Chemo Drug Payments
All cancers	-$340	$35	-$288
All higher-risk cancers	-$476	$99	-$423
High-risk breast cancer	-$1092	-$512	-$451
Lung cancer	-$622	$132	-$512
Colorectal cancer	-$1273	-$21	-$818
High-intensity prostate cancer	-$934	-$257	-$626

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: PP: Performance period.

Exhibit 14: OCM Reduced Payments for White Blood Cell Growth Factors and Bone-Modifying Agents



Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: Whisker bars represent 90% confidence intervals. WBC: White blood cell.

higher- and lower-risk episodes). The lone exception was high-risk breast cancer, as shown in Exhibit 13 above.

Consistent with findings in prior OCM Evaluation reports, most of the savings in Part B non-chemotherapy drug payments came from supportive care drugs. As shown in Exhibit 14, reductions in supportive care drugs accounted for $241 of the $288 reduction in Part B non-chemotherapy drug payments ($p<0.01$). The biggest contributors to this effect were reductions in payments for white blood cell growth factors and bone-modifying agents, which saw reductions of $135 ($p<0.01$) and $71 ($p<0.01$) respectively. These reductions are consistent with observed substitutions toward higher-value use of supportive care drugs, which are reported in **Sections** 6.3 and 6.1.

2.3 Net Impact on Medicare Spending

To measure the change in net payments, we calculated net costs to Medicare as follows[9]:

Net Costs to Medicare = (number of OCM episodes x estimated OCM impact on TEP) + MEOS Expenditures + PBP

We calculated net savings or losses to Medicare over the life of the Model (PP1 through PP11). We also examined whether savings generated from TEP reductions covered the costs of MEOS (excluding PBPs) for higher- and lower-risk cancers.

Overall, OCM led to average TEP reductions equal to $616 per OCM episode, generating gross savings to Medicare. However, after accounting for MEOS payments and PBPs, OCM resulted in net losses to Medicare.

Cumulatively, from PP1 through PP11, total payments on OCM episodes of care fell by roughly $785 million. MEOS payments plus PBPs equaled roughly $1.4 billion, yielding a net cumulative increase in Medicare payments of approximately $639 million, or $473 per episode.

OCM resulted in net losses to Medicare in every performance period, but larger reductions in TEP reduced net payouts in later performance periods.

Medicare incurred net losses in each PP, although individual PP losses were smaller in later periods than in earlier periods and decreased substantially in the last period, from $30.8 million in PP10 to $1.3 million in PP11. The magnitude of the respective cost components—TEP, MEOS, PBPs—varied over time (Exhibit 15).

RELATED SECTIONS

CMS held practices accountable for quality of care by calculating an Aggregate Quality Score (AQS) using several quality measures. See Section 4.2 for more about changes in AQS performance over time and implications for PBPs.

Driven by larger estimated savings in TEP, gross Medicare payment reductions increased over time, from approximately $5 million in PP1 to $127 million in PP11.

OCM incentive payments (MEOS and PBPs) exceeded $100 million in all PPs, and exceeded $150 million in PP8–PP10:

[9] The gross change in Medicare payments was calculated by multiplying the number of OCM episodes by the estimated impact of OCM on TEP. We refer to the gross change in payments as gross Medicare savings (or losses). MEOS payments and PBPs are obtained from the CMS OCM program data. The number of OCM episodes is also taken from program data. Net Medicare savings (or losses) is the sum of gross Medicare savings (losses), PBPs, and MEOS payments.

- Medicare's costs associated with MEOS payments trended downward from $99M in PP1 to $49M in PP11, as participation declined over time, leaving fewer episodes covered by MEOS.
- Medicare's costs associated with PBPs to practices in each PP were between $14M and $32M in PP1–PP7. However, in PP8–P11, PBPs increased sharply to between $74M and $95M, likely due to selection effects introduced by the program changes discussed in Section 1.2.

Net costs (defined as the sum of TEP savings plus the cost of MEOS and PBP payments) were largest in PP1 when net costs increased by $108M ($775 per episode). Net losses were smallest in PP11,when payment reductions were large and incentive payments were declining: in this period, net costs were only $13 per episode (roughly $1 million in total).

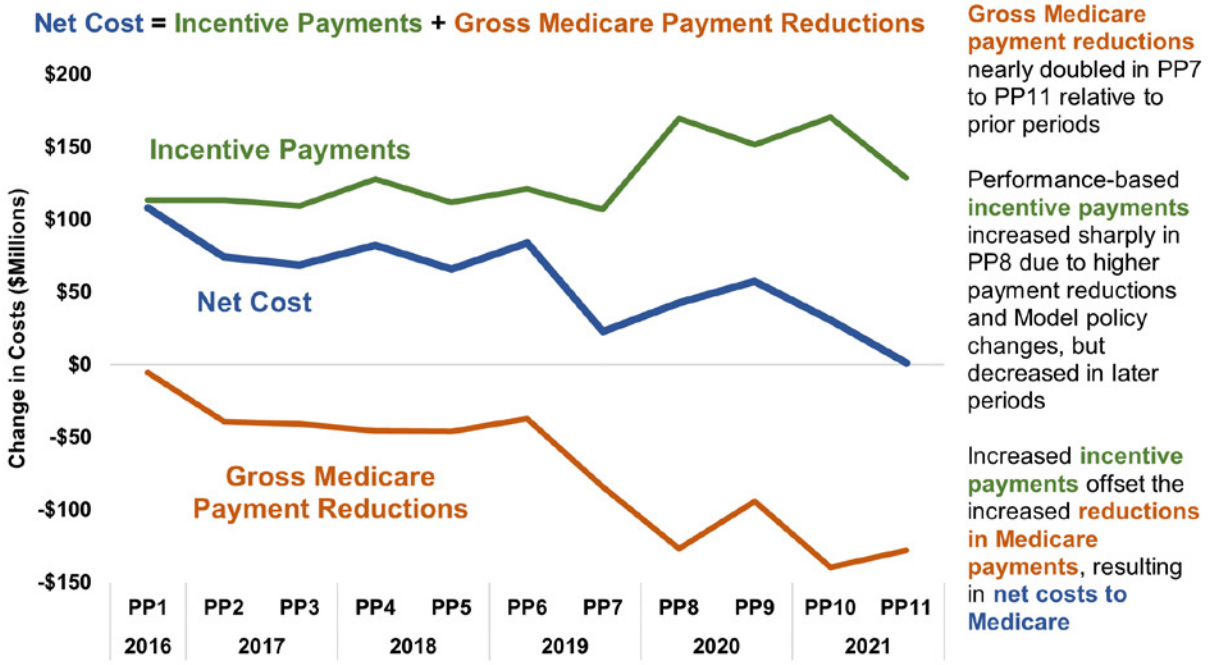
Savings on higher-risk cancer episodes covered the cost of monthly payments in Performance Periods 7-11; in Performance Periods 3-6, monthly payments exceeded episode savings.

OCM generated larger relative reductions in TEP for higher-risk than for lower-risk cancer episodes (see Section 2.1). It is not possible to fully break down Medicare savings and losses by cancer type, since MEOS is paid for individual episodes, but PBPs are earned by the practice. Allocating PBPs to individual episodes would require assumptions that cannot be substantiated in the context of this evaluation. However, we examined whether TEP savings were sufficient to cover the cost of MEOS alone. (See Appendix B.1.3 for detailed findings.)

For higher-risk episodes, OCM resulted in TEP savings in each period in PP3–PP11. In some PPs, these savings were sufficient to cover MEOS. In PP3–PP6, MEOS payments exceeded TEP savings, and Medicare payments rose between $185 (PP3) and $336 (PP6) per episode. Reductions in TEP became large enough to offset MEOS payments from PP7 through PP11 (ranging from $311 to $1,172 per episode).

For lower-risk episodes, MEOS payments were not covered by changes in TEP in any PPs despite some evidence of TEP reductions in the final two years of the Model. On average, in PP3–PP7, the combined effect of TEP increases and MEOS payments increased Medicare payments $737 per episode. In PP8–PP11, OCM led to an estimated reduction in TEP for lower-risk episodes (ranging from $55 to $350), but this was still insufficient to cover MEOS. On average, MEOS payments exceeded lower-risk TEP savings by $392 per episode in PP8–PP11.

Exhibit 15: Despite Gross Payment Reductions, OCM Resulted in Net Costs to Medicare in Every Performance Period After Accounting for Monthly and Performance-Based Payments



Source: Medicare claims 2014–2022 and OCM program data.

Notes: PP: Performance period. Incentive payments included $160 per-beneficiary in Monthly Enhanced Oncology Services payments, as well as performance-based payments for achieving payment and quality thresholds. Gross payment reductions were equal to the average reduction in total episode payments multiplied by the total number of episodes.

2.4 Discussion

Average TEP increased substantially from the baseline through the first three and a half years of the intervention period, and this growth began plateauing simultaneously with the start of the COVID-19 PHE. The pattern of growth in TEP occurred in both OCM and comparison episodes and was driven almost entirely by increases in Part B chemotherapy and Part D drug payments. However, OCM slowed this increase by $616, or 2.1 percent. These reductions were limited to higher-risk cancers, with statistically significant reductions occurring for four cancer types comprising 30 percent of all OCM episodes: high-risk breast cancer, lung cancer, lymphoma, and colorectal cancer.

Payment reductions in OCM episodes were largely driven by changes in spending on supportive care drugs. Although only 9 percent of TEP were for non-chemotherapy drugs, almost half of the reductions in TEP were attributable to payment reductions for these drugs. Significant reductions in Part A payments accounted for the remainder of TEP reductions. Although Part B chemotherapy drugs and Part D drugs constitute the largest categories of TEP, OCM did not have a significant impact on payments for either category of drugs.

OCM achieved significant TEP reductions in 9 of the 11 PPs, and reductions in PP7–11 were double or triple the size of reductions in the preceding PPs. Despite this, OCM yielded net losses to Medicare in each of the 11 PPs, totaling $639 million cumulatively. Net losses in PP8 were primarily due to a sharp uptick in PBP, likely caused by selection effects resulting from program changes.

As shown in **Exhibit 1** in **Chapter 1**, some practices began taking two-sided risk mid-way through OCM, while other practices chose to opt out of the OCM PBPs starting in PP8 (which was allowed under the COVID-19 PHE flexibilities) or terminated their participation in OCM prior to the end of the Model; these trends had implications for the change in net payments attributed to OCM. Forty-eight of the practices that continued participation in PP8 would have been required to take on two-sided risk in the absence of the COVID-19 PHE flexibilities. However, 29 of these practices opted out of reconciliation but remained in the Model. Of the 29 practices that opted out, none had PBPs by PP4, and only four had earned a PBP by PP7. In contrast, of 21 practices that took two-sided risk in PP8, 10 had earned at least one PBP by PP4, and all but one had earned a PBP by PP7. OCM participation and risk arrangements continued similarly in PP10 and PP11, although a handful of practices terminated their OCM participation in PP10.

This result suggests that practices that would otherwise have left the Model or faced the possibility of owing recoupment payments to CMS instead continued to collect MEOS payments with limited promise of reducing TEP. At the same time, previously successful practices, which tended to have more OCM episodes on average, faced more favorable target prices under two-sided risk. Target prices that were easier to achieve, combined with higher episode volumes, meant higher earnings potential for these practices relative to those that remained under one-sided risk. Moreover, in the early phases of the COVID-19 PHE, these practices were more easily able to meet quality thresholds due to system-wide reductions in emergency department visits, and program rules allowing voluntary submission of practice-reported quality measures. Selection of certain practices into two-sided risk, combined with higher potential earnings and easier quality achievements, is the most likely explanation for the large increase in PBP in PP8, which continued through PP11, offsetting increased reductions in TEP.

Gross savings for higher-risk cancer episodes covered the cost of MEOS alone (not PBPs) in PP7–PP11. The forthcoming Enhancing Oncology Model (EOM) focuses on seven cancer types that tend to have higher risk of side effects and higher episode costs than the lower-risk cancers included in OCM. These results hold some promise that EOM will achieve net Medicare savings, particularly given EOM's lower MEOS payments relative to OCM, and mandatory two-sided risk.

Did OCM Affect Service Use Pattern?

CONTEXT AND KEY FINDINGS

OCM aimed to improve care coordination and quality of care. If effective, these changes would also impact service use.

OCM significantly reduced use of some types of hospital-based care.

OCM led to small but significant relative reductions in the likelihood of an emergency department (ED) visit resulting in a hospital admission, driven by high-risk episodes. However, OCM had no overall impact on the probability of having an ED visit not resulting in a hospital admission, the probability of an inpatient stay, or the probability of having an intensive care unit admission.

OCM mostly did not affect outpatient and post-acute service use.

OCM had no significant impact on the use of skilled nursing facilities or radiation therapy services. OCM led to a relative decrease in the likelihood of receiving a home health service for high-risk episodes.

OCM did not affect measures of end-of-life care.

OCM did not impact hospitalizations, ED visits, receipt of chemotherapy, or use of hospice care in beneficiaries' last weeks of life.

OCM had no clinically meaningful impacts on chemotherapy-associated ED visits among higher-risk episodes.

The Oncology Care Model (OCM) aimed to provide higher-quality and better-coordinated oncology care, compared with usual care. Key OCM components included increasing 24/7 access to clinical advice, using care coordinators and patient navigators, providing patient education, and relying on evidence-based methods to deliver effective and timely care. The care delivery reforms encouraged by OCM were hypothesized to affect service use patterns. For example, better care coordination may lead to reductions in hospitalizations or emergency department (ED) visits.

This chapter reviews OCM impacts on health care use, including use of acute care services (ED visits or inpatient admissions), post-acute care, and other outpatient services (e.g., physician visits, medical imaging, etc., but excluding any Part B drug use). We also assessed impacts on care received at the end of life for patients who died during or within 90 days after an episode.

Different measures of hospital care and post-acute care are inextricably linked. For example, reductions in readmissions through better post-discharge care coordination may also manifest as reductions in intensive care unit (ICU) stays. Changes in the use of inpatient services will also have downstream effects on use of post-acute care, even if OCM did not directly affect post-acute services. Therefore, while findings across multiple measures represent distinct impacts of OCM, they may also represent common impacts captured from multiple different perspectives.

3.1 Inpatient Service and ED Use

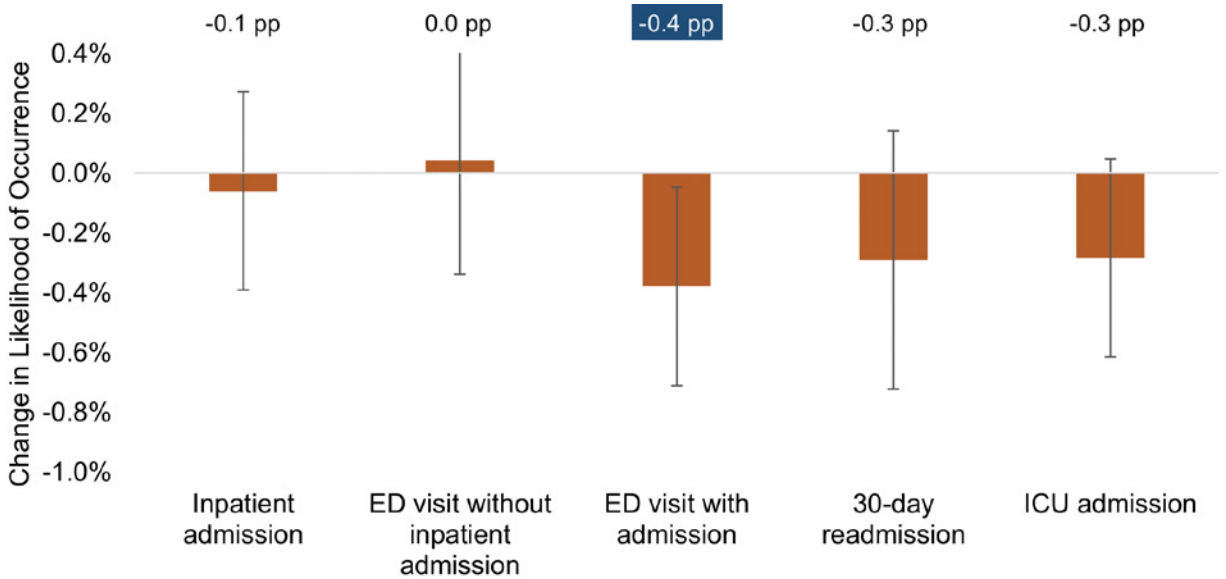
OCM significantly reduced the likelihood of ED visits that resulted in hospital admissions but did not affect ED visits that did not result in a hospital admission,[10] nor the overall likelihood of admission.

OCM led to a small, statistically significant reduction in the likelihood of an ED visit that resulted in an inpatient stay, both overall (Exhibit 16) and for higher-risk episodes (Appendix Exhibit B-12). The likelihood of having at least one ED visit that resulted in an inpatient stay was 21.3 percent at baseline. OCM led to a relative reduction of 0.4 percentage point ($p<0.10$), or 1.8 percent. OCM had no effect on ED visits that did not result in an inpatient stay (Exhibit 16).

INSIGHT FROM THE FIELD

Although OCM had little overall impact on use of emergency department visits, some practices nonetheless spoke about their efforts to reduce avoidable ED visits and hospitalizations during case studies. For example, at one practice, interviewees reported that they were working on reducing ED visits and hospitalizations prior to OCM, but that participation in OCM renewed that effort by implementing new approaches such as increasing use of ambulatory care. An oncologist at the practice reported that "the push to see our patients here as opposed to sending them to the ED was facilitated by OCM."

Exhibit 16: OCM Led to a Reduction in the Likelihood of ED Visits that Resulted in an Inpatient Stay



Shading indicates statistically significant estimates at $p \leq 0.01$, $p \leq 0.05$, and $p \leq 0.10$, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: Whisker bars represent 90% confidence intervals. ED: Emergency department. ICU: Intensive Care Unit.

[10] Consistent with the definition of the quality measures OCM-2, our measure of ED visits that did not lead to an inpatient admission also includes observation stays.

Since OCM did not reduce overall inpatient admissions, this finding suggests that OCM was facilitating direct patient admission without intervening ED visits, when patients required admission to the hospital. OCM practices commented that reducing these often "avoidable" ED visits was also a goal of care management. While rates declined for ED visits that did not result in an inpatient stay, the reduction was similar in OCM and comparison episodes. We found no statistically significant differences in the likelihood of inpatient admissions between the OCM and comparison groups, overall, or among lower- and higher-risk episodes (Appendix Exhibit B-12). OCM also had no effect on the likelihood of an ICU admission among all patients or among lower- and higher-risk episodes. We report results for ED visits stratified by cancer type in Appendix Exhibits B-13—B-15.

3.2 Post-Acute Care and Outpatient Service Use

OCM's impact on outpatient service use varied.

In general, use of post-acute care (**Appendix Exhibit B-17**) and outpatient services (Appendix Exhibit B-18—Exhibit B-19) was largely unchanged by OCM. Outpatient services were a relatively small share of episode payments (see Chapter 2). Subgroup analyses found some impacts among higher-risk episodes. Key results include:

OCM IMPACTS AND CHANGES IN OUTCOMES

Our DID evaluation framework compares changes among OCM episodes from before to after OCM began, to similar changes among comparison episodes. While a lack of impacts can signify that there were no changes in outcomes among OCM episodes, a conclusion of no impact can also indicate that the OCM and comparison groups achieved similar changes over time. Changes among OCM and comparison episodes are reported separate in Appendix B.

OCM had no impact on the likelihood of receiving home health services overall, but **there was a small, statistically significant reduction in the likelihood of receiving home health services for higher-risk cancer episodes.**

OCM had no impact on overall episodes or among lower- and higher-risk episodes for the likelihood of a skilled nursing facility stay or for the likelihood of receiving radiation therapy services.

OCM led to **a small, statistically significant reduction in the number of standard imaging services relative to comparison episodes**.[11] The result was driven by higher-risk episodes, notably lymphoma and colorectal cancer. Across all episodes, the decline amounted to 1.8 percent of baseline values ($p<0.01$). The decline was 3.7 percent of baseline for colorectal cancer ($p<0.05$), and 3.1 percent of baseline for lymphoma ($p<0.05$).

OCM had no impact on the number of advanced imaging services across all episodes.

OCM had no impact on overall or cancer-related evaluation and management visits.

OCM had no impact on radiation therapy services.

3.3 Service Use at End of Life

Sections 3.1 and 3.2 evaluated impacts for all OCM episodes. In this section, we limit the analysis to episodes in which the patient died during the episode or within 90 days of the end date of their final episode, in order to assess service use at end of life.

OCM had no impact on measures of high-intensity care or use of hospice care during deceased patients' last weeks of life.[12]

In *Evaluation of the Oncology Care Model: Performance Periods 1–3*, we described care transformation activities that many OCM practices implemented, including hiring palliative care specialists and enhancing access to palliative care, encouraging patients to engage in advance care planning, and documenting patient wishes and proxy decision makers.

Despite the efforts practices described to improve care at the end of life, impacts for end-of-life measures were not statistically significant (see Appendix Exhibits B-19 and B-20). OCM had no impact on inpatient admissions in the last 30 days of life, the occurrence of two or more visits in the last 30 days of life, occurrence of an ICU stay in the last 30 days of life, or use of chemotherapy in the last two weeks of life.

One of the quality measures that CMS used to adjust performance-based payments is hospice care enrollment at least three days before death. Despite this focus, OCM had no impact on use, duration, or timing of hospice care among deceased OCM patients (Appendix Exhibit B-20).

3.4 Chemotherapy-Related Hospitalizations and ED Visits

Among higher-risk episodes, OCM had no clinically meaningful impact on chemotherapy-associated hospitalizations.

For patients with higher-risk episodes, side effects of toxic chemotherapy are a leading cause of ED visits and

[11] Standard imaging includes services like X-Rays and echography. Imaging techniques like computerized tomography (CT) scans or magnetic resonance imaging (MRI) are classified as advanced imaging.

[12] Claims-based end-of-life results are at the beneficiary level and not the episode level, because death is a non-recurring event.

hospitalizations. In the *Evaluation of the Oncology Care Model: Performance Periods 1–5* report, we described how many OCM practices had adopted systematic approaches and tools to identify patients undergoing especially toxic treatments and support them in the outpatient clinic setting.

Despite these efforts, OCM had no impact on the likelihood of any chemotherapy-related hospitalization among high-risk episodes through Performance Period 11. As shown in **Exhibit 17**, OCM led to a slight 0.2-percentage point relative reduction ($p<0.10$) in the likelihood of any chemotherapy-related outpatient ED visit without a hospital admission. This equates to roughly two ED visits avoided for every 1000 patient episodes.

3.5 Discussion

OCM practices had strong financial incentives to avoid costly hospitalizations and ED visits. They were also held accountable for ED visits that did not lead to hospitalization as part of the Model quality measures. Care redesign activities required by the Model, including patient navigation and care coordination, aimed to facilitate use of appropriate outpatient care outside of the acute setting. Insights from case studies confirmed that reducing hospital-based care was a key emphasis of care delivery redesign under OCM for many practices: as noted in Section 4.1 below, surveys of OCM clinicians indicated that practices made several process changes intended to help pre-empt costly ED visits or hospital stays, such as proactive outreach to high-risk patients and same-day appointments for urgent needs. Despite this, OCM did not decrease the likelihood of a hospital admission or readmission, nor ED visits not leading to an admission, relative to reductions achieved by comparison practices. OCM also failed to reduce the likelihood of chemotherapy-related hospitalizations among higher-risk episodes relative to the comparison group. While we cannot rule out some level of success relative to the comparison group among individual practices, any impacts were too limited to influence our overall aggregate estimate.

While OCM led to small reductions in the likelihood of receiving home health services for higher-risk cancer episodes, it did not impact use of skilled nursing facilities. OCM led to a small decrease in the number of imaging events, but otherwise had no influence on outpatient service use. These findings are consistent with the payment results in **Exhibit 11**, which show little reduction in Part B payments outside of non-chemotherapy drug payments. OCM also failed to improve the timely receipt of hospice care for beneficiaries who died, despite the OCM quality measure holding practices accountable for this outcome.

Overall, to the extent that OCM affected the care trajectory of patients (as discussed more in Chapter 5 and Chapter 6), the influence on the utilization of billable inpatient and outpatient services was limited to small impacts on a handful of measures. Although OCM practices showed some improvement in outcomes specifically targeted by the Model, such as ED visits not leading to an inpatient admission and timely hospice use at the end of life, comparison practices achieved similar improvements, indicating that OCM had no net impact on these outcomes. Accountable care organizations (ACOs), which have similar care coordination capabilities and similarly strong financial incentives to reduce unnecessary use of acute care, have also failed to curtail the use of these services among oncology patients, both overall and at the end of life.[xxx-xxxii] This may suggest that new strategies are needed to minimize avoidable hospitalizations or ED visits among oncology patients. While this highlights the difficulty in improving these outcomes, it also signals that room for improvement may remain. For example, as highlighted in Section 7.1, beneficiaries from historically underserved populations typically have substantially higher rates of acute-care utilization. Improving health equity by reducing or eliminating these differences would translate into reductions in aggregate measures of utilization.

Exhibit 17: OCM Had No Overall Impact on Chemotherapy-Related Hospitalizations or ED Visits

Measures of Chemotherapy-Related Hospitalizations and ED Visits	OCM		COMP		Estimated OCM Impact	
	Baseline Mean	Int Mean	Baseline Mean	Int Mean	DID Estimate	Percent Change
Any chemotherapy-associated hospitalizations	12.8%	12.0%	12.3%	11.3%	0.1 pp	1.1%
Any chemotherapy-associated ED visits	16.8%	15.9%	16.7%	16.0%	-0.2 pp	-1.4%
Any chemotherapy-associated ED visits resulting in a hospital admission	10.1%	9.7%	9.6%	9.3%	-0.1 pp	-0.9%
Any chemotherapy-associated ED visits without a hospital admission	8.2%	7.6%	8.6%	8.2%	-0.2 pp	-2.5%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: ED: Emergency department. OCM: OCM intervention group. COMP: Comparison group. Int: Intervention period. DID: Difference-in-differences. pp: Percentage point.

Did Quality of Care Improve Over Time Among OCM Patients?

CONTEXT AND KEY FINDINGS

Payments for Monthly Enhanced Oncology Services and OCM requirements were intended to transform the way practices delivered care.

OCM practices implemented or expanded several care delivery changes during OCM.

In particular, practices expanded efforts related to screening for pain and depression, sharing information in writing with patients, and proactive navigation and same-day access.

Most oncologists, nurse practitioners, and physician assistants were in agreement about which care delivery enhancements were the most effective.

These enhancements included telephone calls to high-risk patients, same-day appointments to meet patients' urgent needs, and routine monitoring for side effects and refill needs for patients with oral chemotherapy drugs by phone were among the most effective care delivery enhancements.

Care transformation was intended to lead to better care quality. To measure this, OCM included several quality measures that were tied to performance-based payments, including claims-based measures relating to emergency department (ED) visits without an inpatient admission; use of hospice for at least three days among patients who died; screening and management of pain and depression; and patient-reported care experiences. PBPs earned by OCM practices could be reduced if practices did not achieve at least 75 percent of possible points on the Aggregate Quality Score (AQS, a summary score across all quality measures). OCM also included Monthly Enhanced Oncology Services payments to participating practices, with the explicit goal of enhancing care quality.

In Performance Periods 8 through 11, OCM practices were more likely than in prior performance periods to achieve Aggregate Quality Scores high enough to retain their full, earned PBPs.

The increase in Aggregate Quality Score performance was in part driven by a policy change CMS introduced in Performance Period 8, which made reporting the two practice-reported quality measures (OCM-4 and OCM-5) voluntary. This left just three required quality measures. Of the remaining three required measures, achievement on measure OCM-2 (ED visits or observation stays without a hospital admission) improved starting in Performance Period 8 for many practices, because fewer ED visits occurred during the COVID-19 public health emergency.

OCM practices initially reported high rates of pain assessment and management rates, which improved moderately over time, and initially reported low rates of depression screening and follow-up plans, which improved substantially over time.

However, patient reports about the involvement of their cancer therapy team in managing pain and depression did not show similar improvements over time, suggesting that these process transformations did not always yield improved patient-reported outcomes.

Overall care experience for OCM patients changed little during OCM, as measured by six patient-reported composite measures of care experience and a rating of the cancer care team.

However, OCM patients reported diminished involvement of their cancer therapy team in managing some symptoms, especially during the public health emergency. As we did not collect responses from a comparison group during the public health emergency, these changes cannot be attributed to OCM. It is possible that changes caused by, or that coincided with, the public health emergency were associated with reductions in patient perceptions of symptom management for both OCM and non-OCM patients.

Patient-reported overall health status also declined during the COVID-19 public health emergency and symptoms related to energy levels increased.

As with other patient-reported outcomes in this report, these changes cannot be attributed to OCM.

Oncology Care Model (OCM) requirements emphasized timely access to care, shared decision making, patient navigation, and care coordination. OCM also included several quality measures that were tied to performance-based payments (PBPs), including patient experiences. By including a measure of care experience as one of the OCM quality measures, OCM explicitly incentivized participating practices to provide positive care experiences. CMS gave practices wide latitude in meeting Model requirements and pursuing higher quality. In this chapter we summarize results originally presented in ***Evaluation of the Oncology Care Model: Performance Periods 1–3*** detailing some of the ways in which practices implemented care redesign efforts, and their assessment of which efforts were most effective. These requirements and the resulting changes that practices made may have improved quality of care and patient care experience among OCM patients. We assessed quality of care through two different lenses: (1) through OCM practice performance on the OCM quality measures; and (2) through analyses of data from the patient survey. Chapter 5 and Chapter 6 also include findings related to clinical quality of care.

4.1 OCM Practice Implementation of Care Transformation

OCM included monthly enhanced oncology service payments to support additional services for patients undergoing chemotherapy treatment and encouraged improved care quality through Model-specific requirements.[xxxiii] In exchange for MEOS, practices were assigned four requirements (described in Section 1.2) that focused on increased access and patient navigation. OCM practices were also required to provide each patient undergoing chemotherapy with a care plan that included 13 elements of care highlighted in a 2013 Institute of Medicine Report, including items such as communication about prognosis, information about out-of-pocket costs, and survivorship care planning. OCM practices were also incentivized to implement care delivery enhancements through earning PBPs, which were reduced if practices did not score at least 75 percent of possible points on the AQS.[13]

This section describes the care delivery transformations implemented by OCM practices, focusing on findings from the OCM Evaluation Clinician Survey, which collected responses from oncologists, advanced practice providers (nurse practitioners and physician assistants), and clinical care coordinators. A description of the data collection and analytic methods used for the OCM Evaluation Clinician Survey can be found in the technical appendix of a prior report, ***Evaluation of the Oncology Care Model: Performance Periods 1–3***. The survey data provide the most information on which activities practices newly implemented or expanded due to OCM, as well as clinicians' perspectives on which activities were most effective at improving care quality. The ***Evaluation of the Oncology Care Model Participants' Perspectives*** report further provides a broader assessment of overall care delivery transformation activities OCM practices implemented, based on interviews with practice staff and clinicians during case studies with 47 participating practices.

Some care delivery elements required by OCM were already used in over half of OCM practices prior to the start of the Model.

Prior to OCM, many participating practices had already implemented some of the care redesign elements emphasized in OCM. For example, in a representative survey of 400 oncologists at OCM practices, over 60 percent of respondents reported that their practice routinely provided patients with written information about potential harms from treatment prior to the start of OCM (Appendix Exhibits C-1 and C-2). Other care delivery elements provided by practices prior to the start of OCM were related to palliative care and patient education. Over half of oncologists responding to the survey also reported that their practice provided access to outpatient palliative care prior to the start of OCM, and nearly half reported educating patients to "call us first" before going to the ED even before OCM began. In contrast, other care redesign elements, such as sharing expected prognosis and expected response to treatment in writing with patients, were less commonly implemented prior to OCM.[14]

OCM practices implemented or expanded several care delivery changes during OCM, especially relating to screening for pain and depression, sharing information in writing with patients, and proactive navigation and same-day access.

Oncologists at OCM practices reported implementing several care delivery changes that were new or enhanced due to OCM, particularly those linked to OCM quality measures (Exhibit 18). OCM practices reported consistent improvements over time in measures related to screening and management for pain and depression (see Section 4.2 below). Additionally, 70 percent of oncologists responding to the OCM Evaluation survey reported that their practice had implemented new or enhanced efforts since the start of OCM to routinely screen patients for depression, and 60 percent of oncologists reported new or enhanced efforts to routinely screen patients for psychosocial distress (Appendix Exhibits C-1 and C-2).

[13] From PP6 on, the AQS included five equally weighted quality measures: OCM-2, "Risk-adjusted proportion of patients with all-cause ED visits or observation stays that did not result in a hospital admission within the six-month episode"; OCM-3, "Proportion of patients who died who were admitted to hospice for three days or more"; OCM-4, "Pain assessment and management"; OCM-5, "Depression screening and follow-up plan"; and OCM-6, "Patient-reported experience of care."

[14] In case studies of OCM practices, nearly all the oncologists we interviewed expressed ambivalence about stating an explicit prognosis for a patient in writing, given uncertainty with prognostic estimates and challenges in interpreting median life expectancy, and most opted not to include an estimate of life expectancy.

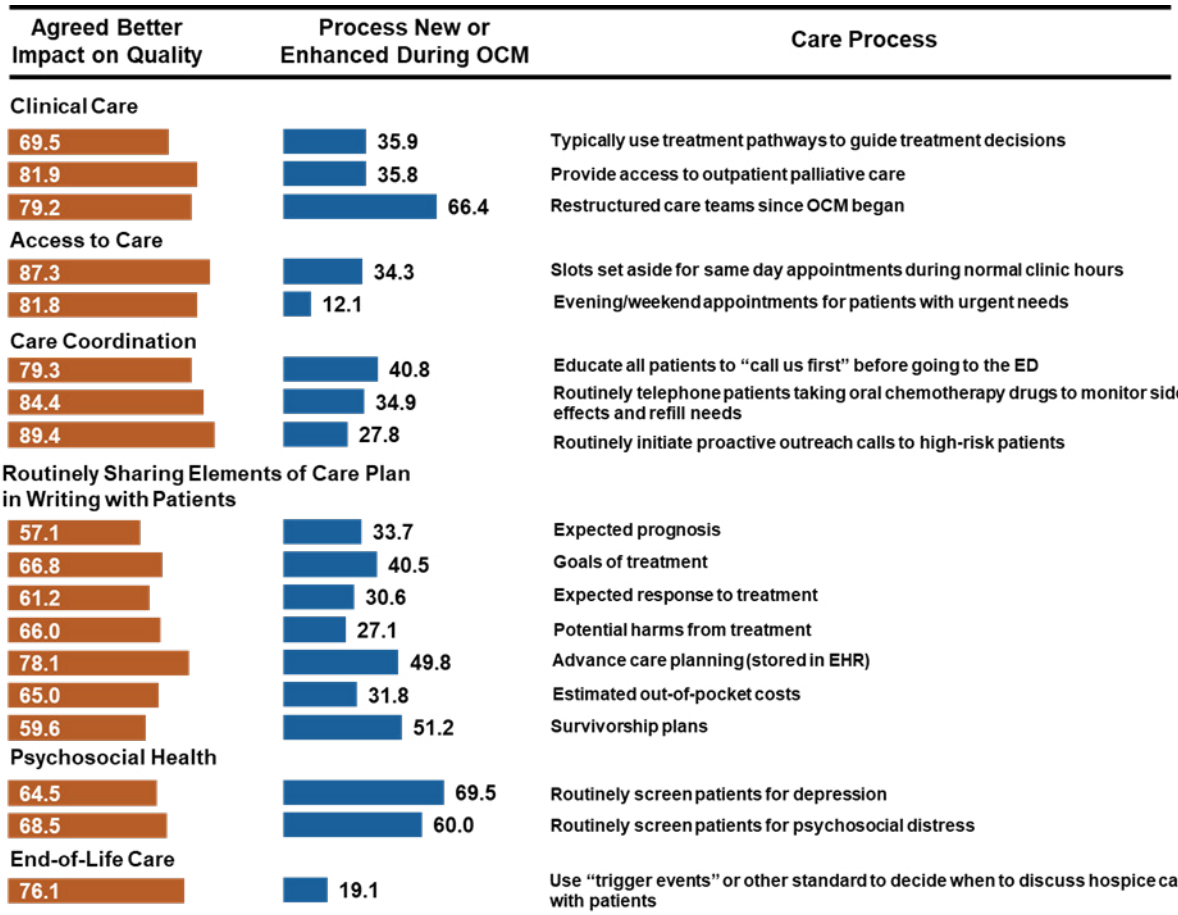
OCM also required participating practices to share care plans consistent with Institute of Medicine recommendations with patients. Over half of oncologists responding to the survey reported new or enhanced efforts related to sharing information in writing with patients related to survivorship plans, and 40 percent of oncologists responding to the survey reported new or enhanced efforts related to routinely sharing the goals of treatment in writing with patients.

OCM incentivized participating practices to reduce ED visits. Incentives were both indirect (reduced expenditures could help practices earn larger PBPs), and direct (ED visits were directly linked to quality scores). While somewhat less common than other care redesign efforts, over 40 percent of oncologists responding to the OCM Evaluation survey reported either new efforts or enhancements of existing efforts to educate all patients to "call us first" before going to the ED. Roughly 35 percent of respondents also reported new or enhanced efforts to routinely telephone patients taking oral chemotherapy drugs to monitor side effects and medication refill needs, and to allow same-day appointments to meet some patients' urgent needs.

Most oncologists, nurse practitioners, and physician assistants agreed that proactive telephone calls to high-risk patients, same-day appointments to meet patients' urgent needs, and routine monitoring for side effects and refill needs for patients with oral chemotherapy drugs by phone were among the most effective care delivery enhancements.

In the OCM Evaluation Clinician Survey, we surveyed oncologists, and separately surveyed nurse practitioners and physician assistants. In the survey, we asked clinicians to rate whether care delivery changes that had been made in their practice improved quality of care, had no change on quality, or diminished quality. Among both groups of clinicians, more than four out of five survey respondents indicated that proactive telephone calls to high-risk patients, same-day appointments to meet patients' urgent needs, and routine monitoring of side effects and refill needs for patients with oral chemotherapy drugs by phone resulted in better quality of care (Appendix Exhibit C-2).

Exhibit 18: Oncologist Experience with Care Process Implementation During OCM



Source: OCM Clinician Survey.
Notes: N=373 NPs/PAs. Estimates were weighted for sampling and nonresponse. ED: emergency department.

For every care process the survey asked about, more than half of clinicians from both groups agreed that it resulted in better quality of care, although some processes were judged less favorably than others. Fewer than six in 10 oncologists, and fewer than six in 10 nurse practitioners and physician assistants reported that routinely sharing expected prognosis in writing with patients resulted in better care: the lowest rated item for both groups of clinicians. The two groups of clinicians were split over the benefit of survivorship plans, with fewer than six in 10 oncologists indicating that it improved care quality, while nearly eight in 10 nurse practitioners and physician assistants indicated that these plans improved care quality. Overall, clinicians were most likely to agree that processes related to access and care coordination improved quality, while they were less optimistic about processes related to psychosocial health or sharing care plan elements with patients in writing (**Appendix Exhibit C-2**).

4.2 Practice Achievement on the Aggregate Quality Score

In Performance Periods 8 through 11, OCM practices were more likely than prior performance periods to achieve an Aggregate Quality Score (AQS) sufficiently high to retain all earned performance-based payments (PBPs).

To ensure OCM practices maintained or improved quality while also reducing spending throughout OCM, CMS assessed practices' performance on several quality measures. CMS used these quality measures to calculate an Aggregate Quality Score, or AQS, and used the AQS to determine whether practices qualified for PBP earnings. The quality measures used in the AQS calculation changed over time but were stable starting in PP6 and on. From PP6 on, AQS included five equally weighted quality measures:

OCM-2, "Risk-adjusted proportion of patients with all-cause ED visits or observation stays that did not result in a hospital admission within the six-month episode"

OCM-3, "Proportion of patients who died who were admitted to hospice for three days or more"

OCM-4, "Pain assessment and management" (practice-reported measure)

OCM-5, "Depression screening and follow-up plan" (practice-reported measure)

OCM-6, "Patient-reported experience of care"

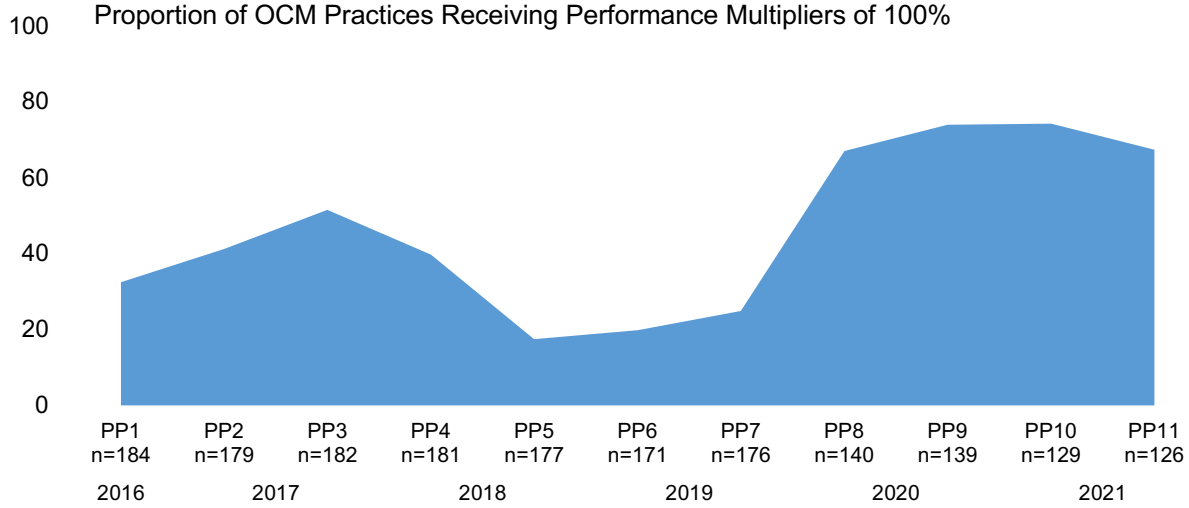
Based on each practice's performance and on the quality measures used in each performance period, CMS calculated each practice's AQS. The AQS was used to hold practices accountable for quality: practices lost some or all of their earned PBP if they had AQS values below certain thresholds. Practices earning at least 75 percent of possible AQS points received a performance multiplier of 100 percent, meaning that they were able to keep their entire PBP if they also achieved spending targets.[15]

From PP8 through PP11, practices were more likely to have AQS performance multipliers of 100 percent relative to prior PPs (**Exhibit 19**). This increase in AQS performance was in part driven by a policy change implemented by CMS starting in PP8, where CMS made reporting the two practice-reported quality measures (OCM-4 and OCM-5) voluntary, leaving just three required quality measures. Additionally, of the remaining three required measures, achievement on measure OCM-2 (ED visits or observation stays) improved starting in PP8 for many practices, in large part because fewer ED visits occurred during the COVID-19 public health emergency (PHE). Prior to PP8, only four practices had taken two-sided OCM risk. Starting in PP8, most practices had the choice of remaining in one-sided risk, entering into two-sided risk, or selecting a flexibility allowed because of the PHE and opting out of performance-based payments entirely. By the end of OCM, 24 practices had taken two-sided risk with payment reconciliation in at least one PP. From PP8-11, these practices met the AQS threshold to receive their full PBP 82% of the time.

Practices that continued their OCM participation through PP11 had higher AQS values on average than practices that ended their participation in OCM prior to the end of the Model, especially in PP6 and PP7 (**Exhibit 20**). This indicates that practices with lower performance on the OCM quality measures were more likely to terminate their OCM participation prior to the end of the Model, a pattern consistent with survivor bias. These differences were especially driven by performance on OCM-4 and OCM-5, the two practice-reported measures regarding screening and management for pain and depression (**Appendix Exhibit C-6**). Despite this, higher AQS values in later PPs are not solely attributable to survivor bias. Practices that continued participating in OCM through PP11 had higher average AQS values in PP8–PP11 (during the COVID-19 PHE) than they had in prior PPs, reflect both underlying improvement on the OCM quality measures and the change in the measures included in the AQS over time.

[15] The *OCM Performance-Based Payment Methodology* has additional information on the calculation of the AQS (available for download at https://innovation.cms.gov/Files/x/ocm-pp3beyond-pymmeth.pdf).

Exhibit 19: OCM Practices Were More Likely to Have Performance Multipliers of 100 Percent in Performance Periods 8-11, Relative to Prior Performance Periods



Source: OCM quality measure data reported to CMS by participating practices.
Notes: N=202 unique OCM practices across all PPs. Aggregate Quality Score values of 75% or greater corresponded to receiving a performance multiplier of 100%. Chi squared value = 385.0, p<0.001. PP: Performance period.

Exhibit 20: Practices That Continued Participating in OCM Had Higher Average Aggregate Quality Score Values Than Those That Ended Their OCM Participation Early

Metric	PP1	PP2	PP3	PP4	PP5	PP6	PP7	PP8	PP9	PP10	PP11
Participated in OCM Through PP11											
N Practices [a]	122	122	124	125	126	126	126	126	126	126	126
Average AQS	67.9	73.0	74.8	73.2	63.4	61.4	66.8	77.4	79.8	80.0	77.5
Ended OCM Participation Prior to PP11											
N Practices	74	69	71	69	57	51	50	14	13	3	0
Average AQS	65.0	67.7	68.0	67.0	56.9	50.9	52.1	75.6	77.0	85.2	n/a
Difference between Practices that Ended OCM Participation Early and that Participated in OCM Through PP11											
Difference in Average AQS	-2.9	-5.3	-6.8	-6.2	-6.5	-10.5	-14.7	-1.8	-2.9	5.2	n/a

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: OCM quality measure data.
Notes: N=202 unique OCM across all PPs. Sample sizes change within practice cohorts over PPs due to practice entries into and termination from OCM over time. PP: Performance period. AQS: Aggregate Quality Score. [a]Four of the 126 practices that received an AQS in PP11 terminated their participation before the end of the model. However, since data for those practices was available through PP11, we included them in the cohort of practices that participated in OCM through PP11.

4.3 Practice Achievement on the OCM Quality Measures

We also assessed OCM practices' performance on the five quality measures included in the AQS in the last three years of OCM.[16]

OCM practices had improved performance on OCM-2 (ED visit or observation stay without an admission) during the COVID-19 PHE, but OCM practice performance on OCM-3 (hospice stay for three or more days) changed little over time.

As discussed in Chapter 3, OCM had no impact on occurrence of ED visits or observation stays without an inpatient admission or on use of hospice care at end of life, relative to the comparison group. Unlike in Chapter 3, where we compare outcomes among OCM episodes with outcomes among comparison episodes, in this chapter we look at practice-level performance among only OCM participating practices, over time.

[16] Sample sizes differed some across the five quality measures. For all measures except OCM-6, which was derived from the patient survey, the required denominator size was 20 (i.e., 20 episodes or 20 visits) over two PPs. For OCM-6, the required denominator was 100 survey responses over two PPs.

From PP1 through PP6, OCM practice performance on OCM-2 (ED visits or observation stays that did not result in an admission), changed little on average over time, with average rates of around 24 percent (Exhibit 21). However, from PP7 through PP11, which overlapped the COVID-19 PHE, OCM practices had improved performance rates on OCM-2. By PP9, the average value across OCM practices was 18.6 percent, stabilizing around 20 percent in PP10 and PP11, well under the pre-established threshold of 21.7 percent to earn all 10 possible points toward the AQS. This decline in ED visits was consistent with declines in ED visits across Medicare during the COVID-19 PHE.

Additionally, the distribution of performance rates for OCM-2 was relatively compact, with the interquartile range (25th to 75th percentile) roughly 3 percentage points. For example, in PP7, the value at the 25th percentile of the distribution was 22.3 and the value at the 75th percentile of the distribution was 25.1.

In contrast to the findings for OCM-2, the average performance rate for OCM practices on OCM-3 (receipt of hospice care at least three days prior to death) changed little over time, consistently measuring around 51 to 53 percent, with a much wider distribution (Exhibit 22). The relatively wide distribution of performance rates on OCM-3 may indicate that many practices have room for improvement, but may also reflect greater statistical noise, given that OCM-3 included only the smaller subset of patients who died.

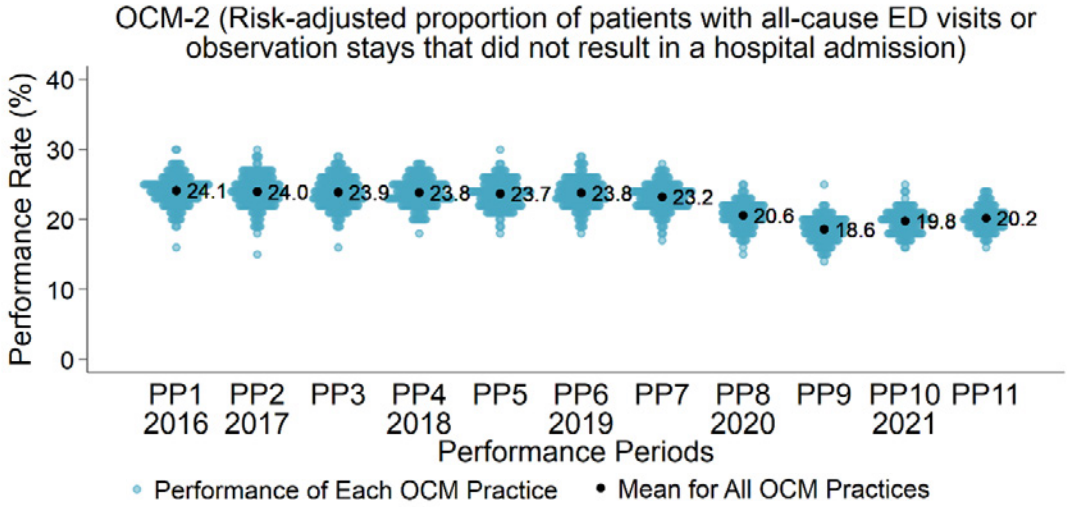
Practices self-reported high pain assessment and management rates and lower (but improving) rates of depression screening and follow-up plans.

Many cancer patients experience pain and depression while undergoing treatment, and evidence suggests that attention to pain and depression can improve health outcomes and survival.[xxxiv] Consistently screening patients for depression and pain, and effectively managing these important symptoms can improve patients' quality of life. OCM practices measure and submit data on two quality measures to CMS for each PP[17]: OCM-4 (pain assessment and management)[18] and OCM-5 (depression screening and follow-up plan).[19] Both measures required screening patients for pain or depression and documenting a plan of care (for pain) or a follow-up plan (for depression).

INSIGHT FROM THE FIELD

In case studies, multiple practices reported that screening for depression and helping patients manage depression, when indicated, was challenging. Practices often lacked internal resources for treating depressed patients, and many also reported a lack of mental health clinicians in their regions who could provide that care. More details on those findings can be found in the December 2021 report: ***Evaluation of the Oncology Care Model: Participant Perspectives***.

Exhibit 21: OCM Practices Had Improved Performance on OCM-2 During the COVID-19 PHE



Source: OCM quality measure data.
Notes: N=202 unique OCM practices with values in any PP. PHE: Public health emergency. ED: Emergency department. PP: Performance period.

[17] The practice-reported quality measures contribute to CMS's calculation of an AQS for each practice, in each PP. Payments are adjusted downward for practices that fail to reach an AQS threshold set by CMS.

[18] To meet the measure criteria for OCM-4, OCM practices were required to screen patients for pain at each contact. Additionally, patients with pain present were required to have a documented plan of care, which could include use of opioids, nonopioid analgesics, psychological support, patient and/or family education, referral to a pain clinic, or reassessment of pain at an appropriate time interval.

[19] To meet the measure criteria for OCM-5, practices were required to screen patients for depression who did not have an active diagnosis for depression or bipolar disorder. Additionally, patients who screened positive for depression were required to have a documented appropriate follow-up plan, such as additional evaluation or assessment for depression; suicide risk assessment; referral to a practitioner who is qualified to diagnose and treat depression; pharmacological interventions; or other interventions or follow-up for the diagnosis or treatment of depression.

On average, from PP2 to PP6, practices improved their measure scores by roughly 10 percentage points for OCM-4 and 13 percentage points for OCM-5 (Exhibit 23).[20] While practices continued to improve on OCM-5 from PP7 to PP11, by another 7 percentage points on average, practice performance on OCM-4 remained relatively stable. As with the AQS overall, the improvements over time in the two practice-reported measures were driven by a combination of survivor bias (reporting of these measures became mandatory during the COVID-19 PHE and the practices submitting had better performance), as well as continued improvements among practices that continued their participation through the end of the Model (Appendix Exhibit C-6). The distribution of the two practice-reported measures also differed over time. Most practices had achieved a high performance rate on OCM-4 (pain) by PP6. In contrast, for OCM-5 (depression), the distribution of performance rates still varied widely among the practices remaining in PP11. This result indicates that many practices may need additional support or resources to improve their performance relating to screening and development of follow-up plans for depression.

OCM practices achieved consistently high performance rates on OCM-6, patient-reported experience of care.

As shown in greater detail in Section 4.4, most OCM practices consistently achieved performance rates of greater than 8 out of 10 for OCM-6, "Patient-Reported Experience of Care." As with OCM-2, the distribution of performance rates across the OCM practices was largely compact.

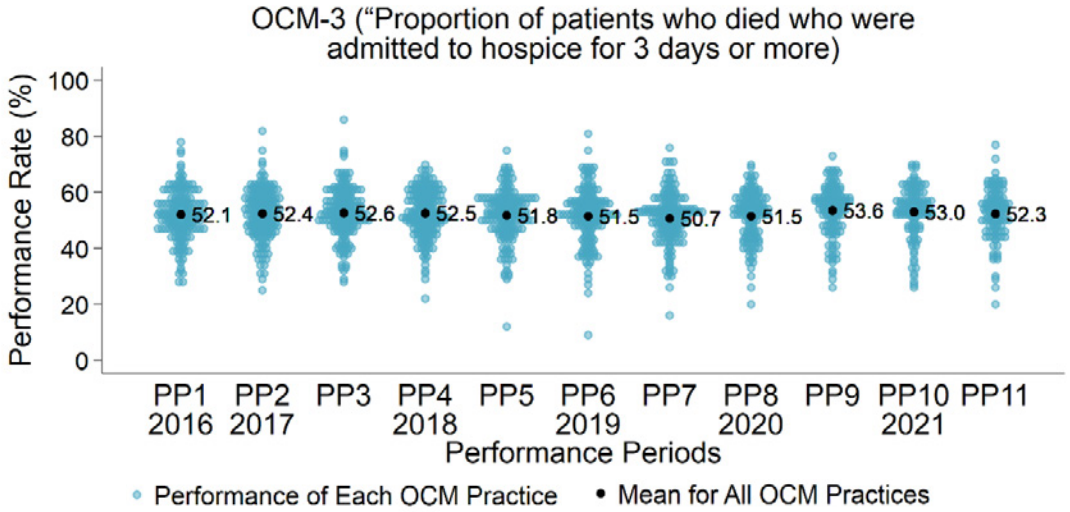
4.4 Patient-Reported Care Experience

We surveyed patients with OCM episodes every quarter through the entire duration of OCM to measure care experiences for OCM patients and support CMS's efforts to calculate patient experience scores at the practice level for the purposes of PBPs. Information about the OCM patient survey methodology is available in Appendix C.2, and the OCM patient survey instrument is available in a prior appendix.[21] For outcomes reported in the OCM patient survey, we assessed trends over time to determine how patient-reported outcomes changed during OCM. For this report, which included 10 survey waves conducted with patients whose OCM episodes occurred partly or completely during the COVID-19 PHE, we assessed time trends during two separate periods: (1) for episodes that occurred prior to the COVID-19 PHE; and (2) for episodes that occurred during the COVID-19 PHE.

Care experiences reported by OCM patients were broadly stable during OCM.

The patient survey contained six composite measures calculated based on responses to several survey questions related to patient experience and one single-item measure of overall satisfaction with the cancer care team (Exhibit 25). See Appendix Exhibit C-4 for the additional detail on the survey questions that make up each composite. All seven measures were scored on a scale of 0 to 10, where 0 was the worst possible score, and 10 was the best possible score.

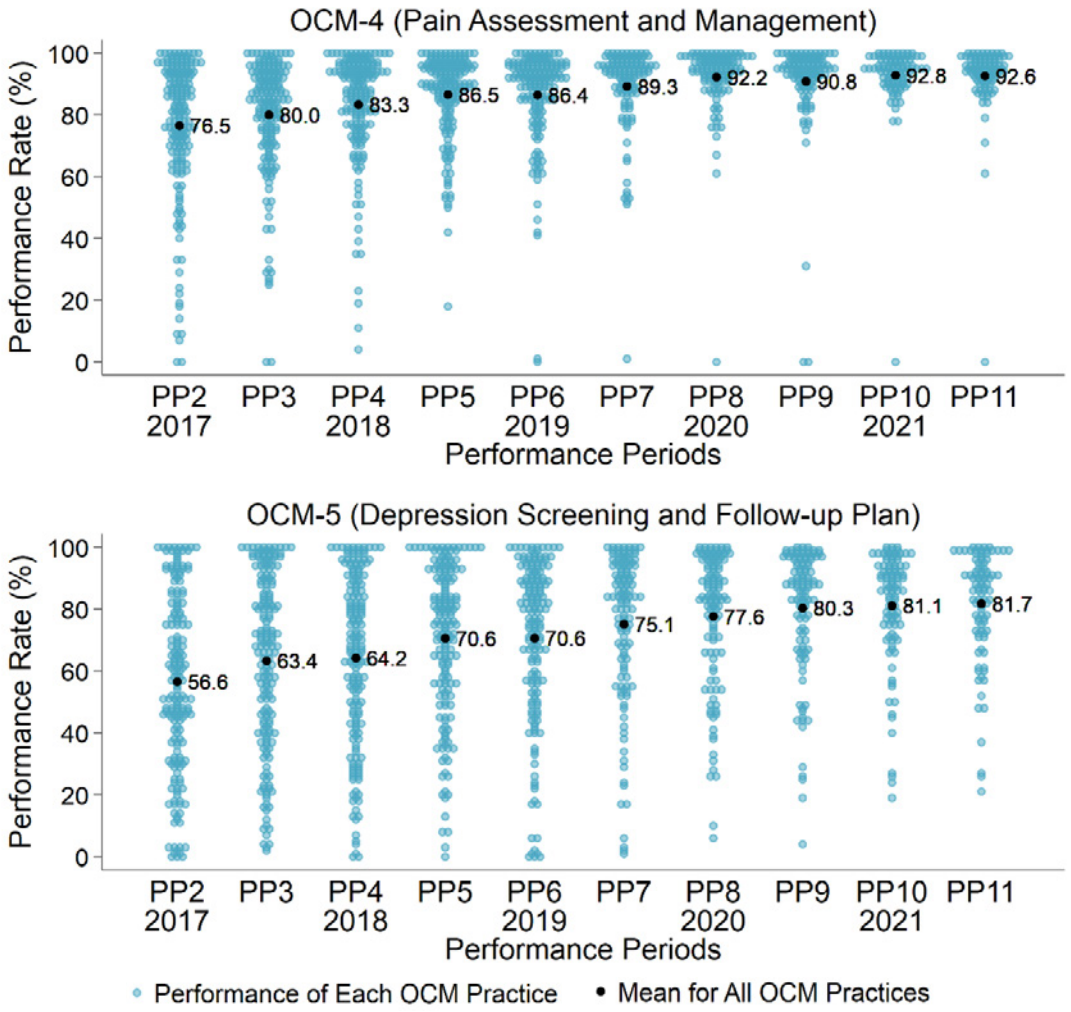
Exhibit 22: OCM Practice Performance on OCM-3 Changed Little Over Time



Source: OCM quality measure data.
Notes: N=189 unique OCM practices with values in any PP. PP: Performance period.

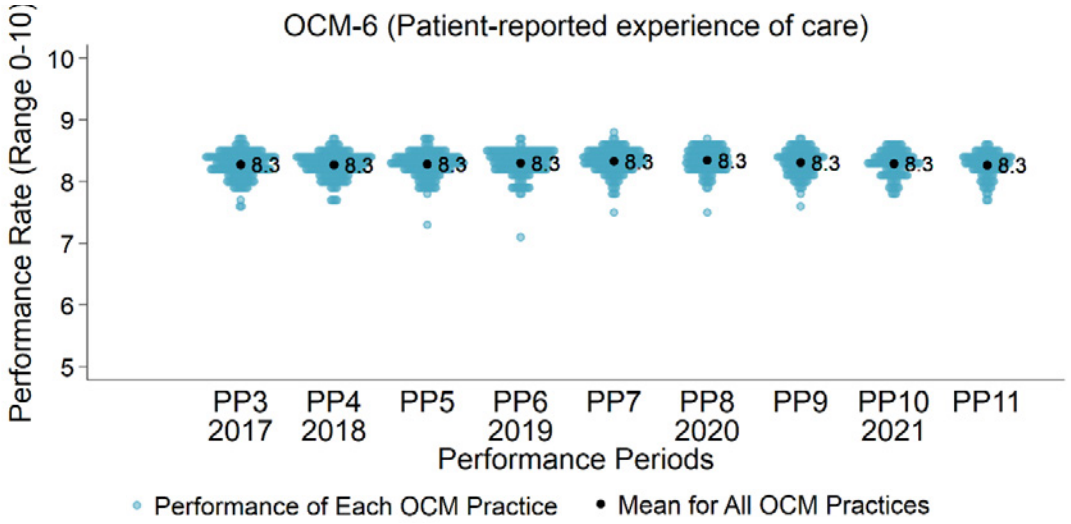
[20] Performance rates from the practice-reported data were not available for the baseline period or for PP1.
[21] OCM used a modified version of the Cancer Consumer Assessment of Healthcare Providers and Systems instrument to measure patient experiences with cancer care. Additional information about this survey instrument can be found at https://www.ahrq.gov/cahps/surveys-guidance/cancer/develop-cancer-surveys.html.

Exhibit 23: Most OCM Practices Reported High Performance on Pain Screening and Management by Performance Period 6, but Performance on Depression Screening and Follow-up Remained Inconsistent Through Performance Period 11



Source: OCM quality measure data reported to CMS by participating practices.
Notes: N=190 unique OCM practices with values in any PP. PP: Performance period.

Exhibit 24: OCM Practices Achieved Consistently High Performance Rates on OCM-6



Source: OCM quality measure data.
Notes: N=175 unique OCM practices with values in any PP. PP: Performance period. Patients rated their cancer care team on a scale of 0 to 10.

Exhibit 25: Validated Measures of Patient-Reported Care Experience Covered Multiple Domains

Care Experience Measures	Description
Rating of cancer care team	Single-item measure rating the cancer care team on a scale of 0 to 10.
Access	Composite measure reflecting patient experiences with the accessibility and convenience of cancer care, including between visits, after hours, and if side effects occurred.
Communication	Composite measure reflecting whether patients felt that their cancer care team respected, listened to, spent enough time with, and explained care aspects clearly to them.
Enabling patient self-management	Composite measure reflecting whether the cancer care team spoke with patients about three symptoms (pain, changes in energy levels, and depression/anxiety) and helped address symptoms when needed; also reflects whether patients spoke to their cancer care team about services to manage cancer at home and about things to do to maintain health during treatment.
Exchanging information	Composite measure reflecting whether patients felt the cancer care team explained side effects of treatment, next steps in treatment, test results, and medications.
Shared decision making	Composite measure reflecting whether patients spoke with their cancer care team about reasons to have (or not have) chemotherapy treatment, asked for their opinion about having chemotherapy treatment, and involved them in decisions as desired.
Symptom management	Composite measure reflecting whether the cancer care team helped patients with eight symptoms, when needed: pain, changes in energy levels, depression/anxiety, nausea/vomiting, difficulty breathing, coughing, constipation/diarrhea, and neuropathy.

At the start of OCM, survey respondents gave high scores for the overall rating of the cancer therapy team and the composite measures for affective communication, access, and exchanging information (each composite measure averaging roughly 9 on a 10-point scale) (Exhibit 26). In contrast, the composite measures for shared decision making, symptom management, and enabling patient self-management had more room for improvement, with ratings averaging 6 to 7 on a 10-point scale.

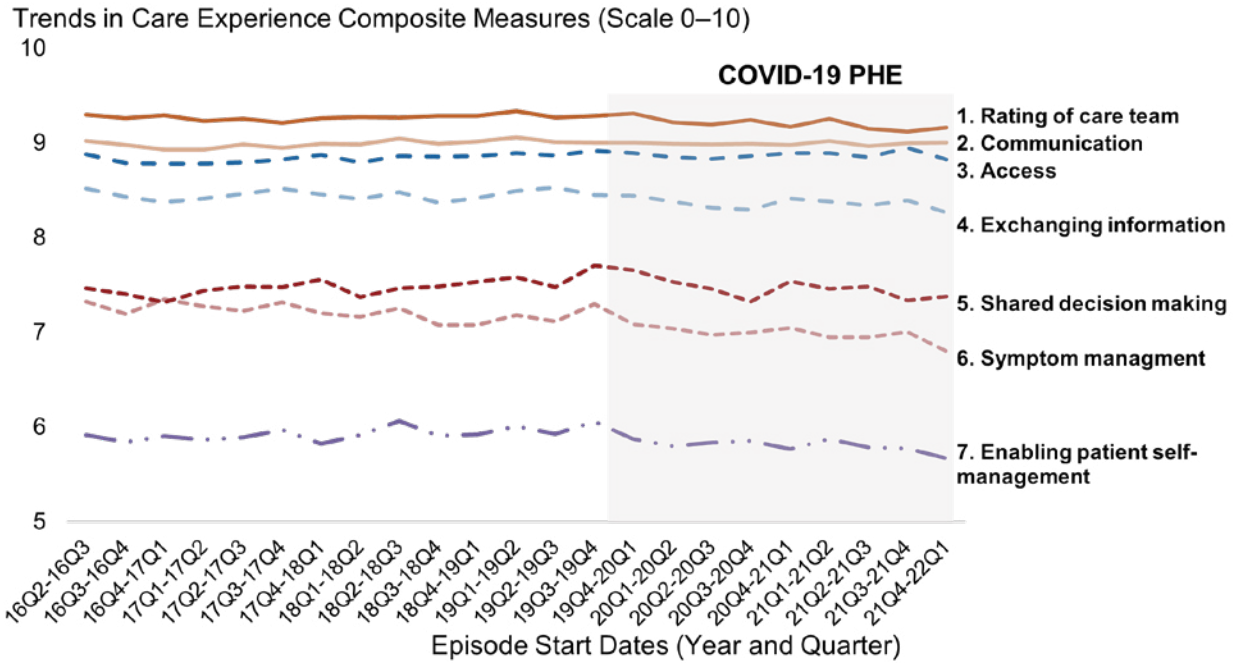
Trends over time prior to the COVID-19 PHE were statistically significant and positive for four of the seven measures (rating of cancer care team, affective communication, access, and shared decision making). The symptom management measure was statistically significant and negative. However, the magnitude of changes was small, even for the statistically significant measures, reflective of the large sample size used in the analysis. The measure with the largest change over time, shared decision making, had a change comparable to an increase of 0.13 on a scale of 0 to 10 from the baseline wave through PP6 (the episodes that occurred just before the start of the COVID-19 PHE). However, during the COVID-19 PHE, OCM patients reported worsening experiences with shared decision making, symptom management, and enabling patient self-management. Trends indicated declines during the COVID-19 PHE of -0.4 on the scale of 0–10 for shared decision making, -0.5 for symptom management, and of -0.3 for enabling patient self-management. We found similar trends both prior to and during the COVID-19 PHE among patients with higher-risk and lower-risk episodes. Although measures related to shared decision making and symptom management declined moderately for patients with OCM episodes during the COVID-19 PHE, experiences for the other four measures were remarkably stable.

The findings prior to the COVID-19 PHE are similar to those reported in a prior report, ***Evaluation of the Oncology Care Model: Performance Periods 1–5***, where we compared survey responses from OCM and comparison patients with episodes initiated between July and December 2018, relative to the baseline. In that difference-in-differences analysis, we found small

INSIGHT FROM THE FIELD

OCM practices received quarterly feedback reports from CMS that summarized their performance on the survey composite measures. A few practices we visited described gaining actionable insight from those data. For example, two practices noticed their low scores on the "shared decision making" survey composite and implemented changes they hoped would improve these scores.

Exhibit 26: Care Experience for OCM Patients Were Broadly Stable Throughout OCM



Source: OCM Patient Survey. Includes episodes initiated from April 2016 through December 2021; data collection for these episodes occurred from January 2017 through August 2022.

Notes: N= 209,884 survey responses. Each survey wave included patients who had episodes over a six-month period (two quarters); for example, Q1 refers to episodes that started between January and March. Gray shading in the chart indicates survey waves with some portion of episodes occurring during the COVID-19 PHE. OCM episodes lasted for 180 days, and patients typically received surveys roughly 6–9 months following the start of their episode. Estimates were weighted for sampling and non-response and regression adjusted. Patients with a COVID-19 diagnosis during the episode were excluded from analysis. PHE: Public health emergency.

differences over time in the patient survey composite measures between the OCM and comparison groups that were not statistically significant.[22]

Patient-reported symptom management was stable during the first three years of OCM, but declined during the COVID-19 PHE.

Among patients who reported having symptoms, the share of OCM respondents reporting that their cancer therapy team tried to help manage symptoms was relatively stable prior to the COVID-19 PHE (and as reported in a prior report, did not differ between OCM and comparison episodes over time through five PPs; see ***Evaluation of the Oncology Care Model: Performance Periods 1–5)***. The proportion of patients reporting that their cancer care team "definitely" tried to help address symptoms (relative to "somewhat" or "no") declined slightly for three of eight symptoms (pain, emotional problems, and coughing; p-values for trend coefficients < 0.10) (**Exhibit 27**).

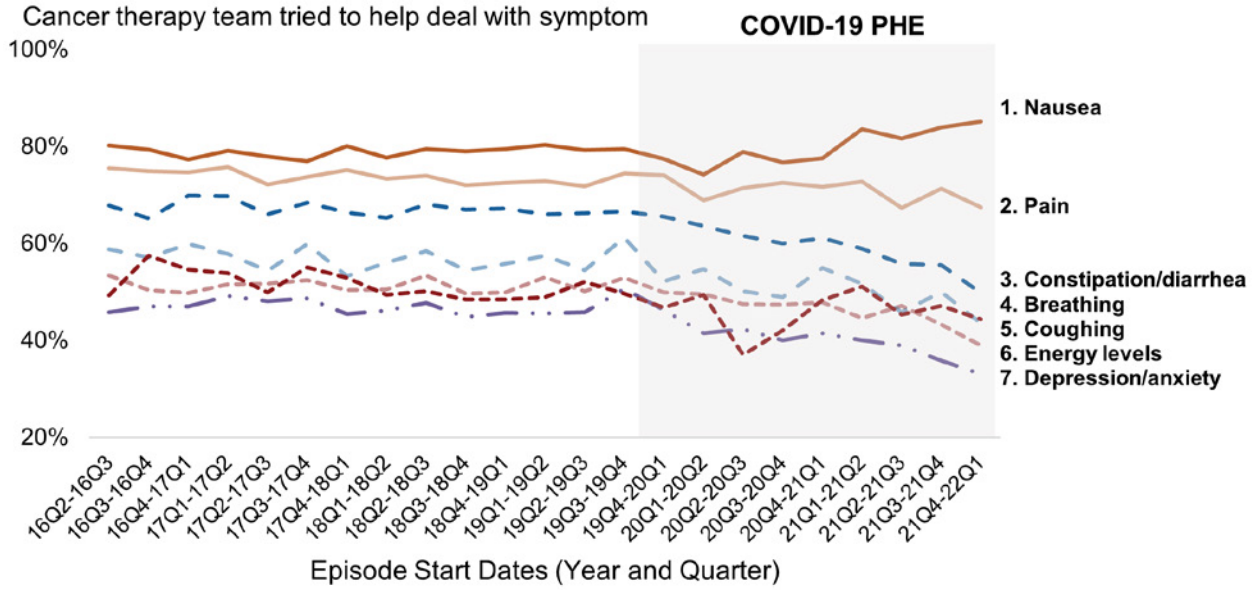
Extrapolating across the survey waves prior to the COVID-19 PHE, these trends indicate a negative change from the baseline wave ranging from 2 percentage points for emotional problems to 5 percentage points for coughing.

During the COVID-19 PHE, patient-reported symptom management declined further, for seven of the eight symptoms, and with statistically significant declines ($p<0.10$) for pain, energy levels, emotional problems, breathing, and constipation or diarrhea. Extrapolating across the survey waves fielded during the COVID-19 PHE, these trends indicate a negative change ranging from 6 percentage points for pain to 15 percentage points for breathing and 17 percentage points for emotional problems. Declines occurred among patients with both lower-risk and higher-risk episodes.

As with other patient survey analyses included in this report, these analyses included OCM patients only (no comparison group) and cannot be considered causal. It is possible that changes caused by, or that coincided with, the COVID-19 PHE were associated with reductions in patient perceptions of symptom management for both OCM and non-OCM patients.

[22] While we previously collected surveys from patients with comparison group episodes, those comparison group surveys were discontinued following the episodes initiated between July and December 2018.

Exhibit 27: OCM Patients Reported Involvement of Their Cancer Therapy Team in Managing Some Symptoms Decreased Over Time, Especially During the COVID-19 PHE



Source: OCM Patient Survey. Includes episodes initiated from April 2016 to December 2020; data collection for these episodes occurred from January 2017 to August 2022.

Notes: N= 209,884 survey responses. Each survey wave included patients who had episodes over a six-month period (two quarters); for example, Q1 refers to episodes started between January and March. Grey shading in the chart indicates survey waves with some portion of episodes occurring during the COVID-19 PHE. OCM episodes lasted for 180 days, and patients typically received surveys roughly 6–9 months following the start of their episode. Estimates were weighted for sampling and non-response and regression adjusted. Patients with a COVID-19 diagnosis during the episode were excluded from analysis. PHE: Public health emergency.

Overall caregiver experience during patients' last month of life declined during the COVID-19 PHE, relative to before the COVID-19 PHE.

We also surveyed caregivers of deceased OCM patients about their experiences during the last month of patients' lives. Additional information about the caregiver survey about experiences during the last month of patients' lives is available in Appendix C.

Overall caregiver experiences with care in the last month of life were broadly positive. Roughly four out of five caregiver respondents reported excellent or very good ratings of the cancer care team (relative to good, fair, or poor) and that care teams followed patients' end-of-life wishes a great deal of the time (relative to somewhat or not at all) (Exhibits 28 and 29). Similarly, ratings for an end-of-life care experience composite measure were 8.4 on average, on a scale of 0–10.[23]

During the COVID-19 PHE, the proportion of caregivers reporting excellent or very good ratings of the cancer care team declined, relative to before the COVID-19 PHE, as did average end-of-life care experience composite measure ratings (Exhibits 28). Trends indicated declines of 7 percentage points for the proportion of caregivers reporting excellent or very good ratings ($p<0.01$) and -0.3 on a scale of 1–10 for the end-of-life care experience composite measure ($p<0.05$) during the COVID-19 PHE. However, the composite rating of end-of-life care experience remained consistently high throughout the PHE.

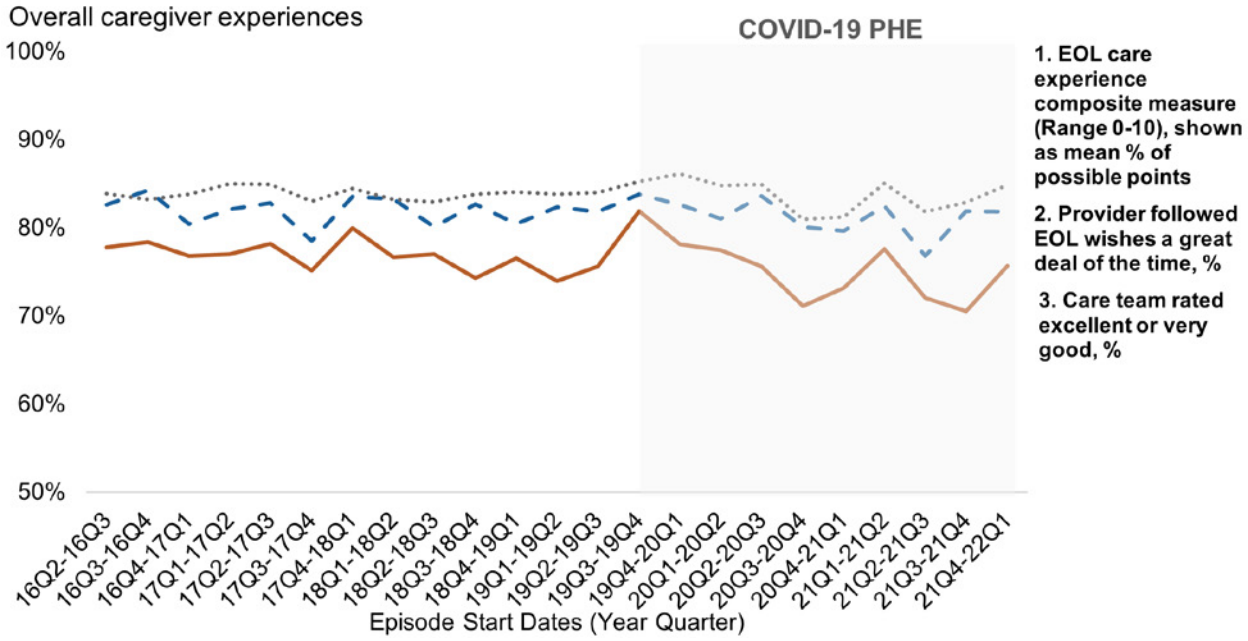
Roughly four out of five caregiver respondents for patients who died reported that providers discussed hospice care with their patient and that hospice care started at the right time (rather than too early or too late) (Appendix Exhibit C-10). There was little change before or after the start of the COVID-19 PHE in overall caregiver experiences and whether hospice care started at the right time during patients' last month of life (Appendix Exhibits C-9 and C-10).

Caregivers reported that patients were more likely to die at home and to prefer to die at home during the COVID-19 PHE.

Caregivers reported a discrepancy between patients' preferred location of death and where they actually died (Exhibit 29). Prior to the COVID-19 PHE, roughly 80 percent of caregivers reported that patients preferred to die at home, while 50 percent of caregivers reported that patients actually died at home. After the start of the COVID-19 PHE, caregivers more often reported that patients died at home (average of 48 percent prior to the COVID-19 PHE, relative to 59 percent during the

[23] The end-of-life care experience composite measure reflected the following five items: provider always showed respect; provider always listened carefully; provider was always direct and straightforward; provider always explained things in a way patient could understand; and provider always spent enough time.

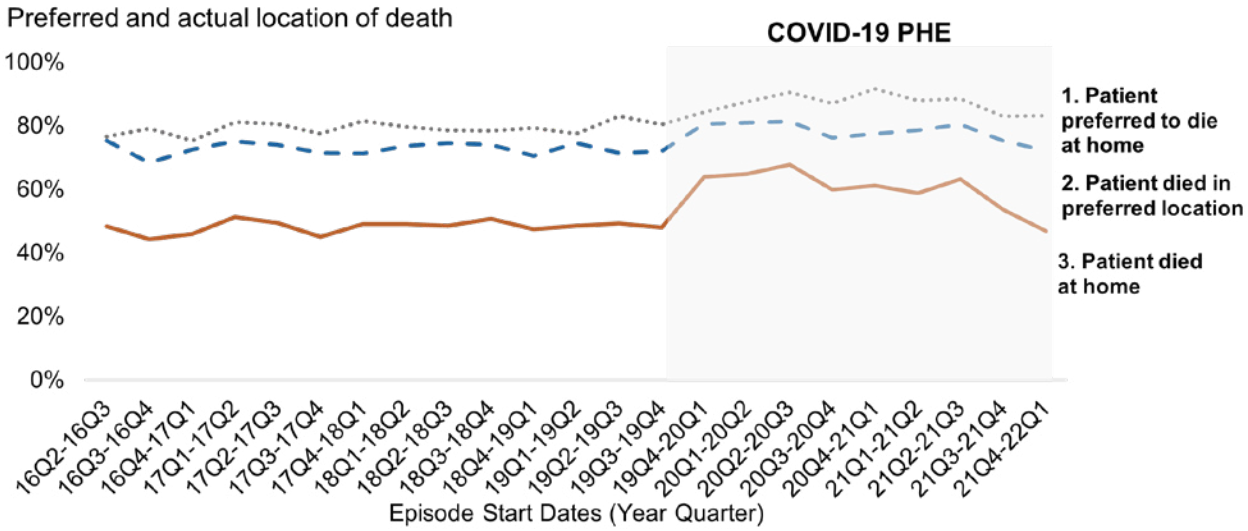
Exhibit 28: During the COVID-19 PHE, Caregivers Reported Care Experience During Patients' Last Month of Life Declined Relative to Before the COVID-19 PHE



Source: OCM Caregiver Survey. Includes episodes initiated from April 2016 to December 2020; data collection for these episodes occurred from January 2017 to August 2022.

Notes: N= 10,957 survey responses from caregivers, limited to higher-risk episodes only. Each survey wave included patients who had episodes over a six-month period (two quarters); for example, Q1 refers to episodes that started between January and March. Grey shading in the chart indicates survey waves with some portion of episodes occurring during the COVID-19 PHE. OCM episodes lasted for 180 days, and patients typically received surveys roughly 6–9 months following the start of their episode. Estimates were weighted for sampling and non-response and regression adjusted. Patients with a COVID-19 diagnosis during the episode were excluded from analysis. PHE: Public health emergency. EOL: End-of-life.

Exhibit 29: During the COVID-19 PHE, Caregivers Reported That Patients Were More Likely to Die at Home and to Prefer to Die at Home Relative to Before the COVID-19



Source: OCM Caregiver Survey. Includes episodes initiated from April 2016 to December 2020; data collection for these episodes occurred from January 2017 to August 2022.

Notes: N= 10,957 survey responses from caregivers, limited to higher-risk episodes only. Each survey wave included patients who had episodes over a six-month period (two quarters); for example, Q1 refers to episodes that started between January and March. Grey shading in the chart indicates survey waves with some portion of episodes occurring during the COVID-19 PHE. OCM episodes lasted for 180 days, and patients typically received surveys roughly 6–9 months following the start of their episode. Estimates were weighted for sampling and non-response and regression adjusted. Patients with a COVID-19 diagnosis during the episode were excluded from analysis. PHE: Public health emergency.

COVID-19 PHE) and preferred to die at home (average of 79 percent prior to the COVID-19 PHE relative to 86 percent during the COVID-19 PHE) However, both measures started trending back toward the pre-COVID-19 averages in the final quarters of OCM, and trends did not differ statistically significantly from zero.

4.5 Patient-Reported Health Outcomes

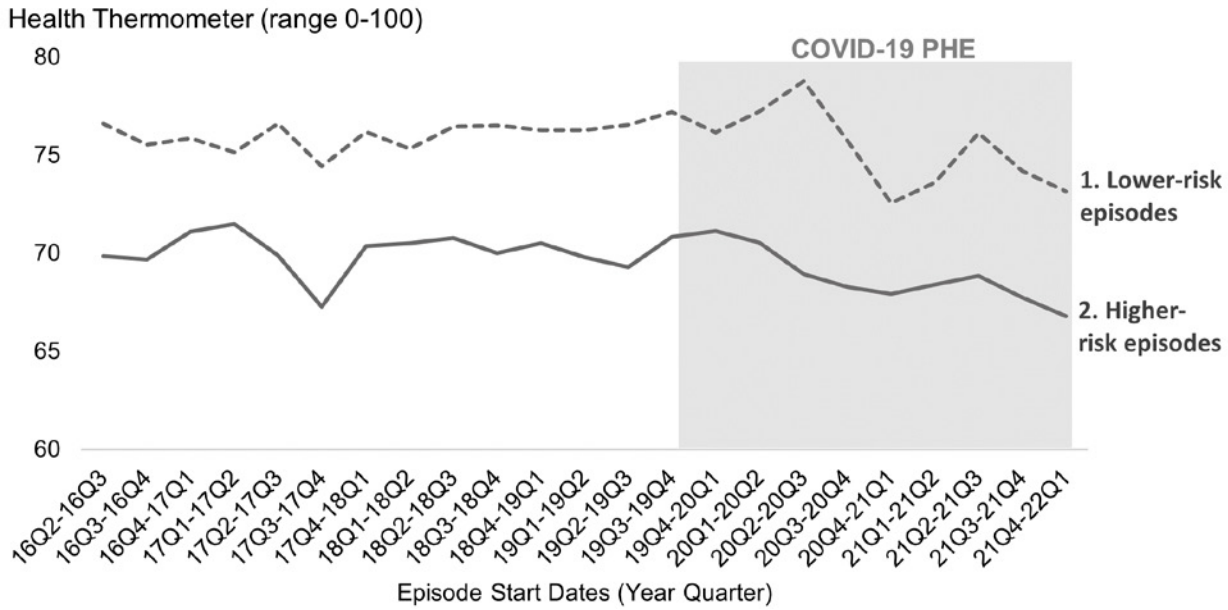
In the patient survey, we asked respondents to report information about their current health status and about symptoms related to their cancer or cancer treatment over the last six months. As with the measures of care experience reported in Section 4.4, we assessed trends in these patient-reported outcomes separately prior to the COVID-19 PHE and during the COVID-19 PHE.

Patient-reported health status declined during the COVID-19 PHE.

We assessed changes over time in patient-reported health status using three measures: (1) average ratings on a "health thermometer" adapted from the EQ-5D visual-analogue health thermometer, where patients reported how good or bad their health is today on a scale of 0 (worst) to100 (best); (2) the proportion of patients who rated their overall health status as very good or excellent (relative to good, fair, or poor); and (3) the proportion of patients who rated their mental or emotional health status as very good or excellent (relative to good, fair, or poor). Appendix C describes additional information on these survey items and measures.

Prior to the COVID-19 PHE, on average, patients with lower-risk episodes consistently reported health thermometer ratings of roughly 76, and patients with higher-risk episodes consistently reported health thermometer ratings of roughly 70 (Exhibit 30). Health thermometer ratings declined during the COVID-19 PHE for patients with both lower-risk and higher-risk episodes, with trends indicating a negative change of roughly 3 points for lower-risk episodes (a relative decrease of -4 percent; $p<0.10$) and a negative change of roughly 4 points for higher-risk episodes (a relative decrease of -6 percent; $p<0.01$). The proportion of patients with lower-risk episodes reporting excellent or very good mental or emotional health status also declined significantly (Appendix Exhibit C-12).

Exhibit 30: Patient-Reported Health Thermometer Ratings Declined During the COVID-19 PHE for Patients With Both Lower-Risk and Higher-Risk Episodes



Source: OCM Caregiver Survey. Includes episodes initiated from April 2016 to December 2020; data collection for these episodes occurred from January 2017 to August 2022.

Notes: N= 209,884 survey responses. Each survey wave included patients who had episodes over a six-month period (two quarters); for example, Q1 refers to episodes that started between January and March. Grey shading in the chart indicates survey waves with some portion of episodes occurring during the COVID-19 PHE. OCM episodes lasted for 180 days, and patients typically received surveys roughly 6–9 months following the start of their episode. Estimates were weighted for sampling and non-response and regression adjusted. Patients with a COVID-19 diagnosis during the episode were excluded from analysis. PHE: Public health emergency.

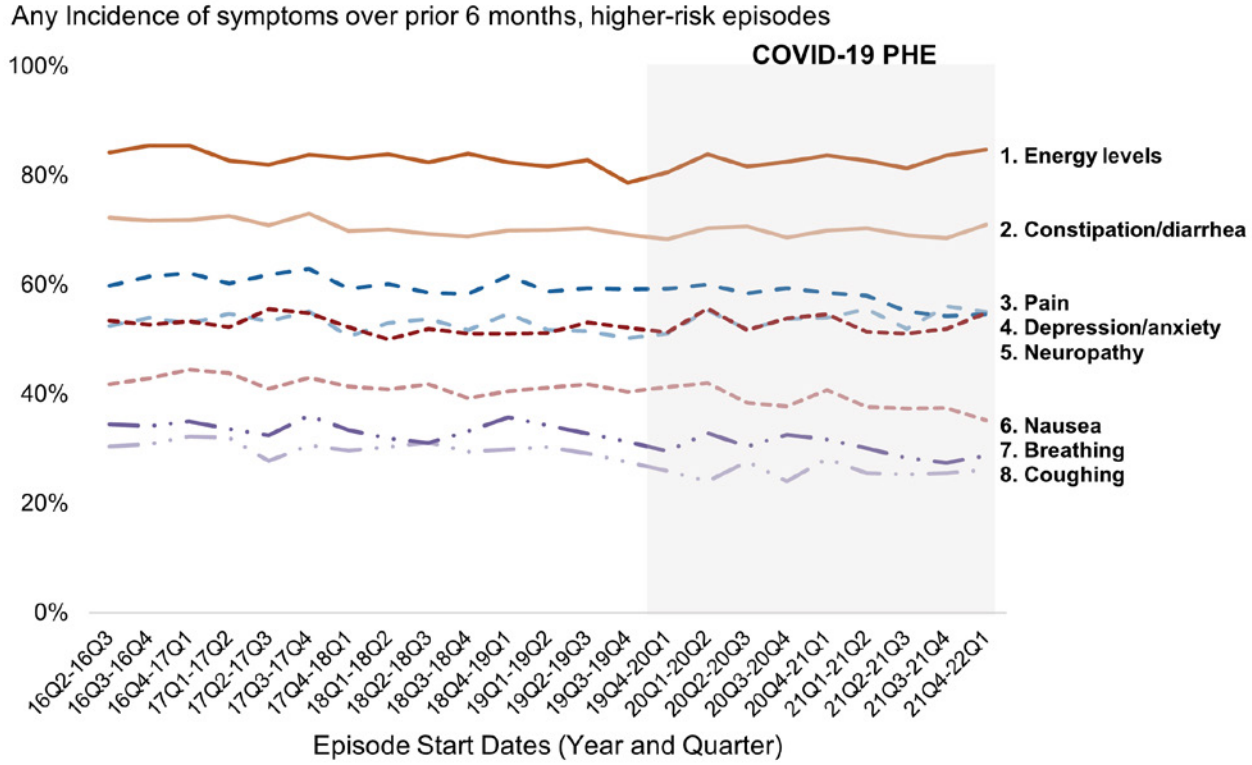
OCM patients with higher-risk episodes reported slightly improved symptoms during OCM, prior to the COVID-19 PHE.

The patient survey asked respondents whether they had been bothered by any of eight symptoms from their cancer or cancer treatment in the prior six months (Exhibit 31).[24] The share of OCM respondents with higher-risk episodes who reported having symptoms decreased slightly over time during OCM prior to the COVID-19 PHE for six of the eight symptoms (Appendix Exhibit C-14).[25] For example, at baseline, 72 percent of respondents reported experiencing constipation or diarrhea over the prior six months; among respondents with episodes initiated in mid-2019, this improved to 70 percent ($p<0.01$). Notably, analyses included only OCM respondents (no comparison group). In a prior report that included surveys from patients with episodes in comparison practices *(Evaluation of the Oncology Care Model: Performance Periods 1–5)*, we found no OCM impact on patient-reported symptoms between baseline and PP5, suggesting similar trends among non-OCM cancer patients as well. During the COVID-19 PHE, patient-reported symptoms were stable over time for patients with higher-risk episodes, with the exception of a statistically significant increase in symptoms related to energy levels. Extrapolating across the survey waves fielded during the COVID-19 PHE, the trend indicates a 6-percentage point ($p<0.05$) increase in the rate of patients experiencing symptoms relating to energy levels.

OCM patients with lower-risk episodes reported fewer symptoms during the COVID-19 PHE, but trends were not statistically significant.

Patients with lower-risk episodes reported lower rates of experiencing all eight symptoms, relative to patients with higher-risk episodes (Appendix Exhibit C-14). For example, roughly half of respondents with lower-risk

Exhibit 31: Patient-Reported Symptoms for Patients with Higher-Risk Episodes Declined Prior to the COVID-19 PHE and Were Largely Stable During the COVID-19 PHE



Source: OCM Caregiver Survey. Includes episodes initiated from April 2016 to December 2020; data collection for these episodes occurred from January 2017 to August 2022.

Notes: N= 209,884 survey responses. Each survey wave included patients who had episodes over a six-month period (two quarters); for example, Q1 refers to episodes that started between January and March. Grey shading in the chart indicates survey waves with some portion of episodes occurring during the COVID-19 PHE. OCM episodes lasted for 180 days, and patients typically received surveys roughly 6–9 months following the start of their episode. Estimates were weighted for sampling and non-response and regression adjusted. Patients with a COVID-19 diagnosis during the episode were excluded from analysis. PHE: Public health emergency.

[24] The survey asked about symptoms for: pain, energy level/fatigue, emotional problems, nausea, breathing, coughing, constipation, and neuropathy.

[25] Statistically significant decreases in rates of symptoms prior to the COVID-19 PHE were observed among respondents with higher-risk episodes for all symptoms ($p<0.10$) except breathing and neuropathy.

episodes reported symptoms related to energy levels, relative to over four out of five respondents with higher-risk episodes. Trends were consistent over time prior to the COVID-19 PHE. During the COVID-19 PHE, respondents with lower-risk episodes were generally less likely to report symptoms, but trends were not statistically significant, in part due to small sample sizes.

4.6 Discussion

As described in prior reports (*Evaluation of the Oncology Care Model: Performance Periods 1–3* and *Evaluation of the Oncology Care Model: Performance Periods 1–5*), many practices implemented care redesign efforts that could have improved quality of care and patient care experience among OCM patients. However, we found limited evidence that OCM practices systematically improved quality of care for OCM patients, either among official Model quality measures, or in measures of patient-reported experience with care and overall health status.

While OCM practices improved their AQS values over time, especially in the final four PPs, this improvement appears to have largely been driven by two changes related to the COVID-19 PHE. Starting in PP8, CMS made reporting the two practice-reported quality measures (OCM-4 and OCM-5) voluntary, as part of the flexibilities allowed during the PHE. This left just three required quality measures; practices that had low performance on the practice-reported measures may have chosen not to submit them. Of the remaining three required measures, achievement on measure OCM-2 (ED visits or observation stays without an admission) improved starting in PP8 for many practices, because fewer ED visits occurred during the PHE, for both OCM and non-OCM episodes. While these two factors were the primary drivers of improvements in AQS values beginning in PP8, compositional changes in OCM participation also contributed to the observed pattern. Roughly 30 percent of participating OCM practices terminated their OCM participation during the PHE prior to the end of OCM, and these practices had lower average AQS values than practices that remained in the Model.

Three of the five quality measures (OCM-2 reflecting ED visits and observation stays without an admission, OCM-3 reflecting use of hospice care for three or more days, and OCM-6 reflecting patient experience of care) included in the final specification of the AQS changed little over time, prior to the COVID-19 PHE. While average performance on OCM-2 among OCM practices improved during the COVID-19 PHE, OCM had little impact on the occurrence of ED visits and observation stays without an admission relative to the comparison group. For the two practice-reported measures relating to screening and management of pain and depression, the OCM practices demonstrated meaningful improvements over time. OCM practices initially reported high rates of pain assessment and management, which improved moderately over time, and low rates of depression screening and follow-up plans, which improved substantially over time. However, patient reports about the involvement of their cancer therapy team in managing pain and depression did not show similar improvements over time, suggesting that patients did not always notice these changes.

Prior to the COVID-19 PHE, patient-reported care experiences changed little for OCM patients, even though many practices implemented care redesign strategies intended to improve care experiences. As reported in a prior report, *Evaluation of the Oncology Care Model: Performance Periods 1–5*, difference-in-differences analyses of patient care experience through the third year of OCM showed small differences over time between OCM respondents and comparison group respondents that were not statistically significant. Once the COVID-19 PHE began, OCM patients reported greater difficulty across multiple domains. During the COVID-19 PHE: patient-reported health status declined for all patients; patients with higher-risk episodes were more likely to report symptoms related to their energy level; and all patients reported declining experiences with symptom management. This analysis of OCM patient survey responses has limitations. The patient survey analyses in this report included OCM patients only (no comparison group) and cannot be considered causal. It is possible that changes caused by, or that coincided with, the COVID-19 PHE were associated with these changes for both OCM and non-OCM patients. It is also possible that these findings were in part due to reductions in survey response rates during the COVID-19 PHE that changed the composition of the analytic sample in unobserved ways not accounted for by our survey weights.[26]

These findings have potential implications for the Enhancing Oncology Model. OCM-4 (practice-reported rates of "Pain assessment and management") showed notable improvement during OCM, suggesting that EOM participants who were not part of OCM may be able to achieve similar improvements. On the other hand, since most practices achieved a high degree of success on OCM-4, at least as measured by the OCM-4 quality measure, future care improvement efforts related to screening and management of pain may not be able to increase it further among OCM practices that join EOM. Despite high scores on OCM-4, roughly a quarter of OCM patients who reported having pain in the patient survey also reported that their cancer therapy team did not try to help them

[26] Survey response rates dropped from a range of 44 percent–48 percent in each quarter during the quarters prior to the COVID-19 PHE to 40 percent–45 percent during the COVID-19 PHE.

deal with their pain. This suggests that there may still be opportunities to improve the experiences of patients with pain. Alternatively, it is possible that survey respondents did not recall certain efforts taken by their care team when responding to the survey (i.e., recall bias). In contrast, despite substantial improvements made by many practices on OCM-5 (depression screening and follow-up plan) of over 20 percentage points on average, room for improvement remains for many practices. Fewer than half of respondents who reported having emotional problems, such as depression or anxiety, also reported on the patient survey that their cancer care teams helped them deal with their problems. Those rates of reported assistance with problems declined even further during the COVID-19 PHE. Many practices began using telemedicine/virtual appointments during the PHE, but telemedicine could make symptom management easier, if patients are able to access clinicians in a timely manner as symptoms come up. Patients may have experienced reduced access to care due to the COVID-19 PHE, but we found no direct evidence of this in the survey. Based on qualitative insights from practices, improvement in connecting patients with mental health services may be challenging without broader changes in the mental health care landscape.

Did OCM Affect Cancer Treatment

CONTEXT AND KEY FINDINGS

OCM's financial incentives encouraged the use of higher-value cancer treatments that were consistent with national clinical guidelines. We assessed the impact of OCM on the use of biosimilar anti-cancer therapies, as well as the impact of OCM on chemotherapy spending for high-risk breast cancer and multiple myeloma.

OCM led to faster adoption of lower-cost biosimilar versions of three high-cost anti-cancer therapies (trastuzumab, bevacizumab, and rituximab).

OCM led to reduced chemotherapy spending during high-risk breast cancer episodes.

Reduced spending was attributable to reduced spending for protein-bound paclitaxel, starting in early performance Periods, as well as reduced spending for Human Epidermal Growth Factor (HER2)-targeted therapies, starting in Performance Periods 10-11 (after biosimilar trastuzumab became available).

OCM did not affect spending on chemotherapy for multiple myeloma.

OCM also encouraged care coordination, adherence to national guidelines, patient education, and financial counseling. We assessed adherence to national guidelines for palliative radiation therapy, avoidance of delays in initiating chemotherapy after surgery for breast or colorectal cancer, and patient adherence to oral cancer treatment regimens for prostate cancer or chronic myeloid leukemia.

OCM did not affect timeliness of chemotherapy after surgery for colorectal cancer or breast cancer.

OCM had no overall impact on adherence to Part D (oral) drug treatment regimens for chronic myeloid leukemia or high-intensity prostate cancer.

The Oncology Care Model (OCM) required practices to follow national cancer treatment guidelines, and incentivizes practices to select less-costly treatment options when appropriate, and to reduce low-value care. Oncologists often have a range of cancer treatment options that may be appropriate for a particular patient. Oncologists usually select a specific care regimen based on multiple factors, including the effectiveness and toxicities of the treatment, as well as patient characteristics. Chemotherapy regimens vary in their associated costs, and OCM incentives could lead to value-based changes in chemotherapy regimens (i.e., preferential selection of less costly chemotherapy regimens, all else being equal). Additionally, aspects of OCM meant to enhance care coordination could improve timeliness of and access to cancer treatment.

This chapter explores the clinical impacts of OCM on cancer treatment provided to patients. Anti-cancer therapies refer to treatments intended to directly combat cancer, in contrast to treatment that mitigates the side effects of anti-cancer treatments (the supportive-care medications described in Chapter 6).

5.1 Biosimilar versus Originator Anti-Cancer Therapies

Adoption of biosimilar versions of three high-cost anti-cancer therapies was faster in OCM relative to comparison episodes.

Biosimilars are biological therapies that the Food and Drug Administration recognizes as being highly similar to an originator drug (the product initially approved for use). Biosimilars are generally less costly than the originator drug and offer an opportunity to reduce drug expenditures while using therapeutically equivalent treatments.[xxxvi] Biosimilar versions of three high-cost and high-volume anti-cancer therapies (rituximab, trastuzumab, and bevacizumab) became available in recent years—all after the start of OCM. These three drugs were all in the top 20 drugs by total Medicare Part B spending in 2019; rituximab was fourth ($1.7 billion in annual Medicare spending), bevacizumab was eighth ($1.0 billion), and trastuzumab was eleventh ($821 million).[xxxvii]

We evaluated whether OCM was associated with higher rates of use and faster rate of adoption of these biosimilar anti-cancer therapies instead of the comparable originator products. Because biosimilar agents were not available before OCM began, it was not possible to use a difference-in-differences (DID) analytic approach. We therefore examined the regression-adjusted difference in the proportion of episodes using biosimilar products and the adjusted rate of adoption for OCM versus comparison episodes after these products became available. These analyses were restricted to episodes for cancer types relevant to the core uses for each drug.[27] For example, rituximab is a key treatment for lymphoma and some chronic leukemias, trastuzumab is a key treatment for patients with high-risk breast cancer that are receiving HER2-targeted therapy, and bevacizumab is used in a small proportion of patients with cancers of the colon/rectum, ovary, lung, brain, endometrium, and kidney.

For each of the three biosimilar anti-cancer therapies, there was a statistically significant increase in the rate of adoption, as measured by the post-period trend, and greater use of biosimilars in OCM versus comparison episodes (Exhibit 32).

Two of these three drugs (rituximab and trastuzumab) also had formulations that could be delivered through subcutaneous injection (i.e., injection into fatty tissue under the skin), which were introduced shortly before the intravenous biosimilar product became available. The subcutaneous formulations can be administered more quickly, which is potentially more convenient for patients, and they also allow oncology practices to turn over their infusion chairs more rapidly, increasing practice-level capacity to treat more patients. However, the subcutaneous formulations are originator products (there are no

Exhibit 32: Faster Rate of Adoption and Greater Use of Biosimilar Rituximab, Trastuzumab, and Bevacizumab in OCM Episodes

Therapy Type	Intervention Mean		Difference in Use	Rate of Adoption (Post-Period Trend)
	OCM	COMP	Estimate	Estimate
Rituximab biosimilar	33.1%	27.1%	6.0 pp	1.1%
Trastuzumab biosimilar	38.6%	33.0%	5.6 pp	1.2%
Bevacizumab biosimilar	44.2%	36.6%	7.6 pp	1.2%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2019–2022.
Notes: OCM: OCM intervention group. COMP: Comparison group. pp: Percentage points.

[27] These analyses comprised about 2-3 percent of all OCM episodes beginning in PP6.

biosimilars available) and subcutaneous formulations are therefore more costly than intravenous biosimilar alternatives.

We examined the adjusted difference in the proportion of episodes using the more costly subcutaneous rituximab (Rituxan Hycela) and trastuzumab (Herceptin Hycleta) as well as the rate of adoption of these products for OCM versus comparison episodes in the time periods they were available. We found slightly faster adoption of subcutaneous rituximab in OCM versus comparison episodes, but no statistically significant difference in average level of use (Appendix Exhibit D-1). We found no difference in OCM versus comparison episodes in the rate of adoption or average use of the more costly subcutaneous trastuzumab (Appendix Exhibit D-1).

In summary, these analyses find that OCM was associated with faster adoption of biosimilar rituximab, trastuzumab, and bevacizumab but did not meaningfully affect use of new (and more costly) subcutaneous formulations of rituximab and trastuzumab.

5.2 Spending on Chemotherapy for Breast Cancer

As described in Section 2.2, OCM reduced payments for Part B chemotherapy spending in high-risk breast cancer episodes by $512. In a prior OCM Evaluation report, *Evaluation of the Oncology Care Model: Performance Periods 1–9*, we examined use of chemotherapy regimens for patients with high-risk breast cancer, based on the drugs given in the first days of each episode, and found very similar regimens for OCM and comparison episodes. In this report, to identify the source of the payment reduction for chemotherapy for high-risk breast cancer episodes, we conducted additional analyses of payments for specific chemotherapy drugs. These analyses compared Part B chemotherapy payments for specific chemotherapy drugs in OCM episodes relative to comparison episodes, before and after OCM began.

OCM led to higher-value use of paclitaxel versus protein-bound paclitaxel.

Protein-bound paclitaxel is a high-priced alternative to paclitaxel. Paclitaxel and protein-bound paclitaxel (also known as nab-paclitaxel, or Abraxane) have similar indications for breast cancer treatment. The primary advantage of protein-bound paclitaxel is that it does not require steroid premedication, unlike conventional paclitaxel. However, a large clinical trial found no therapeutic benefit of protein-bound paclitaxel over conventional paclitaxel, and protein-bound paclitaxel was associated with greater neuropathy than paclitaxel. We observed that OCM led to a relative savings in Part B payments for protein-bound paclitaxel of $126 per episode (across all high-risk breast cancer episodes (**Exhibit 33**).

OCM was associated with lower spending on HER2 targeted therapies in later PPs.

Therapies that target the Human Epidermal Growth Factor 2 (HER2) receptor are critical for high-risk breast cancer patients with overexpression of HER2. There are numerous HER2 targeted therapies recommended by national guidelines for various clinical indications. Trastuzumab was the first HER2 targeted therapy and is now available in biosimilar form. In more recent years, newer HER2 targeted therapies have become available, including pertuzumab, ado-trastuzumab emtansine, and fam-trastuzumab deruxtecan; spending on these drugs has increased somewhat in recent PPs (Appendix Exhibit D-3). Exhibit 34 shows no OCM impacts on spending across the category of all HER2 targeted therapies, or for individual HER2 targeted therapies. However, when examining by PP, we observed a significant savings of $473 on trastuzumab in PP10–PP11, likely related to faster adoption and greater use of biosimilar trastuzumab (see Section 5.1), which first became available in PP7 (Appendix Exhibit D-4). There was also a significant relative reduction in spending for pertuzumab during OCM episodes in PP10–PP11 (Appendix Exhibit D-4).

Exhibit 33: OCM Led to a Relative Decrease in Part B Chemotherapy Payments per Episode for Protein-Bound Paclitaxel

Sum of Chemo Drug Payments per Episode	# of Episodes		OCM		COMP		Impact Estimates			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Impact	90% LCL	90% UCL	Percent Change
Protein-bound paclitaxel	172,546	171,278	$735	$614	$635	$640	-$126	-$199	-$52	-17.1%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: OCM: OCM intervention group. COMP: Comparison group. Int: Intervention period. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit.

Exhibit 34: No Cumulative DID Impact in Part B Chemotherapy Payments for HER2-Targeted Therapies

Sum of Chemo Drug Payments per Episode	OCM		COMP		Impact Estimates			
	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Impact	90% LCL	90% UCL	Percent Change
All HER2 targeted therapies	$8,292	$10,641	$7,647	$10,342	-$347	-$698	$3	-4.2%
Trastuzumab	$5,228	$6,489	$4,851	$6,253	-$141	-$367	$84	-2.7%
Pertuzumab	$1,672	$2,595	$1,511	$2,530	-$96	-$241	$49	-5.7%
Ado-trastuzumab emtansine	$1,237	$1,372	$1,142	$1,382	-$104	-$241	$34	-8.4%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: HER2: Human Epidermal Growth Factor. OCM: OCM intervention group. COMP: Comparison group. Int: Intervention period. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit.
The DID for all HER2 targeted therapies demonstrated a savings of -$418, 90% Confidence interval -$799, -$37, in sensitivity analyses dropping the two largest practices. Across all analyses presented in the table, the number of OCM episodes is 172,546 and the number of Comparison episodes is 171,278.

Fam-trastuzumab was not available in the baseline period and thus DID analyses were not done; rather, we examined differences in spending and the rate of spending increase in the PPs in which the drug was available. We observed a slower rate of spending increase—likely due to slower rate of adoption—for fam-trastuzumab deruxtecan in OCM relative to comparison episodes (Exhibit 35).

OCM was not associated with differences in spending on other Part B or on Part D drugs used to treat high-risk breast cancer.

Across all high-risk breast cancer episodes, there was relatively low per-episode spending for other Part B drugs frequently used in the treatment of high-risk breast cancer, including fulvestrant, eribulin, docetaxel, and doxorubicin, and there was no OCM impact on spending for fulvestrant or eribulin—drugs with sufficient spending to conduct DID analyses (Appendix Exhibit D-5).

Several Part D drugs have become increasingly important in the treatment of breast cancer, most notably the Cyclin-Dependent Kinase (CDK) 4/6 inhibitors palbociclib (approved by the Food and Drug Administration to treat breast cancer in 2015), ribociclib (approved in 2017), and abemaciclib (approved in 2017) (Appendix Exhibit D-6). We observed no OCM-related relative differences in spending for CDK4/6 inhibitors as a class of targeted therapies (Appendix Exhibit D-7). In analyses examining spending differences and rate of spending change for CDK4/6 inhibitors that only became available during the intervention period, we observed that OCM versus comparison episodes had similar spending on ribociclib and abemaciclib and a greater increase in spending for abemaciclib (likely related to faster rate of adoption) in OCM vs. comparison episodes (Appendix Exhibit D-8). There was relatively less spending on everolimus than on other Part D drugs, and there was no OCM impact on spending for everolimus (Appendix Exhibit D-9).

In summary, the OCM impact of lower Part B drug spending on chemotherapy for high-risk breast cancer episodes was explained by a relative reduction in spending on protein-bound paclitaxel beginning in PP1 as well as a reduction in spending on HER2 targeted therapies (trastuzumab, pertuzumab, fam-trastuzumab) in later PPs, coinciding with the availability of biosimilar trastuzumab formulations.

Exhibit 35: OCM Was Associated with a Slower Rate of Spending Increase for Fam-Trastuzumab Deruxtecan (Performance Period 8–11)

	# of Episodes		Intervention Mean		Difference in Spending	90% LCL	90% UCL	Rate of Spending	90% LCL	90% UCL
	OCM	COMP	OCM	COMP						
Fam-trastuzumab deruxtecan	46,752	44,267	$692	$621	$71	-$42	$183	-$32/ quarter	-$60	-$5

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2020–2022 (Performance Periods 8-11).
Notes: OCM: OCM intervention group. COMP: comparison group. LCL: Lower confidence limit. UCL: Upper confidence limit.

5.3 Spending on Chemotherapy for Multiple Myeloma

As reported in Appendix Exhibit B-6 OCM did not lead to any significant change in TEP among multiple myeloma episodes. However, myeloma episodes were notable for their frequency (myeloma was fifth most prevalent episode type) and for their high cost. Mean TEP for myeloma episodes was greater than $79,000 for both OCM and comparison episodes in the intervention period, making myeloma the costliest episode type in OCM. Because of its prevalence and high treatment cost, multiple myeloma is one of seven cancer types included in CMS's Enhancing Oncology Model.

Since myeloma therapy is characterized by a wide array of effective guideline-recommended treatment options, the development of value-based treatment pathways in myeloma (e.g., reduced-intensity treatment regimens for patients with favorable prognostic features) seems plausible. However, value-based care for myeloma remains poorly defined, and the continued emergence of new drugs and drug regimens may complicate development of value-based care pathways.[28]

In this section, we describe chemotherapy use and spending for multiple myeloma. These analyses compared Part B and Part D chemotherapy payments for specific chemotherapy drugs and drug classes in OCM episodes relative to comparison episodes, before and after OCM began. Additionally, we evaluated the content of single- and multi-drug regimens initiating myeloma treatment episodes.

OCM had no impact on spending for three critical classes of myeloma therapies.

Three drug classes dominated chemotherapy spending for myeloma episodes, including immunomodulatory agents (lenalidomide, pomalidomide, and thalidomide), proteasome inhibitors (bortezomib, carfilzomib, and ixazomib), and daratumumab (a monoclonal antibody). Immunomodulatory agents are all oral medications covered under Medicare Part D, while daratumumab and most proteasome inhibitors (except ixazomib) are intravenous or subcutaneous medications covered under Part B.

Across all myeloma episodes, mean episode spending for immunomodulatory agents was $48,763 in OCM episodes during the intervention period, and OCM had no impact on spending for this drug class (Appendix Exhibit D-10). Spending for lenalidomide made up the largest component of spending for immunomodulatory agents, and OCM had no impact on spending for lenalidomide or any of the other individual drugs in this class (see Appendix Exhibit D-11).

Mean spending for proteasome inhibitors was $12,814 in OCM myeloma episodes during the intervention period. While bortezomib accounted for the majority of spending on proteasome inhibitors early in OCM, spending for bortezomib declined over the OCM period. By the later years of OCM each of the three proteasome inhibitors had a similar share of spending in myeloma episodes (see Appendix Exhibit D-18). OCM had no impact on spending for proteasome inhibitors (Appendix Exhibit D-14) or for bortezomib or carfilzomib individually (Appendix Exhibit D-15). OCM episodes had a greater spending on Ixazomib ($469) once this drug became available (by PP1, Appendix Exhibit D-16).

Daratumumab is an important new drug used for treating myeloma. Daratumumab was first approved by the FDA for treatment of myeloma in November 2015 and is now approved for use in multiple situations, including in combination with immunomodulatory drugs and with bortezomib. Mean episode spending for daratumumab was $10,815 in OCM episodes during the intervention period, and spending did not differ significantly in comparison episodes (Appendix Exhibit D-19). Since daratumumab was not available during the baseline period, an OCM DID impact on daratumumab is not calculable.

Single- and multi-drug regimens used in OCM and comparison myeloma episodes were similar.

We assessed initial single- and multi-drug systemic therapy regimens in OCM and comparison episodes; these analyses did not account for dexamethasone, a common, low-cost component of many myeloma therapy regimens. During OCM the most common myeloma regimen among beneficiaries with both Part B and Part D coverage was single-agent lenalidomide; this regimen accounted for 32.0% and 33.0% of OCM and comparison episodes (Appendix Exhibit D-23). Among beneficiaries without a myeloma treatment episode in the previous six months, the most common regimens were single-agent lenalidomide (23.2% of OCM episodes) and the combination of lenalidomide-bortezomib (23.6% of OCM episodes—see Appendix Exhibit D-24). The proportion of episodes using the various regimens were similar between OCM and comparison episodes, both among all episodes with Part B and Part D coverage and after restricting to episodes without an episode in the six months preceding. With the exception of lenalidomide-bortezomib, multi-drug regimens were relatively uncommon. The next most common multi-drug regimens after lenalidomide-bortezomib were daratumumab-pomalidomide (4.3% of OCM episodes) and daratumumab-lenalidomide (3.1% of episodes).

[28] Ouchveridze E, Berger K, Mohyuddin GR. Value in myeloma care: Myth or reality. Curr Hematol Malig Rep. 2022;17(6)206-216.

In summary, OCM had no measurable impact on episode spending for myeloma systemic therapies, either overall or in any individual drug class. It remains unclear whether OCM's lack of an impact on spending for myeloma systemic therapy results from limited opportunities for value-based care in this field or a lack of prioritization of myeloma value-based care by OCM participants.

5.4 Timeliness of Post-Surgical Chemotherapy Initiation

Consensus recommendations call for timely initiation of adjuvant chemotherapy following curative-intent surgery. Observational studies have shown that delays in initiating post-operative chemotherapy following surgery for breast cancer or colon cancer are associated with worse outcomes.[xxxix,xl] Timely chemotherapy after surgery is also more patient centered. These considerations led the American Society of Clinical Oncology (ASCO) Quality Oncology Practice Initiative (QOPI) to include measures of timeliness of adjuvant chemotherapy in their list of quality measures. For example, the QOPI measures included timeliness of adjuvant chemotherapy (defined as within two months after surgery) for patients with stage III colon cancer (QOPI measure 68).[xli]

For each chemotherapy episode for colorectal cancer or high-risk breast cancer, we identified patients who had a qualifying surgical procedure (suggesting receipt of a curative-intent surgical procedure) within the 180 days before the start of the episode. We assessed timing of adjuvant chemotherapy (based on the QOPI definition of adjuvant treatment within 60 days after surgery) for two clinical scenarios: (1) adjuvant chemotherapy following colon/rectum resection for colorectal cancer, and (2) adjuvant chemotherapy following lumpectomy/mastectomy for breast cancer (high-risk breast cancer episodes). Since claims data do not contain information about disease stage, we identified adjuvant chemotherapy based on receipt of chemotherapy following presumed curative-intent surgery.

OCM had no impact on the timeliness of chemotherapy after surgery for colorectal cancer or breast cancer.

Overall, among both OCM and comparison patients who underwent one of the specified surgeries, approximately 63 percent of colorectal cancer patients and 72 percent of breast cancer patients received chemotherapy within 60 days after surgery. Despite the expansion of patient navigation in OCM practices, OCM had no impact on the proportion of patients with colorectal cancer or breast cancer whose first chemotherapy episode began within 60 days after surgery (see Appendix Exhibit D-25).

5.5 Patient Adherence to Oral Medications

Evidence has found that adherence to effective oral anti-cancer drugs, as measured by drugs dispensed, is suboptimal.[xlii,xliii] During site visits and annual follow-up calls, many OCM practices told us about care coordination initiatives seeking to improve patient adherence to oral cancer treatment regimens. Examples include improving patient education efforts about oral cancer treatments and providing financial counseling to address high out-of-pocket costs. Adherence is important; for example, for patients with chronic myeloid leukemia (CML), greater adherence is directly related to achieving a major molecular response, which is associated with better survival.[xliv] We explored whether OCM-related care transformation efforts led to improved patient adherence to two oral (Part D) treatments. We measured adherence using the proportion of days covered. The numerator for covered days was the number of days a patient had the drug available, which we measured as the number of days that could be covered by the supply of drugs dispensed. The denominator was all days in which the patient was eligible for the drug during the episode (see Appendix D.6). We assessed the impact of OCM on adherence to Part D (oral) drugs for two cancer types for which expensive Part D oral chemotherapy drugs play a key role and for which we expected to have reasonable sample sizes: CML and high-intensity prostate cancer.

OCM did not improve adherence to Part D (oral) drug treatment regimens for CML or high-intensity prostate cancer.

Adherence rates during PP1–PP11 were similar for OCM and comparison episodes, both for tyrosine kinase inhibitors (TKIs) for CML (approximately 86 percent) and for enzalutamide or abiraterone for prostate cancer (approximately 85 percent), and remained stable over time.[29] Despite the efforts of many OCM practices to educate patients, address barriers, and improve adherence, OCM had no overall impact on adherence among patients taking TKIs for CML or enzalutamide or abiraterone for prostate cancer (Appendix Exhibit D-26).

5.6 Discussion

In assessing the impact of OCM on cancer treatment during OCM, we found modest but emerging impacts of OCM on anti-cancer treatments. In previous evaluation reports, we found that OCM did not limit adoption or use of high-priced novel therapies, or of newer immunotherapies specifically. We also previously reported that OCM did not lead to greater use of higher-value generic oral cancer medications. In this report, we

[29] Note that adherence to these oral medications was higher than in some prior studies of Medicare patients, including the Winn et al. and Caram et al. studies cited above. This is likely because we studied chemotherapy episodes that were triggered by the dispensing of the oral cancer drug. In other words, beneficiaries who were not filling their prescriptions regularly would trigger fewer OCM-defined chemotherapy episodes and would be underrepresented in these episode-level data.

confirm that OCM had no overall impact on spending for chemotherapy (in Part B or Part D) when evaluated across all episodes. However, OCM participation was associated with greater adoption and use of the first three biosimilar cancer therapies to become available. In addition, OCM resulted in relative reductions in Part B chemotherapy spending for high-risk breast cancer, with impacts attributable to changes in spending for protein-bound paclitaxel and greater use of biosimilar trastuzumab in OCM vs comparison episodes. We did not find similar reductions in chemotherapy spending for multiple myeloma. These findings highlight two general observations. First, in most clinical settings, OCM did not significantly influence decisions about selection of anti-cancer treatments. Second, in limited and specific situations, there is growing evidence that OCM has successfully enabled value-conscious changes in chemotherapy treatment. In the specific scenarios described above, OCM practices identified specific opportunities to substitute a lower cost, therapeutically equivalent cancer treatment for a higher-cost treatment, among high-risk breast cancer episodes. These cases involved one-to-one substitutions (paclitaxel for protein-bound paclitaxel and biosimilar for originator anti-cancer treatments).

With regard to timeliness of cancer treatment and adherence to oral anti-cancer therapies, we found no overall impact of OCM (although as noted in **Section 7.2, Exhibit 46**, we observed relative improvements in adherence for several historically underserved patient populations). On one hand, OCM's mandate for patient navigation services was a potential mechanism for facilitating timely initiation of post-operative adjuvant chemotherapy treatments. On the other hand, OCM did not specifically prioritize timely cancer treatment as a quality measure.

Did OCM Incentivize High-Value Use of Supportive Care Medications?

CONTEXT AND KEY FINDINGS

Cancer treatment can cause toxic side effects, some of which can be prevented or reduced through effective supportive therapy—often given prophylactically, accompanying the first chemotherapy infusion. We assessed the impact of OCM on use of bone-modifying agents to prevent fractures, antiemetics to manage chemotherapy-related nausea, and white blood cell growth factors to prevent fever and neutropenia. In each category, there are multiple drugs with different costs and potency, and guidelines recommend which should be used based on the expected toxicity of a patient's anti-cancer treatments. When treatments are less toxic with less risk of causing side effects, it may be reasonable to start with a lower-cost, less-potent supportive care approach, and if this does not sufficiently control symptoms, shift to a more potent and costly approach. In addition, GCSFs (granulocyte colony-stimulating factors) are available in originator, biosimilar, and on-body forms that have different costs and varying convenience for patients.

OCM generally led to more value-focused use of supportive therapies for mitigating cancer symptoms and side effects of cancer treatment.

Specifically, OCM led to higher-value use of costly bone-modifying agents to prevent fractures; higher-value use of white blood cell growth factors for patients with breast cancer, colorectal cancer, and lung cancer episodes initiating chemotherapy; and greater use of less-costly biosimilar growth factors. In contrast to the ***Evaluation of the Oncology Care Model: Performance Periods 1–9***, OCM had no cumulative impact on higher-value use of antiemetic therapies during chemotherapy with high risk for nausea and vomiting.

OCM did not lead to unintended reductions in appropriate use of supportive care medications.

Leucovorin analogues, including leucovorin and levoleucovorin, are adjunctive medications used to support the effectiveness of 5-fluorouracil (5-FU) chemotherapy. 5-FU is widely used in the treatment of colorectal cancer, and intravenous leucovorin analogues are delivered together with 5-FU in most cases.

OCM led to substitution towards higher-value leucovorin products, which reduced payments for colorectal cancer episodes with 5-FU chemotherapy.

As noted in Chapter 2, the Oncology Care Model (OCM) led to Part B payment reductions for supportive care medications. Supportive care medications, including white blood cell growth factors (i.e., granulocyte colony-stimulating factors [GCSFs]), anti-nausea medications, and bone-modifying agents, are a critical component of safe and effective cancer treatment. Supportive care medications can also be costly. Oncology practices have opportunities to reduce total episode payments (TEP) by using lower-cost supportive care medications that meet patients' needs. In several common clinical situations, oncologists can select between different supportive care medications with similar clinical efficacy but very different costs. This chapter presents evidence about the impact of OCM on the use of supportive care medications during cancer treatment for four such clinical situations. Specifically, we analyzed OCM impacts on the use of (1) bone-modifying agents, (2) anti-nausea medications (antiemetics), (3) white blood cell growth factors (i.e., GCSFs), and (4) leucovorin products. This chapter also discusses biosimilar versus originator white blood cell growth factors and use of on-body injectors.

RELATED SECTIONS

As discussed in Section 2.2, OCM reduced payments for supportive care drugs by $241 per episode, relative to the comparison group, driving reductions in payments for white blood cell growth factors and bone-modifying agents.

6.1 Use of Bone-Modifying Agents for Patients with Bone Metastases

Bone metastases are common in patients with certain types of metastatic cancer, including metastatic breast cancer, lung cancer, and prostate cancer. Clinical practice guidelines of the National Comprehensive Cancer Network (NCCN) recommend use of bone-modifying agents to reduce the risk of cancer-associated bone fracture for most patients with bone metastases from breast cancer, lung cancer, or castration-resistant prostate cancer.[xlv-xlvii]

Two types of bone-modifying agents can be used to prevent fractures from bone metastases: bisphosphonates (zoledronic acid and pamidronate) and denosumab. Use of either denosumab or bisphosphonate meets NCCN guidelines for treatment of bone metastases to prevent fractures in patients with breast cancer, prostate cancer, or lung cancer. Bisphosphonates are relatively inexpensive intravenous drugs that are available in generic formulations. Bisphosphonates are administered every 3–12 weeks, and the Medicare payment amount for a single dose of zoledronic acid (the most widely used bisphosphonate) was approximately $27 in 2022 ; the payment amount for pamidronate was similar. Denosumab is a newer monoclonal antibody given by subcutaneous injection, and no generic or biosimilar equivalents are available. Denosumab is administered every four weeks, and the Medicare payment amount for a single dose of denosumab in 2022 was approximately $2,551. Given the clinical equivalency of bisphosphonates and denosumab for most patients, and the substantially higher cost of denosumab, use of a bisphosphonate for treatment of bone metastases can be considered higher value in most situations (denosumab is preferred for patients with impaired kidney function). This higher-value alternative presents an opportunity for OCM practices to reduce Medicare episode payments while meeting patient needs.

To evaluate OCM impact on use of bone-modifying agents during cancer treatment, we conducted two sets of analyses. Both analyses focused on episodes for treatment of breast cancer (high-risk or low-risk), prostate cancer (high-intensity or low-intensity), or lung cancer, with one or more diagnosis codes for bone metastasis during an episode or in the 180 days preceding the episode.[30] First, we tested whether OCM affected the use of any bone-modifying agent, as is generally recommended in these situations. Second, we tested whether OCM affected the choice of higher-value bisphosphonates versus lower-value denosumab.

OCM led to relatively higher-value use of bone-modifying agents.

To evaluate OCM impact on use of bone-modifying agents during cancer treatment, we conducted two sets of analyses. Both analyses focused on episodes for treatment of breast cancer (high-risk or low-risk), prostate cancer (high-intensity or low-intensity), or lung cancer, with one or more diagnosis codes for bone metastasis during an episode or in the 180 days preceding the episode. First, we tested whether OCM affected the use of any bone-modifying agent, as is generally recommended in these situations. Second, we tested whether OCM affected the choice of higher-value bisphosphonates versus lower-value denosumab.

[30] Lower-risk episodes were included in this analysis because some patients with metastatic breast cancer or prostate cancer can be treated with hormonal therapy only, and thus would be in the low-risk breast cancer or low-intensity prostate cancer groups.

6.2 Antiemetic Use for High-Risk Chemotherapy Regimens

Nausea is a common side effect of chemotherapy, and antiemetic (anti-nausea) medications are prescribed or administered as supportive care for most patients undergoing chemotherapy treatment. Some chemotherapy treatments are especially prone to causing nausea and vomiting—they have a high emetic risk. NCCN guidelines specify the recommended prophylactic antiemetic combinations, given with the first chemotherapy cycle, for patients receiving chemotherapy regimens with low, moderate, or high emetic risk. There are multiple guideline-recommended antiemetic combinations for each emetic risk level, and the costs of distinct antiemetic combinations can vary substantially. In recent years, the average sales price for several antiemetic drugs declined substantially. For example, the average sales price of a single dose of palonosetron (a widely used long-acting serotonin antagonist) declined from $226 in the third quarter of 2018 to $38 in the third quarter of 2020.

We evaluated the OCM impact on use of prophylactic antiemetics, focusing on initial episodes with intravenous chemotherapy regimens of high emetic risk (i.e., those where an appropriate antiemetic is particularly important). We evaluated the use of two relatively costly classes of antiemetic drugs that are featured in the NCCN antiemesis guideline: palonosetron and the neurokinin-1 (NK1) antagonists (aprepitant, fosaprepitant, netupitant, fosnetupitant, and rolapitant). Serotonin antagonists (both short- and long-acting) are among the most commonly used antiemetic drugs, and they are recommended for all patients receiving chemotherapy with high emetic risk. Palonosetron is the most effective and long-lasting of the serotonin antagonists, but it has historically been more costly than other serotonin antagonists. NK1 antagonists are a newer class of antiemetics that are recommended for use in combination with serotonin antagonists for patients receiving chemotherapy that have high emetic risk. NK1 antagonists are the costliest class of antiemetics, although the average sales price of commonly used formulations began to decline substantially in 2020 (starting around the time of PP8).

Because both palonosetron and NK1 antagonists were relatively costly medications until recently, we anticipated that OCM might lead to substitution of less costly alternatives. For example, we expected that OCM practices might substitute less costly short-acting serotonin antagonists for palonosetron or might emphasize the guideline-concordant and NK1-sparing antiemetic regimen of palonosetron and olanzapine. While appropriate and higher-value substitution of individual antiemetic drugs would be consistent with OCM objectives, underuse of guideline-recommended antiemetic regimens would represent a negative impact on quality. We therefore also evaluated the composition of multi-drug antiemetic regimens, classifying these regimens as "guideline-recommended" or "other." We considered a prophylactic antiemetic regimen to be "guideline-recommended" for high-emetic-risk chemotherapy regimens if it contained either (1) an NK1 antagonist and a serotonin antagonist (long- or short-acting), or (2) palonosetron and olanzapine (without an NK1 antagonist).

Exhibit 36: OCM Led to Reductions in the Use of Low-Value Bone-Modifying Agents

Use of Bone- Modifying Agents	OCM		COMP		Estimated OCM Impact	
	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Estimate	Percent Change
Use of any of the three bone-modifying agents						
Breast cancer and bone metastases	73.7%	69.9%	71.2%	67.9%	-0.5 pp	-0.7%
Prostate cancer and bone metastases	66.2%	60.1%	62.1%	56.5%	-0.6 pp	-0.8%
Lung cancer and bone metastases	56.6%	49.7%	55.7%	49.6%	-0.9 pp	-1.6%
Use of denosumab, among episodes with any bone-modifying agents						
Breast cancer and bone metastases	64.6%	66.8%	64.6%	74.9%	-8.1 pp	-12.5%
Prostate cancer and bone metastases	71.3%	72.0%	71.2%	79.6%	-7.6 pp	-10.6%
Lung cancer and bone metastases	57.6%	60.8%	58.3%	69.8%	-8.3 pp	-14.4%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: OCM: OCM intervention group. COMP: Comparison group. Int: Intervention period. DID: Difference-in-differences. pp: Percentage points.

OCM had no net impact on use of preventive anti-nausea medications during episodes with chemotherapy regimens that had a high risk of nausea and vomiting.

During episodes when chemotherapy regimens had high emetic risk, use of guideline-recommended antiemetic combinations was high for both OCM and comparison practices. Use of guideline-recommended antiemetic combinations increased from 79 percent to 84 percent for OCM episodes, and from 75 percent to 78 percent for comparison episodes. OCM had no impact on prophylactic use of palonosetron or NK1 antagonists for high emetic risk chemotherapy (**Appendix Exhibit D-28**), and there was no overall impact of OCM on use of guideline-recommended antiemetics. However, we note that differences in baseline trends for use of NKI antagonists and guideline-recommended therapies (for OCM versus comparison episodes) limit the definitive interpretation of these findings.

Despite prior evaluation reports that found evidence of higher-value antiemetic use in OCM episodes, we no longer find an overall OCM impact on use of prophylactic antiemetic therapies during high-emetic-risk chemotherapy. We conclude that the declining cost of antiemetic therapies in the later years of OCM has likely eroded the salience of strategies for value-based prescribing of antiemetic therapies.

6.3 Use of White Blood Cell Growth Factors

Use of Any White Blood Cell Growth Factors

Patients undergoing chemotherapy are at risk of developing bacterial infections, such as sepsis or pneumonia, because chemotherapy can suppress immune function by inhibiting production of white blood cells in the bone marrow. White blood cell growth factors, known as GCSFs, are often given prophylactically, starting with the first chemotherapy treatment, and continuing with subsequent treatments, to prevent infection, fever, and neutropenia (low white blood count).

Distinct chemotherapy regimens have different risks for causing fever, neutropenia, and immunosuppression, and NCCN guidelines categorize regimens as high-, intermediate-, or low-risk for causing fever and neutropenia. High-risk is defined as greater than 20-percent risk of fever and neutropenia, intermediate as 10–20-percent risk, and low as less than 10-percent risk.[xlix] Guidelines of the American Society of Clinical Oncology (ASCO) and NCCN recommend prophylactic GCSFs for all patients receiving chemotherapy regimens with high risk for fever and neutropenia. The same guidelines recommend against use of prophylactic GCSFs for those receiving low-risk chemotherapy regimens, with rare exceptions. Patients receiving intermediate-risk chemotherapy may benefit from prophylactic GCSFs if patient characteristics indicate increased risk for fever and neutropenia, but a recent large study failed to show any benefit from prophylactic GCSFs during intermediate-risk chemotherapy.[li] ASCO's 2012 Choosing Wisely campaign included the recommendation: "Do not use white cell stimulating factors for prevention of febrile neutropenia for patients with less than 20-percent risk for this complication."[lii]

We evaluated the impact of OCM on use of GCSFs during episodes when the chemotherapy regimen had intermediate or low risk for causing febrile neutropenia, where less use of GCSFs reflects guideline-recommended and higher-value care. We focused on three common cancers: high-risk breast cancer,[31] lung cancer, and colorectal cancer. In breast cancer episodes, we also assessed the impact of OCM on prophylactic use of GCSFs when chemotherapy regimens had a high risk of causing febrile neutropenia and prophylactic use of GCSFs is recommended (and non-use would indicate poor-quality care). In the latter analysis, we focused only on breast cancer because none of the commonly used chemotherapy regimens for treatment of lung or colorectal cancer are classified as having high risk for causing febrile neutropenia.

We anticipated that OCM incentives might lead to less use of prophylactic GCSFs when chemotherapy has an intermediate risk of causing febrile neutropenia because these episodes have the greatest potential for reducing unnecessary prophylactic use of GCSFs. We expected less OCM impact on use of prophylactic GCSFs in episodes where the chemotherapy regimen had low risk for causing febrile neutropenia because there should be little use of GCSFs in such episodes in the baseline period, leaving little room for improvement.

OCM led to higher-value preventive use of white blood cell growth factors relative to the comparison group during some breast cancer, colorectal cancer, and lung cancer episodes.

Breast Cancer: Prophylactic use of GCSFs during chemotherapy regimens that have intermediate risk for causing fever and neutropenia is subject to clinical discretion but is generally of lower value. Prophylactic

[31] This analysis excludes episodes that CMS considers lower risk, defined as hormonal therapy only without intravenous chemotherapy.

GCSF use in such intermediate-risk episodes was relatively high at baseline (for both OCM and comparison episodes), suggesting opportunities for reduction and thus higher-value care. OCM led to a statistically significant 8.1 percentage point relative reduction in prophylactic GCSF use during intermediate-risk chemotherapy episodes, driven by an increase in the comparison group between the baseline and intervention periods (**Exhibit 37**). Prophylactic GCSF use was appropriately very low during breast cancer episodes when chemotherapy had low risk for causing fever and neutropenia, and OCM had no impact on GCSF use in these episodes. Prophylactic use of GCSFs was appropriately high during breast cancer episodes when chemotherapy had a high risk of causing febrile neutropenia, and increased similarly over time in both OCM and comparison episodes, consistent with guideline-recommended care.

Colorectal Cancer: Prophylactic GCSF was used during colorectal cancer episodes when the chemotherapy regimen had intermediate or low risk for causing fever and neutropenia was quite low before OCM began. Nonetheless, OCM led to a statistically significant 1.2 percentage point relative reduction in prophylactic GCSF use during low-risk chemotherapy episodes, as use declined slightly in OCM episodes and increased slightly in comparison episodes—reflecting higher-value care in OCM episodes. However, OCM had no impact on prophylactic GCSF use during colorectal cancer episodes with intermediate risk for fever and neutropenia.

Lung Cancer: OCM led to a statistically significant 2.5 percentage point reduction in use of prophylactic GCSF use during lung cancer episodes when chemotherapy had intermediate risk of causing neutropenia. OCM had no impact on prophylactic GCSF use during lung cancer chemotherapy episodes with low risk for causing neutropenia. Use of GCSFs declined in both OCM and comparison episodes when the chemotherapy regimen posed low risk of febrile neutropenia, but over 10 percent of low-risk episodes (where guidelines discourage use) still had prophylactic GCSF use in both groups.

In summary, there is increasing evidence that OCM practices have identified reducing overuse of prophylactic GCSFs during chemotherapy with intermediate or low risk of fever and neutropenia as an opportunity for improving high-value care. However, continued use of prophylactic GCSFs at relatively high levels during breast and lung cancer chemotherapy with intermediate risk for causing neutropenia suggests additional room for improving high-value use of GCSFs.

Biosimilar Versus Originator White Blood Cell Growth Factors

As shown in Section 5.1, OCM was associated with faster adoption and greater use of biosimilar cancer treatments as substitutes for originator anti-cancer drugs. In prior reports, we found that OCM was associated with greater use of biosimilar growth factors (also known as white blood cell growth factors, or GCSFs), an important class of supportive care drugs used to prevent neutropenia. Here we assess the association of OCM with use of growth factors through the end of the Model.

White blood cell growth factors are used to prevent low white blood cell counts during treatment with chemotherapy regimens that suppress white blood cell production. As shown in Exhibit 38, the two commonly used white blood

Exhibit 37: OCM Led to Relatively Higher-Value Use of Prophylactic GCSF in Some Subgroups of Breast, Colorectal, and Lung Cancer Episodes

Chemotherapy Regimen Fever and Neutropenia Risk Category	OCM		COMP		Estimated OCM Impact	
	Baseline Means	Int. Means	Baseline Means	Int. Means	DID Estimate	Percent Change
Use of Growth Factors—Breast Cancer						
High-risk	85.7%	91.0%	87.6%	91.6%	1.3 pp	1.6%
Intermediate risk	49.3%	48.8%	41.2%	48.7%	-8.1 pp	-16.4%
Low risk	1.6%	1.4%	1.6%	1.6%	-0.2 pp	-10.5%
Use of Growth Factors—Colorectal Cancer						
Intermediate risk	11.1%	9.7%	12.1%	11.6%	-0.9 pp	-7.9%
Low risk	4.1%	3.1%	3.1%	3.2%	-1.2 pp	-29.1%
Use of Growth Factors—Lung Cancer						
Intermediate risk	29.1%	25.2%	27.5%	26.0%	-2.5 pp	-8.4%
Low risk	17.1%	12.0%	15.6%	12.0%	-1.6 pp	-9.2%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: GCSF: Granulocyte colony-stimulating factors. OCM: OCM intervention group. COMP: Comparison group. Int: Intervention period. DID: Difference-in-differences. pp: Percentage points. Risk refers to the risk for fever and neutropenia.

cell growth factor (GCSF) medications are filgrastim and pegfilgrastim. Treatment with filgrastim is less costly than with pegfilgrastim but requires daily subcutaneous injections—often for several days—and may involve frequent laboratory monitoring. Pegfilgrastim can be conveniently administered as a single injection given 24 hours after each chemotherapy treatment, but pegfilgrastim is more costly than filgrastim: the Medicare payment amount for one dose of pegfilgrastim was approximately $2,012 in the second quarter of 2022, compared with $417 per dose of filgrastim in the same quarter.

Biosimilar filgrastim first became available in 2015, and biosimilar pegfilgrastim first became available in 2018; several biosimilar products for each are now available. Biosimilar products are generally less costly than originator products, making biosimilars higher value in most cases. Originator pegfilgrastim is a notable exception, with prices coming down substantially since the biosimilar became available so that in the second quarter of 2022, the price of originator pegfilgratsim was similar to or lower than the price of the biosimilar products (**Exhibit 38**).[32]

In late 2017, the manufacturer of originator pegfilgrastim released an on-body formulation that can be applied via a "patch" on the day of the chemotherapy infusion and automatically injects the drug 24 hours later, offering patients the convenience of not needing to return to the clinic for the injection. No biosimilar version of on-body pegfilgrastim is available.

OCM was associated with greater use of biosimilar growth factor drugs versus originator drugs.

The Food and Drug Administration approved the first filgrastim biosimilar (filgrastim-sndz) in March 2015, just before OCM began, and additional biosimilar formulations have been approved since then. Biosimilar pegfilgrastim-jmdb was first approved in June 2018, and three additional forms of biosimilar pegfilgrastim have been approved since then. Because biosimilar filgrastim and pegfilgrastim were generally not available during the baseline period, we could not conduct difference-in-differences analyses (for which consistent baseline trends would have been required). Instead, we examined the proportion of patient episodes with use of biosimilar and rate of adoption of the biosimilar drugs when the biosimilar agents were available. Biosimilar filgrastim analysis examined episodes during PP1–PP11. Biosimilar pegfilgrastim analyses were limited to PP4–PP11.

During episodes when filgrastim was used (originator or biosimilar), a greater adjusted proportion of OCM episodes used biosimilar filgrastim than did comparison episodes (**Exhibit 39**); the rate of adoption was similar. Similarly, adjusted analyses showed greater use of biosimilar pegfilgrastim in OCM versus comparison episodes, with a similar rate of adoption. The preferential use of biosimilar rather than originator filgrastim and pegfilgrastim in OCM episodes reflects a straightforward strategy of therapeutic substitution and more value-based use of GCSFs. This is consistent with the finding that OCM led to greater use of biosimilar versus originator anti-cancer drugs (i.e., trastuzumab, rituximab, bevacizumab). There were no differences in use of on-body pegfilgrastim during OCM versus comparison episodes (see **Appendix Section D.9.1** for additional details).

Exhibit 38: Average Sales Prices in April 2022 Were Lower for Filgrastim than Pegfilgrastim and for Biosimilar vs. Originator Filgrastim But Similar for Biosimilar and Originator Pegfilgrastim Products

Filgrastim (Neupogen)

Short acting
Daily use x ~3-5 days starting day after chemotherapy
In clinic or at home

Approval Dates and Price Aprill 2022

originator		~$399/dose
-sndz	March 2015	~$158/dose
-aafi	July 2018	~$189/dose
-ayow	Feb 2022	n/a

Pegfilgrastim (Neulasta)

Long acting
1 dose
Given day after chemotherapy in clinic

Approval Dates and Price Aprill 2022

originator		~$2012/dose
-jmdb	June 2018	~2837/dose
-cbqv	Nov 2018	~$3016/dose
-bmez	Nov 2019	~$3322/dose
-apgf	June 2020	~$4043/dose

Pegfilgrastim (Neulasta) On-Body

Long acting
Applied day of chemotherapy injects automatically the next day
Available in late 2017

Price Aprill 2022
$20 for injector + `$2012/dose
No biosimilar formulation available

Notes: All prices based on Medicare Average Sale Price data from April 2022. -sndz, -aafi, -ayow, -jmdb, -cbqv, -bmez, -apgf are suffixes designating different biosimilar products.

[32] See also Abrham I, When More May Yield Less—Price Erosion of Biosimilars Following US Market Entry. 2022, September 22. See https://www.centerforbiosimilars.com/view/dr-ivo-abraham-column-when-more-may-yield-less-price-erosion-of-biosimilars-following-us-market-entry for a graphical depiction of prices of biosimilar and originator products. Accessed June 6, 2023.

Exhibit 39: OCM Led to Relatively Higher-Value Use of Prophylactic GCSF in Some Subgroups of Breast, Colorectal, and Lung Cancer Episodes

	Intervention Mean		Difference in Use	Rate of Adoption (Post-Period Trend)
	OCM	COMP	Estimate	Estimate
Biosimilar filgrastim	59.3%	50.0%	9.3 pp	0.4%
Biosimilar pegfilgrastim	33.5%	28.7%	4.8 pp	-0.3%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: OCM: OCM intervention group. COMP: Comparison group. pp: Percentage points. This analysis assessed use of lower-cost biosimilar versus originator filgrastim, during breast, lung, or colorectal cancer episodes, when filgrastim was used at all. The Rate of Adoption reflects the coefficient of the trend line (per quarter change in use) in the post-periods during which the biosimilar product was available.

6.4 Use of Leucovorin Products With Fluorouracil-Containing Chemotherapy

Leucovorin is an adjunctive medication with various uses in cancer treatment. One of the uses of leucovorin is to support the effectiveness of 5-fluorouracil (5-FU) chemotherapy by slowing down the degradation of 5-FU. 5-FU is widely used in the treatment of colorectal cancer, and intravenous leucovorin is delivered together with 5-FU in most cases. Like 5-FU, leucovorin is a low-cost medication.

Levoleucovorin calcium and levoleucovorin sodium are newer and generally more costly alternatives to leucovorin. These agents are not any more effective than leucovorin; their primary advantage is that they have been readily available during leucovorin drug shortages. These shortages have been intermittently ongoing since at least 2008. The NCCN guideline for colon cancer treatment provides specific recommendations regarding use of 5-FU-containing treatments during leucovorin drug shortages, including 1) use of levoleucovorin, 2) use of lower doses of leucovorin, or 3) treatment without leucovorin. The guideline text states, "Use of levoleucovorin should only be considered during times of [leucovorin] shortage since levoleucovorin is substantially more expensive than [leucovorin]."

OCM led to higher-value use of leucovorin products and reduced spending for leucovorin products during colorectal cancer episodes with 5-FU chemotherapy.

We evaluated the impact of OCM on the use of leucovorin and levoleucovorin, and on spending for these agents. Analyses were limited to colorectal cancer episodes in which 5-FU was used; in these episodes we examined use of any leucovorin product (leucovorin or levoleucovorin) and use of each product specifically, using DID models to assess the OCM impact. We conducted similar analyses evaluating spending for leucovorin and levoleucovorin, using the same episodes.

In the baseline period, any leucovorin product (leucovorin or levoleucovorin) was used in 92.0% of OCM episodes and 89.9 % of comparison episodes. OCM had no impact on use of any leucovorin product during an episode (Exhibit 40). Use of levoleucovorin in the baseline period was more common in OCM episodes (21.4%) than in comparison episodes (13.9%); OCM led to a 5.2 percentage point relative reduction in episodes with levoleucovorin use and an 8.7 percentage point relative increase in leucovorin use. Concurrently, OCM was associated with a $994 reduction in spending for any leucovorin product in OCM episodes (Exhibit 41).

Exhibit 40: OCM led to Relatively More Use of Leucovorin and Relatively Less Use of Levoleucovorin

Use of Leucovorin and Levoleucovorin	# of Episodes		OCM		COMP		Impact Estimates			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Impact	90% LCL	90% UCL	Percent Change
Leucovorin and levoleucovorin	53,819	55,298	92.0%	91.1%	89.9%	88.4%	0.6pp	-1.1pp	2.3pp	0.6%
Leucovorin	53,819	55,298	70.5%	79.8%	78.5%	79.1%	8.7pp	3.6pp	13.8pp	12.3%
Levoleucovorin	53,819	55,298	21.4%	13.5%	13.9%	11.2%	-5.2pp	-9.0pp	-1.4pp	-24.2%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: OCM: OCM intervention group. COMP: Comparison group. Int: Intervention period. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit. pp: Percentage points.

Exhibit 41: OCM led to Savings on Leucovorin Products Overall, Driven by Relatively More Spending on Leucovorin and Relatively Less Spending on Levoleucovorin

Sum of Chemo Drug Payments per Episode	# of Episodes		OCM		COMP		Impact Estimates			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Impact	90% LAL	90% UCL	Percent Change
Leucovorin and levoleucovorin	53,819	55,298	$2,105	$341	$1,164	$394	-$994	-$1,575	-$414	-47%
Leucovorin	53,819	55,298	$100	$114	$111	$94	$31	$14	$49	31%
Levoleucovorin	53,819	55,298	$2,006	$227	$1,053	$300	-$1,025	-$1,618	-$433	-51%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: OCM: OCM intervention group. COMP: Comparison group. Int: Intervention period. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit.

OCM-related changes in use of leucovorin products are consistent with more value-based use. The NCCN colon cancer treatment guideline recommends that levoleucovorin should only be used when conventional leucovorin is unavailable. Our analyses show that use of any leucovorin product did not change during OCM—indicating that OCM practices reduced use of levoleucovorin while maintaining leucovorin use in appropriate situations. It is important to note that the cost of levoleucovorin calcium, the more frequently used levoleucovorin product (Appendix Exhibit D-36), fell substantially during OCM (see Appendix Exhibit D-37). Since use of levoleucovorin was higher at baseline in OCM episodes than in comparison episodes, the falling price of levoleucovorin would result in savings attributed to OCM even if OCM practices made no changes to their use of levoleucovorin products. However, our analysis indicates that at least part of the reduced spending for leucovorin products was attributable to real reductions in use of levoleucovorin in OCM episodes.

6.5 Discussion

OCM led to high-value changes in use of costly cancer supportive care medications, including bone-modifying agents, antiemetic medications, and white blood cell growth factors. OCM also led to higher-value use of leucovorin products for patients with colorectal cancer. Importantly, changes in use of supportive care medications were not associated with negative impacts on measures reflecting the quality of cancer supportive care.

Specifically, OCM led to reduced use of the costly bone-modifying agent denosumab among patients with breast, prostate, and lung cancer, without affecting the proportion of patients who received appropriate treatment for bone metastases. OCM also led to high-value reductions in use of prophylactic white blood cell growth factors during breast and lung cancer chemotherapy with intermediate neutropenia risk and colorectal cancer chemotherapy with low neutropenia risk, without affecting recommended use of prophylactic white blood cell growth factors during breast cancer chemotherapy with high risk for neutropenia. In both of these examples, the magnitude of OCM impacts appears to be growing over time. Furthermore, OCM was associated with greater use of biosimilar white blood growth factors. This strategy of biosimilar substitution is generally reflective of high-value care, and is consistent with the observation that OCM was also associated with greater use and faster adoption of biosimilar anti-cancer treatments, as reported in Chapter 5. These changes would be expected to lead to lower spending for supportive care medications in OCM episodes, consistent with the finding of significant OCM impacts on spending for supportive care medications presented in Chapter 2.

During colorectal cancer episodes, OCM led to substitution of leucovorin for more costly levoleucovorin: a value-increasing tradeoff given the clinical similarity between the two products. Reductions in spending on levoleucovorin likely explains much of the estimated reductions in TEP for colorectal cancer episodes reported in Exhibit 8.

In the previous OCM evaluation report, *Evaluation of the Oncology Care Model: Performance Periods 1–9*, we reported changes in prophylactic use of anti-nausea medications consistent with high-value care. In this updated report, we found no cumulative impact of OCM on use of anti-nausea medication during chemotherapy with high risk for nausea and vomiting. Based on dynamic differences in trends of anti-nausea medication use in OCM and comparison episodes, we conclude that this change in the OCM impact estimate likely reflects substantial declines in the prices of multiple potent anti-nausea medications over the second half of OCM. This observation highlights the notion that value-based care is a dynamic construct that can change rapidly when the costs of alternative treatment strategies are also changing, requiring continuous monitoring to identify new value-based care strategies as opportunities emerge and to facilitate de-adoption of previously effective strategies that are no longer needed.

How did Outcomes Change for Historically Underserved Populations Under OCM?

CONTEXT AND KEY FINDINGS

This chapter considers outcomes for four historically underserved population groups: patients who were non-Hispanic Black (hereafter, "Black patients"), patients who were Hispanic (hereafter, Hispanic patients"), patients with dual Medicare-Medicaid eligibility, and patients living in high-deprivation neighborhoods. In addition to estimating the association between OCM and outcomes of interest within each underserved population, we also assessed the relative impact of OCM for each underserved population against a corresponding reference population. Changes in outcomes for Black and Hispanic patients were compared to those who were non-Hispanic White (hereafter, "White patients"), changes for patients with dual eligibility were compared to those with only Medicare, and changes for patients in high-deprivation neighborhoods (top 20 percent of deprived neighborhoods) were compared to those in less-deprived neighborhoods (all other neighborhoods). **Key findings included:**

OCM was associated with reduced total episode payments for all populations analyzed.

Significant reductions in total episode payments associated with OCM were similar for Black patients and White patients, for patients with and without dual eligibility, and for patients living in high-deprivation and less-deprived neighborhoods. The OCM-related reduction in total episode payments for Hispanic patients was substantially larger than for White patients. OCM was associated with similar-sized reductions in Part B non-chemotherapy drug payments in all populations. Larger reductions among Hispanic patients were attributable to a significant reduction in Part D payments in this population.

Prior to OCM, all four historically underserved populations had more inpatient admissions, emergency department (ED) visits, readmissions, and intensive care unit (ICU) stays relative to the reference populations. During OCM, differentials in some acute care measures decreased between Hispanic patients and White patients and increased between patients in high-deprivation neighborhoods and those in less-deprived neighborhoods.

Relative to White patients, OCM was associated with a decreased probability of having an ED visit without hospital admission for Hispanic patients. Differences in ED visits without hospital admission were driven by a reduction in the probability of this outcome measure among Hispanic patients.

OCM was associated with an increased probability of an inpatient stay or ICU admission among patients in high-deprivation neighborhoods relative to those in less-deprived neighborhoods. Differences in ICU admissions were driven by a reduction in the probability of an ICU admission among patients in less-deprived neighborhoods. Conversely, differences in inpatient stays were driven by an increase in the probability of an inpatient stay among patients in high-deprivation neighborhoods.

Adherence to high-cost oral cancer drugs improved during OCM for all four historically underserved populations.

Prior to OCM, all four historically underserved populations had significantly lower adherence to high-cost oral cancer drugs relative to their reference populations. OCM was associated with significant increases in adherence among all four historically underserved populations, both in absolute terms and relative to their reference populations.

Patient care experiences were similarly high for all populations analyzed during the baseline survey wave and remained high during OCM.

Overall, OCM did not have consistent effects on health equity, for better or worse.

One of the Centers for Medicare & Medicaid Services' (CMS's) stated goals in the **2022 Framework for Health Equity** is "to explicitly measure the impact of our policies on health equity." In support of this goal, the Oncology Care Model (OCM) evaluation conducted exploratory analyses for populations that have been historically underserved. OCM, which began in July 2016, did not explicitly incorporate principles of health equity into the Model design. Nonetheless, the enhanced oncology services that OCM encouraged may have promoted more equitable outcomes for historically underserved populations.

In particular, OCM encouraged patient navigation, use of care plans, and attention to symptom management, which could have disproportionately benefited populations who historically faced disparities in access and care.[liii] Conversely, OCM could have exacerbated disparities if systemic barriers prevented historically underserved populations from experiencing certain improvements related to OCM that were realized by other populations, or if the financial incentives built into OCM had adverse impacts for some populations.

We analyzed outcomes for historically underserved populations that we could identify in available data, and for whom we had sufficient sample size to detect model impacts. These included:

Patients who were Black

Patients who were Hispanic

Patients with dual Medicare-Medicaid eligibility

Patients in high-deprivation neighborhoods (defined as residence in a Census block group in the top quintile of the Area Deprivation Index [ADI]).[33]

Beyond assessing outcomes within a population, we also compared changes in outcomes among historically underserved populations relative to corresponding "reference populations." The reference populations reflect groups that generally have not been underserved, and which may therefore have had different outcomes on average prior to OCM, and may have experienced different impacts under the Model. Patients who were non-Hispanic White (hereafter referred to as "White patients") were the reference population for patients who were non-Hispanic Black and patients who were Hispanic (hereafter, "Black patients" and "Hispanic patients"). Patients with Medicare who were not dual eligible for Medicaid (hereafter, "Medicare-only") were the reference population for patients with dual eligibility. Patients who resided in less-deprived neighborhoods (bottom 80% of deprived neighborhoods) were the reference population for patients who resided in high-deprivation neighborhoods (top 20% of deprived neighborhoods). We provide additional details on the identification of each population and the analytic methods used for these analyses in **Appendix E**.

During the intervention period, roughly 8 percent of OCM episodes were for Black patients, 5 percent were for Hispanic patients, and 83 percent were for White patients.[34] Likewise, during the OCM intervention period, roughly 13 percent of OCM episodes were for patients with dual eligibility, with the other 87 percent among patients with Medicare only. Roughly 13 percent of OCM episodes were for patients living in high-deprivation neighborhoods, while 87 percent of OCM episodes were for patients in less-deprived neighborhoods. There was some overlap in these populations, as roughly one-third of Black patients and one-half of Hispanic patients also had dual eligibility, while fewer than 1 in 10 White patients had dual eligibility.

ANALYTIC APPROACH USED IN THIS CHAPTER

The analyses in Chapters 2–3 and 5–6 use a difference-in-difference (DID) approach to compare changes between OCM and comparison groups over time. This can be interpreted as the impact of OCM. To assess the association of OCM with outcomes for historically underserved populations, we used a "difference-in-difference-in-differences" (DDD) approach, which compares two population-specific DID estimates to one another (e.g., the change for Black OCM patients versus Black comparison patients, relative to the change for White OCM patients versus White comparison patients). This allows us to assess changes within historically underserved populations and within the corresponding reference population, while also assessing the relative change between the two populations among OCM patients. This informs whether OCM increased or decreased differences between groups, relative to traditional Medicare.

See **Appendix E.1.3** for additional detail on the DDD method.

[33] The ADI is a neighborhood-level measure of socioeconomic deprivation based on 17 Census measures covering such domains as housing, income, employment, and education. Each Census block is ranked nationally from 0 (least deprivation) to 100 (most deprivation). The Office of the Assistant Secretary for Planning and Evaluation (ASPE) has identified neighborhood deprivation as a unique risk factor for adverse outcomes in the Medicare population.

[34] The other 4 percent of OCM episodes were for patients classified by Medicare enrollment data as Asian or Pacific Islander, Native America/Alaska Native, or Other. None of these individual groups had sufficient sample size for reliable analysis.

Despite this, White patients were a majority (56 percent) of patients with dual eligibility, while roughly 20 percent were Black, and 16 percent were Hispanic. Similarly, almost one-fourth of patients in high-deprivation neighborhoods also had dual eligibility, while around 1 in 10 patients living in less-deprived neighborhoods had dual eligibility. Almost 70 percent of patients in high-deprivation neighborhoods were White, 20 percent were Black, and 7 percent were Hispanic. In less-deprived neighborhoods, 85 percent of patients were White, 7 percent were Black, and 4 percent were Hispanic. Roughly one-third of Black patients and one-fifth of Hispanic patients lived in high-deprivation neighborhoods, while around 11 percent of White patients lived in high-deprivation neighborhoods. Sample sizes and descriptive statistics for each population included in our analysis are provided in Appendix Exhibits E-3 to E-9. Since this analysis was not exhaustive of all historically underserved populations, we cannot infer the potential effect of OCM on other populations based on the results of these analyses.

Section 7.1 evaluates the association of OCM with total episode payments (TEP) and acute care utilization for historically underserved and reference populations. It also shows how those impacts affected the magnitude of differences between underserved and reference populations. Section 7.2 reports results for clinical outcomes, and Section 7.3 focuses on patient care experiences.

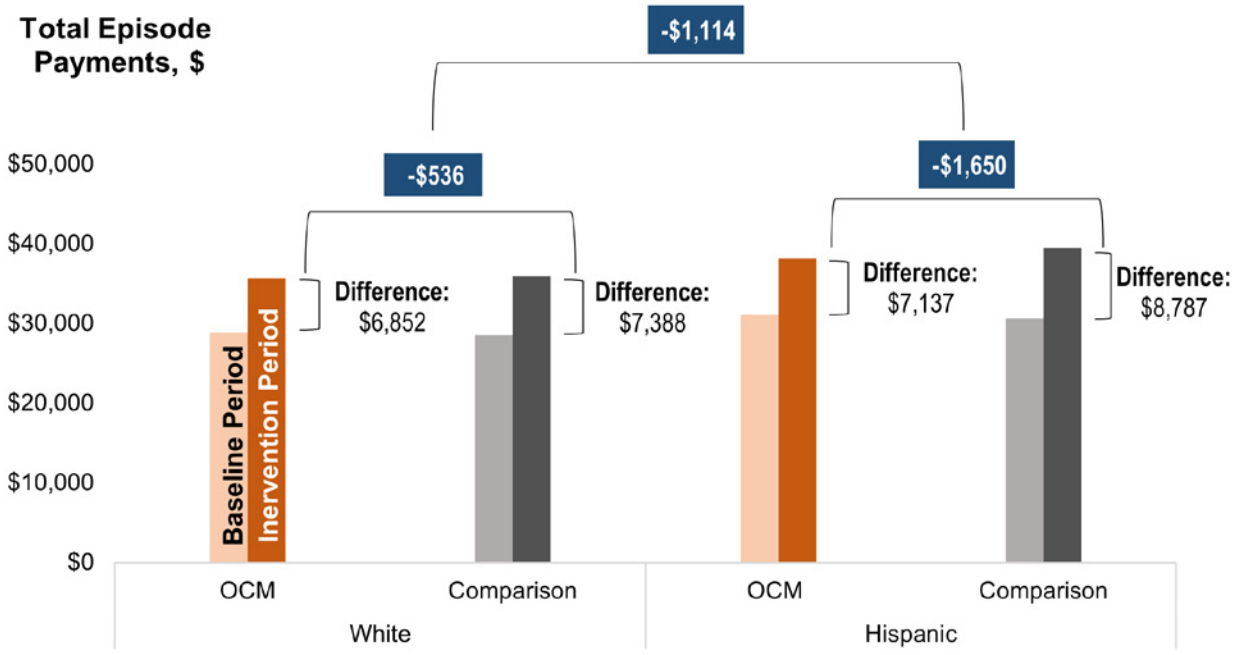
7.1 Changes in Payment and Utilization Outcomes

Payment Outcomes

OCM was associated with similar reductions in total episode payments and Part B non-chemotherapy drug payments for Black and White patients, for patients with dual eligibility or Medicare only, as well as for patients in high-deprivation neighborhoods and patients in less-deprived neighborhoods. Reductions in total episode payments were greater for Hispanic patients than for other populations, primarily due to larger reductions in Part D payments.

Prior to OCM, all four historically underserved populations had higher TEP than their reference populations, primarily due to larger Part D payments that offset lower Part B payments (Appendix Exhibits E-10 to E-12). Reductions in TEP were similar between Black patients and White patients, between patients with dual eligibility and those with only Medicare, and between patients in high-deprivation neighborhoods and patients in less-deprived neighborhoods. These reductions were consistent in magnitude with the overall estimate of -$616 and were similarly driven primarily by reductions in Part B non-chemotherapy drug payments (see Section 2.1).

Exhibit 42: Reductions in Total Episode Payments Associated with OCM Were Substantially Larger for Hispanic Patients Relative to non-Hispanic White Patients



Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.

Home

Reductions in total episode payments were greater for Hispanic patients than for other populations, primarily due to larger reductions in Part D payments.

OCM was associated with a substantially larger reduction in TEP for Hispanic patients than the other populations. Exhibit 42 presents a visual breakdown of estimated reductions in TEP for Hispanic patients relative to White patients, illustrating the approach used for estimating the association of OCM with outcomes of interest for historically underserved populations relative to the reference population. Between the baseline and intervention periods, TEP increased by almost $7,000 in the OCM group and over $7,000 in the comparison group for White patients, but increased by $536 less among White OCM patients relative to White comparison patients ($p<0.01$). Similarly, TEP increased substantially for Hispanic patients in both the OCM and comparison groups. However, among Hispanic patients, TEP for OCM patients increased by $1,650 less than for comparison patients ($p<0.01$). The difference between these two estimates (-$1,650 minus -$536) was -$1,114, indicating that OCM yielded significantly greater reductions in TEP among Hispanic patients than among White patients ($p<0.01$).

As shown in **Exhibit 43**, OCM was associated with similar statistically significant reductions in Part B non-chemotherapy drug payments for both White patients and Hispanic patients. However, OCM was associated with a reduction of $796 in Part D payments among Hispanic patients ($p<0.01$), with no difference in Part D payments for White patients. The Part D payment reduction was the primary driver of larger overall reductions in TEP among Hispanic patients relative to White patients during OCM ($817).

Use of Hospital Inpatient and ED Services

OCM was associated with a decreased probability of having an emergency department (ED) visit without hospital admission for Hispanic patients. Measures of hospital inpatient and intensive care unit (ICU) stays increased for patients in high-deprivation neighborhoods relative to patients in less-deprived neighborhoods.

Exhibit 44 and Appendix Exhibit E-13 show summary findings related to use of acute care services for Hispanic patients and Black patients relative to White patients. Exhibit 45 reports acute care service use for patients in high-deprivation neighborhoods relative to patients in less-deprived neighborhoods. Appendix Exhibit E-14 reports acute care service use for patients with dual eligibility relative to patients with only Medicare.

Prior to OCM, all four historically underserved populations were substantially more likely to have an ED visit without admission, inpatient stay, or 30-day readmission than their corresponding reference populations. OCM was not associated with changes in acute care service use among White patients but was associated with reductions among Hispanic patients in the probability of an ED visit without hospital admission (-1.0 percentage point, $p<0.10$). The combined effect of changes among Hispanic patients and White patients during OCM resulted in a decreased likelihood of an ED visit without hospital admission for Hispanic patients relative to White patients (-1.1 percentage points, $p<0.10$). OCM was not associated with changes in the use of acute care services among

Exhibit 43: Baseline Differences in TEP between Hispanic and White Patients Decreased by Nearly Half during OCM, through Differential Reductions in Part D Payments

Outcome	OCM Baseline			Estimate Associated with OCM		
	Hispanic	White	Difference (Difference %)	Hispanic (A)	White (B)	Differential (A-B)
TEP without MEOS	$31,040	$28,847	$2,193 (7.6%)	-$1,650	-$536	-$1,114
Part A payments	$6,593	$6,136	$456 (7.4%)	-$57	-$171	$114
Part B chemotherapy payments	$7,134	$7,802	-$669 (-8.6%)	-$304	$33	-$337
Part B non-chemotherapy drug payments	$2,355	$2,686	-$331 (-12.3%)	-$359	-$279	-$80
Part D payments	$9,189	$6,224	$2,965 (47.6%)	-$796	$20	-$817

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: We did not conduct tests for the statistical significance of baseline differences for the claims-based measures of utilization and payment, because of the large sample sizes. TEP: Total episode payment. MEOS: Monthly Enhanced Oncology Services payment.

Exhibit 44: OCM Was Associated with a Small, Statistically Significant Decrease in the Likelihood of an ED Visit Without Hospital Admission for Hispanic Patients Relative to White Patients

Outcome	OCM Baseline			Estimate Associated with OCM		
	Hispanic	White	Difference (Difference %)	Hispanic (A)	White (B)	Differential (A-B)
Any ED visit without admission	27.4%	24.0%	3.4 pp (14.2%)	-1.0 pp	0.0 pp	-1.1 pp
Any inpatient admission	28.1%	27.8%	0.3 pp (1.0%)	0.5 pp	-0.1 pp	0.6 pp
Any 30-day readmission	29.3%	26.0%	3.3 pp (12.8%)	-0.1 pp	-0.3 pp	0.2 pp
Any ICU admission	10.8%	10.1%	0.7 pp (7.2%)	-0.4 pp	-0.3 pp	-0.1 pp

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: We did not conduct tests for the statistical significance of baseline differences for the claims-based measures of utilization and payment, because of the large sample sizes. ED: Emergency department. ICU: Intensive care unit. pp: Percentage point.

Exhibit 45: OCM Was Associated with Differentially Increased Hospital Utilization for Patients in High-Deprivation Neighborhoods Relative to Patients in Less-Deprived Neighborhoods

Outcome	OCM Baseline			Estimate Associated with OCM		
	ADI Top 20%	ADI Lower 80%	Difference (Difference %)	ADI Top 20%	ADI Lower 80%	Differential (A-B)
Any ED visit without admission	30.1%	23.6%	6.5 pp (27.5%)	0.3 pp	0.0 pp	0.3 pp
Any inpatient stay	30.3%	27.5%	2.9 pp (10.4%)	0.7 pp	-0.2 pp	0.8 pp
Any 30-day readmission	27.8%	26.5%	1.3 pp (4.8%)	-0.5 pp	-0.3 pp	-0.2 pp
Any ICU admission	10.9%	10.0%	0.9 pp (9.4%)	0.3 pp	-0.4 pp	0.6 pp

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: We did not conduct tests for the statistical significance of baseline differences for the claims-based measures of utilization and payment, because of the large sample sizes. ADI: Area Deprivation Index. ED: Emergency department. ICU: Intensive care unit. pp: Percentage

Black patients or patients with dual eligibility. Nor was OCM associated with differences in acute care service use between Black and White patients or between patients with dual eligibility and patients with only Medicare.

OCM was associated with an increase in the likelihood of an inpatient stay among patients in high-deprivation neighborhoods (0.7 percentage points, $p<0.05$). Changes among patients in less-deprived neighborhoods included a significant reduction in the occurrence of an ICU stay (-0.4 percentage points, $p<0.10$). The combined effect of changes among the two populations during OCM resulted in the following among patients in high-deprivation neighborhoods relative to those in less-deprived neighborhoods: an absolute and relative increase in the likelihood of an inpatient stay (0.8 percentage points, $p<0.05$) and a relative increase in the likelihood of an ICU admission (0.6 percentage points, $p<0.10$).

Service Use at End of Life

OCM was associated with reduced end-of-life ED visits among Hispanic patients relative to White patients, and was associated with increased end-of-life ED use and a decrease in timely hospice initiation among patients with dual eligibility relative to patients with only Medicare.

Prior to OCM, all four historically underserved populations were more likely to have a hospitalization in the last 30 days of life or two or more ED visits in the last 30 days of life than their corresponding reference populations and were less likely to enroll in hospice care at least three days before death (Appendix Exhibit E-15 to E-18).

Service use at the end of life did not change for Black patients or White patients under OCM; OCM did not affect differences between these two groups. Similarly, OCM did not affect end-of-life care for patients in high-deprivation neighborhoods, nor those in lower-deprivation neighborhoods.

Among Hispanic patients, OCM was associated with a 2.4 percentage point reduction in the likelihood of two or more ED visits in the last 30 days of life ($p<0.10$). This change among Hispanic patients resulted in a 2.2 percentage point reduction relative to White patients ($p<0.10$).

OCM was associated with a 0.6 percentage point reduction in the likelihood of two or more ED visits in the last 30 days of life among Medicare-only patients ($p<0.10$). This change resulted in an increase of 1.6 percentage point among patients with dual eligibility relative to patients with Medicare only ($p<0.05$). OCM was also associated with a 2.1 percentage point reduction in the likelihood of hospice initiation three or more days before death among patients with dual eligibility ($p<0.05$), which resulted in a 2.6 percentage point decrease relative to patients with only Medicare ($p<0.05$). As OCM included a quality measure assessing timely receipt of hospice care at the end of life, there is not a clear mechanism by which Model incentives would decrease access to hospice care among patients with dual eligibility.

Chemotherapy-Related ED Visits and Hospitalizations

OCM was generally not associated with the use of chemotherapy-associated inpatient admissions or ED visits for historically underserved populations. One exception was an increase in the probability of an ED visit without hospital admission among Black patients relative to White patients.

Prior to OCM, all four historically underserved populations had greater use of chemotherapy-associated ED visits and hospitalizations relative to their reference populations (Appendix Exhibit E-19 to E-22). OCM was associated with a 0.3 percentage point reduction in the likelihood of a chemotherapy-related ED visit that did not result in a hospital admission among White patients ($p<0.05$). Although there was no corresponding change among Black patients, this reduction among White patients resulted in a 0.8 percentage point increase in the likelihood of a chemotherapy-related ED visit that did not result in a hospital admission among Black patients relative to White patients ($p<0.05$). OCM was not associated with changes in chemotherapy-related acute care service use among Hispanic patients, patients with dual eligibility, patients with only Medicare, patients in high-deprivation neighborhoods, or patients in less-deprived neighborhoods.

7.2 Changes In Clinical Outcomes[35]

Adherence to High-Priced Oral Cancer Treatments

OCM was associated with increases in adherence to high-priced oral cancer drugs for historically underserved populations.

All four historically underserved populations (Black, Hispanic, dual-eligible, or residing in high-deprivation neighborhoods) had significantly lower rates of adherence to high-cost oral cancer treatments for prostate cancer prior to OCM. Lower adherence can lead to worse cancer treatment outcomes. Black patients, patients with dual eligibility, and patients living in high-deprivation neighborhoods had lower rates of adherence to high-priced drugs for chronic myeloid leukemia (CML) (Exhibit 46). OCM was associated with statistically significant increases in adherence to oral treatments for prostate cancer among Black, Hispanic, and dual-eligible populations (ranging from 2.5 percentage points to 3.9 percentage points; $p<0.01$ in all cases). OCM was also associated with a significant 3.4 percentage point increase in adherence to high-priced oral treatments for CML among Black patients ($p<0.01$) and a significant 2.2 percentage point increase in adherence to oral treatments for CML among patients dual eligible for Medicare and Medicaid. OCM was also associated with a significant 1.5 percentage point increase in adherence to oral treatments for patients with CML living in high-deprivation neighborhoods ($p<0.10$). At the same time, OCM was associated with reductions in adherence to high-priced oral treatments for CML by 1.3 percentage points for White patients and by 1.7 percentage points for patients with only Medicare. The combined result of these changes was a substantial OCM-associated improvement in adherence among each historically underserved population relative to the corresponding reference population.

Chemotherapy Initiation Within 60 Days After Surgery

OCM was associated with more timely initiation of chemotherapy after surgery for patients with breast cancer who were Black or who lived in deprived neighborhoods.

Prior to OCM, Black patients who underwent surgery for breast or colorectal cancer before initiating chemotherapy were significantly less likely to have timely initiation of chemotherapy (i.e., within 60 days of surgery) than White patients (Exhibit 47). Similarly, prior to OCM, patients with dual eligibility who underwent surgery for breast or

[35] Since historically underserved populations have relatively small sample sizes compared to the full OCM sample, some of the clinical analyses presented in this section are based on fewer than 1,000 Black or Hispanic patients, or patients with dual eligibility. Lack of statistical significance may not definitively imply that OCM was not associated with clinical outcomes among historically underserved populations.

Exhibit 46: OCM Was Associated with Improved Adherence to High-Priced Oral Cancer Treatments for Historically Underserved Populations, Which Substantially Decreased or Eliminated Baseline Differences in Adherence Relative to Corresponding Reference Populations

Adherence to High-Priced Oral Cancer Treatments	OCM Baseline			Estimate Associated with OCM		
	Black	White	Difference (% Difference)	Black (A)	White (B)	Differential (A-B)
CML	82.4%	88.6%	-6.1pp (-6.9%)	3.4pp	-1.3pp	4.8pp
Prostate Cancer	86.1%	89.7%	-3.6pp (-4.0%)	2.5pp	-0.3pp	2.7pp
	Hispanic	**White**	**Difference (% Difference)**	**Hispanic (A)**	**White (B)**	**Differential (A-B)**
CML	85.0%	88.6%	-3.5pp (-4.0%)	1.2pp	-1.3pp	2.5pp
Prostate Cancer	86.2%	89.7%	-3.5pp (-3.9%)	3.1pp	-0.3pp	3.3pp
	Dual	**Non-Dual**	**Difference (% Difference)**	**Dual (A)**	**Non-Dual (B)**	**Differential (A-B)**
CML	86.1%	88.2%	-2.0pp (-2.3%)	2.2pp	-1.7pp	4.0pp
Prostate Cancer	87.3%	89.3%	-1.9pp (-2.1%)	3.9pp	-0.3pp	4.2pp
	ADI Top 20%	**ADI Lower 80%**	**Difference (% Difference)**	**ADI Top 20% (A)**	**ADI Lower 80% (B)**	**Differential (A-B)**
CML	85.0%	88.3%	-3.3pp (-3.7%)	1.5pp	-1.2pp	2.7pp
Prostate Cancer	87.6%	89.2%	-1.6pp (-1.8%)	0.7pp	0.3pp	0.5pp

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: High-priced oral treatments included enzalutamide or abiraterone for prostate cancer, and tyrosine kinase inhibitors for CML. ADI: Area Deprivation Index. CML: chronic myeloid leukemia. pp: Percentage points.

colorectal cancer were less likely to have timely initiation of chemotherapy relative to Medicare-only patients. In addition, patients in the top 20 percent of deprived neighborhoods who underwent surgery for breast cancer were less likely to have timely initiation of chemotherapy relative to patients in less-deprived neighborhoods. Differences between Hispanic patients and White patients in timely receipt of chemotherapy for breast cancer were similar in magnitude to differences between Black patients and White patients. However, differences were not statistically significant, likely due to a smaller sample size of Hispanic patients.

OCM was associated with improvements in the timeliness of chemotherapy after breast cancer surgery for Black patients and for patients living in the high-deprivation neighborhoods. Among Black patients with breast cancer, there was a 6.1 percentage point improvement in the likelihood of timely chemotherapy after surgery ($p<0.05$), a differential improvement of 5.7 percentage points relative to White patients ($p<0.05$). Among patients living in high-deprivation neighborhoods, OCM was associated with a 5.1 percentage point improvement in the likelihood of timely chemotherapy after breast cancer ($p<0.01$), a differential improvement of 4.7 percentage points relative to patients living in less-deprived neighborhoods ($p<0.05$). OCM was not associated with relative changes in the likelihood of timely chemotherapy after breast cancer surgery for Hispanic versus White or dual-eligible patients versus Medicare-only patients.

Among patients who had surgery for colorectal cancer, OCM was not associated with any change in the likelihood of timely chemotherapy after surgery for Black or Hispanic patients, or for patients living in the most deprived neighborhoods. Among patients who are dual eligible for Medicare and Medicaid, the proportion of patients with dual eligibility who received timely chemotherapy following colorectal cancer surgery decreased by a statistically non-significant 4.0 percentage points, contributing to a relative decrease in the proportion of dual-eligible patients with timely initiation of chemotherapy for colorectal cancer relative to Medicare-only patients (-4.4 percentage points, $p<0.10$); however, this difference was no longer statistically significant in sensitivity analyses that excluded the two largest practices.

Exhibit 47: OCM Was Associated with More Timely Initiation of Chemotherapy After Surgery for Patients with Breast Cancer Who Were Black or Who Lived in High-Deprivation Neighborhoods, But Associated with Increased Differences Between Dual-Eligible and Medicare-Only Patients After Surgery for Colorectal Cancer

Timely initiation of chemotherapy after surgery for…	OCM Baseline			Estimate Associated with OCM		
	Black	White	Difference (% Difference)	Black (A)	White (B)	Differential (A-B)
Breast cancer	68.0%	72.6%	-4.6pp (-6.3%)	6.1pp	0.4pp	5.7pp
Colorectal cancer	55.7%	61.0%	-5.3pp (-8.7%)	0.3pp	-0.2pp	0.5pp

	Hispanic	White	Difference (% Difference)	Hispanic (A)	White (B)	Differential (A-B)
Breast cancer	68.2%	72.6%	-4.5pp (-6.2%)	2.6pp	0.4pp	2.2pp
Colorectal cancer	60.6%	61.0%	-0.4pp (-0.7%)	-1.7pp	-0.2pp	-1.4pp

	Dual	Non-Dual	Difference (% Difference)	Dual (A)	Non-Dual (B)	Differential (A-B)
Breast cancer	68.4%	72.5%	-4.1pp (-5.7%)	2.6pp	0.9pp	1.7pp
Colorectal cancer	56.2%	61.2%	-5.0pp (-8.2%)	-4.0pp	0.4pp	-4.4pp[a]

	ADI Top 20%	ADI Lower 80%	Difference (% Difference)	ADI Top 20% (A)	ADI Lower 80% (B)	Differential (A-B)
Breast cancer	68.4%	72.6%	-4.1pp (-5.6%)	5.1pp	0.3pp	4.7pp
Colorectal cancer	60.4%	60.4%	0.0pp (0%)	-1.9pp	0.1pp	-2.0pp

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: [a]After dropping the two largest OCM practices, the differential estimate was no longer statistically significant (-3.3pp, 90% CI: -7.9, 1.2).
ADI: Area Deprivation Index. pp: Percentage points.

Treatment With Recommended Supportive Care Medications

OCM was not associated with changes in receipt of recommended supportive care medications among most historically underserved populations.

Prior to OCM, Black patients and patients with dual eligibility both had significantly lower use of bone-modifying drugs for bone metastases relative to their reference populations (Appendix Exhibit E-23). Prior to OCM, differences between all historically underserved and reference populations in use of antiemetic (anti-nausea) medications and white blood cell growth factors were small and non-significant.

OCM was not significantly associated with relative differences in use of bone-modifying drugs or antiemetic medications for any of the underserved populations we examined. Notably, Black patients (relative to White patients) and patients with dual eligibility (relative to patients with Medicare only) had lower rates of bone-modifying drugs at baseline. OCM was associated with a relative decrease in use of white blood cell growth factors for Black relative to White patients and for patients with dual eligibility relative to patients with Medicare only. The difference for Black versus White patients was largely driven by relative increases in use of white blood cell growth factors among White patients, who had modestly (but not significantly) lower rates of growth factor use at baseline. The difference for patients with dual eligibility and patients with Medicare only was driven by increases for patients with Medicare only, who had slightly greater use in the baseline period.

7.3 Patient-Reported Care Experience

In the baseline survey, respondents from all subpopulations reported similarly positive care experience. Small changes in patient experience during OCM were similar between historically underserved populations and their corresponding reference groups.

Analyses of patient care experiences assessed trends over time for subgroups of patients in OCM-participating practices because we did not survey patients treated in comparison practices throughout the study period.[36] We present full results of care experience analyses in Appendix Exhibits E-24 to E-27. In general, all populations included in these analyses reported positive care experiences during their chemotherapy treatment. For example, in the baseline survey wave, Hispanic and White respondents, as well as respondents with dual eligibility, respondents with only Medicare, and respondents living in high-deprivation and less-deprived neighborhoods, gave their care team a rating of 9.3 out of 10 on average. Black patients gave their care team a rating of 9.2 on average, which was not significantly different from the average rating of White patients.

Averages for measures other than the shared decision making composite were similar to or more positive for Black respondents and Hispanic respondents than for White respondents during the baseline survey wave. The only relative change over time by race and ethnicity was in the rating of the cancer care team, which improved among Black respondents relative to White respondents, a difference in trends of 0.007 per quarterly survey wave ($p<0.05$). This equates to an improvement of 0.14 on a scale of 0–10 over the full intervention period (1.4 percentage points) among Black respondents relative to White respondents, across all 11 performance periods.

There were no differences in patient care experiences between respondents with dual eligibility and those with only Medicare during the baseline survey wave. The only relative change over time by dual eligibility was in the rating of the cancer care team, which declined among respondents with dual eligibility relative to respondents with only Medicare, a difference in trends of -0.008 per quarterly survey wave ($p<0.10$). This equates to a decline of 0.18, or 1.8 percentage points, among respondents with dual eligibility relative to respondents with only Medicare, across all 11 performance periods.

There were no differences in patient care experiences between respondents living in more- and less-deprived neighborhoods during the baseline survey wave.

The only relative change over time by neighborhood ADI was in the rating of the cancer care team, which improved among respondents living in high-deprivation neighborhoods relative to respondents living in less-deprived neighborhoods, a difference in trends of 0.005 per quarterly survey wave ($p<0.05$). This equates to an improvement of 0.11, or 1.1 percentage points, among respondents living in high-deprivation neighborhoods relative to respondents living in less-deprived neighborhoods, across all 11 performance periods.

Notably, in a sensitivity analysis removing the two largest OCM practices, all three statistically significant relative differences in the rating of cancer care team over time were smaller in magnitude and no longer statistically significant, so these findings should be interpreted with caution. Moreover, the analyses lacked a comparison group to assess if these changes over time were similar or different compared with patients not treated by OCM-participating practices.

7.4 Discussion

Changes in most outcomes during OCM were similar for Black and Hispanic patients relative to non-Hispanic White patients, for patients with dual eligibility relative to those with Medicare only, and for patients in high-deprivation neighborhoods relative to those in less-deprived neighborhoods. However, there were several noteworthy patterns of results that serve to demonstrate progress made by OCM and to highlight neighborhoods for future improvement.

In Chapter 2, we presented estimates showing that overall TEP reductions attributable to OCM averaged $616 per episode, driven primarily by reductions in Part B non-chemotherapy drug payments. Estimated reductions in TEP for Black and White patients, patients with dual eligibility, patients with only Medicare, patients in high-deprivation neighborhoods, and patients in less-deprived neighborhoods were very similar to the overall estimate, and estimated reductions in Part B non-chemotherapy drug payments in each population were similar to the overall estimate of $288. TEP reductions associated with OCM were higher for Hispanic patients due to large decreases in Part D payments; reductions in Part B non-chemotherapy drug payments among Hispanic patients were similar to those in the other four populations. These results suggest that changes the participating practices made in the use of supportive care drugs paid through Part B were applied similarly across all patients, including those from historically underserved populations. However, it remains unclear why OCM was associated with reduced Part D payments for Hispanic patients.

[36] We surveyed patients with comparison oncology episodes twice during the study period; once in the baseline wave and again in the third year of OCM. Comparison patients were not included in this analysis, which was extended through the sixth year of OCM.

Our analysis of acute care utilization outcomes suggests that OCM was associated with small changes in some measures of acute care service use, which may have increased differences in utilization between patients in high-deprivation neighborhoods and patients in less-deprived neighborhoods. For example, OCM was associated with a roughly 2 percent (0.7 percentage point) increased likelihood of an inpatient stay among patients in high-deprivation neighborhoods and reductions of roughly 4 percent (0.4 percentage point) in the likelihood of an ICU admission among patients in lower-deprivation neighborhoods, which yielded significant differentials between patients from higher- and lower-deprivation neighborhoods.

On the other hand, OCM was associated with the likelihood of an ED visit without hospital admission for Hispanic patients relative to White patients. Furthermore, OCM is no longer associated with increased acute care use among Black patients relative to White patients or among patients with dual eligibility relative to those with Medicare only. These two patterns were present in estimates from the ***Evaluation Report for PP1–PP9***, but are no longer evident after the final year of data.

Prior to OCM, each of the historically underserved populations we analyzed had significantly higher use of acute care services, including ED visits, hospitalizations, readmissions, and ICU stays, relative to the reference populations. In **Section 3.5**, we noted the difficulty that OCM and other value-based payment programs have had in reducing acute care use, and our results indicate that these challenges were equally or more difficult to surmount among historically underserved populations, despite potentially more room for improvement among these populations (given their higher baseline use). New, tailored supportive care strategies may be required to improve equity in the use of acute care services during cancer treatment. Alternatively, greater use of acute care services may result from tailored supportive care strategies that apply greater outreach to at-risk populations.

By analyzing results separately by population, we were able to uncover some findings that were not evident when pooled across all OCM patients. For example, the overall impact estimates of OCM on adherence to high-priced oral cancer drugs in **Section 5.5** were small and non-significant. However, the results in this chapter indicated significant improvements in adherence among all four historically underserved populations when each group was analyzed separately. Prior research has also found lower adherence to oral cancer medications for patients of color, which could reflect financial burden experienced by historically underserved populations, resulting in non-adherence due to high out-of-pocket costs for such Part D drugs.[lvi,lvii] It is possible that improved outreach from patient navigators and financial counseling required under OCM helped address financial barriers and contributed to better adherence for historically underserved populations.

Similarly, the overall impact of OCM on changes in timely initiation of chemotherapy after breast cancer surgery was not significant (**Section 5.4**). However, timely initiation of chemotherapy after breast cancer surgery improved significantly among Black patients and patients living in high-deprivation neighborhoods. Timely initiation of chemotherapy after surgery for colorectal cancer did not improve for Black or Hispanic patients or for those living in deprived neighborhoods, consistent with overall impact estimates. The timeliness of chemotherapy following surgery for colorectal cancer worsened for dual-eligible beneficiaries relative to Medicare-only beneficiaries. The improvements in timeliness of chemotherapy for patients with breast cancer that were not evident for patients with colorectal cancer may be related to earlier recognition in the literature that delays in breast cancer treatment are associated with worse survival.[lviii,lix,lx,lxi] This earlier recognition led to numerous programs and studies engaging patient navigators in the coordination of breast cancer care to enhance access to timely treatment for at-risk populations, which have not yet been replicated for patients with colorectal cancer.[lxii,lxiii,lxiv]

Within OCM practices, Black and Hispanic patients, patients with dual eligibility, and patients in high-deprivation neighborhoods reported similarly positive care experience outcomes relative to White patients, those with only Medicare, and those in lower-deprivation neighborhoods. This was particularly true with regard to their rating of their cancer care team. Positive care experiences were sustained, but not improved upon, for all historically underserved populations treated in OCM practices during the Model period.

For several key outcomes, we uncovered minimal changes associated with OCM, both for each historically underserved population specifically and in relation to the corresponding reference populations. Value-based payment models that are not designed to improve health equity may have limited potential to do so.[lxv-lxix] The forthcoming Enhancing Oncology Model includes design elements specifically intended to address inequities in health outcomes, such as increased incentive payments for treating patients with dual eligibility, and mandatory screening for social determinants of health, which could help to overcome those limitations.

Lastly, we acknowledge concerns that episode-based payment models could incentivize avoidance of historically underserved populations if they are perceived as more medically complex and as having higher average costs relative to other patients. Although we did not directly assess this possibility in the current report, prior analysis by our team reported in the ***Evaluation Report for PP1–PP5*** did not find any evidence of changes in the proportion of Black or Hispanic patients, or patients with dual eligibility, treated by OCM practices relative to comparison practices after the start of the Model.

How Did Patients Describe Their Cancer Treatment Journeys?

CONTEXT AND KEY FINDINGS

We interviewed 30 patients with cancer in 2022, towards the end of OCM. Some received their cancer care from OCM participants, and some did not. Our goal in conducting these interviews was to holistically understand patients' cancer journeys and experiences.

Many people we spoke with described their cancer journeys from start to finish, with little prompting. Cancer journey stories commonly included the following phases: life before cancer, receiving a diagnosis and finding an oncologist; treatment goals, planning, and decisions; cancer treatment and supportive care; and getting help.

People we spoke with expressed a variety of preferences about treatment planning and how to make decisions with their oncology teams. While most people we spoke with were actively involved in treatment planning and collaborated with their care teams, some people preferred to defer to their doctor's judgment when making treatment decisions, and a few people we spoke with declined recommended treatments, sometimes seeking out second opinions.

People we spoke with consistently spoke about the importance of communication with their oncology teams. Most, but not all, expressed positive experiences related to communication. A few felt left out of key decisions or that the care team was not responsive to their needs.

Some people mentioned having access to a care coordinator or navigator who helped with logistics, while others navigated their care primarily by themselves.

Many people mentioned needing help at home with activities of daily living—such as showering, cooking, climbing stairs, and getting in and out of bed—due to pain or weakness resulting from their cancer treatment.

Most of the people we spoke with did not need help paying for their cancer treatment or related costs because of secondary insurance (e.g., employer or retiree supplemental insurance or Medicaid).

The Oncology Care Model (OCM) included several aspects intended to improve patient experiences with cancer treatment. To better understand how patients experience cancer treatment, we interviewed a diverse group of 30 Medicare fee-for-service beneficiaries who had recently received chemotherapy to learn about their cancer treatment journeys. We loosely guided the conversations to focus on: finding an oncologist to work with, communicating with their care team, making treatment decisions, managing symptoms, handling financial issues, getting help, and anything else that was important to them. Throughout the interviews, which lasted for up to one hour, we asked, "what was most important to you," and "what went well, what could have gone better."

This chapter is based on candid insights from these 30 patients about their experiences undergoing cancer treatment. About half received their cancer care from physician groups participating in OCM, and the rest received care from other physician groups that did not participate. Our purpose was not to make comparisons between patients with and without OCM episodes, but rather to understand what matters most to patients with cancer, regardless of where they get treatment. Throughout the chapter, we emphasize direct quotes from the patients we interviewed to demonstrate similarities and differences in the cancer treatment journeys described during the interviews.[37] Appendix F contains additional detail on the methodology used in conducting and analyzing interviews.

8.1 Characteristics and Life Experiences of Interview Participants

Demographic and Socioeconomic Characteristics

The patients who participated in interviews had diverse characteristics.

We conducted interviews with a diverse group of 30 patients who had recently been treated for cancer. About two-thirds of interview participants were female, and the participants represented a range of races and ethnicities: nine Black, nine Hispanic, five White, and seven identified as other races or ethnicities. The most common cancer types among them were breast cancer, multiple myeloma, and lymphoma. Six of the 30 patients were enrolled in both Medicaid and Medicare, and 24 had FFS Medicare but not Medicaid. Roughly one-quarter lived in a rural area. One-fifth lived in highest-deprivation neighborhoods and one-fifth lived in the lowest-deprivation neighborhoods. Half were in the midst of their first cancer treatment experience as observed in the Medicare claims data. Additional details about the patients we interviewed can be found in Appendix Exhibit F-1.

Living Situation

About one-quarter of the patients we spoke with lived alone and continued to live independently throughout their treatment.

Many told us they managed quite well, with very little help, by accessing community resources and relying on friends and family.

Several patients emphasized the importance of living near caregivers.

Some patients lived with others (for example, spouse or adult children) or had family assistance nearby. One person gave up their apartment to move in with a daughter. A few relied on family who traveled to be closer and provide care and support.

CANCER TREATMENT JOURNEY STORIES:

PATIENTS HAD VARIED LEVELS OF SUPPORT AT HOME

"**I live by myself.** I've never been married. No kids. I just live by myself."

"No, **I live alone…I definitely discussed things with them [two daughters]**. But they both live out of state, so they were not here physically. So, I had to do all of this alone. I don't really have a support person in town."

"I have a **daughter that lives right here in town**, and she helps me a lot. She comes in if I need something that I can't do very good, and my grandson mows our grass, so that's under control."

"**My husband—he made sure, you know, that there was always something for me to eat.**"

[37] Quotes from different individuals in the same box are presented using separate sets of quotation marks.

Prior Cancer Diagnosis

Over one in four patients interviewed had prior experiences with cancer.

Sometimes, cancers may recur despite a successful round of treatment. Nearly 60 percent of OCM episodes followed a prior episode. During the interviews, 8 of the 30 patients mentioned a prior cancer diagnosis. For some, this was the result of spread (metastasis) from the initial cancer, while others were diagnosed with an entirely new cancer. Some interviewees who had a prior cancer diagnosis described how their earlier cancer treatment experience informed their expectations and decisions about their current treatment. Patients with prior experience described feeling more familiar with the process of undergoing cancer treatment and more comfortable advocating for themselves.

Everyday Routines

Many patients discussed how starting cancer treatments changed their routines.

Some patients were determined to do as much as they could themselves and limited changes to their routine. Some patients were working when they started cancer treatment, and several had to stop due to the rigor of their treatments and related side-effects. Others were able to continue working part time or from home. Some expressed having to curtail time with family, or reduce time spent on hobbies.

Patients Who Are Also Caregivers

Several patients spoke about their role as both a patient and a caregiver.

Some patients were not only dealing with treatments of their own but carrying major responsibility for the care of a family member. Responsibilities included transportation to and from appointments, household chores, and managing the illness of another person in addition to their own.

CANCER TREATMENT JOURNEY STORIES:

SOME PATIENTS WERE ALSO CAREGIVERS

"Me and my wife … during this time she's had brain tumors that she's had to have taken out. She's had breast cancer along with radiation. And so, with the [cancer treatment I have been taking], **I've been able to support her** during her trials. And **she's been there supporting me** during mine. So, we've done fine."

CANCER TREATMENT JOURNEY STORIES:

MANY PATIENTS HAD CANCER PREVIOUSLY

"**I was diagnosed with pancreatic cancer (stage 2B) in July of 2017**. And at that time, I had the surgery…And after six months, they did a biopsy on the lymph nodes …the cancer had spread outside the pancreas. Six months after that, things looked good."

"**I have two types of cancer. I've had thyroid cancer since 1998**…I've had about four surgeries on my neck. And the thing is, I didn't know I had multiple myeloma…until I went to do the last surgery for the thyroid…in 2014…and that's how I found out that I have multiple myeloma."

CANCER TREATMENT JOURNEY STORIES:

TREATMENTS CHANGED EVERYDAY ROUTINES

"I was a flooring contractor. So, **once I started doing the [hormone therapy] it was kind of like, I couldn't keep up**. It just takes everything out of you. So, I didn't have the energy to work anymore, and I had to finally stop."

"Prior to my diagnosis **I was babysitting for my great-nephew and -niece two days a week. I had to stop all that.**"

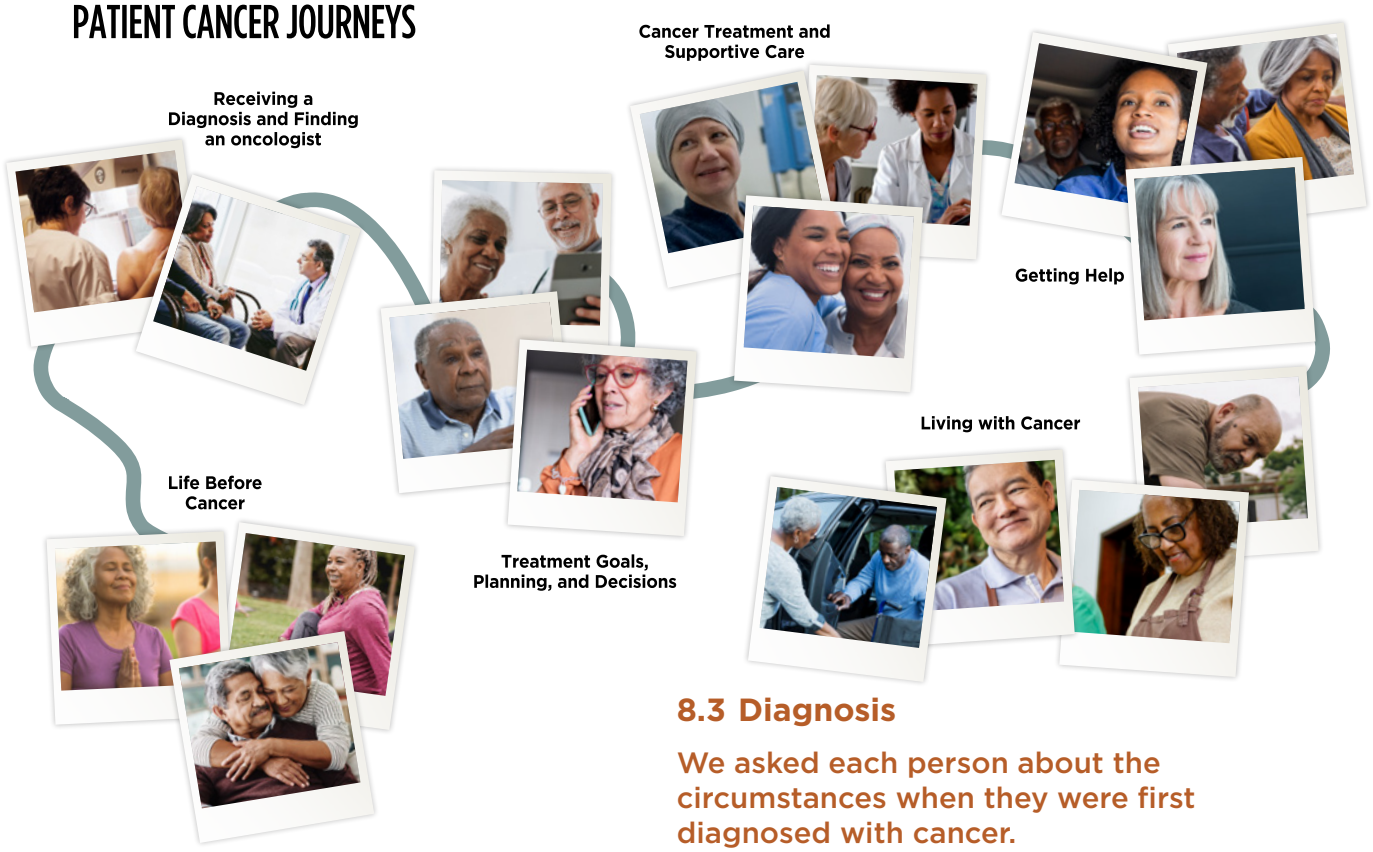
"**I'm always fatigued**. But I go to a pottery studio every day, and I try to keep myself moving, but by two o'clock I have to take a break. And then I kind of pick up again around five and move about again, but I'm not exactly how I used to be."

8.2 Cancer Care Journeys

Many patients described their cancer journeys from start to finish, with little prompting.

Although we had a detailed interview protocol about the process leading up to, during, and after receiving cancer treatments, many patients we spoke with naturally described their cancer journeys as a story that played out over time, with little prompting. Patients often expressed

Exhibit 48: Patient Cancer Journeys



gratitude for the opportunity to share their story and hoped that others might learn from their experiences. **Exhibit 48** describes the phases most commonly described by patients during their cancer journeys. The remainder of this chapter describes the care and experiences patients had throughout their cancer journey.

8.3 Diagnosis

We asked each person about the circumstances when they were first diagnosed with cancer.

Some patients we spoke with sought treatment for pain or other symptoms and were first diagnosed while receiving treatment for those symptoms.

For patients who received their cancer diagnosis when seeking treatment for related symptoms, several told us that tests were done right away after presenting with symptoms and they were diagnosed relatively quickly.

CANCER TREATMENT JOURNEY STORIES:

PATIENTS RECEIVED DIAGNOSES IN DIFFERENT WAYS

"It was an accident that I found out that I had that cancer. I found out that I had the disease because I was having nausea problems. I couldn't hold my food down and everything like that. So I was doing regular treatments with my primary care doctor and she ordered an MRI and found out that it was some growth on the liver and the kidney. So, then we did a biopsy and found out that the one on the liver was cancerous."

"I was diagnosed with metastatic breast cancer…the diagnosis was January 2, 2019. It was a little frustrating for me beforehand. …**I went to the doctor but he really did nothing and didn't believe me.** And so I dealt with the inflammation and the itching for months and months, and I went back to him finally and there was still a problem with time elements and one appointment to the other, you know, of having a mammogram, doing a follow-up mammogram. Just the whole process was frustrating then."

"I was diagnosed… through a regular mammogram, just a routine mammogram. When I was called back for further testing, the radiologist came in and asked me if I would consent to a biopsy — that there was something suspicious. I also saw a surgeon that day, just to examine me, and the surgeon also spoke very honestly with me…. She said, 'I hope I'm wrong, but in my experience, I think I'm looking at breast cancer.'"

Other patients described telling physicians about their symptoms multiple times before diagnostic tests were conducted that would reveal cancer.

Others had their cancer identified through routine screening.

A few patients we interviewed learned they had cancer after routine screening mammograms for breast cancer, prostate-specific antigen (PSA) tests for prostate cancer, or colonoscopies for colon cancer.

8.4 Oncologist Selection

Patients found their oncologists in a variety of ways.

After receiving a cancer diagnosis, some patients had surgery to remove a tumor and then saw an oncologist, while others went straight to a medical oncologist for cancer treatment, without surgery. About half of the patients we spoke with were referred to their oncologist by another physician, while others had a pre-existing relationship with their oncologist from a prior cancer episode. A few patients were referred to their oncologist by a friend or family member or found their oncologist themselves.

CANCER TREATMENT JOURNEY STORIES:

PHYSICIANS, FRIENDS, AND FAMILY HELPED PATIENTS FIND ONCOLOGISTS

"**The oncologist at [local hospital] referred me to a doctor in [nearest city]**. He called me and told me, 'You don't need to come see me. You need to see a [gynecologic oncology] specialist.' So, he gave me the name of a couple and he told me he had some patients who had gone to the people that he had mentioned. He told me the ones that they liked. So, we decided on [gynecologic oncologist]."

"My wife's boss's mother-in-law had pancreatic cancer, and she said, 'This is the guy I recommend.' And we have a neighbor who had pancreatic cancer, and his wife said the same: **the oncologist is very passionate about his patients.**"

"**I was in the car and saw the clinic and said, 'what is this?**' And somebody told me. So, I said, 'I have to go and check it out.' I always find places by myself. I'm a curious person, and I'm very independent."

CANCER TREATMENT JOURNEY STORIES:

LOCATION WAS AN IMPORTANT FACTOR IN CHOOSING AN ONCOLOGIST

"I'm in central [midwestern state]—kind of in the boondocks—and **[teaching hospital] is in [another part of the state]. And we had to go down there sometimes three times a week for about six weeks... Now I go once a week**...Sometimes if the appointment is at eight in the morning, we're getting up at four in the morning to get there."

"Well, **all of that was done at the hospital in the city five hours away [from my home]**. When I first went for cancer treatments there, they went through the paperwork, did the blood work and everything, and thought [hospital in city five hours away] would be the best place to deal with this kind of cancer."

"...one of the things we were discussing then is 'where do you want your treatment?' because I'm a good 40 minutes from [teaching hospital]. And there were other facilities in the area, one of which is 20 minutes just up the road from [me]... **So, we chose to go to that [local] facility.**"

Some patients living outside of major cities travelled long distances to receive cancer treatment, while others were able to find care locally.

While many patients living outside of major cities were ultimately happy with the cancer care they received, most spoke about having few options and/or having to travel long distances for their care. Traveling long distances for cancer care, which often requires multiple visits every month (and sometimes multiple visits per week) adds financial burden and complexity to an already challenging time.

8.5 Treatment

In this section we describe aspects of treatment that interviewees discussed. Topics include interviewees' understanding of treatment goals, treatment planning and decisions, communication with cancer care team, care coordination and patient navigation, managing symptoms, and supportive care.

Treatment Goals

The pros and cons of treatment will differ for everyone, and willingness to undergo difficult treatments is a personal decision. To engage in decisions like this, a person needs to understand both their prognosis and the goal of treatment. Accordingly, an Institute of Medicine report on cancer care states that it is important for doctors to convey the prognosis to each cancer patient, and also convey the goal or purpose of recommended treatments—the potential for cure, or if that is not possible, the trade-offs of treatment side effects versus extending life. Doctors should check to be certain that there is no misunderstanding, because being treated with chemotherapy does not necessarily mean a cure is possible. OCM built on the Institute of Medicine's advice by requiring care plans for cancer patients that include prognosis, treatment goals, side effects, and other relevant information to help patients understand their treatment purpose and likely effects.

Most patients had a treatment goal of living longer with reasonable quality of life.

Most of the 30 patients we spoke with understood that they will always have cancer and the treatment goal is to extend their lives with reasonable quality of life. However, a few patients did not initially understand their prognosis and goals of treatment and were upset when they eventually realized what the future would hold.

CANCER TREATMENT JOURNEY STORIES:

TREATMENT GOALS WERE NOT ALWAYS CLEAR

"**He indicated that…there is no cure for lymphoma. It's just a fact of treating it, and sort of trying to keep it in remission**… for as long as we can."

"As a layperson, **I obviously thought well it's in remission, which means your cancer is gone. But he [oncologist] indicated that I still had a lot of cancer cells floating around in my body**. He hates that word [remission] because he said, 'You know it's not as if they've disappeared, it's just that now they're inactive.'"

"I was thinking 'I can handle anything for six months'… I then had six months of the nastiest treatment I would never wish on anybody…**and then it was clarified to me that it [chemotherapy] would be for the rest of my life. I don't think I can ever remember being so depressed as when I found that out.**"

Treatment Planning and Decisions

For many patients with cancer there is more than one reasonable treatment option, and decisions about the best approach will depend on each person's values and preferences.

Patients expressed a variety of preferences about treatment planning and making decisions with their oncology teams.

Some patients wanted to understand all their treatment options and discuss possible approaches with their doctors, family, and friends. Others preferred to leave treatment decisions entirely to their doctors. A few had strong opinions about which treatments were unacceptable—some negotiated with their doctor to consider other options, but a few lost confidence in their doctor and sought a second opinion or switched to a different doctor. We noticed three patterns of experiences around shared decision making in treatment planning:

ACTIVELY INVOLVED IN TREATMENT PLANNING

- Searched for and read relevant information
- Involved family/friends
- Discussed options with doctors
- Negotiated with doctors about certain treatments

TRUSTED DOCTOR'S TREATMENT PLAN

- Completely trusted doctors to make treatment decisions
- Felt unable to assess treatment plan (lacked expertise), but content with decisions
- Saw no other option, left decision to doctors

DECLINED TREATMENT PLAN

- Declined specific treatments
- Could not reach agreement with doctor about other options
- Sought second opinion
- Changed doctors

CANCER TREATMENT JOURNEY STORIES:

SOME PATIENTS KNEW WHAT TO EXPECT FROM TREATMENT

"**The surgeon answered all my questions.** She gave me paperwork so I could take it home. She did explain that sometimes you just need to read it and understand it for yourself. She said, 'Share it with family members.'"

"**They went over it all with me and also printed it out for me.** So, I knew all about the drug…how it worked and the possible side effects…and I could take it home and study it."

"When I was first diagnosed with cancer I was flooded with material and special meetings that explained what was happening. **My family came in and we all talked about it.**"

CANCER TREATMENT JOURNEY STORIES:

SOME PATIENTS INQUIRED ABOUT ALTERNATE TREATMENT OPTIONS

"The doctors were satisfied with it [the cancer] being stable. **I wanted something a little more tangible, a little more aggressive.** So, we talked about it, and he gave me this option of treatment [immunotherapy]."

"The urologist…said that I had to have my bladder taken out… which would have been like a 95% cure rate, because then it [the cancer] could not metastasize. **But I'm also thinking about quality of life…and I wasn't willing to do that.** So, we decided on [chemotherapy] treatment."

"The first option he gave me was to have a bone marrow transplant…**I said no because I didn't want to go through all of that. I'd have to move there [to a city hours away] …and I didn't want to do that.** And he told me he'd had fantastic results with what he would be doing for me [instead]…I was totally satisfied not accepting the bone marrow transplant."

Roughly half of the patients we spoke with were actively involved in treatment planning.

Seventeen of the 30 patients told us they felt well-informed and actively involved in making treatment decisions with their doctors. Many of these patients read information provided by the cancer care team and involved friends and family in discussing the treatment plan. Some searched online for more information before making a treatment decision, or talked with other patients who had the same type of cancer and treatment.

Some patients also refused specific treatments or wanted more aggressive treatments. Their doctors were flexible and willing to consider options that were more in synch with the individual's values and priorities.

CANCER TREATMENT JOURNEY STORIES:

SOME PATIENTS LEFT TREATMENT DECISIONS TO THEIR ONCOLOGIST

"**I have left that totally up to my doctors**, to tell me the best way where they think we should go. I've been trusting them. Basically, I just left everything in their hands."

"**I surrendered myself to them with full confidence.**"

"That's pretty much what they told me: 'Here's what we need to do.'…**I didn't really know nothing about it, so I didn't know what to think about it.**"

"Well, he talked it over with me, and told me what he was going to do. But **I wasn't educated as far as cancer.**"

Some patients preferred to defer their treatment decisions to their doctors to make the right treatment decisions.

Nine of the 30 patients we interviewed told us that they trusted their doctors and did not feel the need—or lacked the expertise—to participate in making these important decisions. They generally felt well cared for and left treatment planning to their doctors.

Four of these nine patients said they received all the information they needed, and had opportunities to ask questions, and agreed with the treatment plan laid out by their doctor. These patients expressed total confidence and trust in their doctors to make the right decisions.

CANCER TREATMENT JOURNEY STORIES:

SOME PATIENTS DECLINED THEIR TREATMENT PLAN

"**I ended up giving up on the guy [doctor] locally**, because his theory was to have my PSA go up high…and then he would administer the shot that brings it down. It's a really extreme process to go through. I'd be normal…and then all of a sudden, I'd be a crazy man…I decided to just forget the guy, because he's driving me nuts."

"She [medical oncologist] wanted to send me back to the previous doctor, and yet the previous doctor [radiation oncologist] had told me there was nothing more than his treatments could do for me. **So, I'm bouncing back and forth, and I lost confidence.** I reached out to another cancer center… because everything I was getting from my original clinic was going south."

IMPORTANCE OF COMMUNICATION

We used data from the patient survey to identify which aspects of care experience mattered most to patients undergoing chemotherapy.

We combined responses to survey questions into aggregated measures across five domains of patient experience with care: (1) access to care, (2) communication, (3) exchanging information, (4) enabling patient self-management, and (5) shared decision making. We also asked respondents to give an overall rating of their cancer care team. Together, we used these measures to understand the impact of OCM on patient experience with care, as discussed in Section 4.4.

While all domains were positively associated with the overall rating of the cancer care team, respondents' ratings of their communication with their care team were most strongly associated with the overall rating. The communication measure reflects how well the cancer care team showed respect for, listened carefully to, was straightforward with, and spent enough time with patients. Notably, more than 9 out of 10 survey respondents indicated that their cancer care teams always or usually communicated effectively on these criteria.

Additional information about this analysis can be found in Appendix C.5.

Five of these nine patients preferred to follow their doctor's advice, because they lacked the knowledge necessary to make these important decisions. Even so, they were mainly comfortable with the process and felt confident that their doctors made the right treatment decisions.

A few patients declined recommended treatments, sometimes seeking out second opinions.

Four patients told us about conflicts with their doctors that could not be overcome. Some patients declined certain treatments their doctor recommended, and a few could not reach agreement with their doctor about a different approach. These patients sought second opinions (with or without help from their doctor), and a few lost confidence and decided to find a new doctor.

Communication

Since most people lack detailed knowledge about cancer and its treatments, they rely on their doctors and care teams to communicate essential information. Effective and clear communication between doctors and patients can help them feel heard, respected, and in control.

CANCER TREATMENT JOURNEY STORIES:

MANY PATIENTS HAD POSITIVE COMMUNICATION EXPERIENCES

"**And he always says 'I have something in my back pocket for you.** I don't want to have to use it, because of what the side effects are, but if we get to a point we may have to.' He asks me what's going on, and if there's been blood work done or there's been a CT scan… and anything it shows or didn't show. It's back and forth between us."

"**And the nurses, when you went in for infusions, were unbelievably knowledgeable**, and made it as enjoyable as something like that can be."

"…and then all of a sudden it [cancer test] started to climb back up again. He [oncologist] said '**Sometimes that happens, don't get discouraged; this is a marathon, it's not a sprint.**' I remember him saying that and I just loved him, he was so compassionate."

CANCER TREATMENT JOURNEY STORIES:

NEGATIVE COMMUNICATION EXPERIENCES HAD SIGNIFICANT IMPACTS

"**But when the cancer had metastasized there was nothing, I mean zero, support with regards to 'Now this is what you can expect, or this is the direction we go, and this is what we look for.**' There was nothing like that. So, I was doing this phase not being fully aware that I was going to be on chemo for the rest of my life."

"You go into it with a plan, and that's the way I tried to explain it to them: '**We are on a team together here…come and tell me what's going on, so I can work with you to help me.' …I don't feel that happened.**"

"I went to [urban medical center] to have my prostate taken out. So then he [local urologist] was administering the [periodic] injections and he didn't know how much to give me, and **he was kind of upset with the fact that I even went to [urban medical center]** so he said at one point "Okay, if you have any complications I'm not going to help you at all.'"

Patients consistently mentioned the importance of clear communication with their oncology teams. Most expressed positive experiences related to communication, but a few felt left out of key decisions or that the care team was not responsive to their needs.

Many people we interviewed spoke about excellent communication, even when the news was not good, and how much they appreciated the clear communication, knowledge, and compassion of their doctors and nurses.

However, for some people, poor communication seemed to be the underlying cause of negative experiences. Key information was not shared or was not fully understood. One person pleaded unsuccessfully for better communication and collaboration with her care team. In two situations, there was a distinct personality clash between a patient and their doctor that could not be overcome, resulting in those patients receiving treatment from other doctors.

CANCER TREATMENT JOURNEY STORIES:

CARE COORDINATION HELPED SOME PATIENTS

"I needed to know what to do, where to go, even financially. **They helped me so much, and I never needed to go out and do the research myself**…Everything I've done, every doctor I've seen, they're the ones [cancer center staff] who sent me to these doctors and set up the appointments."

"The radiation oncologist was a member of the same health system, so **there was continuity where they were sharing information**…I think the team approach is critical because each has their own niche to deal with. The surgeon takes care of this, the chemo doctor takes care of this, and the radiation oncologist takes care of this."

"**They have a special person you could call** if you had a concern about how you were feeling, or if you wanted to change an appointment, or had a financial problem. It was the same person who gave me the binder and the phone numbers. She was our go-to girl…If I needed to talk with the social worker, she would make arrangements for that."

CANCER TREATMENT JOURNEY STORIES:

CARE COORDINATION WAS COMPLEX FOR PEOPLE IN RURAL AREAS

"It kind of throws things off a bit because what [urban medical center] says, and what they do here [locally] are two different things. **So, I just try to stay on top of everything, and I can see where people start to drop the ball**."

"**I believe there should be some doctor…who would organize all my treatments, so that I wouldn't have to go to so many different places just to figure out what's going on with my body**…Can somebody look at my chart and see what needs to be done for this particular patient, rather than send me over here for a heart catheter, over there for a bone test, other there for something else…Why would I have to call [urban medical center] and then [local hospital] and then finally end up at [clinic]?"

"**The center has had a problem getting medical records from my local hospital.** They needed my most recent MRIs and summaries, so that…they can figure out what would be a good treatment. I'm scheduled now for another MRI, and I'll have to request that those images are sent to the cancer center."

Care Coordination and Patient Navigation

Some people mentioned having access to a care coordinator or navigator who helped with logistics, while others navigated their care primarily by themselves.

Several patients we interviewed told us about good experiences with well-coordinated care, and individual caregivers who excelled as navigators or coordinators. One person spoke about the importance of team-based care, when there are many specialists involved who need to communicate and coordinate.

Patients living in smaller towns, far from a major medical center, often wanted their local doctors to collaborate with experts in the city. Some patients we interviewed got services in multiple locations and described being frustrated by the level of coordination required on their part to share records, ensure that specialists' recommendations reach the care team in a timely manner, and overcome logistical barriers.

CANCER TREATMENT JOURNEY STORIES:

PATIENTS EXPERIENCED A VARIETY OF SIDE EFFECTS

"**Once you stop the chemo, things start to subside, whereas radiation, when you're going through it, it doesn't appear to be that bad. But it's the gift that keeps on giving afterwards.**"

"**Chemo is hard. Anybody that says it's easy is crazy because it's not.** You lose your hair.... I got neuropathy in both my hands and my feet."

"**I guess the biggest one was problems in my mouth.** I guess almost everybody that does chemo gets mouth sores. I had my share and that kind of drove me crazy for a while."

"**After the radiation, I had a really bad radiation burn.** So, then I had to go to see the wound doctor for about a month and a half. That was no fun."

"**I ended up with lymphedema** … And I figured that might have been from the radiation because they mess up your lymph nodes when they do that."

Supportive Care: Managing Symptoms from Cancer and Side Effects from Treatment

More than half the patients we spoke with experienced distressing side effects from their cancer treatments, which varied in type, frequency, and severity. The impact ranged from a one-time episode or mild inconvenience to more severe problems that required a pause or change in treatment.

RELATED SECTIONS

For additional information about the prevalence of symptoms and care experience as reported in the OCM Patient Survey, see Section 4.4.

Common side effects included fatigue, nausea, diarrhea, hair loss, mouth sores, dehydration, fluid retention, and weight gain. Other less common, but no less distressing, side effects included lymphedema, radiation burns, cold hypersensitivity, blood clots, skin eruptions, cardiac symptoms, electrolyte imbalances, and shingles.

CANCER TREATMENT JOURNEY STORIES: SOME PATIENTS EXPERIENCED NEUROPATHY

"**One day I was picking up something and I dropped it. I didn't realize I had dropped it until I heard it hit the floor**...That's why everything that I have in my kitchen right now is in plastic..... My biggest fear is if I use glass, I'll drop it and I'll have glass all over the floor and I go to sweep it and I don't get it all up."

"**I couldn't even pick up a spoon or fork** because a part of that treatment is that things feel very cold. Even things at room temperature are cold, too cold for me to touch or drink...And I would just show up at the doctor's office, not having any intention of crying, but I would just burst out crying in the treatment center. They were really, good because the chemo that was causing the things to be cold...was the one that I was not tolerating well...so, after I think it was only like four or five treatments at most, they eliminated that."

Many patients who undergo cancer treatment experience neuropathy, such as prickling, burning or numbness related to the nervous system, with varying levels of severity. Some chemotherapy drugs can cause neuropathy, although not everyone who receives chemotherapy will experience neuropathy. Five patients told us they experienced neuropathy, which for some was debilitating. For one person, walking became very difficult, another had trouble holding onto a hot cup of tea. Some patients mentioned cold hypersensitivity, a type of neuropathy from a specific chemotherapy drug used to treat colon cancer, rectal cancer, and other gastrointestinal cancers. Patients who experience this symptom can be bothered by even brief exposure to cold temperatures, such as when removing items from the freezer, eating cold foods, or drinking cold liquids. Symptoms can occur within hours of receiving chemotherapy and often resolve within a week of treatment, though they may recur following additional cancer treatment.

CANCER TREATMENT JOURNEY STORIES: CARE TEAMS HELPED PATIENTS MANAGE SYMPTOMS

"I think one of the biggest parts of their job once they, you know, read the blood, the lab work and [are] sure that the numbers are heading the right way, **the next biggest part of their job is to help you with the side effects.** I was always in there saying, well, this is going on and I've never experienced this in my life, and they're going, well, you know, you can do this, you can do that."

"**Whenever I have a question, I can call their office.** Initially, I get a recording, but they call me back for prescription refills or appointment issues or whatever."

CANCER TREATMENT JOURNEY STORIES:

SOME HAD CHALLENGES WITH TIMELY SYMPTOM MANAGEMENT

"They said, 'If there's ever an issue, call us.' **I called them, left the message, but I did not hear back from them**, and I was waiting…Okay, I'm going to call the cancer doctor, let him know what's going on… but they were already out by the time I got there…. Someone who I talked to from the hospital … said, 'Well, you're going to have to call back on Monday.' That's what I had to do over that weekend and then finally…they got back to me on Monday morning."

"**I didn't get a lot of instruction.** No one gave me anything to read. No one gave me literature about the drugs that I was on; I had no information whatsoever. And so, I was sort of [finding] my way through it and reading as much as I could on my side to sort of get ahead of things."

Most patients we spoke with were pleased with their care and care team.

Most patients we spoke with felt that their care team helped them manage symptoms and side effects. They described receiving education, guidance, and support to manage their treatments and resulting side effects, and generally did not complain about communication surrounding their side effects. Many said they were able to easily reach a consistent member of the care team for support and guidance. Most patients told us that their care teams were responsive, answered questions, and quickly helped address side effects.

However, a few patients described poor communication or inadequate systems that were not set up to address patient's symptoms in a timely manner.

One person experienced a three-day delay in response over a weekend, and another felt that staff did not prepare them for side effects, and they had to find answers on their own.

RELATED SECTIONS

OCM practices implemented several changes to prevent avoidable ED visits including education patients to "call us first" before going to the ED; calling patients taking oral chemotherapy drugs to monitor side effects and refill needs; and allowing same-day appointments to address patients' urgent needs. See Section 4.1 for more detail.

CANCER TREATMENT JOURNEY STORIES:

SOME USED THE EMERGENCY DEPARTMENT TO MANAGE SYMPTOMS AND SIDE EFFECTS

"**I had to go once for temperature of over 103. I stayed there for maybe four or five days because they thought I had some kind of serious infection.** My doctor…was in one day for some kind of meeting, and I had come out from under my delirium and had called them. So, he came to see me. I said, well, you need to tell these people that the reason I'm here is because of cancer. …I don't have no infectious disease because they were calling other places to have me, whatever. So, he finally got them to let me go."

"And then suddenly in the afternoon, I feel like I couldn't understand what I wrote. And it's like, it was not my writing. **Then my husband immediately called my doctor… she said, 'okay, take her to emergency.**' Then they took me to emergency, and they say I have like a blood clot, but a very, very, very tiny [one]."

CANCER TREATMENT JOURNEY STORIES:

SOME PATIENTS MANAGED SIDE EFFECTS THEMSELVES

"One time I can remember going back to the car and not being able to go home because I was just really sick. And when they found out about it later, they said, 'well, why didn't you come back up and we could have helped you?' **I just sat in the [car], until I felt good enough to go home.**"

"I tend to be self-sufficient and will approach things logically. I'm trying to remember if I ever had to call. No, I don't think so. The only times I've had to call is when I was having difficulty getting the [anticancer drug] renewed and … I kept going to my pharmacy and they said no, you haven't got anything…**So I'm not a caller.**"

"My treatment was on a Thursday afternoon, and on Friday morning I didn't feel like getting up out of bed, you know, and I decided that that was going to be my lazy day. **I also had the mental attitude that I was going to beat this.** 'I beat it one time, I can beat it the second time,' and that's the thing I kept telling myself and my family and my friends: that cancer does not have me, I've got it. I will win this battle."

Several patients we spoke with went to the emergency department to manage symptoms and side effects, but others preferred to deal with issues on their own when possible.

Five patients we spoke with reported visiting a hospital emergency department (ED) because of symptoms from their cancer or treatment side effects. Reasons for these visits included high fever, pain when breathing, nosebleeds, dehydration, and a blood clot. For some, symptoms were serious and clearly required hospital resources. For others, their needs could possibly have been met in the outpatient setting rather than in a hospital.

Other patients we spoke with were committed to being self-sufficient and tended not to call or reach out to the cancer care team, even when issues with side effects arose.

They preferred to manage on their own or wait until their next scheduled visit to report the issue. One person spoke about having a positive mental attitude and giving themselves permission to be lazy on post-treatment days.

CANCER TREATMENT JOURNEY STORIES:

FAMILY AND FRIENDS HELPED MANY PATIENTS WITH DAILY ACTIVITIES

Help with mobility: "My daughter came up from Florida, and my son came down from Connecticut, and another son came later to help me, when I got out of the hospital from Oklahoma. I mean, when I got out of the hospital, I could not walk up one step. I couldn't get out of a chair myself. Had to use the walker and barely got around."

Help with showering: "I did have a skin cancer that was so, so bad they had to send me to the wound center for several treatments. And I remember for some reason I had to have my leg wrapped the whole time and they had me wash with a certain solution. And I don't think I could wash it in the shower. It was just something I think my husband used to have to wrap plastic around when I would get in the shower. And I said, 'oh my gosh, I wonder when I'm going to get this leg clean?'"

Help with home maintenance: "In our shower, there was one thing on the showerhead, it got down to the point where it would not put out much water because we have a lot of condensate in the water supply here. And my wife and I collaborated on getting that working again, but I'm just not as strong and I'm more shaky and I get tired more easily than I used to, which is frustrating when you want to get through a project like that and get it done."

8.6 Getting Help

We asked patients about the types of help they may have needed during their cancer treatment.

Help from Family and Friends

Many patients mentioned needing help at home with activities of daily living—such as showering, cooking, climbing stairs, and getting in and out of bed—due to pain or weakness resulting from their cancer treatment.

Home-based assistance was typically provided by informal support networks, such as a spouse or children. Only one individual mentioned receiving help from a paid caregiver—in this case, the patient's sister—who was paid by Medicaid for five out of the seven days each week that she spent time in the home. In most cases, these caregivers lived nearby, although some patients mentioned that relatives commuted from different states to provide temporary home-based assistance.

Emotional Support and Use of Mental Health Care Services

Many patients told us they received emotional support from their family or friends, as well as from their oncology care team. A few got assistance from mental health providers, and seven patients described unmet mental health needs. Eight patients said they did not need mental health or emotional support.

The patients we spoke with described receiving emotional support through a variety of sources.

Many patients cited their oncology team as a source of emotional support during cancer treatment. For example, one individual recalled frequent encouragement from doctors and nurses when he was experiencing bouts of severe side effects from medication. Others described a highly trusting and communicative relationship with

CANCER TREATMENT JOURNEY STORIES:

FAMILY AND THERAPY GROUPS PROVIDED EMOTIONAL SUPPORT

"**I was supported because of the anxiety that I was having** because of where my sister was [in relation to her own cancer]. The primary oncologist and surgeon were all very aware of what was going on with me personally, and they fully supported that. I got the support from all angles from the team."

"**My daughter drove me to appointments, and she stayed there.** And like I said, she dialed my other daughters, and they listened in to what the doctor talk to me. They were all concerned. She usually went with me [to chemo appointments], and she went and got the [prescriptions]."

"**I had group therapy to speak to people to express myself**, how I feel about the cancer and how the cancer was being treated."

CANCER TREATMENT JOURNEY STORIES:

SOME PATIENTS WERE TAKING MEDICATIONS FOR DEPRESSION AND ANXIETY

"**I have been on antidepressants for about 20 years.** And so, between my primary physician and my counselor, who I was already seeing every two, three, four weeks, relatively regularly—they just took me in their arms and said, this is what we're going to do to help you out. This is what we want you to do. So, they increased my meds a little bit. And my counselor is really good; [what] she would tell me is like, you decide when you want to come back, or I think let's see each other sooner than later."

"**I mean, it's sort of expected. How could you not be depressed about a cancer diagnosis?** The antidepressant I ended up on was something really mild, it was amitriptyline and a very low dose but I'm telling you that it made all the difference in the world. I cried every day for those first six months and I don't think I really cried since then… It's just it made a huge, huge difference."

RELATED SECTIONS

As shown in Sections 4.3 and 4.4, although OCM practices reported improvement in depression screening and follow-up plans (Exhibit 23), patient reports related to involvement of their cancer care team in managing depression and anxiety declined during the COVID-19 PHE (Exhibit 27).

their providers, who checked in on their personal (in addition to medical) well-being. Many patients also credited informal support networks, such as family and friends, for providing emotional support. One individual, whose sister was undergoing cancer treatment at the same time, relied on her best friend for support instead of "burdening" her family. Other patients recalled family or friends accompanying them to medical appointments, as a form of emotional (in addition to logistical) support. Several patients also described the therapeutic value of support groups, both for medical informational exchange and feelings of camaraderie.

CANCER TREATMENT JOURNEY STORIES:

SOME PATIENTS WANTED MORE EMOTIONAL SUPPORT FROM CLINICIANS

"I just pray and give it to God and I just leave it there… So much been going on since I have been diagnosed with cancer. **The first social worker I talked to, I talked to her one time.** Like I told you, she was very nice, and she had me to bring the bills that, you know, that they would try to help me with. But when I asked for her this time, it was no show. So, you know, it's just hard. I just deal with what I got to deal with, and I don't want to be a burden on no one…. **I don't think she [social worker] knows all this, but she never asked either. She ain't never asked.**"

"My biggest complaint is that to me cancer treatment should be a full-body approach. And the only thing they did was do blood tests and pump me full of pills. **On my own, I was doing yoga, meditation, exercise program, you know, relaxation—trying to do all of the things, the mental things, the physical things, you know, everything.** And I think that's part of why I think I've done so well. But I am disappointed that the cancer treatment center didn't have [additional supports]."

Several patients we spoke with described taking medications for depression and anxiety during their cancer treatment.

One person, who had experienced depression predating her cancer diagnosis, spoke highly of the care coordination between her mental health and oncology providers. Another person expressed immense gratitude for her antidepressant and suggested that such medications be offered automatically as part of all chemotherapy regimens.

CANCER TREATMENT JOURNEY STORIES:

SOME PATIENTS DID NOT NEED EMOTIONAL SUPPORT

"They also have counselors on staff that I could meet with. I haven't done that. I haven't felt the need to do that. I have a very supportive family, but those resources are there if needed."

"**I think I had a pretty good outlook.** Look, I don't think I got all stressed out about it."

A few patients were frustrated by the lack of emotional support from clinicians—specifically, social workers—during their cancer treatment.

For example, one individual, who was raising her granddaughter following the deaths of her sister and daughter, said that her social worker did not inquire about the patient's backstory or potential sources of grief during their initial meeting, and then became difficult to track down. Another individual emphasized the need for mental health support to be integrated into a holistic treatment approach.

CANCER TREATMENT JOURNEY STORIES:

PATIENTS WERE GRATEFUL FOR INSURANCE TO COVER THE HIGH COST OF CANCER CARE

"I'm in an income bracket that qualifies me for Medicaid. My biggest expense is just putting gas in my vehicle to get back and forth [to medical appointments] and you know, little incidental things like the special mouthwash for the mouth sores and stuff like that… But gosh, **the cost of the prescription drugs that they're covering is incredible.** I can't believe what some of this stuff costs and why I should be getting it. I've had a full life, I think I'm going to have survivor's guilt or something because if the same amount of money was spent on a young person that had their whole life ahead of them, it would seem like it would be a lot fairer deal for everybody. I didn't ask for any of it, it just appeared. **All I can say is thank you.**"

Several patients did not need formal mental health support.

Several patients declined formal mental health support because their needs were being met by informal networks, such as family and friends. Four patients also cited their own positive outlooks and psychological stability as reasons for not needing emotional support.

CANCER TREATMENT JOURNEY STORIES:

SOME PATIENTS DID NOT NEED EMOTIONAL SUPPORT

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"**I think I had a pretty good outlook.** Look, I don't think I got all stressed out about it."

Financial Needs, Financial Support, and Out-of-Pocket Costs

Most of the patients we spoke with did not need help paying for their cancer treatment or related costs. These individuals told us that most, if not all, of the costs that were not covered by Medicare were covered by employer or retiree supplemental insurance or Medicaid.

Many patients who had supplemental insurance in addition to Medicare expressed gratitude for good insurance coverage and minimal out-of-pocket expenses and considered themselves "lucky" and "fortunate" to have few cancer-related expenses. Several also acknowledged that not all cancer patients are as fortunate.

CANCER TREATMENT JOURNEY STORIES:

PATIENTS WERE GRATEFUL FOR INSURANCE TO COVER THE HIGH COST OF CANCER CARE

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Some patients, whose insurance did not fully cover their expensive treatment, received support from philanthropic foundations. A financial representative, clinician, or friend helped them apply for these grants.

Several patients mentioned receiving assistance from other sources, including care coordinators, pharmacists, and financial representatives at their oncology clinics, community organizations, and family members. Some of this was for assistance with costs related to getting care, such as transportation.

CANCER TREATMENT JOURNEY STORIES:
MANY PATIENTS HAD HELP WITH TRANSPORTATION

"The majority of time it's me driving. **Unless I'm really bad off, and then my daughter will go along and my wife, and they'll help me.** I went where I've gotten sick on the way and everything kind of went bad. But other than that, I usually kind of go by myself. And last time I had a daughter come from [out of town] and pick me up and bring me home."

"**I just call a cab.**"

"Right now, I'm about four miles from my doctor, so it's pretty easy to get there and **I can drive myself.**"

"**My daughter, she took me when I went so that I didn't have to drive home.** Because it's 70 miles to go there and 70 miles back."

Three patients expressed some concern about being able to afford treatment but did not mention requesting financial assistance. One individual, who took pride in his self-sufficiency, specified that he chose not to ask for help. A few patients also told us they needed but did not receive financial assistance during their cancer treatment.

CANCER TREATMENT JOURNEY STORIES:
CHALLENGES RELATED TO THE COVID-19 PANDEMIC

"**No one could go in the hospital with me.** They rolled me in, and I had to sit in there by myself."

"**[Communication] was a little more limited during the COVID lockdown period because my wife couldn't go to the sessions with me**, and since she's still a practicing physician, it was very helpful to have her there. But other than just the business of not having visitors with you, when you're there, that wasn't any different at all from how it had been previously."

"I had to meet with the medical oncologist, and I had a lot of questions for her. Now, **nobody [no family caregiver] could go there [with me]** and meet with them. There's a lot of sick people there, compromised people, immune system wise. But she was very good. My sister was on the phone; I had her on speakerphone. So, what I'm saying is… they gave you an option: you can't have somebody there with you, but you have the option of having someone on a speakerphone so that they are hearing the same thing, and they can ask questions. People have to be creative in this kind of a world that we're in right now."

"**They didn't know if I had COVID, so the nurses wouldn't come near me.** I dropped something off the side of my bed, and I couldn't get to it. The nurse just looked at me and walked off. She wouldn't help. So, you felt very isolated. I mean, my wife and kids couldn't get in to see me… My daughter went out and bought them both a fluorescent orange vest and from a mile away they jumped up and down so I could see them. Then at night they turned on their lights in their car, and I flashed the lights in the room, and which was sort of like being together, the best we could do at that time."

Transportation

Several patients described asking for transportation help and receiving it, and no one reported unmet needs related to transportation.

Most patients received transportation assistance from their family or friends, but others were able to get to and from appointments entirely on their own. Several patients living in more rural areas specifically mentioned distance as a reason for needing transportation to medical appointments, while others recalled physical weakness or discomfort.

CANCER TREATMENT JOURNEY STORIES:

MANY PATIENTS HAD HELP WITH TRANSPORTATION

"The majority of time it's me driving. **Unless I'm really bad off, and then my daughter will go along and my wife, and they'll help me.** I went where I've gotten sick on the way and everything kind of went bad. But other than that, I usually kind of go by myself. And last time I had a daughter come from [out of town] and pick me up and bring me home."

"**I just call a cab.**"

"Right now, I'm about four miles from my doctor, so it's pretty easy to get there and **I can drive myself.**"

"**My daughter, she took me when I went so that I didn't have to drive home.** Because it's 70 miles to go there and 70 miles back."

Diet and Nutrition

Patients who were referred to dietitians or nutritionists had mixed experiences.

Two patients received actionable and practical recommendations, while one person stopped seeing a nutritionist due to their insufficient assistance with meal plans. Another person was offered a meal plan that was inappropriate for her health conditions.

8.7 Cancer Treatment During the COVID-19 Public Health Emergency

Several patients we spoke with mentioned challenges with their cancer diagnosis, treatment, and recovery related to the COVID-19 pandemic.

Eleven of the 30 patients we interviewed in 2022 mentioned the COVID-19 pandemic while describing their cancer experiences. Some were hospitalized during the pandemic, for surgery or other treatments; others received outpatient services that were impacted by the pandemic and related public health precautions. Many patients recalled feelings of isolation when they were in medical settings, due to visitation restrictions and precautionary distancing by medical staff. Some found workarounds to involve family members and feel less alone.

Two patients recalled concerns for their own safety while in health care settings, as well as precautions they took during the pandemic. For example, a gynecologic oncologist advised one woman to receive the COVID-19 vaccination a week before her ovarian cancer surgery so she could be "as covered as possible." Another left his inpatient rehabilitation facility during a COVID-19 outbreak because his family was concerned that he would be infected with the virus.

Three patients described early and continuing social isolation from family, friends, and the community during the pandemic.

8.8 Discussion

A few important themes arose from these 30 interviews, some of which overlapped with the survey responses from roughly 200,000 patients as presented in Chapter 4. These themes, described below, may be relevant as CMS moves forward with future cancer care improvement models.

(1) Strong communication drove measures of high satisfaction with care.

While some interview participants told us about poor experiences related to their cancer treatment, most felt that their cancer teams communicated clearly, responded to their needs, and generally provided high-quality care. This corroborated survey findings from patients treated by oncology practices participating in OCM, who provided

generally positive ratings about their care experiences and rated their cancer care teams, on average, over 9 on a scale of 0-10. We also learned in the interviews that patients who were not satisfied with their care teams often changed oncologists or sought a second opinion. Looking forward to the Enhancing Oncology Model, survey-based measures of care experience may be useful to monitor for declines in quality of care, but it may not be reasonable to expect practices to improve on the already high care experience ratings reported by patients.

(2) Living situation is important.

Whether a person with cancer lives alone or has support at home or nearby, and whether they are caregivers themselves (for example, caring for an ill family member) directly affects access, care experiences, and even completion of treatment. Understanding each person's unique living situation and how it may affect transportation, resilience, and treatment decisions may help cancer care teams improve patient outcomes.

(3) Shared decision making is not one size fits all.

Many OCM elements were intended to ensure that patients were fully informed, engaged, and on board with the cancer treatment approach; the Enhancing Oncology Model will have similar elements. While most patients we interviewed did want to be active participants in making treatment decisions, a sizeable share (9 of the 30) felt most comfortable putting their trust in their physicians and engaged minimally in the treatment planning process. A few patients objected to their physician's treatment approach and advocated strongly for alternatives. The variety of preferences and experiences expressed about shared decision-making in the interviews was consistent with findings from the patient survey, where we found room for improvement. Oncology care teams could potentially improve patient experiences with shared decision making by more consistently educating patients about treatment options and potential drawbacks to each, assessing patients' desired level of involvement in decision making, and involving patients to the extent that they wish.

(4) People in rural areas face unique challenges.

While the aggregate survey results showed high scores for access to cancer care, our interviews found that patients with cancer who live in rural areas and smaller towns often face unique challenges. While their initial diagnosis may come after surgery at a hospital in the city, it is not always possible to travel long distances for every chemotherapy or radiation treatment. They may have to rely on local providers and may therefore have fewer choices. Rural residents may struggle to find an oncologist whose treatment approach is acceptable to them, or to get a second opinion. They may also face transportation challenges and may need to rely on family and friends to get to and from appointments.

(5) Out-of-pocket costs are manageable for most.

Financial issues were relatively minor for these 30 patients, many of whom were of modest means, and this was universally appreciated. Medicare, Medicaid, and retiree/supplemental insurance meant these patients did not have to choose between cancer treatment and financial jeopardy. This corresponded with the relatively modest out-of-pocket costs that patients reported in the survey. The biggest financial issue some faced was copayment for prescription drugs, but most received assistance with this as well, arranged for by their oncology care team or pharmacist. The lack of financial concerns expressed among interviewees was notable, given that total costs of care paid for by Medicare steadily increased throughout OCM, from roughly $29,000 per episode prior to the Model to nearly $40,000 per episode by the end of the Model. Policy makers should keep monitoring whether patients continue to have modest out-of-pocket costs themselves, among growing costs of care overall, and potential shifting of chemotherapy drugs from Part B to Part D.

(6) Closing the gap in addressing mental health in oncology requires a multifaceted solution.

Oncology Care Model patient surveys found that support for mental health needs (emotional problems, depression, anxiety) was the biggest gap in symptom management, despite the Model requirement that cancer patients be screened for depression. Several patients we interviewed also described mental health needs that their oncology care teams did not adequately address. While depression screening is a critical first step to identify patient needs, closing the treatment gap will require greater support for oncology care teams to address cancer patients' mental health needs. In site visits with oncology practices participating in OCM, clinicians at several practices noted that patients often faced long waits for mental health appointments, which were made worse by inadequate community mental health resources. Improving timely access to high-quality mental health care for patients undergoing cancer treatment may require broader efforts to improve mental health access throughout the health care system.

Appendix

A. Data and Methods

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

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

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

A.2.1 Secondary Data Sources

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

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

Data Source	Purpose
2014–2022 Part B Claims (Virtual Research Data Center (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, radiation, and surgery use.
2014–2022 PDE Tap Files (VRDC)	• Identify Part D chemotherapy triggers for episode identification. • Calculate episode-level Part D drug utilization and payment measures. • Identify supportive care drug use.
2014–2022 Part A Claims (VRDC)	• Calculate episode-level utilization and payment measures for Part A services. • Construct HCC scores. • Identify use of radiation and surgery.
2014–2022 Integrated Data Repository System	• Determine standardized Part A and B payments.
2014–2022 Common Medicare Environment 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 Monthly Part D enrollment and dual eligibility County-level Medicare Advantage penetration County-level emergency department (ED) visits among fee-for-service (FFS) population

Data Source	Purpose
2014–2022 Enrollment Database Files (VRDC)	• Determine Medicare Secondary Payer information for beneficiary eligibility criteria for episode identification.
2014–2022 Common Medicare Environment Files (VRDC)	• Determine end-stage renal disease coverage for episode identification.
2016–2022 Food and Drug Administration National Drug Code Directory	• Identify PDEs that are for drugs, excluding vaccines.
2016–2022 Medicare Part B Drug Average Sales Price	• Identify Part B claims that are indicative of drugs.
2014–2022 CMS Health Professional Shortage Area (HPSA) Files	• Identify proportion of the population within a county residing in a HPSA.
2014–2022 National Plan and Provider Enumeration System (NPPES; VRDC)	• Supplement provider specialty information in Part B claims data.
2014–2022 Master Data Management 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[a] Office-Based Physician File	• Link practice sites to Tax Identification Numbers (TINs) to construct practice's affiliation with health system and hospital ownership.
2014–2021 Area Health Resource Files	• Construct county-level sociodemographic and market supply characteristics.
Welch and Bindman (2016), [b] list of Association of American Medical Colleges medical schools, [c] and websites of medical school oncology/hematology departments, divisions, and institutes	• We used TINs compiled by Welch and Bindman (2016) to identify practices affiliated with a medical school's academic medical group. We updated this list in 2019, using a similar approach as described in Welch and Bindman (2016).
National Comprehensive Cancer Network (NCCN) and American Society of Clinical Oncology (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 performance period (PP) and associated expenditures. • Identify total amount paid by Medicare for performance-based payment (PBP) and Monthly Enhanced Oncology Services (MEOS).

Notes: [a]IQVIA. Physician Data for Marketing & Research. Available from: https://www.onekeydata.com/databases/physician-data. [b]Welch P, Bindman, AB. Town and gown differences among the largest medical groups in the US. Journal of Academic Medicine. 2016 July;91 (7):1007–14. c Association of American Medical Colleges (AAMC). AAMC Medical School Members. Available from: https://members.aamc.org/eweb/DynamicPage.aspx?site=AAMC&webcode=AAMCOrgSearchResult&orgtype=Medical%20School. d USA FACTS. US COVID-19 cases and deaths by state. Available from: https://usafacts.org/visualizations/coronavirus-covid-19-spread-map/.

The Medicare claims used in this report were retrieved as of October 2021, and three months of claims run-out was applied uniformly. A report on Medicare claims maturity[lxxii] estimates that over 90 percent of Part A and Part 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 per-beneficiary $160 MEOS payment that practices may bill for to cover the provision of enhanced services and care coordination.

A.2.2 Observation Period for this Report

OCM began July 1, 2016, and focuses on six-month episodes of care triggered by chemotherapy 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 11 PPs.

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 OCM's first 11 PPs (PP1–PP11), between July 1, 2016, and December 31, 2021, and ended between December 31, 2016, and June 30, 2022. 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,[38] 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 do not contaminate the baseline period. Specifically, we do not include the baseline episodes that began between January 2, 2016, and June 30, 2016, and ended between July 1, 2016, and December 29, 2016. Episodes that began during this period ended early in the first PP, which would have contaminated the baseline and intervention periods.

A.2.3 Episode Identification

We followed the OCM program methodology to construct six-month episodes and attribute each episode to a single practice with at least one oncologist. We defined episodes based on beneficiary (patient) eligibility and qualifying trigger events. Each episode was attributed to the practice that provided the plurality of E&M visits for cancer. We identified all eligible cancer episodes nationwide that occurred during the baseline period, and, separately, during the intervention period, following the OCM methodology. **Exhibit A-2** shows the number of episodes used in this report, for the OCM and comparison groups, for each period. **Exhibit A-3** shows the types of cancer into which we classified episodes. The original OCM methodology included 21 reconciliation-eligible cancer types. These were expanded to 24, with breast cancer divided into low- versus high-risk episodes, prostate cancer divided into low- versus high-intensity episodes, and bladder cancer divided into low- versus high-risk episodes. We also analyzed all non-reconciliation-eligible cancer types combined, for a total of 25 distinct episode cancer types.

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 within 59 days of the Part D claim, in each PP, assuming this date is not included in a previous episode. Then, among patients with a trigger chemotherapy event, we used Part B carrier claims to determine whether the patient had had at least one cancer-related E&M service during the six months following the chemotherapy trigger event, billed under a TIN that has at least one oncology clinician (National Provider Identifier (NPI)). Finally, we required that the patient 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. An episode could end earlier than six months following the trigger event only if the patient died.

[38] As a consequence of the Medicare Part D benefit structure, Medicare payments are not observed on individual 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.

Exhibit A-2: Number of Episodes by Performance Period

Period (Episodes Initiating)	Number of Episodes	
	OCM	Comparison Group
Baseline-3 (7/2/14–1/1/15)	113,552	134,074
Baseline-2 (1/2/15–7/1/15)	117,335	138,560
Baseline-1 (7/2/15–1/1/16)	114,994	132,971
Hold-out period (1/2/16–6/29/16)		
PP1 (7/1/16–1/1/17)	126,654	145,234
PP2 (1/2/17–7/1/17)	128,238	146,648
PP3 (7/2/17–1/1/18)	124,327	138,790
PP4 (1/2/18–7/1/18)	132,814	145,987
PP5 (7/2/18–1/1/19)	129,418	140,333
PP6 (1/2/19–7/1/19)	137,418	147,758
PP7 (7/2/19–1/1/20)	128,269	133,904
PP8 (1/2/20–7/1/20)	127,853	131,987
PP9 (7/2/20–1/1/21)	121,793	126,603
PP10 (1/2/21–7/1/21)	128,321	135,233
PP11 (7/2/21–12/31/21)	115,382	121,434
Total all periods	1,745,632	1,662,849

Source: Medicare claims 2014–2021.
Notes: PP: Performance period. For PP7–PP8, number of episodes exclude episodes with one or more claims with COVID-19 diagnosis. Refer to Appendix Section A.2.9 for more details.

Exhibit A-3: Episodes Were Classified into One of 25 Cancer Types

Cancer Type
Acute leukemia
Anal cancer
Bladder cancer - low-risk
Bladder cancer - high risk
Breast cancer - low-risk
Breast cancer - high risk
Chronic leukemia
Central nervous system tumor
Endocrine tumor
Female genitourinary cancer other than ovary
Gastro/esophageal cancer
Head and neck cancer
Kidney cancer
Liver cancer
Lung cancer
Lymphoma
Malignant melanoma
Myelodysplastic syndromes
Multiple myeloma
Ovarian cancer
Pancreatic cancer
Prostate cancer - low-intensity
Prostate cancer - high-intensity
Small intestine / Colorectal cancer
All non-reconciliation eligible cancers

A.2.4 Attribution of Episodes to Practices

After identifying eligible episodes following the OCM attribution methodology, we assigned episodes to the practice that provided the plurality of cancer-related E&M services during the episode. A practice is defined as a TIN with at least one oncology clinician. TINs are billing units for tax purposes and may or may not align with the structure of physician group organizations; 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 were not available for groups not participating in OCM (i.e., comparison TINs used for this evaluation), we were unable to track organizational changes similarly among the comparison group, and instead attributed episodes to individual comparison TINs. We therefore defined a comparison practice as a TIN with at least one oncology clinician.

A.2.5 Sample of OCM and Comparison Practices

OCM practices volunteered to participate in the Model and may differ from non-OCM practices. We included 202 practices participating in OCM.[39,40] 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. We used propensity score matching (PSM) to select comparison practices.[lxxiv,lxxv] 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 used PSM to identify comparison practices based on patterns of billing for OCM services and similarity to OCM practices in terms of key practice, patient, and market characteristics. The PSM process resulted in a comparison group of 534 practices. Detailed information about the comparison group selection and PSM methodology is provided in the Performance Period One Report.

The PP1–PP11 intervention period had 522 comparison practices with at least one attributed episode across the intervention period; for PP11, there were 403 practices with at least one episode. We anticipated that some attrition would occur and deliberately constructed the comparison group to be large enough to accommodate a modest reduction in TINs and episodes over time. Attrition had a variety of reasons including practice closures, mergers with or acquisitions by other practices or hospitals, or that the TIN no longer had attributed episodes.

A.2.6 Claims-Based Utilization, Payment, and End-of-Life Outcome Measures

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

Exhibit A-4: Definition of Utilization Outcome Measures

Outcome Measure	Definition
Inpatient utilization	
Acute-care hospital (ACH) hospitalizations	**Occurrence** and **number** of Part A hospitalizations at ACHs, per episode (claim type 60, 61). ACHs are paid under the inpatient prospective payment system. The measure includes hospitalizations that originated during the episode (i.e., claim from date the hospitalization occurred within the episode start and end dates). Multiple claims that were part of 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.

[39] Practices that joined OCM late in the Model were reflected in the baseline when they were forced to pool with an existing OCM practice. When practices joined the Model through mergers with existing OCM practices, no change was reflected in the baseline.

[40] During PP4–5, two OCM practices were brought into mandatory pools with existing OCM practices and two OCM practices underwent ownership changes and rejoined as new OCM practices. The addition of the late entrants into the baseline data did not have an effect on overall balance between the OCM and comparison groups.

Outcome Measure	Definition
ACH intensive care unit (ICU) admissions	**Occurrence and number** of ACH hospitalizations with an ICU stay, per episode. Claims for ICU were identified using revenue center codes 0200–0209.
30-day unplanned readmissions	**Occurrence** and **number** of 30-day ACH unplanned readmissions per episode. Only readmissions associated with an index ACH hospitalization (a stay during which the patient survives the hospitalization) that originated during the episode were included. A 30-day unplanned 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.
30-day readmissions	**Occurrence** and **number of 30-day ACH readmissions per episode.** Only readmissions associated with an index ACH hospitalization (a stay during which the patient survives the hospitalization) that originated during the episode were included. The count for this measure includes 30-day readmissions that occurred after the end of the episode but were tied to an index hospitalization that occurred during the episode.
ED utilization	
Outpatient ED visits	**Occurrence** and **number** of ED visits not resulting in a hospitalization at the same facility, per episode. This measure includes ED visits that did not ultimately lead to admission to the same facility (based on the same revenue center codes above). Observation states that originated in the ED were also counted in this measure. However, this measure does not reflect observation stays that did not originate in the ED.
Inpatient ED visits	**Number** of ED visits resulting in a hospitalization at the same facility, per episode. This measure includes ED visits that did ultimately lead to an admission to the same facility (based on the same revenue center codes as above).
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 agency services	**Occurrence** of home health agency service per episode (claim type 10).
60-day home health agency spells	**Number** of 60-day home health agency spells per episode.
Hospice services	**Occurrence** of hospice service per episode (claim type 50).
Hospice care days	**Number** of days spent in hospice care 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 scans, magnetic resonance imaging, and nuclear medicine (e.g., positron emission tomography).
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 (i.e., physical therapy, occupational therapy, and speech-language pathology) services per episode. Outpatient rehabilitation therapy services were identified according to procedure codes found in CMS's annual therapy update.[lxxvii]
Chemotherapy and drug utilization	
Part B chemotherapy services	**Occurrence** and **number** of Part B chemotherapy services per episode. Part B chemotherapy drugs were identified using the Healthcare Common Procedure Coding System (HCPCS) codes found within the chemotherapy trigger list, per OCM model specifications.
Part B novel therapy drug use	**Occurrence** and **incidence** (i.e., number of times administered) of Part B novel therapy drug use per episode. Episodes were classified as having novel therapy use if a chemotherapy drug used during the episode was a novel therapy at the time, for a specific cancer type.
Part B drug services	**Number** of Part B drug services per episode.
Part D chemotherapy services	**Occurrence** and **number** of Part D chemotherapy services per episode. Part D chemotherapy drugs were identified using the HCPCS codes found within the chemotherapy trigger list, per OCM model specifications.
Part D novel therapy services	**Occurrence** and **number** of Part D novel therapy services per episode. Episodes were classified as having novel therapy use if a chemotherapy drug used during the episode was a novel therapy at the time, for a specific cancer type.
Part D fills per episode	**Number** of overall Part D files per episode.
Occurrence of chemotherapy-associated hospitalizations	**Occurrence** of Part A hospitalizations within 30 days after Part B chemotherapy infusions or 30 days after filling a Part D drug prescription, per episode**.**
Occurrence of any chemotherapy-associated ED visits	**Occurrence** of any ED visits within 30 days after Part B chemotherapy infusions or 30 days after filling a Part D drug prescription, per episode.
Occurrence of chemotherapy-associated ED visits resulting in a hospital admission	**Occurrence** of any ED visits within 30 days after Part B chemotherapy infusions or 30 days after filling a Part D drug prescription, resulting in a hospitalization, per episode.
Occurrence of chemotherapy-associated ED visits without a hospital admission	**The occurrence** of any ED visits within 30 days after Part B chemotherapy infusions or 30 days after filling a Part D drug prescription, leading to a hospitalization, per episode.

Exhibit A-5: Definition of Medicare Payment Outcome Measures

Outcome Measure	Definition
Overall payments	
Total episode payments (TEP)—Part A, B, and D Payments	Total Part A, B, and D Medicare 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 and 80 percent gross drug cost above the out-of-pocket threshold. All payments reflect the Medicare payment, not allowed payments.
Part A payments	Total Part A Medicare payments per episode.
Part B payments (without MEOS)	Total Part B Medicare payments, excluding MEOS payments, per episode.
Part D payments	Total Part D Medicare payments per episode. This measure was restricted to episodes for patients enrolled in Part D for all months of the episode, while alive.
Part D gross drug costs	Total Part D gross drug costs per episode. A prescription's Gross Drug Costs reflected 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 was restricted to episodes for patients 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 unplanned readmission payments	Payments for 30-day unplanned readmissions per episode.
30-day readmission payments	Payments for 30-day readmissions per episode.
Payments for inpatient stays originating in the ED	Payments for inpatient stays originating in the ED per episode.
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 agency payments	Payments for post-acute home health agency services per episode.
Hospice payments	Payments for hospice services per episode (claim type 50).
Inpatient rehabilitation facility (IRF) payments	Payments for post-acute services at an inpatient rehabilitation facility per episode (claim types 60, 61).
Long-term care hospital (LTCH) payments	Payments for post-acute services at an LTCH per episode (claim types 60, 61).
Other inpatient hospital payments	Other inpatient hospital payments per episode includes inpatient psychiatric facilities and prospective payment system-exempt cancer hospitals.
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.
ED visit payments not resulting in inpatient stay	Part B payments not resulting in an inpatient stay per episode.

Other institutional payments	Other institutional payments per episode.
Other non-institutional payments for episodes	Other non-institutional payments per episode.
Chemotherapy, cancer-related, and drug 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.
Part B drug payments	Payments for Part B drugs per episode.
Part B non-chemotherapy drug payments	Payments for Part B non-chemotherapy drugs per episode.
Part B supportive care drug payments	Payments for Part B supportive care drugs per episode. These drugs are used in support of cancer treatment, and include antiemetic (i.e., anti-nausea) medications; white blood cell, red blood cell, and platelet growth factors; and bone-modifying agents.
Part B chemotherapy administration payments	Payments for chemotherapy administration 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.
Part D chemotherapy payments	Part D chemotherapy payments per episode.
Part D novel therapy payments	Payments for Part D novel therapy drugs per episode.
Part D non-chemotherapy drug payments	Payments for Part D non-chemotherapy drugs per episode.
Part D novel therapy 30-day equivalents	Number of Part D 30-day equivalents for novel therapy chemotherapy drugs per episode.
Part D drug payments	Payments for Part D drug payments are both generic and name brand.
Part D 30-day equivalents	Number of Part D generic or brand name 30-day equivalents for chemotherapy drugs per episode.
Beneficiary cost sharing	
Part A beneficiary cost-sharing	Standardized Part A beneficiary costs (deductible plus coinsurance) per episode. (Note that this is often paid by supplemental insurance.)
Part B beneficiary cost-sharing	Standardized Part B beneficiary costs (deductible plus coinsurance) per episode. (Note that this is often paid by supplemental insurance.)
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 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	
Part B chemotherapy during the last 14 days of life	**Occurrence** of any Part B chemotherapy dates of service within 14 days of the patient's date of death.
Any hospitalization in the last 30 days of life	**Occurrence** of any hospitalization within 30 days of the patient's date of death.
ED use (2+ visits) in the last 30 days of life	**Occurrence** of two or more ED visits within 30 days of the patient's date of death.
Hospice care utilization and timing	
Never admitted to hospice care	**Occurrence** of a patient dying with no previously recorded hospice care use (specifically, no hospice care claims ending within the six months prior to the date of death).
Being in hospice care 1–2 days before death	**Occurrence** of a patient discharged to death from hospice care (discharge codes 40, 41, or 42) and previously using hospice care continuously 1–2 days before death.
Hospice care 3–180 days before death	**Occurrence** of a patient discharged to death from hospice care (discharge codes 40, 41, or 42) and previously using hospice care continuously 3–180 days before death.

A.2.7 Sample Characteristics Analyzed

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

Exhibit A-7: Definition of Patient-Level Characteristics

Characteristic	Definition
HCC risk score	Used to quantify patient severity of illness for their cancer and non-cancer comorbidities and predict plan payments in Medicare Advantage risk adjustment. HCC scores are based on patient demographics and diagnostic history, including cancer and non-cancer codes. Each episode was assigned an HCC score based on the patient'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 through June 30, 2015 claims.
Age group	Patients were divided into the following groupings: 0–64, 65–69, 70–74, 75–79, 80–84, and 85+.
Dual eligibility status	Patients were flagged as dual eligible if they were either Medicaid full-dual or partial-dual eligible.
Race/ethnicity	Patients 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 Research Triangle Institute (RTI) race code methodology.[41]

[41] Additional detail on the RTI race code methodology can be found here: https://www.resdac.org/cms-data/variables/research-triangle-institute-rti-race-code.

Exhibit A-8: Definition of Episode-Level Characteristics

Characteristic	Definition
Cancer type	The 24 cancer types 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 were expanded to 24, with breast cancer divided into low- versus high-risk episodes, prostate cancer divided into low- versus high-intensity episodes,[42] and bladder cancer divided into low- versus high-risk episodes.[43] We also analyzed 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 one of the following drugs was taken during the episode: atezolizumab, avelumab, cemiplimab-rwlc, dostarlimab-gxly, durvalumab, ipilmumab, nivolumab, nivolumab and relatlimab-rmbwor pembrolizumab.

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 submitted at least one E&M claim for at least one episode attributed to the TIN.
Clinical specialty mix	A practice's NPIs were classified into the following clinical 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 clinician specialty by first using the specialty reported in the Part B claims data; if that was not reported or was less specific, we augmented it 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.

[42] Low- and high-intensity designations for prostate cancer follow the methodology used in the OCM PBP prediction model. Low-intensity prostate cancer episodes are 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.

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

A.2.8 Approach for Claims-Based Analyses

In this section, we describe the claims-based impact analyses conducted for this Annual Report. Analyses were conducted in CMS's VRDC environment using SAS Enterprise Guide v7.1 and Stata/MP 16.1 statistical software.

Impact Analyses

Given the quasi-experimental design of OCM, we used difference-in-differences (DID) regression analyses to estimate Model impact on important payment outcomes. The DID design 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. Accordingly, the DID models estimate the average effect of OCM over the entire duration of the intervention period, and for each of the first nine PPs individually. We performed all DID analyses at the episode level. We estimated regression models for payment outcome measures using ordinary least squares (OLS) regression. For utilization outcomes, we estimated logit models for the occurrence of the event and OLS models for the count, or intensity, of the event, conditional upon occurrence. We specified the models to derive estimates of the impact of OCM for each PP quarter (two quarters per PP). Using a weighted average methodology, we combined PP quarter estimates into a single cumulative impact estimate and individual PP estimates. Because multiple episodes were attributed to each OCM and comparison practice, patterns that affect all episodes attributed to a practice will result in errors that are correlated. Accordingly, we clustered standard errors at the practice level.

DID Impact Specification: Payment Outcomes

The growth rate of many payment outcome measures varied considerably by episode cancer type, over time. For example, in PP4 and PP5, there was a sharp increase in TEP for lung cancer episodes that was not present in PP1 to PP3; in contrast, for colorectal cancer episodes, the change in TEP (relative to baseline) was the same in all PPs. These differences by episode cancer type were likely due to the availability of new, more-expensive treatments used for specific cancer types in more-recent PPs. To account for these varied trajectories by episode cancer type, we incorporated cancer type interaction terms in the DID specification used to assess payment measures. Including these interaction terms in the specification improved model fit.

The form of the DID specification we use for assessing payment outcomes is as follows:

$$Y = \beta + \varphi OCM + \sum_{q=1}^{N} \gamma_q PPQ_q + \sum_{c=1}^{G} \partial_c Can_c + \sum_{q=1}^{N} \alpha_q OCM \cdot PPQ_q + \sum_{c=1}^{G} \theta_c OCM \cdot Can_c + \sum_{q=1}^{N}\left(\sum_{c=1}^{G} \delta_{qc} Can_c \cdot PPQ_q\right) + \sum_{q=1}^{N}\left(\sum_{c=1}^{G} \rho_{qc} OCM \cdot Can_c \cdot PPQ_q\right) + \pi' X + \varepsilon, \textbf{(1)}$$

where ***Y*** is an outcome for each episode originating in quarter q; OCM is an indicator variable equal to one for OCM practices and zero for comparison practices; similarly, ***PPQ*** is an indicator distinguishing each quarter of intervention data from the baseline data; ***Can*** is an indicator distinguishing the 24 cancer types and the group of non-reconciliation-eligible cancer types; and ***X*** is a vector of pre-determined covariates for each episode. The indicators for OCM, PP quarter, and cancer type are interacted to account for cancer-specific trajectories in payments and use between the baseline and intervention periods, as described above.

The coefficient α_q in model (1) captures the marginal impact of the OCM intervention on outcome Y, in quarter q. The coefficient ρ_{qc} captures the impact of cancer type c for the OCM intervention on outcome Y, in quarter q. We use the estimated coefficients to generate predicted values of the outcome measures. For both the baseline and intervention period, we compared two predictions to calculate the marginal effect. The overall marginal effect is equal to the average marginal effect for each observation, which is calculated as the difference between the predicted outcome for the OCM group and a predicted counterfactual outcome for the comparison group, where the impact of OCM is assumed to be zero.[lxxviii] Using this model, we constructed estimates of the overall impact of OCM and the impact of OCM in each PP by taking linear combinations of the estimates of the appropriate PP quarters. The ρ_{qc} coefficients are aggregated across all cancer types to estimate the impact of OCM in each PP quarter, relative to changes over the same time period in episodes of comparison practices. We weighed the PP quarter estimates by the number of episodes in each PP quarter to obtain the average cumulative and PP-level impacts and used the delta method to assign significance to combined estimates. In all impact analyses, we excluded episodes with a COVID-19 diagnosis during the episode from the estimation sample.

For subgroup analyses, model specification varied on the subgroup. For estimates specific to the higher- and lower-risk cancer types, we used the same model as used for overall estimates, model (1) described above. For estimates specific to each cancer type, we used the following form of the DID specification:

$$Y = \beta + \varphi OCM + \sum_{q=1}^{N} \gamma_q PPQ_q + \sum_{c=1}^{G} \partial_c Can_c + \sum_{q=1}^{N} \alpha_q (PPQ_q \cdot OCM) + \pi' X + \varepsilon, \textbf{(2)}$$

where ***PPQq*** indicates episodes that originate in quarter q of the intervention period. This model is similar to the model specified in model (1), but without the cancer-type interactions. The coefficients α_q in model (2) capture the incremental, or marginal, impact of the OCM intervention on outcome ***Y*** in PP quarter q, relative to changes from baseline to the same quarters among comparison episodes. (See the subsection below on "Subgroup Analyses" for additional detail on the subgroup analyses.)

In addition to the DID estimates, we estimated regression-adjusted means of the outcome measures for OCM and comparison episodes during the baseline and intervention periods and examined trends across the two periods. We also estimated the DID estimate as a percentage of the OCM baseline mean to provide context (scale) and quantify the relative percentage change associated with OCM. For some key payment measures, we calculated trends reflecting the risk-adjusted mean in the outcome measure for each PP from the start of baseline until PP11, separately for OCM and comparison episodes.

DID Impact Estimation: Binary and Count Outcomes

For utilization outcomes, we take a two-stage approach. For binary outcomes (e.g., the occurrence of a given outcome at least once), we estimated the logit analogs of equations (1) and (2) using maximum likelihood estimation. In these cases, the coefficient α_q captures changes in the log-odds that Y occurs for OCM episodes, relative to changes from baseline to the same quarters among comparison episodes. We estimated cumulative and PP-level impacts from the quarterly estimates using the same approach described for model (1).[44]

To estimate the effect of OCM on the intensity with which an event occurs (e.g., number of times the event occurred), we used the linear specification as described in models (1) and (2), using OLS regression. For these analyses, we estimated the models conditional on the event occurring (e.g., the sample is restricted to observations with a count greater than zero). Additionally, we excluded episodes with extreme values (observations in the top 0.1 percent of the distribution) from respective OCM intensity estimation.[45] For interpretation of impact on count variables, we estimated total change in the number of events during the whole OCM model intervention based on the relevant DID estimates. This was accomplished by multiplying the per-episode DID impact by the total number of OCM episodes with a non-zero event count occurring at any time during the intervention period (PP1–PP11).

Covariate Selection

The DID models control for time-varying changes/influences that affect both the comparison and OCM groups, as long as the model assumptions are met. The primary DID assumption of parallel trends is that outcomes in the treatment and comparison group evolved the same way prior to the intervention, and that they would continue to follow these parallel trends in the absence of the intervention. **Exhibit A-10** shows the patient-, practice-, and market-level factors we control for in DID analyses. The covariates in the DID models were informed by the broader research literature on oncology outcomes, a review of National Quality Forum measures, discussions with clinical experts, and extensive statistical testing of alternative specifications using baseline period data. We included 31 covariates in all DID impact analyses. Models 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. For a small group of outcomes, we excluded covariates that were redundant due to sample selection. For example, for all Part D-related outcome measures that apply to beneficiaries enrolled in Part D, the covariate indicating Part D enrollment is excluded.

Due to the overlap of OCM and the COVID-19 public health emergency (PHE), we include four covariates in our analyses to control for market-level COVID-19 effects on care delivery (see **Appendix A.2.9** for additional detail on controlling for the COVID-19 PHE).

[44] End-of-life DID outcome estimates employ the simple DID approach used in previous annual reports (specified below) for assessing the impacts of OCM. We employed specification testing to determine whether using models (1) or (2) affected our calculations. Our numeric findings were largely unchanged, and therefore the results displayed used the simpler, previous methodology.

[45] Outlier or extreme values are unusual data points that can distort underlying model assumptions, estimation, and conclusions.

Exhibit A-10: Covariates Included in DID Models

Domain	Model Covariate	Definition
Patient-Level		
Patient characteristics	Sex	Patients were categorized as male, or female based on documented sex.
	Race and ethnicity	Patients were categorized as non-Hispanic White, Black, Hispanic, or Other based on RTI race code methodology.
	Age	Patients were categorized as under 65, 65–69, 70–74, 75–79, 80–84, and 85+ years of age.
	Medicaid dual eligibility	Patients were categorized as having full/partial Medicaid benefits or having no benefits.
	Part D enrollee	Patients were coded as a Part D enrollee if enrolled in Part D for all months of the episode, while alive.
CMS program alignment	Patient alignment to other CMS programs	Patients 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+.
Patient clinical characteristics	Cancer type	Depending on the model, this covariate was based on all 24 cancer types (along with the group of non-reconciliation eligible cancers) or a subset of cancers that are relevant to the outcome/subgroup.
	Previous episode	If Patients 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 patient used during the episode: Part B chemotherapy only, Part D chemotherapy only, or Part B and D chemotherapy.
	CMS HCC risk score	A Patient'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.
	Percentage 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.

Domain	Model Covariate	Definition
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 others 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	Percentage of population 65+	The percentage 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.
	Percentage in poverty	The percentage 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 Medicare Alternative Models	Medicare Advantage penetration	The percentage 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	Percentage of population designated as a Primary Care HPSA	The practice's percentage 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 health services utilization	Total inpatient ED visits among FFS population	The practice's county-level inpatient 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).
Market-level COVID-19 exposure	COVID-19 average cumulative death rate	All time cumulative confirmed COVID-19 death rate per 10,000 individuals in a county, averaged over the 6-month episode.
	Average new death rate	Seven-day moving average of confirmed COVID-19 death rate per 10,000 individuals in a county, averaged over the 6-month episode
	Average cumulative infection rate	All time cumulative confirmed COVID-19 infection rate per 10,000 individuals in a county, averaged over the 6-month episode
	Average new infection rate	Seven-day moving average of new confirmed COVID-19 infection rate per 10,000 individuals in a county, average over the 6-month episode
State fixed effects	Indicator variables	A set of indicator variables equal to one if practices are located in each state, and zero otherwise.

Subgroup Analyses

We conducted subgroup analyses for a select group of outcome measures to examine differential impacts of OCM by episode cancer type. The subgroup analyses serve several purposes: (1) to inform the generalizability and to assess the participation and reach of OCM, (2) to identify underlying drivers of success in OCM, and (3) to measure whether OCM leads to unintended consequences for particular groups of patients. We identified two subgroup categories: cancer treatment intensity (i.e., higher-risk and lower-risk episodes) and individual episode cancer type. 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 including: TEP, Part A payments, Part B payments, Part D payments, Part B chemotherapy payments, Part B novel therapy use and payments, Part B non-chemotherapy drug payments, Part B supportive care drug payments, Part B imaging payments, ACH hospitalizations, outpatient ED visits (resulting versus not resulting in inpatient admission), 30-day unplanned readmissions, and number of 60-day home health spells.

Exhibit A-11: Subgroups Evaluated in the Report Covering PP1–PP11

Subgroup Category	Episode Subgroups
Treatment intensity	Lower-Risk Episodes[46] Higher-Risk Episodes[47]
Cancer type	Low-risk breast cancer Low-intensity prostate cancer High-risk breast cancer Lung cancer Lymphoma Colorectal/small intestine cancer Multiple myeloma Non-reconciliation-eligible cancers High-intensity prostate cancer Chronic leukemia

Parallel Trends Assumption

The DID model 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 baseline (pre-OCM) parallel trends assumption results in biased DID estimates.

For each outcome measure, we tested the null hypothesis that episodes attributed to 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. For outcome measures assessed for a subpopulation of the data (e.g., cancer type), we limited the episode sample to the subgroup of interest and ran an analogous parallel trends test.

If we rejected the null hypothesis that baseline trends are parallel, we reviewed the data to determine whether OCM and comparison baseline trends appeared visually parallel, and whether the removal of a small number of extreme values would result in the outcome measure passing the parallel trends test (i.e., we cannot reject the null hypothesis).

Using this combination of criteria, we identified outcome measures (and relevant subgroups, where applicable) that cannot be reliably reported because of a potential bias in the DID estimate. None of the outcome measures included in this report failed DID parallel trends tests.

Sensitivity Tests

We performed several sensitivity tests to understand whether the reported impact estimates were robust with respect to the model specification and the episode sample used. We performed sensitivity testing on the following payment outcome measures: TEP, Part A payments, Part B payments without MEOS, Part D payments, Part B chemotherapy payment, Part D chemotherapy payment, Parts B and D chemotherapy payment, Part A ACH hospitalization payment, and key utilization outcomes. We selected these measures because they are important for understanding the impact of OCM, and because they rely on different types of data and have different functional forms. We conducted sensitivity tests for the full sample of episodes and for the subsamples of higher-risk and lower-risk episodes, separately.

[46] Lower-risk cancer episodes include low-risk breast cancer, low-intensity prostate cancer, and low-risk bladder cancer.
[47] Higher-risk cancer episodes include the 21 cancer types and non-reconciliation eligible cancers not included in the lower-risk cancer type subgroup.

We conducted the following sensitivity tests:

Varying model specifications for payment outcomes (excluding all covariates and cancer-type interactions, excluding market-level and practice-level covariates only, including cancer-type interactions only)

Exclusion of episodes with extreme large payment values (top 5 and 10 percent of TEP)

Exclusion of episodes for the two largest OCM practices and practices that were part of the US Oncology Network

Exclusion of episodes for patients without Part D enrollment in all months

Exclusion of episodes for which patient had a chemotherapy episode in previous PP (i.e., new versus ongoing chemotherapy or hormonal therapy treatment)

Estimation of zero-inflated negative binomial model for count outcomes instead of OLS regression

Exclusion of episodes with the use of CAR-T therapy for utilization outcomes

Estimation of Net Impact to Medicare

A reduction in per-episode payments (TEP) implies that OCM is reducing episode-level spending, but this does not necessarily translate into net savings for Medicare, because TEP does not include the MEOS payment or performance-based payments (PBP) that Medicare pays to participating practices. To assess the net impact of OCM, we must include the MEOS payments and PBP made to participating practices to determine whether OCM is achieving sufficient savings to cover its costs. Reconciliation data (MEOS and PBP data source) was available through PP8. Hence, for this report, the net impact to Medicare was estimated for PP1–PP8. To calculate the net impact, we add total MEOS and PBP amounts paid by Medicare to the gross reduction in episode payments measured by TEP, as follows:

$$Net\ Impact = (Gross\ Impact\ on\ TEP) + (MEOS + PBP) \quad \textbf{(3)}$$

Using our DID estimates for TEP in each PP, we multiplied TEP by the number of OCM episodes in that PP to estimate the gross impact on TEP. We then summed MEOS payments and PBP with the gross impact on TEP, to estimate the net impact for Medicare. For PP3–PP8, we also calculated the impact on Medicare spending separately among lower-risk and higher-risk episodes. Since PBP is paid to practices and not defined for each episode, we only included MEOS payments and did not include PBP in the savings/losses estimates for higher-risk and lower-risk episodes. **Exhibit A-12** defines the measures 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 PP	A per episode estimate of the impact on TEP attributable to the OCM model. This is estimated for each PP.
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.
Gross impact on TEP, by PP	The product of the 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	Gross impact on TEP + total MEOS + PBP, calculated for each PP separately.

Notes: DID: Difference-in-differences. TEP: Total episode payments. PP: Performance period. MEOS: Monthly enhanced oncology services. PBP: Performance-based payments.

A.2.9 Risk Adjustment for Time and Geography Variant Severity of COVID-19 Pandemic

In this section, we describe our analytic approach to addressing direct and indirect impacts of the COVID-19 pandemic and associated PHE on OCM impact analyses.

The COVID-19 PHE, which officially began on January 27, 2020, had direct and indirect effects on health and health care delivery[lxxx] PP7 through PP11 overlapped with the COVID-19 PHE. Some episodes initiated in PP7 (July 2, 2019, through January 1, 2020) and most episodes initiated in PP8 (January 2, 2020 through July 1, 2020) ended after the start of the PHE in early 2020. All episodes for PP9–11 occurred entirely (episode start and subsequent oncology care) during the PHE.

The prevalence of COVID-19 varied across time and geographic regions. The comparison group used from the start of this evaluation includes non-participating oncology practices that closely resemble the OCM participants on numerous dimensions, including market attributes. However, the selected comparison practices were not matched to OCM participants exactly in the same community. It is possible that the COVID-19 pandemic affected OCM and comparison practices that were in different communities at different times and in different ways. Therefore, we developed strategies to disentangle the time-varying impact of OCM from the time- and community-varying effects of the PHE. Our selection of covariates to account for time-varying severity of the PHE is detailed in **Appendix A.2.9** of ***Evaluation of the Oncology Care Model: Performance Periods 1-9***.

COVID-19 Covariate Data Source

County-level daily counts of COVID-19 cases, deaths related to COVID-19, and population were obtained from USA FACTS.[lxxxi]

COVID-19 Covariate Construction

We calculated the rates for each measure as the county-level average over the six-month episode time frame, in the county associated with patient residence address. For example, to calculate "Average New Infection Rate" for an episode spanning from November 3, 2020 to May 2, 2021 for a patient residing in county A, we: (1) calculated daily new infection rates for each day in the episode time span as new infection counts divided by the population count in county A multiplied by 10,000; and (2) calculated the average of the daily rates over the episode time frame. We obtained daily infection rates and county populations from USA FACTS.

Exhibit A-13: Covariates for Measuring Time-Variant Severity of PHE

COVID-19 Measure	Definition
Average new infection rate	New confirmed COVID-19 infection rate per 10,000 individuals in a county, averaged over the six-month episode
Average cumulative infection rate	All time cumulative confirmed COVID-19 infection rate per 10,000 individuals in a county, averaged over the six-month episode
Average new death rate	New confirmed COVID-19 death rate per 10,000 individuals in a county, averaged over the six-month episode
Average cumulative death rate	All-time cumulative confirmed COVID-19 death rate per 10,000 individuals in a county, averaged over the six-month episode

B. Payment and Utilization Outcome Analyses

B.1 Impact on Payment Outcomes

B.1.1 Impact on Total Episode Payments and Payment Components

Exhibit B-1: OCM Reduced TEP, Driven by Relative Decreases in Part A and Part B Payments

Measure	OCM			COMP			Impact Estimates through PP11			
	Number of Episodes	Baseline Mean	Int. Mean	Number of Episodes	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change
TEP without MEOS	1,746,368	$29,206	$36,190	1,919,516	$28,788	$36,388	-$616	-$912	-$321	-2.1%
Part A payments	1,746,368	$6,229	$5,712	1,919,516	$6,078	$5,736	-$176	-$288	-$63	-2.8%
Part B payments	1,746,368	$17,286	$21,673	1,919,516	$17,029	$21,756	-$340	-$529	-$149	-2.0%
Part D payments [a]	1,447,764	$6,699	$10,547	1,602,679	$6,736	$10,636	-$53	-$216	$111	-0.8%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Source: Medicare claims 2014–2022.

Notes: [a]Part D payments were calculated as the sum of low-income cost-sharing and reinsurance amounts, as reflected on the Part D Event file. TEP: Total episode payments. MEOS: Monthly Enhanced Oncology Services payment. OCM: OCM intervention group; COMP: Comparison group. Int.: Intervention period. PP: Performance period. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit.

Exhibit B-2: Impact on TEP and Payment Components by Performance Periods

Measure	Total Number of Episodes	Period-by-Period Impact Estimates										
		PP1 DID	PP2 DID	PP3 DID	PP4 DID	PP5 DID	PP6 DID	PP7 DID	PP8 DID	PP9 DID	PP10 DID	P11 DID
TEP without MEOS	3,665,884	-$37	-$296	-$316	-$340	-$356	-$268	-$653	-$1,145	-$868	-$1,317	-$1,282
Part A payments	3,665,884	-$58	-$134	-$159	-$121	-$70	-$45	-$313	-$356	-$43	-$352	-$299
Part B payments	3,665,884	-$50	-$175	-$151	-$257	-$199	-$193	-$254	-$559	-$544	-$743	-$662
Part D payments [a]	3,050,443	$103	$64	$30	$122	-$65	$36	-$41	-$197	-$257	-$143	-$269

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Source: Medicare claims 2014–2022.

Notes: [a]Part D payments were calculated as the sum of low-income cost-sharing and reinsurance amounts, as reflected on the PDE. TEP: Total episode payments. MEOS: Monthly Enhanced Oncology Services payment. PP: Performance period. DID: Difference-in-differences.

Exhibit B-3: Impact on Part A Payments by Performance Periods

Measure	Period-by-Period Impact Estimates N=3,665,884										
	PP1 DID	PP2 DID	PP3 DID	PP4 DID	PP5 DID	PP6 DID	PP7 DID	PP8 DID	PP9 DID	PP10 DID	PP11 DID
All Part A payments	-$58	-$134	-$159	-$121	-$70	-$45	-$313	-$356	-$43	-$352	-$299
ACH payments	$49	$0	-$17	$44	$89	$83	-$60	-$90	$165	-$28	$14
SNF payments	$6	-$13	-$26	-$18	-$25	$12	-$38	-$43	-$30	-$39	-$36
HHA payments	-$13	-$1	-$18	-$22	-$2	-$14	-$47	-$58	-$59	-$71	-$80
Hospice payments	$6	-$2	$9	-$19	-$7	-$15	-$28	-$27	-$9	-$40	-$9
IRF payments	-$2	$5	$3	-$6	$4	$22	$32	-$6	$6	$13	-$1
LTCH payments	$9	$9	$6	$6	-$11	-$9	-$6	-$5	$1	-$4	-$18
OIP payments	-$114	-$130	-$116	-$107	-$117	-$123	-$166	-$127	-$117	-$182	-$168

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: ACH: Acute care hospital. SNF: Skilled nursing facility. HHA: Home health agency. IRF: Inpatient rehabilitation facility. LTCH: Long-term care hospital. OIP: Other inpatient facility. PP: Performance period. DID: Difference-in-differences.

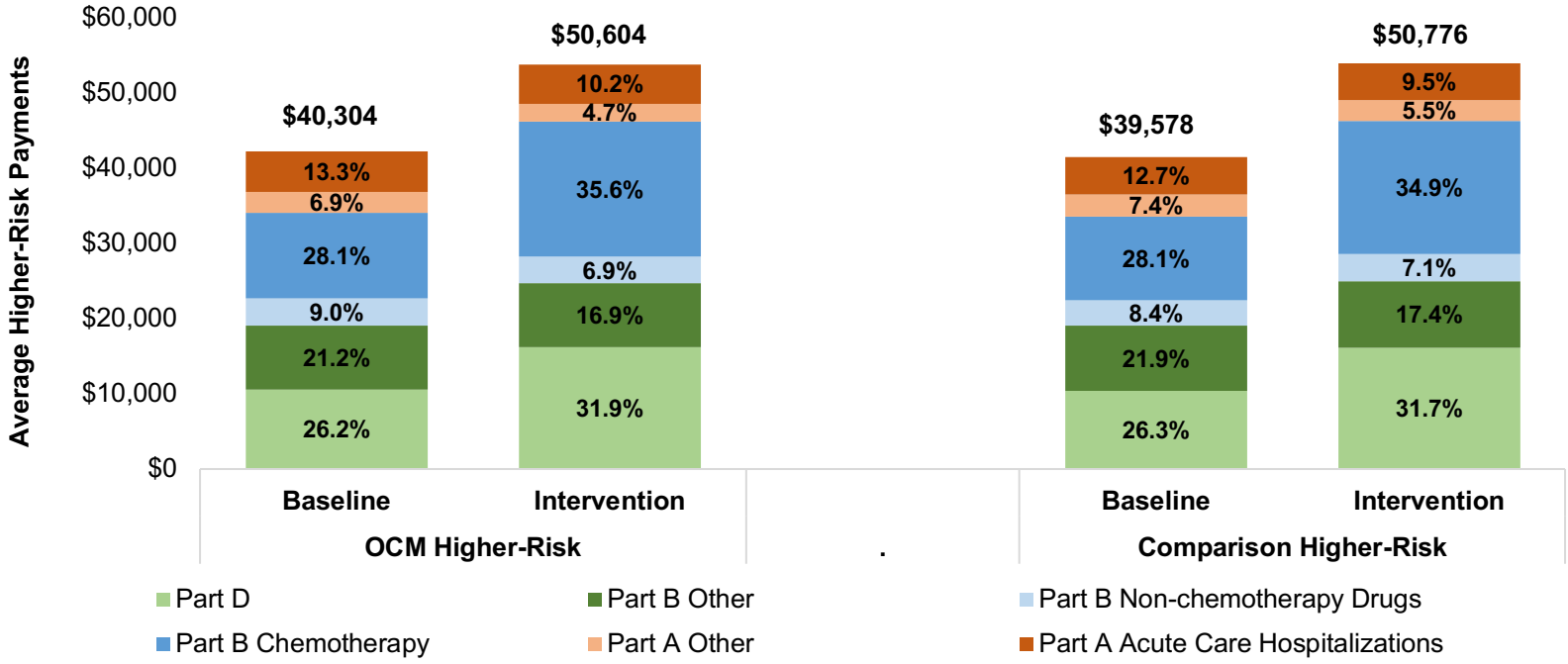
Exhibit B-4: Impact on Part B Payments by Performance Period

Measure	Period-by-Period Impact Estimates N=3,665,884										
	PP1 DID	PP2 DID	PP3 DID	PP4 DID	PP5 DID	PP6 DID	PP7 DID	PP8 DID	PP9 DID	PP10 DID	PP11 DID
All Part B payments	-$50	-$175	-$151	-$257	-$199	-$193	-$254	-$559	-$544	-$743	-$662
Chemo payments	$53	-$60	$56	-$65	$6	$94	$206	$72	$44	-$44	$27
Other payments without MEOS	-$34	-$53	-$37	-$32	-$17	-$64	-$38	-$79	-$66	-$133	-$77
Non-chemo drug payments	-$83	-$118	-$160	-$159	-$208	-$237	-$376	-$442	-$456	-$469	-$496
Cancer E&M payments	$0	$5	$2	$8	$4	$2	-$2	-$8	-$15	-$16	-$19
Non-cancer E&M payments	-$8	-$1	-$9	-$13	-$4	-$1	-$17	-$42	-$18	-$29	-$33
Imaging payments	-$8	-$9	-$18	-$25	-$20	-$21	-$25	-$41	-$39	-$38	-$40
Radiation therapy payments	$0	$23	$14	$23	$18	$8	-$17	-$14	-$11	-$18	-$28
Chemo administration payments	$6	$12	$9	$7	$9	$7	-$3	-$12	-$7	-$10	-$19
Labs payments	$5	$7	$0	-$5	$3	$3	$13	$5	-$1	$2	-$1

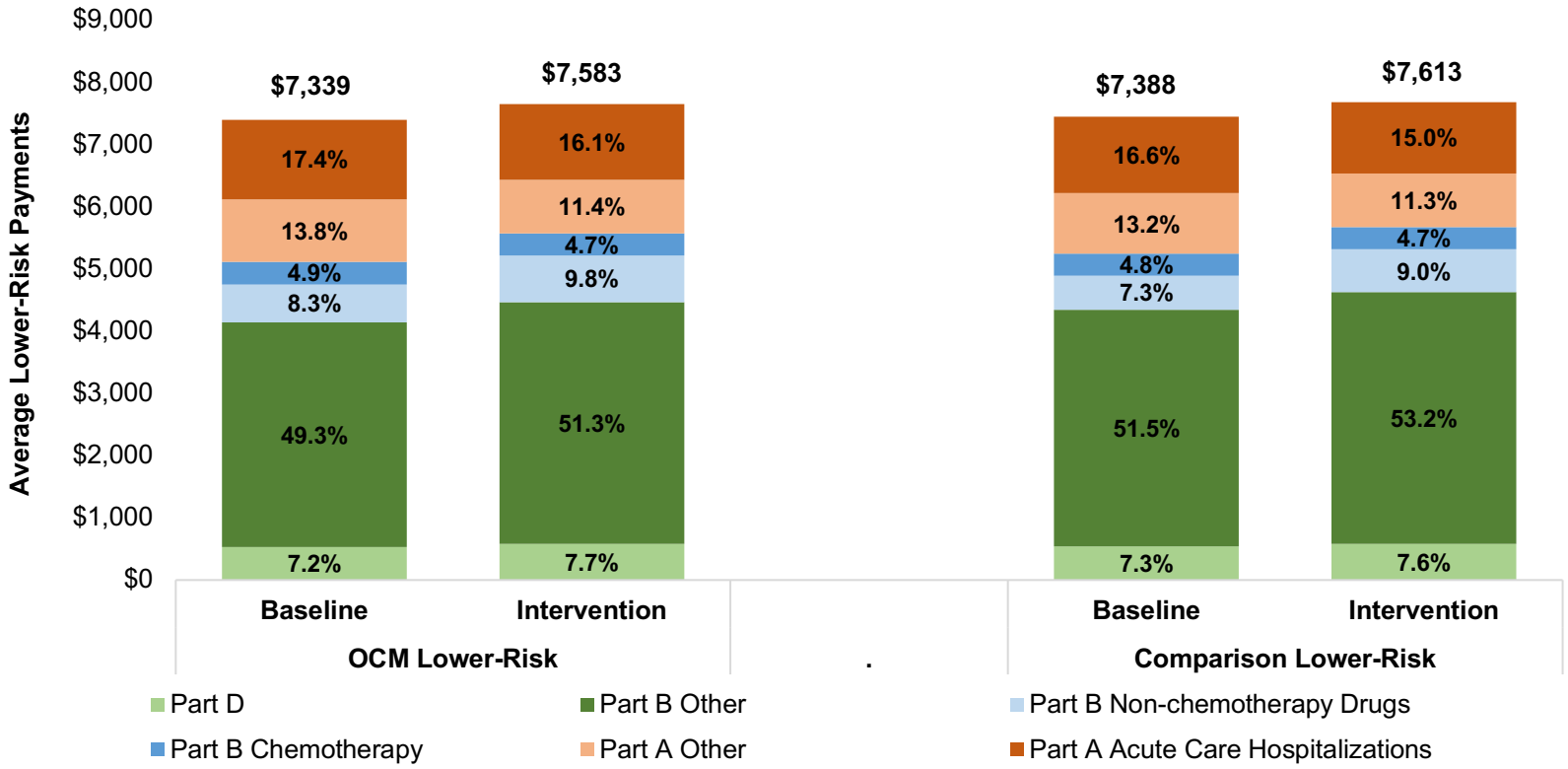
Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: MEOS: Medicare Enhanced Oncology Service payment. E&M: Evaluation and management. PP: Performance Period. DID: Difference-in-differences.

B.1.2 Differential Impacts by Cancer Type and Episode Risk Grouping

Exhibit B-5: TEP Components by Higher- and Lower-Risk Cancers
Panel A: Components by Higher-Risk Cancers



Panel B: Components by Lower-Risk Cancers



Source: Medicare claims 2014–2022.

Notes: Part D payments were calculated as the sum of low-income cost-sharing and reinsurance amounts, as reflected on the PDE. Part B Other includes Chemotherapy Administration Payments, Radiation Payments, Non-Cancer E&M Payments, Cancer E&M Payments, Imaging Payments, Lab Payments, and other Part B Non-Institutional Payments without MEOS. Part A Other includes: Other Inpatient Hospital Payments, SNF Payments, Home Health Care Payments, Inpatient Rehab Facility Payments, Long-Term Care Facility Payments, and Hospice Payments.

Exhibit B-6: OCM Reduced Part B Payments for Higher-Risk Episodes, Including High-Risk Breast, Lung, Colorectal, and High-Intensity Prostate Cancers

Part B Payments	OCM N=1,746,368			COMP N=1,919,516			OCM N=1,746,368			
	Number of Episodes	Baseline Mean	Int Mean	Number of Episodes	Baseline Mean	Int Mean	DID	90% LCL	90% UCL	Percent Change
Episode risk group										
Lower-risk episodes	568,673	$4,583	$4,986	654,543	$4,703	$5,090	$16	-$52	$83	0.3%
Higher-risk episodes	1,177,695	$23,495	$30,067	1,264,973	$23,140	$30,188	-$476	-$750	-$202	-2.0%
Cancer type										
Low-risk breast cancer	410,791	$3,186	$3,431	417,544	$3,255	$3,524	-$24	-$73	$25	-0.8%
Low-intensity prostate cancer	145,974	$7,579	$8,415	215,930	$7,665	$8,522	-$22	-$195	$151	-0.3%
High-risk breast cancer	175,823	$24,668	$27,331	174,238	$23,903	$27,658	-$1,092	-$1,523	-$661	-4.4%
Lung cancer	162,906	$27,365	$43,735	171,530	$26,990	$43,981	-$622	-$1,212	-$31	-2.3%
Lymphoma	100,418	$31,211	$35,310	99,393	$31,790	$36,495	-$606	-$1,240	$28	-1.9%
Colorectal cancer	90,598	$25,602	$26,296	94,206	$24,502	$26,469	-$1,273	-$1,909	-$637	-5.0%
Multiple myeloma	106,252	$22,819	$31,685	109,443	$22,421	$31,613	-$327	-$946	$292	-1.4%
High-intensity prostate cancer	71,769	$17,397	$18,264	84,537	$16,793	$18,594	-$934	-$1,560	-$308	-5.4%
Chronic leukemia	61,152	$12,268	$12,736	62,890	$12,207	$12,825	-$151	-$519	$217	-1.2%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Source: Medicare claims 2014–2022.

Notes: OCM: OCM intervention group. COMP: Comparison group. Int.: Intervention period. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit. Non-reconciliation eligible cancers were not included in this table because the Part B payments impact estimate could not be reliably reported due to failure of the baseline parallel trends assumption.

Exhibit B-7: OCM Had No Overall Impact on Part B Chemotherapy Payments for Higher- or Lower-Risk Episodes or Individual Cancers Apart from High-Risk Breast Cancer

Part B Chemo Payments	OCM N=1,746,368			COMP N=1,919,516			Impact Estimates			
	Number of Episodes	Baseline Mean	Int Mean	Number of Episodes	Baseline Mean	Int Mean	DID	90% LCL	90% UCL	Percent Change
Episode risk group										
Lower-risk episodes	568,673	$358	$354	654,543	$356	$355	-$4	-$11	$4	-1.0%
Higher-risk episodes	1,177,695	$11,333	$18,017	1,264,973	$11,130	$17,715	$99	-$118	$316	0.9%
Cancer type										
Low-intensity prostate cancer	145,974	$1,152	$1,137	215,930	$1,150	$1,142	-$8	-$30	$15	-0.7%
High-risk breast cancer	175,823	$12,720	$15,273	174,238	$11,966	$15,031	-$512	-$860	-$165	-4.0%
Lung cancer	162,906	$13,008	$30,454	171,530	$12,795	$30,110	$132	-$420	$683	1.0%
Lymphoma	100,418	$19,774	$22,930	99,393	$20,156	$23,635	-$323	-$817	$170	-1.6%
Colorectal cancer	90,598	$11,672	$12,864	94,206	$11,405	$12,618	-$21	-$489	$448	-0.2%
Multiple myeloma	106,252	$13,697	$22,263	109,443	$13,395	$22,059	-$99	-$677	$480	-0.7%
High-intensity prostate cancer	71,769	$5,907	$6,811	84,537	$5,691	$6,852	-$257	-$788	$274	-4.3%
Chronic leukemia	61,152	$6,010	$6,126	62,890	$5,774	$6,043	-$154	-$430	$122	-2.6%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Source: Medicare claims 2014–2022.

Notes: OCM: OCM intervention group. COMP: Comparison group. Int.: Intervention period. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit. Low-risk breast cancer is not included in this measure as chemotherapy is not a primary treatment for this cancer type. Non-reconciliation eligible cancers are not included in this table because the Part B chemotherapy payments impact estimate could not be reliably reported due to failure of the baseline parallel trends assumption.

Exhibit B-8: OCM Reduced Part B Non-Chemotherapy Drug Payments for Higher-Risk Episodes, with Reductions Concentrated in High-Risk Breast, Lung, Colorectal, High-Intensity Prostate Cancers, Multiple Myeloma, in addition to Non-Reconciliation Eligible Cancers

Part B Non-Chemo Payments	OCM N=1,746,368			COMP N=1,919,516			Impact Estimates			
	Number of Episodes	Baseline Mean	Int Mean	Number of Episodes	Baseline Mean	Int Mean	DID	90% LCL	90% UCL	Percent Change
Episode risk group										
Lower-risk episodes	568,673	$609	$744	654,543	$539	$687	-$13	-$54	$29	-2.1%
Higher-risk episodes	1,177,695	$3,625	$3,480	1,264,973	$3,339	$3,618	-$423	-$543	-$303	-11.7%
Cancer type										
Low-risk breast cancer	410,791	$323	$412	417,544	$328	$418	$0	-$27	$27	0.0%
Low-intensity prostate cancer	145,974	$1,308	$1,482	215,930	$1,136	$1,331	-$21	-$139	$98	-1.6%
High-risk breast cancer	175,823	$4,294	$4,262	174,238	$4,150	$4,570	-$451	-$598	-$304	-10.5%
Lung cancer	162,906	$4,103	$3,209	171,530	$3,685	$3,303	-$512	-$722	-$302	-12.5%
Lymphoma	100,418	$4,488	$5,283	99,393	$4,605	$5,429	-$29	-$259	$202	-0.6%
Colorectal cancer	90,598	$4,529	$3,787	94,206	$3,795	$3,871	-$818	-$1,214	-$423	-18.1%
Multiple myeloma	106,252	$2,023	$2,545	109,443	$1,808	$2,572	-$242	-$450	-$35	-12.0%
Non-reconciliation eligible cancers [a]	88,398	$3,050	$2,785	117,909	$2,823	$2,940	-$382	-$583	-$182	-12.5%
High-intensity prostate cancer	71,769	$5,424	$5,172	84,537	$4,953	$5,327	-$626	-$907	-$345	-11.5%
Chronic leukemia	61,152	$1,599	$2,022	62,890	$1,668	$2,179	-$88	-$255	$78	-5.5%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Source: Medicare claims 2014–2022.

Notes: [a]Non-reconciliation eligible cancers are types of cancer identified by CMS to be rare. OCM episodes for these cancer types are not included in performance-based payments, although practices may submit claims for Monthly Enhanced Oncology Services payment during treatment episodes for these types of cancer. OCM: OCM intervention group. COMP: Comparison group. Int.: Intervention period. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit.

B.1.3 Net Impact of OCM

Exhibit B-9: OCM Resulted in Larger Per-Episode Losses for Lower-Risk Episodes Compared to Higher-Risk Episodes

Cancer Type Risk Group	Gross Impact on TEP	MEOS Payments	Total Cost to Medicare†	Number of Episodes	Per Episode net Cost to Medicare‡
PP3					
Lower-risk episodes	$8,848,472	$26,467,279	$35,315,751	41,348	$854
Higher-risk episodes	-$48,328,882	$64,523,811	$16,194,929	87,394	$185
All episodes	-$40,787,550	$90,991,090	$50,203,539	128,742	$390
PP4					
Lower-risk episodes	$7,127,440	$28,336,925	$35,464,365	43,460	$816
Higher-risk episodes	-$50,156,275	$66,981,659	$16,825,384	89,725	$188
All episodes	-$45,343,863	$95,318,584	$49,974,721	133,185	$375
PP5					
Lower-risk episodes	$2,612,610	$26,156,183	$28,768,793	41,470	$694
Higher-risk episodes	-$45,309,363	$64,202,059	$18,892,696	87,639	$216
All episodes	-$45,975,222	$88,893,894	$42,918,672	129,098	$332
PP6					
Lower-risk episodes	$2,207,900	$26,636,176	$28,844,076	44,158	$653
Higher-risk episodes	-$35,121,784	$66,478,151	$31,356,367	93,409	$336
All episodes	-$36,869,820	$93,114,327	$56,244,507	137,567	$409
PP7					
Lower risk episodes	$3,678,624	$21,871,422	$25,550,046	38,319	$667
Higher-risk episodes	-$89,068,351	$61,036,471	-$28,031,880	90,059	-$311
All episodes	-$83,846,936	$82,907,894	-$939,042	128,378	-$7
PP8					
Lower-risk episodes	-$5,812,376	$20,670,464	$14,858,088	31,589	$470
Higher-risk episodes	-$126,091,130	$58,421,569	-$67,669,561	79,054	-$856
All episodes	-$126,755,234	$77,403,202	-$49,352,033	110,639	-$446
PP9					
Lower-risk episodes	-$1,674,090	$20,451,360	$18,777,270	30,438	$617
Higher-risk episodes	-$95,743,683	$56,817,338	-$38,926,345	77,651	-$501
All episodes	-$93,911,588	$77,268,698	-$16,642,890	108,089	-$154
PP10					

Cancer Type Risk Group	Gross Impact on TEP	MEOS Payments	Total Cost to Medicare†	Number of Episodes	Per Episode net Cost to Medicare‡
Lower-risk episodes	-$6,085,926	$20,194,767	$14,108,841	30,737	$459
Higher-risk episodes	-$136,594,072	$55,006,472	-$81,587,600	75,217	-$1,085
All episodes	-$139,569,420	$75,201,239	-$64,368,181	105,954	-$608
			PP11		
Lower-risk episodes	-$9,608,200	$10,243,612	$635,412	27,452	$23
Higher-risk episodes	-$123,536,550	$39,036,172	-$84,500,378	72,075	-$1,172
All episodes	-$127,649,404	$49,279,784	-$78,369,620	99,527	-$787

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: Data are not available to break out MEOS payments by higher- and lower-risk episodes in PP1 and PP2; therefore, analysis begins in PP3. COVID episodes were removed from the higher- and lower-risk episode counts in PP7 through PP11. A total of 15,184 COVID episodes were removed. As MEOS was a cost incurred, for program net impact estimate, MEOS for all episodes includes MEOS paid related to episodes with COVID-19 diagnosis. Episodes with COVID-19 diagnosis did not have a higher or lower risk indicator. Hence, MEOS for all episodes is not the total of MEOS related to higher and lower risk. Gross impact was estimated as total program episode multiplied by the DID. Overall, DID is a weighted estimate. Hence the gross estimate for all episodes does not always equal the sum of the gross impact for higher- and lower-risk episodes. †Total Cost to Medicare was calculated as the sum of the Gross Impact on TEP plus MEOS payments. ‡Per episode net cost to Medicare was calculated as the sum of the Gross Impact on TEP and total MEOS payments, divided by the number of episodes. TEP: Total episode payments. MEOS: Monthly Enhanced Oncology Services. PP: Performance period. DID: Difference-in-differences.

B.1.4 Results of Sensitivity Analyses for Payment Outcome Measures

As discussed in **Appendix Section A**, we ran a number of sensitivity tests on key outcome measures to assess whether impact estimates were sensitive to changes in model specification and/or the types of practices and episodes in the sample. **Exhibit B-10** summarizes the sensitivity tests that were conducted for each of the key payment outcome measures that were sensitive to specification changes in the prior *Evaluation Report for PP1–PP9* and warranted further investigation. We chose not to revise the main estimates, as these cases did not suggest a general pattern of bias in the main outcomes. **Exhibit B-11** summarizes the results of the sensitivity tests that were conducted.

Exhibit B-10: Sensitivity Tests Conducted for Selected Payment Outcome Measures

Type of Test	Sensitivity Test	Payment Outcome Measures	
		Part A	Part D
Payment outliners exclusions	Exclusion of episodes with payments in the top 10% of the distribution	X	
Practice-based exclusions	Exclusion of the two largest OCM practices	X	X
	Exclusion of practices that are part of the US Oncology Network		X
Other exclusions	Exclusion of episodes for which the patient had a chemo episode in the previous PP	X	

X indicates that sensitivity analysis was performed. PP: Performance period.

Exhibit B-11: Outcome Measures That Were Sensitive to Specific Robustness Checks

Sensitivity Test	Outcome Measure(s) That Were Sensitive	Impact and Considerations on Interpretability of the Impact Estimate
1. Exclusion of episodes with payments in the top 10% of the distribution 2. Exclusion of the two largest OCM practices 3. Exclusion of episodes for which the patient had a chemo episode in the previous PP	Part A payments	The impact estimate for Part A payments was smaller in absolute magnitude and significant at the 10% level for the first two sensitivity tests. The impact estimate for the third sensitivity tests was smaller in absolute magnitude and no longer statistically significant.
1. Exclusion of practices that are part of the US Oncology Network 2. Exclusion of the two largest OCM practices	Part D Chemo payment	The impact estimate for Part D chemo payments was larger in absolute magnitude and was statistically significant for these two sensitivity analyses.

B.2 Impact on Utilization Outcomes

B.2.1 Impact on Inpatient Service and ED Use

Exhibit B-12: Meaningful Reductions in Likelihood of ED Visits Resulting in an Inpatient Stay among Higher-Risk Cancer Episodes

Measure	Number of Episodes		OCM		COMP		Impact Estimates			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change
Any inpatient stay										
All episodes	1,746,368	1,919,516	27.9%	24.0%	26.5%	22.7%	-0.1 pp	-0.4 pp	0.3 pp	-0.2%
Low-risk cancer episodes	568,673	654,543	11.4%	9.9%	11.1%	9.3%	0.2 pp	0.0 pp	0.5 pp	2.2%
High-risk cancer episodes	1,177,695	1,264,973	36.0%	31.1%	34.1%	29.3%	-0.2 pp	-0.6 pp	0.3 pp	-0.5%
Any ED visit or observation stay not resulting in an inpatient stay										
All episodes	1,746,368	1,919,516	24.5%	22.9%	25.0%	23.3%	0.0 pp	-0.3 pp	0.4 pp	0.2%
Low-risk cancer episodes	568,673	654,543	16.2%	15.5%	16.1%	15.2%	0.3 pp	0.0 pp	0.6 pp	1.8%
High-risk cancer episodes	1,177,695	1,264,973	28.6%	26.6%	29.4%	27.4%	-0.1 pp	-0.6 pp	0.4 pp	-0.3%
Any ED visit not resulting in an inpatient stay										
All episodes	1,746,368	1,919,516	23.5%	22.1%	24.1%	22.7%	0.0 pp	-0.4 pp	0.3 pp	-0.1%
Low-risk cancer episodes	568,673	654,543	15.6%	14.9%	15.7%	14.7%	0.2 pp	0.2 pp	0.2 pp	1.5%
High-risk cancer episodes	1,177,695	1,264,973	27.4%	25.7%	28.3%	26.7%	-0.1 pp	-0.1 pp	-0.1 pp	-0.5%
Any ED visits resulting in an inpatient stay										
All episodes	1,746,368	1,919,516	21.3%	18.8%	20.1%	17.9%	-0.4 pp	-0.7 pp	0.0 pp	-1.8%
Low-risk cancer episodes	568,673	654,543	8.0%	7.1%	7.8%	6.8%	0.1 pp	-0.1 pp	0.3 pp	1.5%
High-risk cancer episodes	1,177,695	1,264,973	27.9%	24.6%	26.2%	23.5%	-0.6 pp	-1.1 pp	-0.2 pp	-2.2%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Source: Medicare claims 2014–2022.

Notes: OCM: OCM intervention group. COMP: Comparison group. Int.: Intervention period. pp: Percentage points. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit. ED: Emergency department. Intensity (Number of Visits or Stays) measures are conditional on observing any use of measure and less than the 99.9 percentile.

Exhibit B-13: Likelihood of ED Visits Resulting in an Inpatient Stay Driven by Lung, Colorectal, and Non-Reconciliation Eligible Cancers

Subgroup	OCM		COMP		Impact Estimates			
	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change
Cancer type								
Low-risk breast cancer	5.9%	5.1%	6.0%	5.0%	0.2 pp	0.0 pp	0.4 pp	3.5%
High-risk breast cancer	19.1%	17.4%	18.7%	17.2%	-0.1 pp	-0.7 pp	0.5 pp	-0.6%
Low-intensity prostate cancer	12.7%	11.4%	11.7%	10.2%	0.1 pp	-0.4 pp	0.6 pp	1.0%
Lung cancer	37.0%	32.5%	34.4%	31.6%	-1.7 pp	-2.5 pp	-0.9 pp	-4.6%
Lymphoma	22.0%	21.2%	21.7%	21.4%	-0.5 pp	-1.3 pp	0.2 pp	-2.5%
Colorectal/small intestine cancer	26.5%	25.3%	25.2%	24.9%	-0.9 pp	-1.8 pp	0.0 pp	-3.3%
Multiple myeloma	23.5%	20.5%	22.9%	20.1%	-0.2 pp	-1.0 pp	0.7 pp	-0.7%
Non-reconciliation eligible cancers	25.9%	22.9%	22.7%	21.7%	-1.9 pp	-3.0 pp	-0.9 pp	-7.5%
High-intensity prostate cancer	24.6%	20.0%	22.1%	18.4%	-0.9 pp	-2.0 pp	0.3 pp	-3.5%
Chronic leukemia	18.7%	15.6%	19.0%	15.0%	0.9 pp	0.0 pp	1.8 pp	4.8%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: ED: Emergency department. OCM: OCM intervention group. COMP: Comparison group. Int.: Intervention period. pp: Percentage points. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit. Intensity (Number of Visits or Stays) measures are conditional on observing any use of measure and less than the 99.9 percentile.

Exhibit B-14: Any ED Visits or Observation Stays Not Resulting in an Inpatient Stay: Chronic Leukemia and Low-Risk Breast Cancer Were Outliers

Subgroup	OCM		COMP		Impact Estimates			
	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change
Cancer type								
Low-risk breast cancer	14.3%	13.4%	15.0%	13.6%	0.5 pp	0.1 pp	0.9 pp	3.4%
High-risk breast cancer	23.6%	22.3%	25.3%	23.9%	0.0 pp	-0.7 pp	0.7 pp	0.1%
Low-intensity prostate cancer	19.4%	19.1%	19.6%	18.7%	0.6 pp	0.0 pp	1.2 pp	3.1%
Lung cancer	32.0%	29.1%	34.4%	31.2%	0.4 pp	-0.4 pp	1.3 pp	1.3%
Lymphoma	23.4%	23.3%	25.0%	25.1%	-0.1 pp	-1.0 pp	0.8 pp	-0.5%
Colorectal/small intestine cancer	28.0%	26.7%	29.5%	28.9%	-0.8 pp	-1.7 pp	0.2 pp	-2.7%
Multiple myeloma	25.4%	23.5%	26.5%	24.9%	-0.2 pp	-1.1 pp	0.6 pp	-0.9%
Non-reconciliation eligible cancers	26.8%	25.3%	28.8%	26.6%	0.7 pp	-0.2 pp	1.6 pp	2.6%
High-intensity prostate cancer	26.6%	24.9%	27.6%	25.4%	0.6 pp	-0.5 pp	1.6 pp	2.2%
Chronic leukemia	22.7%	21.7%	24.5%	22.0%	1.5 pp	0.4 pp	2.6 pp	6.6%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: ED: Emergency department. OCM: OCM intervention group. COMP: Comparison group. Int.: Intervention period. pp: Percentage points. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit..

Exhibit B-15: Any ED Visits Not Resulting in an Inpatient Stay: Chronic Leukemia and Low-Risk Breast Cancer Were Outliers

Subgroup	OCM		COMP		Impact Estimates			
	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change
Cancer type								
Low-risk breast cancer	13.8%	12.8%	14.7%	13.2%	0.4 pp	0.0 pp	0.8 pp	2.9%
High-risk breast cancer	22.2%	21.0%	24.1%	23.0%	-0.1 pp	-0.7 pp	0.6 pp	-0.4%
Low-intensity prostate cancer	18.9%	18.5%	19.1%	18.1%	0.6 pp	0.0 pp	1.2 pp	3.1%
Lung cancer	31.1%	28.4%	33.6%	30.6%	0.3 pp	-0.5 pp	1.1 pp	1.0%
Lymphoma	22.6%	22.5%	24.1%	24.4%	-0.3 pp	-1.2 pp	0.6 pp	-1.4%
Colorectal/small intestine cancer	27.0%	25.9%	28.6%	28.2%	-0.7 pp	-1.6 pp	0.1 pp	-2.7%
Multiple myeloma	24.7%	22.9%	26.0%	24.2%	-0.1 pp	-1.0 pp	0.7 pp	-0.5%
Non-reconciliation eligible cancers	25.8%	24.4%	27.9%	26.0%	0.5 pp	-0.4 pp	1.4 pp	2.0%
High-intensity prostate cancer	26.0%	24.3%	26.9%	24.9%	0.3 pp	-0.7 pp	1.3 pp	1.1%
Chronic leukemia	21.8%	21.2%	23.9%	21.5%	1.8 pp	0.7 pp	2.9 pp	8.3%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: OCM: OCM intervention group. COMP: Comparison group. Int.: Intervention period. pp: Percentage points. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit..

Exhibit B-16: No Impact on Other Acute-Care Utilization

Measure	Number of Episodes		OCM		COMPI		mpact Estimates			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change
Occurrence of 30-day readmission										
Low-risk cancer episodes	55,073	63,790	15.9%	15.2%	15.7%	15.0%	0.1%	-0.7%0	.9%0	.6%
High-risk cancer episodes	354,549	367,053	28.5%	27.4%	27.6%	26.9%	-0.3%-	0.8%	0.2%	-1.1%
Occurrence of 30-day Unplanned readmission										
Low-risk cancer episodes	55,073	63,790	14.9%	14.1%	14.8%	13.8%	0.2%	-0.6%1	.0%1	.1%
High-risk cancer episodes	354,549	367,053	26.8%	25.6%	26.2%	25.2%	-0.2%-	0.7%	0.3%	-0.8%
Occurrence of ICU admission										
Low-risk cancer episodes	568,673	654,543	3.4%	3.1%	3.3%	2.9%	0.1%	-0.1%0	.2%1	.8%
High-risk cancer episodes	1,177,695	1,264,973	13.5%	11.9%	12.7%	11.6%	-0.4%-	0.9%	0.0%	-3.3%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: OCM: OCM intervention group. COMP: Comparison group. Int.: Intervention period. PP: Performance period. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit. ICU: Intensive care unit. Intensity (Number of Visits or Stays) measures are conditional on observing any use of measure and less than the 99.9 percentile. The occurrence of readmissions is conditional on having an inpatient stay.

B.2.2 Impact on Use of Post-Acute Care

Exhibit B-17: Reduction in Occurrence of Home Health Services among High-Risk Episodes

Measure	Number of Episodes		OCM		COMP		Impact Estimates			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change
Occurrence of home health service										
Low-risk cancer episodes	568,673	654,543	7.8%	6.8%	7.7%	6.8%	-0.1%	-0.4%	0.3%	-0.6%
High-risk cancer episodes	1,177,695	1,264,973	20.3%	17.9%	19.7%	17.8%	-0.5%	-0.9%	0.0%	-2.3%
Occurrence of SNF stay										
Low-risk cancer episodes	568,673	654,543	2.6%	2.0%	2.6%	2.0%	0.1%	-0.1%	0.2%	2.1%
High-risk cancer episodes	1,177,695	1,264,973	6.5%	5.0%	6.3%	4.8%	-0.1%	-0.3%	0.1%	-1.6%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: OCM: OCM intervention group. COMP: Comparison group. Int.: Intervention period. PP: Performance period. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit. SNF: Skilled nursing facility. Intensity (Number of Visits or Stays) measures are conditional on observing any use of measure and less than the 99.9 percentile.

B.2.3 Impact on Use of Imaging Services, E&M services, and Radiation Therapy Services

Exhibit B-18: No Impact of OCM for E&M services or Radiation Therapy Services

Measure	Number of Episodes		OCM		COMP		Impact Estimates			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change
Number of E&M services	1,744,335	1,917,936	21.136	18.295	20.307	17.807	-0.276	-0.843	0.291	-1.3%
Low-risk cancer episodes	568,673	654,543	13.625	12.020	13.326	11.718	0.003	-0.308	0.314	0.0%
High-risk cancer episodes	1,177,695	1,264,973	25.213	21.838	24.097	21.101	-0.378	-1.116	0.361	-1.5%
Number of cancer-related E&M Services	1,744,363	1,917,860	5.321	4.931	5.048	4.710	-0.028	-0.140	0.085	-0.5%
Low-risk cancer episodes	568,673	654,543	2.172	2.095	2.094	2.028	-0.011	-0.041	0.020	-0.5%
High-risk cancer episodes	1,177,695	1,264,973	6.957	6.431	6.602	6.097	-0.022	-0.191	0.148	-0.3%
Occurrence of radiation therapy service										
Low-risk cancer episodes	568,673	654,543	7.7%	7.9%	8.4%	8.5%	0.1%	-0.2%	0.4%	1.2%
High-risk cancer episodes	1,177,69	1,264,973	17.0%	15.1%	17.5%	15.6%	0.0%	-0.2%	0.3%	0.3%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: OCM: OCM intervention group. COMP: Comparison group. Int.: Intervention period. E&M: Evaluation and management. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit. Intensity (Number of Visits or Stays) measures are conditional on observing any use of measure and less than the 99.9 percentile.

Exhibit B-19: Relative Reductions in Number of Imaging Services Driven by Lymphoma and Colorectal Cancer

Subgroup	Number of Episodes		OCM		COMP		Impact Estimates			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID	90% LCL	90% UCL	Percent Change
Number of standard and other imaging services	1,277,332	1,394,691	5.934	5.175	5.816	5.156	-0.104	-0.160	-0.049	-1.8%
Number of advanced imaging services	1,144,945	1,255,578	5.384	5.491	5.331	5.476	-0.033	-0.106	0.039	-0.6%
Number of standard and other imaging services by cancer type										
Low-risk breast cancer	410,791	417,544	4.165	3.642	4.169	3.674	-0.037	-0.103	0.028	-0.9%
High-risk breast cancer	175,823	174,238	4.991	4.406	5.027	4.461	-0.048	-0.145	0.049	-1.0%
Low-intensity prostate cancer	145,974	215,930	2.756	2.299	2.628	2.236	-0.058	-0.129	0.014	-2.1%
Lung cancer	162,906	171,530	5.380	4.504	5.429	4.611	-0.076	-0.192	0.040	-1.4%
Lymphoma	100,418	99,393	4.344	3.858	4.290	3.924	-0.134	-0.244	-0.023	-3.1%
Colorectal/small intestine cancer	90,598	94,206	3.776	3.266	3.708	3.332	-0.141	-0.256	-0.026	-3.7%
Multiple myeloma	106,252	109,443	5.089	4.086	5.121	4.178	-0.075	-0.208	0.058	-1.5%
Non-reconciliation eligible cancers	88,398	117,909	4.548	3.786	4.453	3.786	-0.101	-0.239	0.037	-2.2%
High-intensity prostate cancer	71,769	84,537	3.778	2.888	3.674	2.880	-0.108	-0.241	0.025	-2.9%
Chronic leukemia	61,152	62,890	4.008	3.283	4.090	3.227	0.136	0.002	0.269	3.4%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Source: Medicare claims 2014–2022.

Notes: OCM: OCM intervention group. COMP: Comparison group. Int.: Intervention period. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit. Intensity (Number of Visits or Stays) measures are conditional on observing any use of measure and less than the 99.9 percentile.

Exhibit B-20: OCM Had No Impact on Measures of High-Intensity Care at End of Life

Measures for High-Intensity Care	OCM		COMP		Estimated OCM Impact	
	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Estimate	Percent Change
Any chemotherapy in last 14 days of life	11.9%	10.6%	11.6%	10.4%	-0.1 pp	-0.5%
Any hospitalization in last 30 days of life	52.9%	51.5%	53.0%	52.2%	-0.6 pp	-1.1%
Any ICU stay in last 30 days of life	24.1%	24.9%	23.5%	25.1%	-0.8 pp	-3.1%
ED use (2+ visits) in last 30 days of life	15.0%	15.4%	15.6%	16.4%	-0.3 pp	-1.8%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Source: Medicare claims 2014–2022.

Notes: Means and DID impact estimates are regression-adjusted. OCM: OCM intervention group. COMP: Comparison group. pp: Percentage point. Int.: Intervention period. DID: Difference-in-differences. ED: Emergency department. ICU: Intensive care unit.

Exhibit B-21: Among Patients Who Died, OCM Had No Impact on Use, Duration, or Timing of Hospice Care

Measures of Hospice Care Use	OCM		COMP		Estimated OCM Impact	
	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Estimate	Percent Change
Never used hospice care	32.3%	30.3%	33.4%	31.6%	-0.2 pp	-0.5%
Hospice stay of 3–180 days and dying with hospice care	58.7%	60.1%	57.6%	58.9%	0.1 pp	0.2%
Hospice stay of 1–2 days and dying with hospice care	7.5%	7.9%	7.3%	7.8%	0.0 pp	-0.4%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: Means and DID impact estimates are regression-adjusted. OCM: OCM intervention group. COMP: Comparison group. pp: Percentage point. Int.: Intervention period. DID: Difference-in-differences. ED: Emergency department. ICU: Intensive care unit.

B.2.4 Impact on Use of Imaging Services, E&M services, and Radiation Therapy Services

We limited sensitivity tests in this report to measures that were sensitive to specification changes in the prior Evaluation Report for PP1–PP9 and warranted further investigation. None of the occurrence measures included in this report were sensitive to specification changes in the previous report, and so we did not conduct sensitivity analysis of utilization measures for this report.

C. Clinician and Patient Surveys and OCM Quality Measures

C.1. Clinician Survey Results

In August to October of 2018, we surveyed three types of clinicians participating at OCM practices about their experience with care process implementation during OCM. We present a full discussion of methods in results in the Evaluation of the Oncology Care Model: Performance Period 1-3—Appendices. To provide context for the evaluation summary in Chapter 1, we have reproduced the key survey results below.

Exhibit C-1: Experience with Care Process Implementation Related to OCM, Responses from Oncologists

Care Processes	Implementation Timing of Care Processes, Percent				Better Impact on Quality of Care, Percent
	Implemented before OCM and Unchanged	Enhanced Since OCM	New Since OCM	Not Used at All	
Clinical care					
Typically use treatment pathways to guide treatment decisions*	24.5	28.6	7.3	39.7	69.5
Provide access to outpatient palliative care*	57.0	31.7	4.1	7.3	81.9
Restructured care teams since OCM began	0.0	0.0	66.4	33.6	79.2
Access to care					
Slots set aside for same day appointments during normal clinic hours, to meet some or all patients' urgent needs	40.5	26.8	7.5	25.2	87.3
Evening/weekend appointments for patients with urgent needs	15.0	5.8	6.3	72.8	81.8
Care coordination					
Educate all patients to "call us first" before going to the ED	46.9	30.9	9.9	12.3	79.3
Routinely telephone some or all patients taking oral chemotherapy drugs to monitor side effects and refill needs	39.6	27.2	7.7	25.4	84.4
Routinely initiate proactive outreach telephone calls to some or all high-risk patients	12.4	15.4	12.4	59.7	89.4
Routinely sharing elements of a care plan in writing with patients					
Expected prognosis	15.6	17.4	16.3	50.8	57.1
Goals of treatment *	30.8	23.9	16.6	28.6	66.8
Expected response to treatment*	20.2	14.8	15.8	49.2	61.2
Potential harms from treatment*	63.2	23.7	3.4	9.7	66.0
Advance care planning (and include completed forms in the electronic health record)	30.7	40.7	9.1	19.5	78.1
Estimated out-of-pocket costs	39.5	20.5	11.3	28.7	65.0
Survivorship plans	18.4	33.6	17.6	30.4	59.6
Psychosocial health					
Routinely screen patients for depression	24.9	37.9	31.6	5.6	64.5
Routinely screen patients for psychosocial distress	25.0	36.1	23.9	15.1	68.5
End-of-life care					
Use "trigger events" or another standard to decide when to discuss hospice care with cancer patients	12.8	14.6	4.5	68.1	76.1

Source: OCM Clinician Survey.

Notes: N=398 oncologists. Estimates were weighted for sampling and nonresponse. *Questions were answered by oncologists only. ED: Emergency department.

Exhibit C-2: Experience with Care Process Implementation Related to OCM, Responses from NP/PAs

Care Processes	Implementation Timing of Care Processes, Percent				Better Impact on Quality of Care, Percent
	Implemented before OCM and Unchanged	Enhanced Since OCM	New Since OCM	Not Used at All	
Clinical care					
Restructured care teams since OCM began	0.0	0.0	72.5	27.5	88.5
Access to care					
Slots set aside for same day appointments during normal clinic hours, to meet some or all patients' urgent needs	37.4	32.8	5.2	24.6	91.1
Evening/weekend appointments for patients with urgent needs	9.5	6.6	6.0	77.8	95.3
Care coordination					
Educate all patients to "call us first" before going to the ED	52.1	36.9	7.1	3.9	82.4
Routinely telephone some or all patients taking oral chemotherapy drugs to monitor side effects and refill needs	31.2	25.1	12.7	31.1	89.7
Routinely initiate proactive outreach telephone calls to some or all high-risk patients	10.9	14.4	8.4	66.2	91.7
Routinely sharing elements of a care plan in writing with patients					
Expected prognosis	11.5	14.4	13.6	60.5	59.6
Advance care planning (and include completed forms in the electronic health record)	30.3	42.5	8.5	18.7	82.0
Estimated out-of-pocket costs	30.0	20.2	10.8	39.0	62.4
Survivorship plans	18.1	34.3	18.6	29.1	79.6
Psychosocial health					
Routinely screen patients for depression	23.8	48.6	22.3	5.3	79.8
Routinely screen patients for psychosocial distress	22.8	45.8	16.9	14.5	87.1
End-of-life care					
Use "trigger events" or another standard to decide when to discuss hospice care with cancer patients	17.8	16.0	3.1	63.1	81.1

Source: OCM Clinician Survey.
Notes: N=373 NPs/PAs. Estimates were weighted for sampling and nonresponse. ED: emergency department; NP: nurse practitioner; PA: physician assistant.

C.2 Patient Survey Methods

C.2.1 Patient Survey Instrument

We assessed patient experiences using a survey instrument adapted from the Consumer Assessment of Healthcare Providers and Systems (CAHPS) Cancer Survey, developed by investigators at the American Institutes for Research and the Mayo Clinic with support from the Agency for Healthcare Research and Quality and the California Health Care foundation.[48]

The CAHPS Cancer Survey was designed to measure patient experiences across several domains of cancer care, including access, communication, shared decision making, symptoms, and patient self-management. We adapted the survey, which was still in development at the time we developed the OCM Patient Survey, to address all types of systemic treatment included in OCM (chemotherapy, biologic therapy, and hormonal therapy). We also augmented

[48] Additional details about the CAHPS Cancer Survey development are included at https://www.ahrq.gov/cahps/surveys-guidance/cancer/develop-cancer-surveys.html.

the instrument to add items that are of interest to OCM, including symptoms (e.g., nausea, neutropenia, constipation) and management of these symptoms, quality of life, health status, understanding of the purpose of treatment, and out-of-pocket costs. In some cases, we adapted items from the Cancer Care Outcomes Research and Surveillance (CanCORS) Consortium patient survey.[lxxxii]

In addition, we sought to collect information from patients who died during or soon after an episode. We thus developed a slightly reworded "alternative" survey for family members of patients who died before we mailed the survey, and sent this "alternative" survey with a different mailing label and cover letter addressed to "family of" the beneficiary. We further developed a questionnaire on deceased beneficiaries that was mailed to family of beneficiaries who died within 12 months of their episode initiation.[lxxxiii,lxxxiv]

We conducted cognitive testing on new questions with a small convenience sample of Medicare beneficiaries with recent chemotherapy experience.

Exhibit C-3 describes the approaches used by the main and alternative surveys.

Exhibit C-3: Patient Survey Instruments and Timing

	Main Survey	Alternative 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 end-of-life 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 end-of-life 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 main and alternative surveys were combined to calculate practice composite scores for payment adjustment. No end-of-life questions were used in scoring or payment adjustment.	

C.2.2 Measures of care experience and other patient-reported outcomes

The patient survey contained survey items used in six validated composite measures, along with one single-item measure of overall satisfaction with the cancer care team (**Exhibit 25 in main report**). Each composite measure was calculated based on responses to several survey questions related to patient experience. **Exhibit C-4** describes the items included in each of the composite measures.

Exhibit C-4: Patient Experience Validated Composites and Rating of Cancer Therapy Team

Composite	Questions
Rating of Cancer Therapy Team	Number from 0 (worst possible) to 10 (best possible) the patient rates 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]

Composite	Questions
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]
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 not to 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 were "Yes, definitely," "Yes, somewhat," and "No." [b]Responses were "Never," "Sometimes," "Usually," and "Always." [c]Responses were "Yes" and "No."

In addition to the validated composite measures of care experience, we also analyzed several items relating to patient-reported symptoms and caregiver experience during deceased patients' last month of life.

For eight patient-reported symptoms, we created binary measures that reflected whether patients reported having been bothered by each symptom a little, quite a bit, or very much over the prior six months.

For caregiver experiences during deceased patient's last month of life, we primarily used binary measures reflecting positive care experiences. We also created an end-of-life care experience composite measure, reflecting average end-of-life care experience across the following items: provider showed respect, provider listened carefully, provider was direct and straightforward, provider explained things in a way patient could understand, and provider spent enough time.

C.2.3 Patient Survey Sample and Administration

We surveyed a sample of beneficiaries in OCM practices by mail each quarter because patient experiences were included as a factor in the OCM Performance-Based Payment Aggregate Quality Score. For example, surveys for beneficiaries with episodes that occurred between April 2016 and September 2016 were fielded in January through March 2017. This timing allowed the patients to reflect on the full six-month OCM episodes. In other words, the survey timing helped to ensure that when asked about the care they have received in the past six months, respondents did not include periods before their OCM episode began. Additional waves were conducted every three months.

In each survey wave, we sampled patients who had received OCM-defined chemotherapy in the previous six months, and we assigned each to the practice that had billed the most E&M visits for that beneficiary between the episode triggering date and the date that the patient was identified for the survey. Specifically, we drew a proportionate sample of patients treated by each oncology practice participating in OCM (or comparison practice for the relevant waves), stratified by patient age, race/ethnicity, and cancer type. For beneficiaries who had died by the time of the survey, a tailored alternative questionnaire was sent to family proxies that included the same care experience questions as the main survey except current health status, and asked about end-of-life care.

We collected survey responses by mail, using paper surveys. The survey administration followed a protocol similar to that for the CAHPS, with an initial survey mailing, a thank-you/reminder postcard one week later, and a second survey mailing to nonrespondents three weeks after the first. The survey packets included an invitation cover letter, the 12-page paper questionnaire, and a prepaid envelope to return the survey.

C.2.4 Patient Survey Analytic Methods

For this report covering PP1 and PP11, we examined the impact of OCM on care experiences collected from the OCM patient surveys among OCM patients only (no comparison group) on a quarterly basis using a time trend analysis. The analysis includes survey responses from the baseline survey (April 2016–September 2016)[49] through responses from patients with episodes initiated in PP11 (July 2021–December 2021). The analysis used the following regression model:

$$y_i = \beta_0 + \beta_1 + Baseline_i + \beta_2\, TimeTrend_i + X'_i\beta_2 + \varepsilon_i \quad \textbf{(4)}$$

where ***yi*** is a survey outcome for patient *I*, **Baseline**$_i$ represents the average regression-adjusted value of the outcome in the baseline wave, **TimeTrend**$_i$ represents the average change in the outcome over time across each Wave, and $\boldsymbol{X_i}$ represents a set of patient- and practice-level covariates for patient *i*. The coefficient of the interaction term estimates the risk adjusted OCM impact.

We used an OLS regression if the outcome measure was a continuous variable and a logistic regression if the outcome measure was a dichotomous variable. We report the 90 percent confidence intervals for all estimates of interest.

We combined responses to the main and alternative surveys (described in **Exhibit C-3**, above) to understand care received by patients who survived and those who did not, except for end-of-life care questions. These questions were not asked in the survey sent to living patients.

We weighed the main and alternative surveys using sampling and nonresponse weights and clustered the standard errors at the practice level. Patients with a COVID-19 diagnosis during the episode were excluded from analysis.

Risk Adjustment

For all patient survey analyses, composite scores and individual questions were risk adjusted for patient characteristics, practice characteristics, and measures of the incidence and prevalence of COVID-19 cases and deaths during each episode. Patient characteristics included: age group; gender; race; Medicare and Medicaid dual eligibility; self-reported education level; overall health and mental health; whether 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. Patients with lower-risk episodes were receiving only hormonal therapy; higher-risk episodes included all other patients. Practice characteristics included: practice size categories (based on the number of oncologist NPIs), academic medical center affiliation, oncology versus multi-specialty practice, practice affiliation with a health system, and hospital ownership.

C.2.5 Patient Survey Response Rates

OCM Patient Survey response rates are described below (**Exhibit C-5**). The overall response rate across all 23 waves was 44.7 percent for the main survey and 34.6 percent for the Alternative survey.

[49] 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.

Exhibit C-5: Patient Survey Response Rates

Survey Wave[a]	Main Patient Survey		Alternative Survey	
	Surveys Sent	Response Rate	Surveys Sent	Response Rate
Baseline wave (4/16–9/16)	39,057	48.2%	3,308	38.9%
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%
Intervention wave 8 (4/18–9/18)	22,195	46.5%	1,933	36.1%
Intervention wave 9 (7/18–12/18)	20,767	45.8%	1,543	34.5%
Intervention wave 10 (10/18–3/19)	20,876	45.9%	1,663	34.0%
Intervention wave 11 (1/19–6/19)	21,765	44.3%	1,642	33.1%
Intervention wave 12 (4/19–9/19)	19,251	45.3%	1,474	35.3%
Intervention wave 13 (7/19–12/19)	21,388	48.1%	1,654	38.9%
Intervention wave 14 (10/19–3/20)	20,061	46.8%	1,669	35.1%
Intervention wave 15 (1/20–6/20)	15,655	45.0%	1,191	33.0%
Intervention wave 16 (4/20–9/20)	15,127	45.3%	1,165	34.5%
Intervention wave 17 (7/20–12/20)	16,751	43.3%	724	31.9%
Intervention wave 18 (10/20–3/21)	17,320	42.8%	1,161	33.5%
Intervention wave 19 (1/21–6/21)	16,263	39.9%	1,108	30.9%
Intervention wave 20 (4/21–9/21)	15,713	41.8%	1,067	30.6%
Intervention wave 21 (7/21–12/21)	15,984	41.2%	692	31.6%
Intervention wave 22 (10/21–12/21)	10,501	41.1%	869	32.2%

Source: OCM Patient and Caregiver Surveys.
Notes: [a]Range of episode start dates included in each survey waves is shown in parentheses.

Exhibit C-6: OCM Practices That Participated in OCM Through PP11 Had Better Performance on OCM-4 and OCM-5 In PPs 2–7 Than Practices That Ended OCM Participation Prior to PP11

Quality Measure	Average Performance Rate Across OCM Practices										
	PP1	PP2	PP3	PP4	PP5	PP6	PP7	PP8	PP9	PP10	PP11
All practices (N=202 with data in any PP)											
Number of practices	*n=191*	*n=191*	*n=195*	*n=194*	*n=183*	*n=177*	*n=176*	*n=140*	*n=139*	*n=129*	*n=126*
OCM-2 ED visit or observation stay without admission	24.1	24.0	23.9	23.8	23.7	23.8	23.2	20.6	18.6	19.8	20.2
OCM-3 Hospice stay for three or more days	51.8	52.4	52.6	52.5	51.8	51.5	50.7	51.5	53.6	53.0	52.3
OCM-4 Pain assessment and management	[b]	76.5	80.0	83.3	86.5	86.4	89.3	92.2	90.8	92.8	92.6
OCM-5 Depression screening and follow-up plan	[b]	56.6	63.4	64.2	70.6	70.6	75.1	77.6	80.3	81.1	81.7
OCM-6 Patient-reported experience of care	[b]	[b]	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
Participated in OCM through PP11 (n=126) [a]											
Number of practices	*n=122*	*n=122*	*n=124*	*n=125*	*n=126*	*n=126*	*n=126*	*n=126*	*n=126*	*n=126*	*n=126*
OCM-2 ED visit or observation stay without admission	24.2	24.0	23.9	23.9	23.7	23.7	23.2	20.5	18.6	19.8	20.2
OCM-3 Hospice stay for three or more days	51.8	52.7	53.2	52.8	52.7	52.2	50.9	51.4	53.4	53.0	52.3
OCM-4 Pain assessment and management	[b]	78.7	83.2	85.0	87.9	88.2	91.0	92.4	91.0	92.8	92.6
OCM-5 Depression screening and follow-up plan	[b]	57.8	65.3	66.6	70.8	75.2	76.9	77.7	80.8	81.2	81.7
OCM-6 Patient-reported experience of care	[b]	[b]	8.3	8.3	8.3	8.3	8.3	8.4	8.3	8.3	8.3
Ended OCM participation prior to PP11 (n=76)											
Number of practices	*n=69*	*n=69*	*n=71*	*n=69*	*n=57*	*n=51*	*n=50*	*n=14*	*n=13*	*n=3*	*n=0*
OCM-2 ED visit or observation stay without admission	24.0	23.9	23.9	23.8	23.7	24.0	23.3	21.1	18.8	18.8	[c]
OCM-3 Hospice stay for three or more days	51.8	51.7	51.4	51.9	49.6	49.6	50.2	52.3	54.7	53.0	[c]
OCM-4 Pain assessment and management	[b]	72.0	73.3	79.4	83.0	81.5	79.2	90.0	88.1	86.5	[c]
OCM-5 Depression screening and follow-up plan	[b]	54.1	59.2	58.7	70.0	58.3	64.4	76.4	71.3	69.7	[c]
OCM-6 Patient-reported experience of care	[b]	[b]	8.3	8.3	8.3	8.3	8.3	8.3	8.2	8.4	[c]

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Source: OCM quality measure data.

Notes: Significance shading indicates differences between OCM practices that participated through PP11 and those that ended their participation prior to PP11. [a] Data for OCM-4 and OCM-5 was not submitted in PP1. Data for OCM-6 was not collected until PP3. [b] No practices in the cohort that ended their OCM Participation Prior to PP11 had data available in PP11. PP: Performance period

C.4 Patient-Reported Care Experience

C.4.1 Patient-Reported Care Experience Composite Measures and Rating of the Cancer Care Team

Exhibit C-7: No Meaningful Changes over Time in Adjusted Composite Measures of Quality of Care

	Composite Measures (scale 0–10), Mean						
	Shared Decision Making	Access to Care	Communication	Exchange of Information	Self-Management	Symptom Management	Rating of Cancer Care Team
All episodes							
N	198,350	202,290	200,524	199,317	198,101	99,402	193,208
Baseline periods mean	7.46	8.88	9.02	8.52	5.92	7.32	9.30
Linear time trend, Waves 1–14	0.010	0.006	0.005	0.002	0.008	-0.016	0.002
Linear time trend, Waves 15–23	-0.044	-0.009	-0.003	-0.017	-0.037	-0.055	-0.016
Higher-risk episodes							
N	138,505	141,685	140,582	140,098	139,185	84,690	135,319
Baseline periods mean	7.42	9.01	9.03	8.62	6.43	7.50	9.28
Linear time trend, Waves 1–14	0.012	0.005	0.003	0.002	0.005	-0.015	0.000
Linear time trend, Waves 15–23	-0.038	-0.010	-0.004	-0.012	-0.026	-0.039	-0.019
Lower-risk episodes							
N	59,845	60,605	59,942	59,219	58,916	14,712	57,889
Baseline periods mean	7.57	8.55	9.00	8.24	4.62	6.15	9.36
Linear time trend, Waves 1–14	0.004	0.006	0.010	0.000	0.015	-0.021	0.008
Linear time trend, Waves 15–23	-0.057	-0.009	0.003	-0.029	-0.069	-0.160	-0.009

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Source: OCM Patient and Caregiver Surveys, April 2016–December 2021.

Notes: At least some portion of episodes included in Waves 15–23 occurred during the COVID-19 public health emergency. Estimates were weighted for sampling and nonresponse and adjusted for demographic characteristics, health status, cancer type and treatment duration, the calendar month when the episode was triggered, practice characteristics, and the incidence and prevalence of COVID-19 cases and deaths during each episode. Patients with a COVID-19 diagnosis during the episode were excluded from analysis. The baseline survey covered the time period April 2016 through September 2016.

C.4.2 Patient-Reported Management of Symptoms

Exhibit C-8: OCM Patients Reported That Involvement of Their Cancer Therapy Team in Managing Some Symptoms Declined over Time, Especially during the COVID-19 PHE

	Cancer Therapy Team "Definitely" Helped Address Symptoms When Present (Relative to "Somewhat" or "No"), Percentage							
	Pain	Energy Level	Emotional Problems	Nausea	Breathing	Coughing	Constipation or Diarrhea	Neuropathy
All episodes								
N	103,277	147,054	93,274	62,210	51,299	46,299	114,682	87,413
Baseline periods mean	76%	53%	46%	80%	59%	49%	68%	49%
Linear time trend, Waves 1–14	-0.003	-0.001	-0.001	0.001	-0.003	-0.004	-0.001	-0.001
Linear time trend, Waves 15–23	-0.007	-0.011	-0.018	0.003	-0.016	-0.005	-0.014	-0.005
Higher-risk episodes								
N	81,029	114,266	72,256	55,700	44,604	39,512	96,497	70,239
Baseline periods mean	79%	54%	45%	82%	60%	50%	71%	52%
Linear time trend, Waves 1–14	-0.003	0.000	-0.001	0.000	-0.002	-0.003	-0.002	-0.001
Linear time trend, Waves 15–23	-0.008	-0.007	-0.010	0.004	-0.013	0.000	-0.009	-0.002
Lower-risk episodes								
N	22,240	32,788	21,018	6,505	6,695	6,786	18,185	17,174
Baseline periods mean	61%	50%	47%	63%	48%	45%	49%	39%
Linear time trend, Waves 1–14	0.000	-0.001	-0.002	0.006	-0.002	-0.005	0.002	-0.002
Linear time trend, Waves 15–23	-0.003	-0.026	-0.049	0.005	-0.030	-0.027	-0.039	-0.018

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Source: OCM Patient and Caregiver Surveys, April 2016–December 2021.

Notes: At least some portion of episodes included in Waves 15–23 occurred during the COVID-19 public health emergency. Estimates were weighted for sampling and nonresponse and adjusted for demographic characteristics, health status, cancer type and treatment duration, the calendar month when the episode was triggered, practice characteristics, and the incidence and prevalence of COVID-19 cases and deaths during each episode. Patients with a COVID-19 diagnosis during the episode were excluded from analysis. The baseline survey covered April 2016 through September 2016.

C.4.3 Caregiver-Reported Experiences during Patients' Last Month of Life

Exhibit C-9: Overall Caregiver Experiences with Care in Patients' Last Month of Life Changed Little During OCM

	Care Team Rated Excellent or Very Good, %	Provider Followed End-of-Life Wishes a Great Deal of the Time, %	End-of-Life Care Experience Composite (Range 0-10), Mean	Provider Always Showed Respect, %*	Provider Always Listened Carefully, %*	Provider Was Always Direct and Straightforward, %*	Provider Always Explained Things in a Way Patient Could Understand, %*	Provider Always Spent Enough Time, %*
Higher-risk episodes								
N	10,468	8,721	10,452	10,306	10,239	10,161	10,100	10,275
Baseline periods mean	78%	83%	8.38	75%	70%	62%	63%	56%
Linear time trend, Waves 1–14	-0.002	-0.001	-0.001	-0.001	0.000	0.002	0.001	0.001
Linear time trend, Waves 15–23	-0.008	-0.004	-0.030	-0.003	-0.005	-0.002	-0.004	-0.007

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Source: OCM Caregiver Survey, April 2016–December 2021.

Notes: At least some portion of episodes included in Waves 15–23 occurred during the COVID-19 public health emergency. Estimates were weighted for sampling and nonresponse and adjusted for demographic characteristics, health status, cancer type and treatment duration, the calendar month when the episode was triggered, practice characteristics, and the incidence and prevalence of COVID-19 cases and deaths during each episode. Patients with a COVID-19 diagnosis during the episode were excluded from analysis. The baseline survey covered the time period April 2016 through September 2016. *These five items were included in the End-of-Life Care Experience Composite measure.

Exhibit C-10: Caregiver Experiences Related to Hospice Care in Patients' Last Month of Life Changed Little During OCM

	Any Provider Discussed Hospice Care, %	Patient Ever Entered Hospice Care, %	Hospice Care Started at the Right Time, %
Higher-risk episodes			
N	10,244	8,338	6,652
Baseline periods mean	82%	84%	76%
Linear time trend, Waves 1–14	-0.002	0.002	0.001
Linear time trend, Waves 15–23	-0.003	0.000	-0.006

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Source: OCM Caregiver Survey, April 2016–December 2021.

Notes: At least some portion of episodes included in Waves 15–23 occurred during the COVID-19 public health emergency. Estimates were weighted for sampling and nonresponse and adjusted for demographic characteristics, health status, cancer type and treatment duration, the calendar month when the episode was triggered, practice characteristics, and the incidence and prevalence of COVID-19 cases and deaths during each episode. Patients with a COVID-19 diagnosis during the episode were excluded from analysis. The baseline survey covered April 2016 through September 2016.

Exhibit C-11: During the COVID-19 PHE, Caregiver Reports That Patients Died at Home and Preferred to Die at Home Increased Relative to Before the COVID-19 PHE, but Trends Reverted Back to Baseline Levels in the Second Year of the COVID-19 PHE

	Patient Died at Home, percentage	Patient Preferred to Die at Home, Percentage	Patient Died in Preferred Location, Percentage
Higher-risk episodes			
N	10,584	9,165	9,086
Baseline periods mean	48%	77%	75%
Linear time trend, Waves 1–14	0.002	0.002	0.000
Linear time trend, Waves 15–23	-0.002	0.006	0.000

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

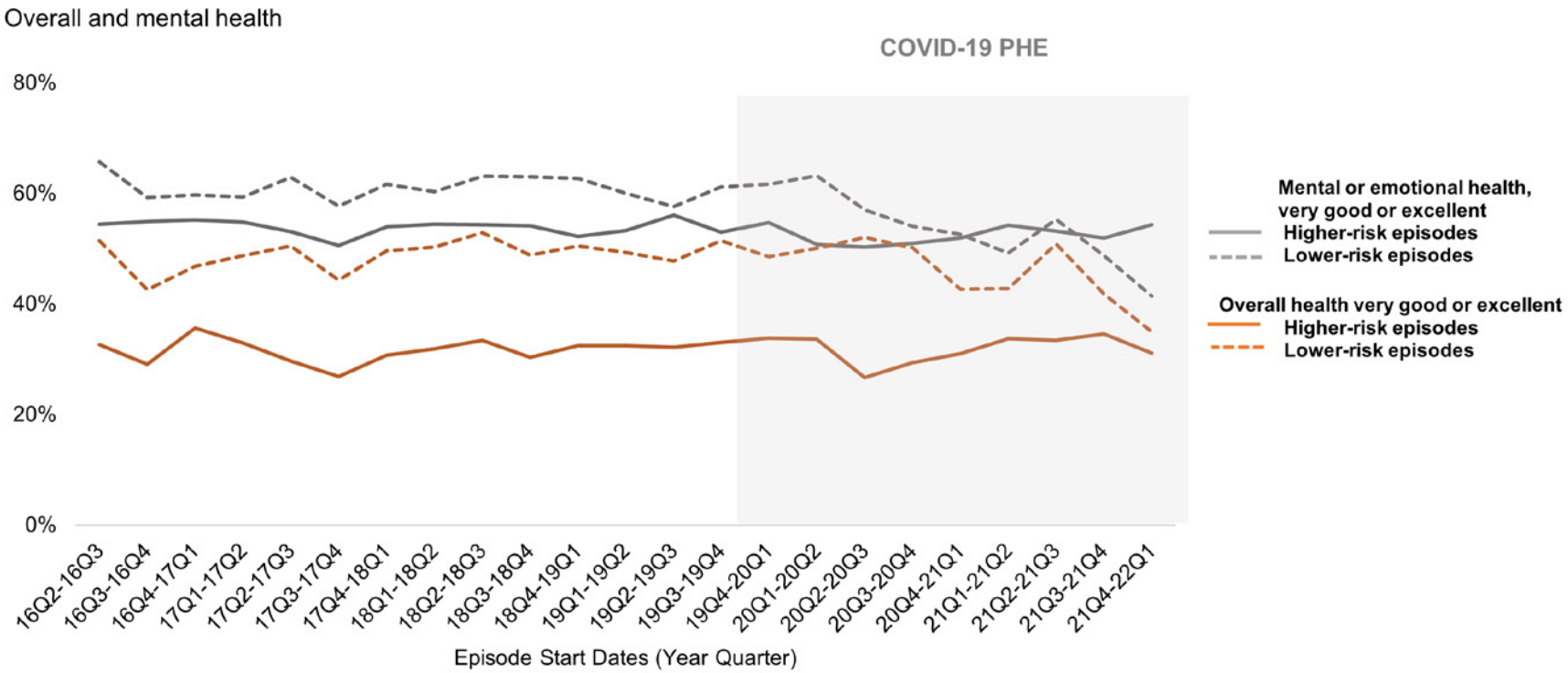
Source: OCM Caregiver Survey, April 2016–December 2021.

Notes: At least some portions of episodes included in Waves 15–23 occurred during the COVID-19 PHE. Estimates were weighted for sampling and nonresponse and adjusted for demographic characteristics, health status, cancer type and treatment duration, the calendar month when the episode was triggered, practice characteristics, and the incidence and prevalence of COVID-19 cases and deaths during each episode. Patients with a COVID-19 diagnosis during the episode were excluded from analysis. The baseline survey covered the time period April 2016 through September 2016. PHE: Public health emergency.

C.5 Patient-Reported Health Outcomes

C.5.1 Overall Health Status

Exhibit C-12: Patient-reported Health Status Declined During the COVID-19 Public Health Emergency for Patients with Lower-Risk Episodes



Source: OCM Patient Survey. Includes episodes initiated from April 2016 to December 2021; data collection for these episodes occurred from January 2017 to August 2022.

Notes: N= 209,884 survey responses. Each survey wave included patients who had episodes over a six-month period (two quarters); for example, Q1 refers to episodes that started in January through March. Gray shading in the chart indicates survey waves with some portion of episodes occurring during the COVID-19 public health emergency. OCM episodes lasted for 180 days, and patients typically received surveys roughly six to nine months following the start of their episode. Estimates were weighted for sampling and nonresponse and regression adjusted. Patients with a COVID-19 diagnosis during the episode were excluded from analysis.

Exhibit C-13: Patient-Reported Health Status Declined During the COVID-19 Public Health Emergency

	Health Thermometer (Range 0–100), mean	Overall Health Very Good or Excellent, %	Mental or Emotional Health, Very Good or Excellent, %
All episodes			
N	178,667	182,872	182,872
Baseline periods mean	71.9	38.3%	57.9%
Linear time trend, Waves 1–14	0.006	0.001	-0.001
Linear time trend, Waves 15–23	-0.457	-0.004	-0.006
Higher-risk episodes			
N	121,076	124,003	124,003
Baseline periods mean	69.9	32.7%	54.4%
Linear time trend, Waves 1–14	-0.029	0.000	0.000
Linear time trend, Waves 15–23	-0.483	-0.003	-0.002
Lower-risk episodes			
N	57,591	58,869	58,869
Baseline periods mean	76.6	51.4%	65.7%
Linear time trend, Waves 1–14	0.046	0.002	-0.001
Linear time trend, Waves 15–23	-0.370	-0.007	-0.015

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Source: OCM Patient and Caregiver Surveys, April 2016–December 2021.

Notes: At least some portion of episodes included in Waves 15–23 occurred during the COVID-19 public health emergency. Estimates were weighted for sampling and nonresponse and adjusted for demographic characteristics, health status, cancer type and treatment duration, the calendar month when the episode was triggered, practice characteristics, and the incidence and prevalence of COVID-19 cases and deaths during each episode. Patients with a COVID-19 diagnosis during the episode were excluded from analysis. The baseline survey covered the time period April 2016 through September 2016.

Exhibit C-14: OCM Patients With Higher-Risk Episodes Reported Slightly Improved Symptoms during OCM, Prior to the COVID-19 Public Health Emergency

	Prevalence of Symptoms, %							
	Pain	Energy Level	Emotional Problems	Nausea	Breathing	Coughing	Constipation or Diarrhea	Neuropathy
All episodes								
N	194,657	195,744	195,050	194,019	194,434	194,108	196,005	194,844
Baseline periods mean	54.4%	76.1%	48.8%	33.7%	28.4%	25.5%	60.9%	46.7%
Linear time trend, Waves 1–14	-0.002	-0.002	-0.001	-0.002	-0.001	-0.001	-0.003	-0.002
Linear time trend, Waves 15–23	-0.002	0.004	0.003	-0.004	-0.001	-0.003	0.002	0.000
Higher-risk episodes								
N	136,799	137,696	136,908	136,380	136,589	136,301	137,956	136,986
Baseline periods mean	59.8%	84.2%	52.5%	41.8%	34.5%	30.4%	72.3%	53.5%
Linear time trend, Waves 1–14	-0.002	-0.002	-0.001	-0.002	-0.0007	-0.001	-0.002	-0.0018
Linear time trend, Waves 15–23	-0.002	0.006	0.007	-0.004	0.000	-0.002	0.002	0.001
Lower-risk episodes								
N	57,858	58,048	58,142	57,639	57,845	57,807	58,049	57,858
Baseline periods mean	40.7%	55.6%	39.2%	13.3%	12.8%	12.9%	31.9%	29.7%
Linear time trend, Waves 1–14	-0.002	-0.002	-0.002	0.000	0.000	0.000	-0.002	-0.001
Linear time trend, Waves 15–23	-0.001	-0.002	-0.007	-0.004	-0.003	-0.004	0.000	-0.002

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Shading iOCM Patient and Caregiver Surveys, April 2016–December 2021.

Notes: At least some portion of episodes included in Waves 15–23 occurred during the COVID-19 public health emergency. Estimates were weighted for sampling and nonresponse and adjusted for demographic characteristics, health status, cancer type and treatment duration, the calendar month when the episode was triggered, practice characteristics, and the incidence and prevalence of COVID-19 cases and deaths during each episode. Patients with a COVID-19 diagnosis during the episode were excluded from analysis. The baseline survey covered the time period April 2016 through September 2016.

C.6 Survey Analysis of What Matters Most

Methods

The patient survey contained five composite measures calculated from responses to several survey questions related to patient experience and one single-item measure of overall satisfaction with the cancer care team (Exhibit C-4). See Appendix C.2 for additional detail on the survey questions that make up each composite. All six measures were scored on a scale of 0 to 10, where 0 was the worst possible score and 10 was the best possible score.

We used multivariate regression to assess how the five Oncology Care Model Patient Survey composite measures were associated with the overall rating of the cancer care team, before and after controlling for other factors. The independent variables controlled for in the regression analysis included: survey wave, demographic characteristics, health status, and practice-level characteristics.

Results

The mean of the overall rating of the cancer care team was 9.3 on a scale of 0 to 10, with a standard deviation of 1.4. While all measures were positively associated with the overall rating, Communication was more strongly associated with the overall rating than the other four composite measures, followed by the Access composite (**Exhibit C-15**). We found similar findings in bivariate analyses and before and after regression adjustment for other factors.

Exhibit C-15: Quality of Communication Correlated Most Strongly with Overall Rating of Cancer Care Team

Care Experience Composite Measures (Range: 0-10)	Mean (SD)	Coefficient	95% CI	p-value
Shared decision making	7.5 (2.7)	0.02	0.01 to 0.02	<0.001
Access	8.9 (1.6)	0.13	0.12 to 0.14	<0.001
Communication	**9.0 (1.8)**	**0.40**	**0.39 to 0.42**	**<0.001**
Exchanging information	8.4 (2.2)	0.05	0.05 to 0.06	<0.001
Enabling patient self-management	5.9 (3.0)	0.02	0.02 to 0.03	<0.001

Source: Oncology Care Model Patient Survey (2017-2022).
Notes: N = 209,884 survey responses. Estimates were weighted for sampling and non-response and adjusted for survey wave, demographic characteristics, health status, and practice-level characteristics. Patients with a COVID-19 diagnosis during the episode were excluded from analysis. SD: Standard deviation. CI: Confidence interval.

D. Clinical Analyses

D.1. Overview of Methods for Clinical Analyses

Details about variable definitions for each of the clinical analyses are described in this appendix section. Impact analyses used DID models, which included all adjustment variables as described in **Appendix A.1**, including covariates for COVID-19. We also estimated DID effects over time, for PP1–3, PP4–6, PP7–9, and PP10–11. Unless otherwise noted, DID impacts stratified over time are reported in the **Supplemental Appendices** accompanying this report.

For DID analyses, we examined trends in OCM and comparison episodes over the baseline period, to understand whether trends were parallel before the Model began. Specifically, we estimated linear probability models fit to baseline period episodes that included an indicator variable for OCM practices (an intercept) in addition to a linear interaction between quarter number and treatment group (a slope). We focused the DID analyses on variables for which we did not find evidence for differential trends, with two exceptions, both related to prophylactic use of antiemetics. These were Prophylactic Use of NK1 Antagonists During High-Emetic-Risk Chemotherapy and Prophylactic Use of Guideline-Recommended Antiemetics. There were numerous changes over time in the use of antiemetics that we believed were important to document. For these measures, we noted when we observed differential trends (e.g., if a 95 percent confidence interval of the OCM slope effect did not contain zero) and included a footnote in the results cautioning the reader about our inability to make definitive interpretations of OCM impact for these two measures. We also described raw rates by quarter for all measures.

For some outcomes, we could not conduct DID models due to limited or no use of a given treatment in the baseline period (e.g., for treatments that became available after the start of the model). For these (where baseline rates were less than 5 percent among all episodes), we estimated linear probability models fit to the intervention period (or to the period where a treatment was available) to examine differential trends in adoption between OCM and comparison practices. As with models examining differential baseline trends, these models included an indicator variable for OCM practices (an intercept) in addition to a linear interaction between quarter number and treatment group (a slope). We report the estimated differential trend (e.g., rate of adoption) in addition to an adjusted difference in the proportion of episodes using the treatment after these treatments became available. We adjusted these models for the same covariates as in the DID models.

D.2. Biosimilar versus Originator Anti-Cancer Therapies

Three biosimilar infused anti-cancer therapies became available in recent years: rituximab, trastuzumab, and bevacizumab. Biosimilar therapies are less costly than the originator product and offer an opportunity for savings without altering the choice of agent. For two of these three drugs, a subcutaneous formulation was introduced shortly before the biosimilar product became available.

Rituximab for Lymphoma

Rituximab is an infused therapy used to treat lymphoma. It was initially approved by the U.S. Food and Drug Administration (FDA) in November 1997, and expanded indications were approved in 2011 and 2021. It is infused weekly, or every three to eight weeks, depending on the indication. In June 2017, a subcutaneous form of rituximab called Rituxan Hycela (rituximab with hyaluronidase) was approved. Subcutaneous rituximab is injected by clinical staff in the office, and patients are observed for 15 minutes. For patients receiving rituximab only and no other infusions, use of subcutaneous rituximab could more quickly free up a chair in the infusion center for another patient and enable the clinic to treat more patients. The first infused rituximab biosimilar was approved in 2019. There is no biosimilar for the subcutaneous product.

We examined the adjusted rate of adoption and differences in the proportion of episodes in which the following treatments were used: (1) subcutaneous rituximab among episodes with any form of rituximab, and (2) biosimilar rituximab among episodes with originator or biosimilar infused rituximab (i.e., omitting subcutaneous rituximab; results were similar examining biosimilar rituximab among episodes with any form of rituximab). Analyses were limited to PP6 through PP11, the time period when these treatments were available. As described in the main text of this report and shown in Exhibit D-1, there was very little use of subcutaneous rituximab and similar rates of use in OCM and comparison episodes, with a slightly faster rate of adoption in OCM versus comparison.

Exhibit D-1: Slightly Faster Adjusted Rate of Adoption of Subcutaneous Rituximab for OCM versus Comparison Lymphoma Episodes, with Similar Levels of Use and No Difference in Rate of Adoption or Levels of Use for Subcutaneous Trastuzumab

Outcome	# of Episodes		Intervention Mean		Percentage Point Difference in Use	90% LCL	90% UCL	Rate of Adoption	90% LCL	90% UCL
	OCM	COMP	OCM	COMP						
Subcutaneous rituximab	27,125	25,532	5.5%	4.9%	0.6pp	-0.6pp	1.8pp	0.2pp	0.0 pp	0.4pp
Subcutaneous trastuzumab	17,204	16,502	2.3%	2.5%	-0.2pp	-1.2pp	0.8pp	-0.1pp	-0.3pp	0.1pp

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Source: Medicare claims 2019–2022. (Performance Periods 6-11).

Notes: OCM: OCM intervention group. COMP: Comparison group. LCL: Lower confidence limit. UCL: Upper confidence limit. pp: Percentage points.

As presented in the main report, we observed faster rates of adoption and higher levels of use of biosimilar versus originator rituximab for OCM versus comparison episodes. Results were similar in sensitivity analyses excluding the two largest OCM practices, for which no similarly sized comparison practices were available.

Trastuzumab for Human Epidermal Growth Factor 2 Positive Breast Cancer

Trastuzumab is an infused therapy, initially approved by the FDA in 2012, used to treat Human Epidermal Growth Factor 2 (HER2) positive breast cancer. It is typically given every three weeks for a year to patients receiving adjuvant chemotherapy for early-stage breast cancer, or until disease progression to patients with metastatic breast cancer. In June 2019, a subcutaneous form of trastuzumab (Herceptin Hylecta, or trastuzumab with hyaluronidase) was approved. Like subcutaneous rituximab, the dose is given in the office, and patients are observed for 15 minutes. Biosimilar trastuzumab products were approved starting in 2017, but their availability was delayed due to lawsuits.

We examined the adjusted rate of adoption and differences in the adjusted proportions of episodes in which the following treatments were used: (1) subcutaneous trastuzumab among episodes with any form of trastuzumab, and (2) biosimilar trastuzumab among episodes with originator or biosimilar infused trastuzumab (i.e., omitting subcutaneous trastuzumab; results were similar examining biosimilar rituximab among episodes with any form of trastuzumab). As described in the main report, we found very little use of subcutaneous trastuzumab and no difference in the rate of adoption or the proportion of episodes with any of subcutaneous trastuzumab for OCM versus comparison episodes; see also **Exhibit D-1**.

As presented in the main report, we observed faster rates of adoption and higher levels of use of biosimilar versus originator trastuzumab for OCM versus comparison episodes. Results were similar in sensitivity analyses excluding the two largest OCM practices, for which no similarly sized comparison practices were available.

Bevacizumab

Bevacizumab is an infused therapy approved for treatment of several cancers, including colorectal cancer (approved 2004), lung cancer (2006), breast cancer (2008; later revoked), brain cancer (2009), kidney cancer (2009), cervical cancer (2014), and ovarian cancer (2014). Biosimilar bevacizumab products were approved starting in 2017, but their availability was delayed because of lawsuits.

We focused on cancer episode types for which bevacizumab has active FDA approvals: colorectal, lung, ovarian, central nervous system (CNS) tumors, other female genitourinary, and kidney; **Exhibit D-2** shows the proportion of episodes with any bevacizumab use by cancer type. We used multivariable models to assess the adjusted rate of adoption and differences in the adjusted proportions of episodes during PP6 through PP11, in which biosimilar bevacizumab was used in OCM versus comparison episodes.

Exhibit D-2: Episodes with Use of Bevacizumab during PP6 through PP11

Cancer Type	Percent	Cancer Type	Percent
Colorectal cancer	53.0%	CNS tumor	9.1%
Ovarian cancer	21.4%	Other female genitourinary	6.2%
Lung cancer	9.2%	Kidney cancer	1.1%

Source: Medicare claims 2019–2022.

As presented in the main report, we observed faster rates of adoption and higher levels of use of biosimilar versus originator bevacizumab for OCM versus comparison episodes. Results were similar in sensitivity analyses excluding the two largest OCM practices, for which no similarly sized comparison practices were available.

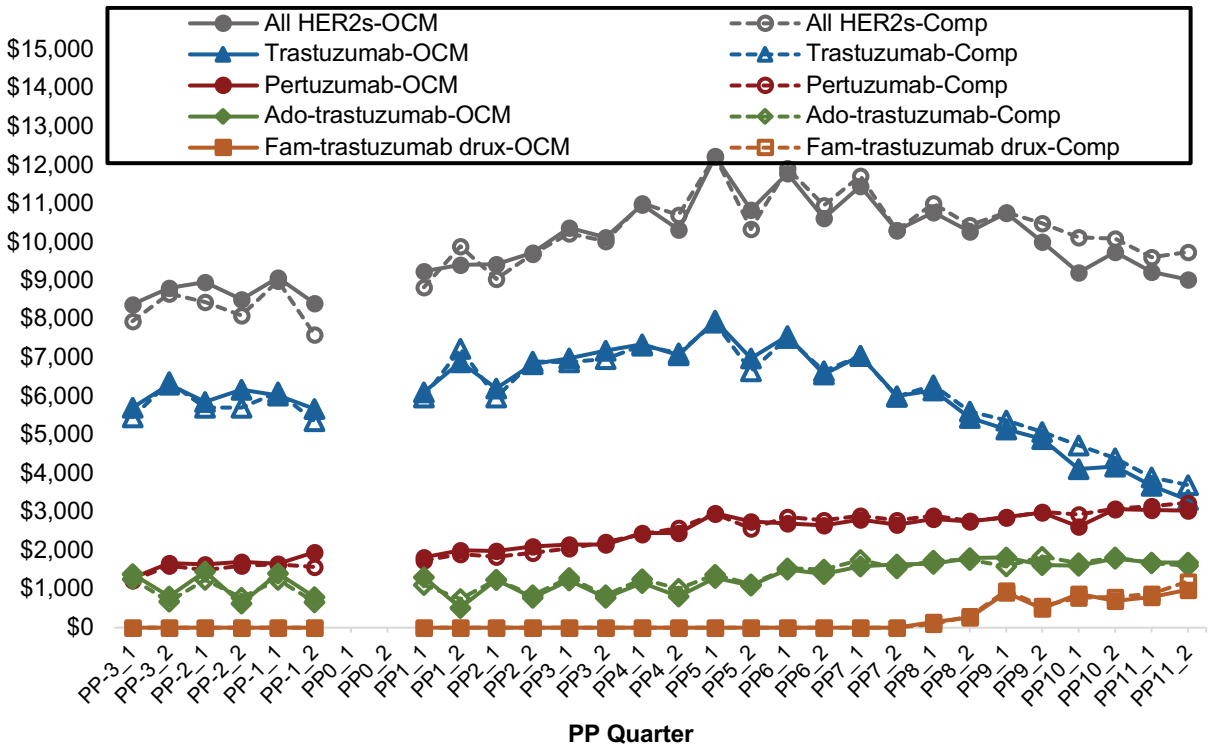
D.3. Spending on Chemotherapy for Breast Cancer

As noted in Section 5.2, we identified OCM-related reductions in payments for Part B chemotherapy for high-risk breast cancer that began as early as PP1. To understand the source of these savings, we conducted analyses examining Part B chemotherapy spending on various breast cancer drugs across all high-risk breast cancer episodes to identify sources of savings in Part B chemotherapy. We plotted unadjusted spending over time for each drug and for selected classes of drugs (e.g., HER2 targeted agents). For drugs available during the baseline period, we conducted DID analyses overall and by PP. For drugs available only during the intervention period, we used linear models to assess spending in the PPs for which the drug was available (for OCM and comparison episodes) and rates of increase in spending. The denominator for all analyses included all episodes for high-risk breast cancer. Additional results not included in the main section of the report are included here.

Protein-bound paclitaxel. As reported in the main report, we observed that OCM led to a relative savings in Part B payments of $125.5.

HER2 targeted therapies. As noted above, for patients with high-risk breast cancer with overexpression HER2, therapies that target the HER2 receptor are a critical component of systemic therapy. Trastuzumab has long been the primary HER2 targeted therapy (**Exhibit D-3**), and trastuzumab is now available as a biosimilar. In more-recent years, newer HER2 targeted therapies have become available, including pertuzumab, ado-trastuzumab emtansine, and fam-trastuzumab deruxtecan, and spending on these drugs has increased somewhat in recent PPs (**Exhibit D-3**).

Exhibit D-3: Spending on All HER2 Targeted Therapies Among All OCM and Comparison Episodes Over Time, Unadjusted



Source: Medicare claims 2014–2022.
Notes: OCM quarterly trend versus comparison group trend in baseline period for all HER2 targeted therapies: $38 per quarter (95% confidence interval: -$76, $152), P=0.52 HER2 = Human Epidermal Growth Factor 2.

As noted in the main section of the report, there were no cumulative OCM impacts on spending for all HER2 targeted therapies combined, or individual HER2 targeted therapies. However, when examining by PP, we observed a significant savings of $473.1 on trastuzumab in PP10–11, likely related to greater use and faster rate of adoption of biosimilar trastuzumab during that time (**Exhibit D-4**; see also Section 5.1). There was also a significant relative reduction in spending for pertuzumab in PP10–PP11 (**Exhibit D-4)**.

Exhibit D-4: OCM Led to a Reduction in Part B Chemotherapy Payments for Trastuzumab and Pertuzumab in PP10–PP11 and Ado-trastuzumab in PP4–6

Sum of Chemo Drug Payments per Episode	DID Impact PP 1–11	90% CI	DID Impact PP 1–3	90% CI	DID Impact PP 4–6	90% CI	DID Impact PP 7–9	90% CI	DID Impact PP 10–11	90% CI
Trastuzumab	-$141	-367, 84	-$79	-312, 154	-$56	-346, 233	-$142	-440, 156	-$473	-792, -154
Pertuzumab	-$96	-241, 49	-$34	-172, 104	-$138	-313, 37	-$118	-320, 85	-$246	-488, -5
Ado-trastuzumab emtansine	-$104	-241, 34	-$105	-244, 33	-$182	-347, -17	-$86	-275, 103	-$71	-290, 147

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: DID: Difference-in-differences. CI: Confidence Interval. PP: Performance Period.

Other Part B drugs. As noted in the main section of the report, across all high-risk breast cancer episodes, there was relatively little spending on other Part B drugs frequently used in the treatment of high-risk breast cancer, including fulvestrant, eribulin, docetaxel, and doxorubicin, and no impact of OCM on spending on fulvestrant or eribulin (**Exhibit D-5**; DID analyses were not conducted for docetaxel or doxorubicin due to limited spending on these drugs).

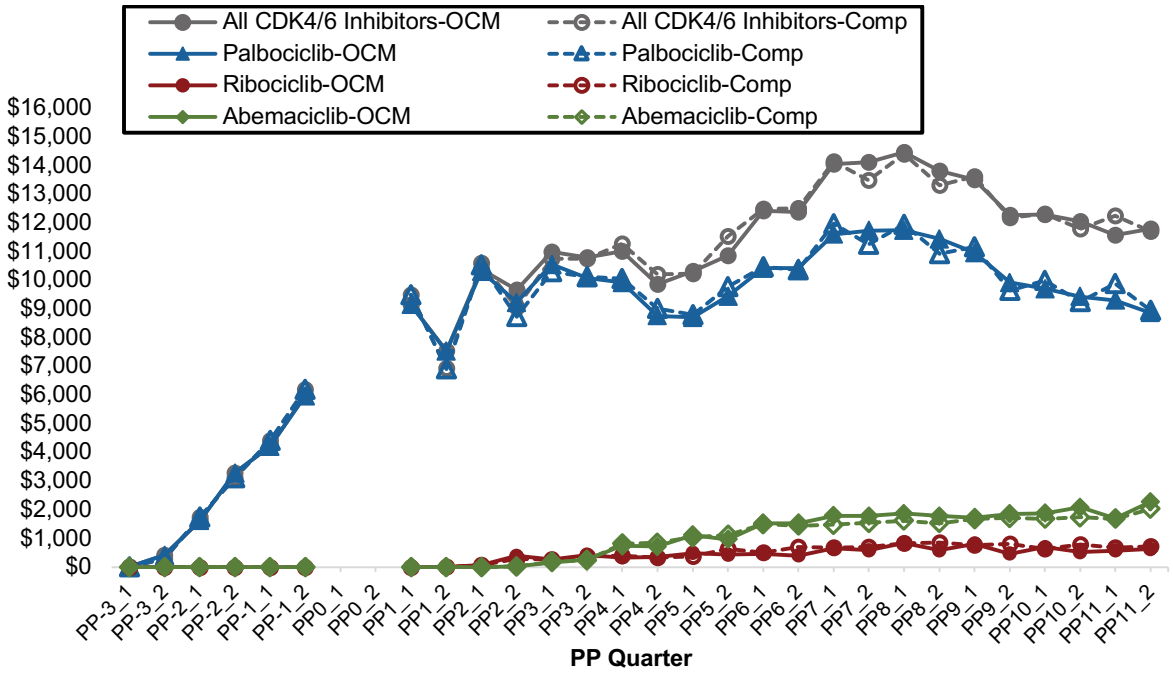
Exhibit D-5: No OCM Impact on Chemotherapy Payments for Fulvestrant or Eribulin Across All Episodes

Sum of Chemo Drug Payments per Episode	# of Episodes		OCM		COMP		Impact Estimates			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Impact	90% LCL	90% UCL	Percent Change
Fulvestrant	172,546	171,278	$1,492	$1,991	$1,528	$2,031	-$4	-$76	$69	-0.2%
Eribulin	172,546	171,278	$516	$471	$476	$434	-$3	-$61	$54	-0.7%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: DID: Difference-in-differences. CI: Confidence Interval. PP: Performance Period.

Part D drugs. As noted in the main section of the report, several Part D drugs have become increasingly important in the treatment of breast cancer, most notably the CDK4/6 inhibitor palbociclib, and more recently CDK4/6 inhibitors ribociclib and abemaciclib (Exhibit D-6).

Exhibit D-6: Spending on All CDK4/6 Inhibitors Among All OCM and Comparison Episodes Over Time, Unadjusted



Source: Medicare claims 2014–2022.
Notes: Spending based on Part D Gross Drug Cost; OCM quarterly trend versus comparison group trend in baseline period for all CDK4/6 inhibitors: -$32 per quarter (95% confidence interval: -$155, $91), P=0.61.

We observed no OCM-related relative differences in use of CDK4/6 inhibitors (**Exhibit D-7**), although in analyses examining spending differences and rate of spending change in the intervention period after ribociclib and abemaciclib became available during the intervention period, we observed that OCM versus comparison episodes had a greater relative increase in spending for abemaciclib (**Exhibit D-8**).

Exhibit D-7: No Impact of OCM on Spending for Any CDK4/6 Inhibitor (Palbociclib, Ribociclib, and Abemaciclib) or on Spending for Palbociclib (Individually)

Sum of Chemo Drug Payments per Episode	# of Episodes		OCM		COMP		Impact Estimates			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Impact	90% LCL	90% UCL	Percent Change
All CDK4/6 Inhibitors	172,546	171,278	$5,481	$10,941	$5,022	$10,759	-$278	-$682	$126	-5.1%
Palbociclib	172,546	171,278	$4,842	$9,519	$4,375	$9,399	-$347	-$737	$43	-7.2%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Notes: Spending based on Part D Gross Drug Cost. OCM: OCM intervention group. COMP: Comparison group. Int: Intervention period. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit. CDK4/6: Cyclin-dependent kinase 4 and 6.

Exhibit D-8: No Spending Difference Between OCM and Comparison Episodes for Ribociclib or Abemaciclib in the Intervention Period but a Slower rate of Spending Increase for Ribociclib and a Greater Rate of Spending Increase for Abemaciclib in OCM vs. Comparison Episodes

Sum of Chemo Drug Payments per Episode	# of Episodes		Intervention Mean		Difference in Spending	90% LCL	90% UCL	Rate of Spending Increase	90% LCL	90% UCL
	OCM	COMP	OCM	COMP						
Ribociclib	136,429	133,197	$478	$468	$10	-$131	$151	-$10/qtr-	$20	-$0.1.
Abemaciclib	123,395	119,462	$1,244	$1,186	$59	-$142	$259	$20/qtr$	2	$37

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2017–2022 (Performance Periods 2-11).
Notes: Spending based on Part D Gross Drug Cost. OCM: OCM intervention group. COMP: comparison group. LCL: Lower confidence limit. UCL: Upper confidence limit.

We observed declining spending on everolimus over time, and no OCM impact on everolimus use (**Exhibits D-9**).

Exhibit D-9: No OCM Impact on Spending for Everolimus

Sum of Chemo Drug Payments per Episode	# of Episodes		OCM		COMP		Impact Estimates			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Impact	90% LCL	90% UCL	Percent Change
Everolimus	172,546	171,278	$2,275	$1,056	$2,295	$1,091	-$15	-$231	$201	-1%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: Spending based on Part D Gross Drug Cost; OCM: OCM intervention group. COMP: Comparison group. Int: Intervention period. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit.

D.4. Spending on Chemotherapy for Multiple Myeloma

As noted in the main report, multiple myeloma is the cancer bundle with the highest episode spending. We sought to understand spending further for myeloma episodes. We conducted analyses examining Part B and Part D spending on chemotherapy, examining spending on various drugs used to treat multiple myeloma across all myeloma episodes. We plotted unadjusted spending over time for each drug and for selected classes of drugs (e.g., immunomodulatory agents, proteasome inhibitors). For drugs available during the baseline period, we conducted DID analyses. For drugs available only during the intervention period, we used linear models to assess spending in the PPs for which the drug was available (for OCM and comparison episodes) and rates of increase in spending. The denominator for all analyses included all episodes for high-risk breast cancer. In addition, we characterized chemotherapy regimens based on drugs administered or filled within the first 30 days of the start of an episode. We examined regimens among all 218,392 episodes and among the 26% of episodes with no chemotherapy in the last 6 months (note, the latter group is mostly patients with newly diagnosed or treated myeloma, although could include patients with prior therapy if they were new to Medicare as well as patients who had a break in treatment—24% of this group ever had a prior myeloma episode). We additionally examined regimens after restricting to the subset of individuals enrolled in both Part B and Part D (85% of all myeloma episodes and 77% of myeloma episodes without an episode in the prior 6 months). Additional results not included in the main section of the report are included here.

Immunomodulatory Agents. As reported in the main report, we observed no OCM impact on use of immunomodulatory agents when examining all of the agents together (**Exhibit D-10**). We further observed no OCM impact for any of the agents when examined individually, including lenalidomide, pomalidomide, or thalidomide. (**Exhibit D-11**).

Exhibit D-10: No Impact of OCM on Part D Drug Payments per Episode for Immunomodulatory Agents

Sum of Chemo Drug Payments per Episode	# of Episodes		OCM		COMP		Impact Estimates			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Impact	90% LCL	90% UCL	Percent Change
Immunomodulatory agents (IMiDs)	105,904	109,113	$36,061	$48,763	$36,263	$49,264	-$300	-$1,270	$671	-0.8%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: COMP: Comparison group. DID: Difference-in-differences. Int.: Intervention period. LCL: Lower confidence limit. OCM: OCM intervention group. PP: Performance period. UCL: Upper confidence limit.

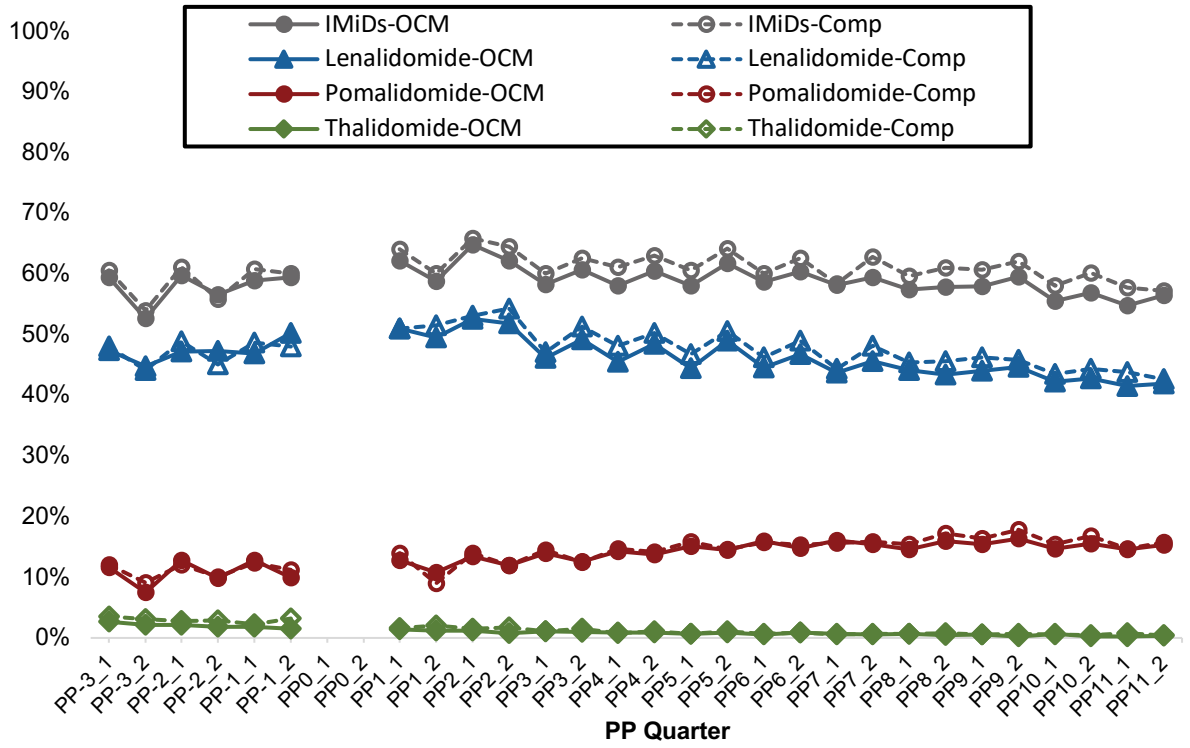
Exhibit D-11: No DID Impact of OCM on Part D Drug Payments for Immunomodulatory Agents Lenalidomide, Pomalidomide, or Thalidomide

Sum of Chemo Drug Payments per Episode	# of Episodes		OCM		COMPI		mpact Estimates			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Impact	90% LCL	90% UCL	Percent Change
Lenalidomide	105,904	109,113	$27,416	$37,737	$27,467	$37,974	-$187	-$1,047	$674	-0.7%
Pomalidomide	105,904	109,113	$8,019	$10,816	$8,044	$11,048	-$206	-$982	$569	-2.6%
Thalidomide	105,904	109,113	$626	$210	$751	$242	$93	-$45	$232	14.9%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: COMP: Comparison group. DID: Difference-in-differences. Int.: Intervention period. LCL: Lower confidence limit. OCM: OCM intervention group. PP: Performance period. UCL: Upper confidence limit.

Exhibit D-12 shows the proportion of episodes treated with immunomodulatory agents, including lenalidomide, pomalidomide, and thalidomide. Lenalidomide use declined slightly in later performance periods as pomalidomide use increased. Patterns were generally similar in OCM and comparison episodes.

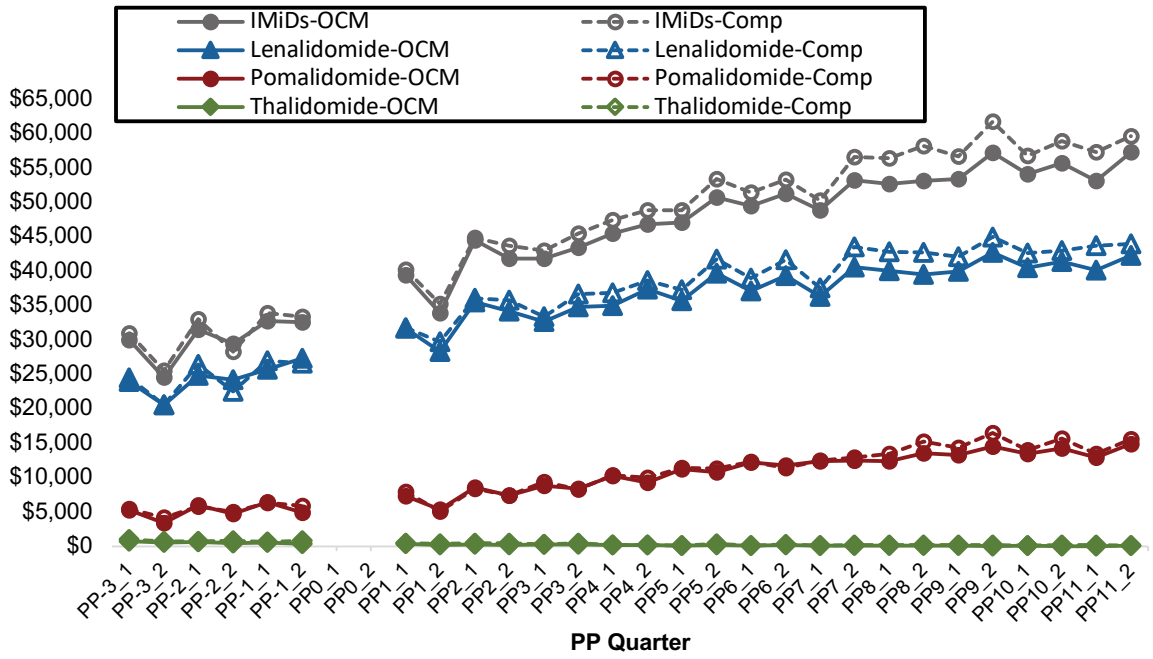
Exhibit D-12: Unadjusted Proportion of Episodes with Use of Immunomodulatory Agents (IMiDs) was Similar in OCM and Comparison Episodes Over Time



Source: Medicare claims 2014–2022.

Exhibit D-13 shows spending on immunomodulatory agents, over time across all episodes. Spending on lenalidomide increased despite stable or slightly decreasing use. This could be due to higher or more frequent doses or price increases (which have been previously documented). Patterns were generally similar in OCM and comparison episodes, with slightly higher spending on lenalidomide in comparison episodes.

Exhibit D-13: Unadjusted Spending on Immunomodulatory Agents (IMiDs) Among All Episodes Increased Over Time and Was Similar Among OCM and Comparison Episodes



Source: Medicare claims 2014–2022.
Notes: SOCM quarterly trend versus comparison group trend: -$71 per quarter (95% confidence interval: -$268, $126), P=0.48.

Proteosome Inhibitors. As described in the main report, we observed no OCM impact on use of proteosome inhibitors when examining all of the agents together (**Exhibit D-14**). We further observed no OCM impact on spending for the two most frequently used drugs in this class, bortezomib and carfilzomib (**Exhibit D-15**). In analyses examining the intervention period only, we observed greater spending on ixazomib for OCM relative to comparison episodes, although there was no difference in the rate of spending increase (Exhibit D-16).

Exhibit D-14: No Impact of OCM on Parts B & D Drug Payments per Episode for Proteasome Inhibitors

Sum of Chemo Drug Payments per Episode	# of Episodes		OCM		COMP		Impact Estimates			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Impact	90% LCL	90% UCL	Percent Change
All proteasome inhibitors	105,904	109,113	$11,884	$12,814	$11,534	$12,070	$394	-$117	$904	3.3%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: COMP: Comparison group. DID: Difference-in-differences. Int.: Intervention period. LCL: Lower confidence limit. OCM: OCM intervention group. PP: Performance period. UCL: Upper confidence limit.

Exhibit D-15: No DID Impact of OCM on Part B Drug Payments per Episode for Individual Proteasome Inhibitors Bortezomib or Carfilzomib

Sum of Chemo Drug Payments per Episode	# of Episodes		OCM		COMP		Impact Estimates			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Impact	90% LCL	90% UCL	Percent Change
Bortezomib	105,904	109,113	$7,337	$5,559	$7,254	$5,504	-$28	-$291	$234	-0.4%
Carfilzomib	105,904	109,113	$4,247	$4,052	$3,977	$3,806	-$24	-$390	$342	-0.6%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: COMP: Comparison group. DID: Difference-in-differences. Int.: Intervention period. LCL: Lower confidence limit. OCM: OCM intervention group. PP: Performance period. UCL: Upper confidence limit.

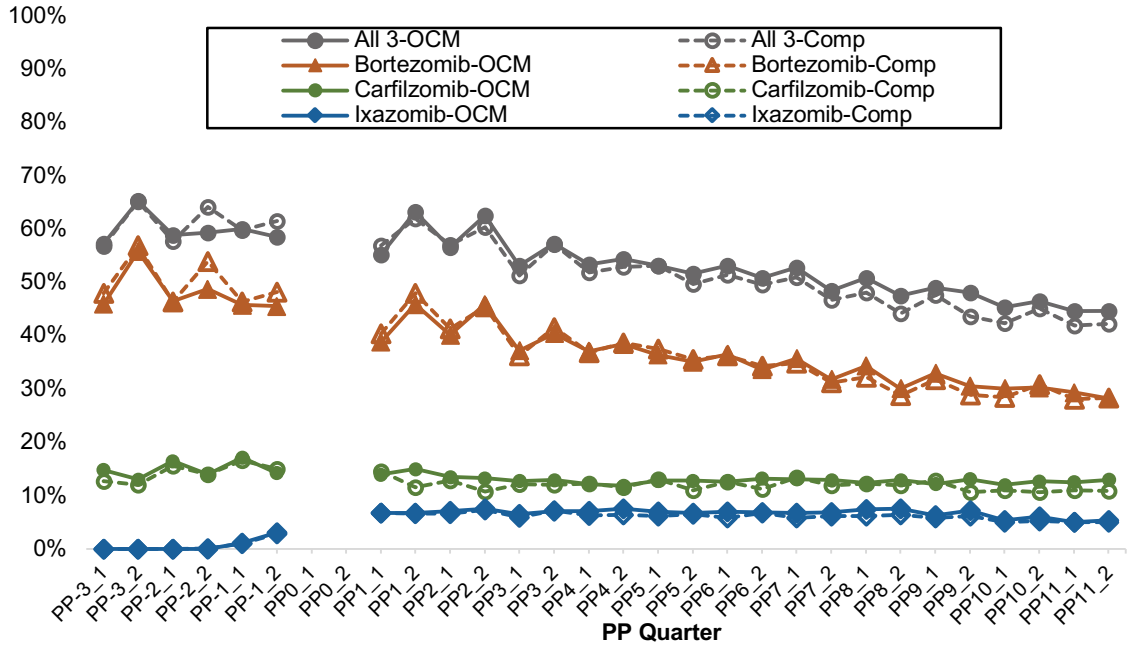
Exhibit D-16: Higher Part D Spending per Episode for Ixazomib for OCM vs. Comparison Episodes with Similar Rate of Spending Increase

	# of Episodes		Intervention Mean		Difference in Spending	90% LCL	90% UCL	Rate of Spending Increase	90% LCL	90% UCL
	OCM	COMP	OCM	COMP						
Ixazomib	86,791	88,318	$3,255	$2,786	$469	$109	$829	$19/qtr	-$9	$47

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10.
Source: Medicare claims 2014–2022.
Notes: COMP: Comparison group. DID: Difference-in-differences. Int.: Intervention period. LCL: Lower confidence limit. OCM: OCM intervention group. PP: Performance period. UCL: Upper confidence limit.

Exhibit D-17 shows the proportion of episodes with use of proteasome inhibitors, including bortezomib, carfilzomib, and ixazomib. Use of bortezomib declined over time, with relatively stable use of carfilzomib and ixazomib. Patterns were generally similar in OCM and comparison episodes.

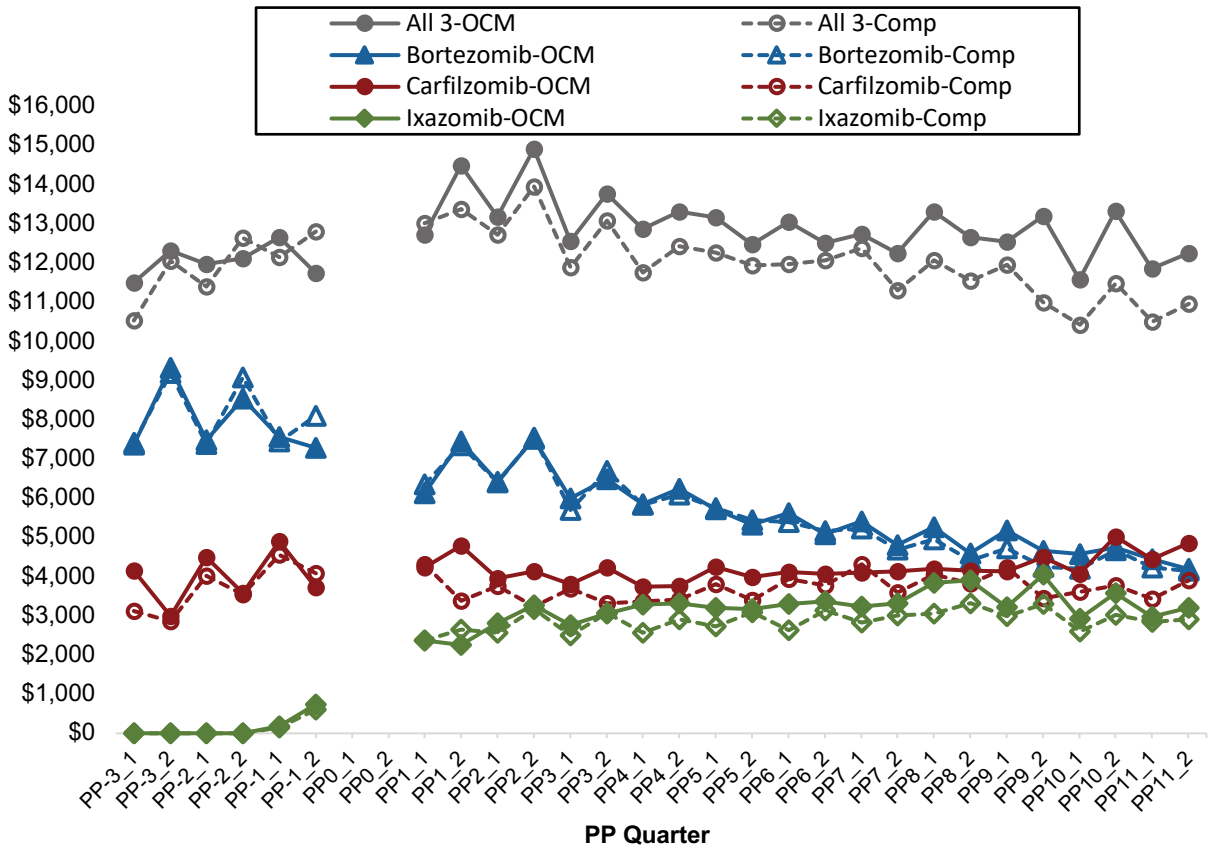
Exhibit D-17: Unadjusted Proportion of Episodes Treated with Proteasome Inhibitors Similar in OCM and Comparison Episodes Over Time



Source: Medicare claims 2014–2022.; results are unadjusted.

Exhibit D-18 shows spending on proteasome inhibitors. Spending on bortezomib declined over time as generic versions became available. Spending on other drugs, for which no generic alternatives were available, increased over time, despite relatively stable patterns of use shown above. Patterns were generally similar in OCM and comparison episodes.

Exhibit D-18: Unadjusted Spending on Proteasome Inhibitors Among All Episodes was Similar for OCM and Comparison Episodes Over Time



Source: Medicare claims 2014–2022.
Notes: OCM quarterly trend versus comparison group trend: -$222 per quarter (95% confidence interval: -$348, -$96), P=0.001.

Other newer myeloma therapies. We observed similar spending and rate of spending increase for daratumumab, elotuzumab, isatuximab, and selinexor, all of which became available during the intervention period (**Exhibit D-19**).

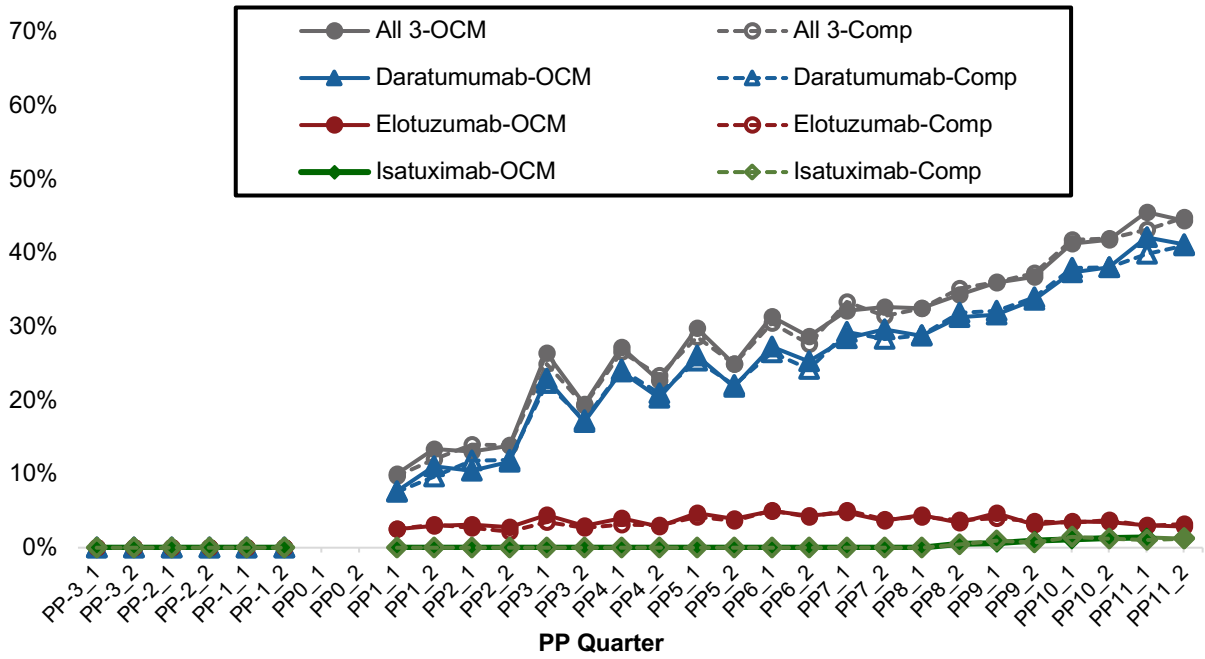
Exhibit D-19: Similar Part B Chemotherapy Payments and Rate of Spending Increase for Daratumumab, Elotuzumab, Isatuximab, and Selinexor in OCM and Comparison Episodes

	# of Episodes		Intervention Mean		Difference in Spending	90% LCL	90% UCL	Rate of Spending Increase	90% LCL	90% UCL
	OCM	COMP	OCM	COMP						
Daratumumab	86,791	88,318	$10,815	$11,027	-$212	-$711	$286	$4/qtr	-44	51
Elotuzumab	86,791	88,318	$1,282	$1,331	-$49	-$236	$139	-$15/qtr	-31	2
Isatuximab	31,420	31,131	$274	$272	$2	-$107	$111	$8/qtr	-19	35
Selinexor	48,124	47,968	$510	$465	$45	-$44	$135	-$0/qtr	-24	23

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10.
Source: Medicare claims 2016–2022. Daratumumab included PP1-11; Elotuzumab included PP1-11; Isatuximab included PP8-11; Selinexor included PP6-11.
Notes: COMP: comparison group. DID: Difference-in-differences. Int.: Intervention period. LCL: Lower confidence limit. OCM: OCM intervention group. PP: Performance period. UCL: Upper confidence limit.

Exhibit D-20 shows the proportion of episodes treated with daratumumab, elotuzumab, and isatuximab (all monoclonal antibodies). Use of daratumumab increased substantially over time, with relatively little use of the other drugs. Patterns were generally similar in OCM and comparison episodes.

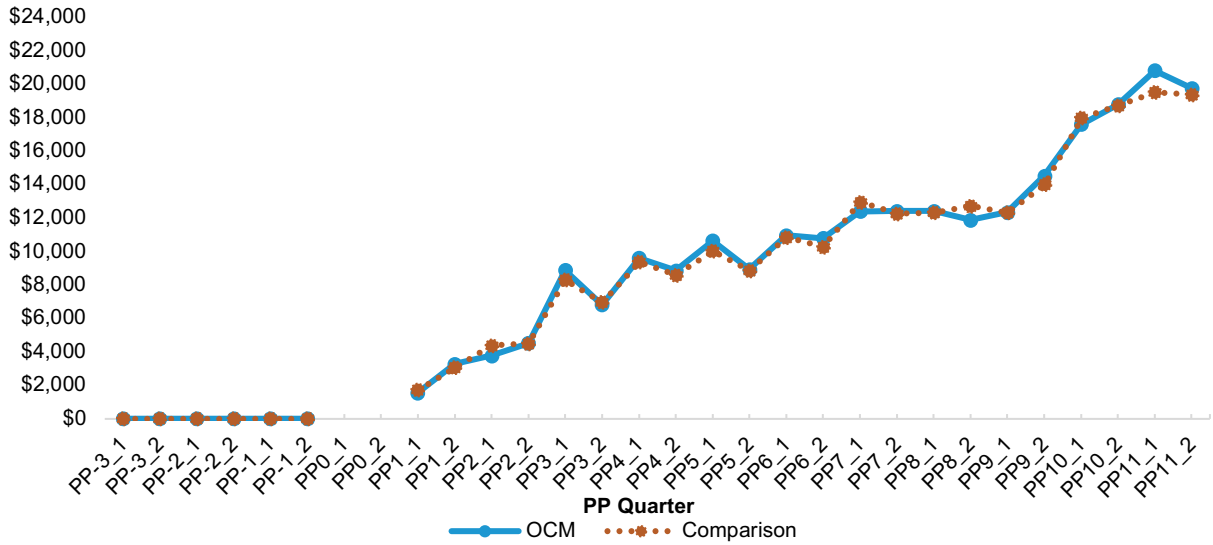
Exhibit D-20: Unadjusted Proportion of Episodes with Monoclonal Antibody Use Was Similar in OCM and Comparison Episodes; Daratumumab Use Increased Substantially Over Time



Source: Medicare claims 2014–2022.

Exhibit D-21 shows spending on daratumumab over time. Spending increased sharply in PP9, coinciding with publication of the practice changing GRIFFIN trial in August 2020.[lxxxvii]

Exhibit D-21: Unadjusted Spending on Daratumumab Among All Episodes Increased Markedly Over Time in Both OCM and Comparison Episodes



Source: Medicare claims 2014–2022.

We observed no DID impact for less frequently used melphalan or cyclophosphamide (**Exhibit D-22**).

Exhibit D-22: No DID Impacts on Part B Chemotherapy Payments per Episode for Melphalan or Cyclophosphamide

Sum of Chemo Drug Payments per Episode	# of Episodes		OCM		COMP		Impact Estimates			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Impact	90% LCL	90% UCL	Percent Change
Melphalan	105,904	109,113	$35	$29	$51	$36	$9	-$22	$41	26.7%
Cyclophosphamide	105,904	109,113	$160	$66	$167	$70	$3	-$23	$28	1.8%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: COMP: comparison group. DID: Difference-in-differences. Int.: Intervention period. LCL: Lower confidence limit. OCM: OCM intervention group. PP: Performance period. UCL: Upper confidence limit.

When we examined drugs filled or administered within 30 days of the start of the episode among patients enrolled in Parts B and D, we observed similar patterns of drugs used, both among all myeloma episodes (**Exhibit D-23**) and when limiting to episodes with no episode in the prior 6 months (**Exhibit D-24**).

Exhibit D-23: Chemotherapy Regimens for OCM and Comparison Episodes in Baseline and Intervention Periods (all myeloma episodes), includes only beneficiaries enrolled in Parts B and D

Initial Treatment Regimen	OCM		COMP	
	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean
Lenalidomide	41.4	32.0	39.9	33.0
Bortezomib	24.5	13.8	24.0	13.0
Bortezomib + Lenalidomide	7.7	9.4	9.1	9.7
Daratumumab	0.0	6.9	0.0	6.7
Pomalidomide	6.8	4.6	7.1	4.9
Carfilzomib	5.6	3.9	4.9	3.4
Daratumumab + Pomalidomide	0.0	4.3	0.0	4.3
Daratumumab + Lenalidomide	0.0	3.1	0.0	3.0
Ixazomib	0.0	2.5	0.0	2.3
Bortezomib + Daratumumab	0.0	2.0	0	2.2
Ixazomib + Lenalidomide	0.1	2.3	0.0	1.9
Bortezomib + Cyclophosphamide	2.5	1.1	2.8	1.3
Other	11.4	14.1	12.2	14.3

Source: Medicare claims 2014–2022.

Exhibit D-24: Chemotherapy Regimens for OCM and Comparison Episodes in Baseline and Intervention Periods (among beneficiaries with no chemotherapy in the prior 6 months), includes only beneficiaries enrolled in Parts B and D

Initial Treatment Regimen	OCM		COMP	
	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean
Lenalidomide	33.5	23.2	31.5	23.9
Bortezomib + Lenalidomide	12.9	23.6	13.3	23.8
Bortezomib	32.4	16.7	31.9	15.6
Daratumumab	0.0	5.0	0.0	5.1
Bortezomib + Cyclophosphamide	4.9	2.9	5.6	3.4
Pomalidomide	3.9	3.0	4.5	3.0
Carfilzomib	3.4	2.6	3.9	2.4
Daratumumab + Lenalidomide	0.0	3.0	0.0	2.9
Bortezomib + Daratumumab	0.0	2.2	0.0	2.4
Daratumumab + Pomalidomide	0.0	1.9	0.0	2.0
Ixazomib	0.0	2.0	0.0	2.0
Other	9.0	13.9	9.3	13.5

Source: Medicare claims 2014–2022.

D.5. Timeliness of Post-Surgical Chemotherapy Initiation

Measures and Analytic Approach

Timeliness of chemotherapy is a quality measure that can be assessed using administrative claims data. Observational studies suggest that cancer outcomes may be better for patients who receive more-timely chemotherapy, although such studies may not adequately account for differences in patients whose chemotherapy is and is not delayed. , Nevertheless, the ASCO Quality Oncology Practice Initiative (QOPI) adopted measures of adjuvant chemotherapy within two months of surgery for stage III colon cancer (QOPI measure 68) and adjuvant chemotherapy within 60 days after surgery for stage II or IIIA non-small cell lung cancer (measure 81). Although QOPI does not have a similar measure for breast cancer, prior research suggests that adverse outcomes are associated with chemotherapy delays of more than 60 days.[xl]

For episodes for colorectal and high-risk breast cancer, we assessed chemotherapy initiation within 60 days after surgery. We assessed chemotherapy initiation after lung cancer surgery for AR03 but found evidence of differential baseline trends—indicating that trends over time for the OCM and comparison groups may have differed before the model began; we therefore did not pursue analyses further in the lung cancer subgroup.

Specifically, we examined the following two clinical scenarios:

Chemotherapy following lumpectomy or mastectomy for high-risk breast cancer

Chemotherapy following colon or rectum resection for colorectal cancer

We identified chemotherapy treatment episodes with a qualifying surgery (presumed curative-intent cancer surgery) in the 180 days before the start of the episode. Specifically, we identified chemotherapy episodes with surgeries in the 180 days before the episode start (denominator) and receipt of the first dose of chemotherapy within 60 days after surgery (numerator). We focused on adjuvant chemotherapy that occurred after surgery and did not examine episodes where chemotherapy began before surgery.

Some patients receive adjuvant (postoperative) radiation therapy in addition to adjuvant chemotherapy. Most patients who receive both chemotherapy and radiation in the postoperative setting receive chemotherapy first. In preliminary analyses, we observed that among individuals who had presumed curative-intent surgery followed by chemotherapy within 180 days, receipt of radiation between surgery and chemotherapy was infrequent (1 percent of episodes for colorectal cancer and <10 percent for breast cancer). Given the small number of episodes with radiation between episodes, and the high rates of chemotherapy within 60 days for them, we used the same definition of timeliness of chemotherapy for patients who did and did not receive radiation. We did not include episodes from the first quarter of the baseline and intervention periods in our analysis, to ensure that we were identifying patients with no chemotherapy in the prior six months.

Results

As noted in the main report, OCM had no cumulative impact on the proportion of patients receiving timely chemotherapy following surgery for colorectal cancer or breast cancer through PP11, as shown in **Exhibit D-25**. Results were similar in sensitivity analyses excluding the two largest OCM practices, for which no similarly sized comparison practices were available.

Exhibit D-25: No Cumulative OCM Impact on Timeliness of Adjuvant Chemotherapy for Colorectal Cancer or Breast Cancer

	# of Episodes		OCM		COMP		Impact Estimates			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Impact	90% LCL	90% UCL	Percent Change
Colorectal cancer	17,783	18,127	60.4%	61.9%	61.4%	63.2%	-0.3pp	-2.2pp	1.7pp	-0.4%
Breast cancer (high risk)	22,645	23,446	71.9%	71.1%	74.1%	72.2%	1.1pp	-0.8pp	3.0pp	1.5%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: OCM: OCM intervention group. COMP: Comparison group. Int.: Intervention period. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit. pp: Percentage points.

D.6. Patient Adherence to Oral Medications

After learning about OCM practices' efforts to support patient adherence, we assessed whether OCM was associated with better adherence to oral treatment regimens. We examined two cancer types for which adherence to oral drugs has a major role in treatment: high-intensity prostate cancer and chronic myeloid leukemia (CML). These analyses were limited to patients who had Part D coverage for all months of their cancer treatment episodes.

Measures and Analytic Approach

For high-intensity prostate cancer episodes, we focused on adherence to abiraterone or enzalutamide. For the analysis of adherence to tyrosine kinase inhibitors (TKIs), we selected episodes with 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 also assessed the use of any of the TKIs (including imatinib, dasatinib, nilotinib, bosutinib, and ponatinib).

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 that patient's cancer. For high-intensity prostate cancer, we looked for a switch to enzalutamide or apalutamide (if on abiraterone); abiraterone or apalutamide (if on enzalutamide); or use of docetaxel, cabazitaxel, sipuleucel-T, or mitoxantrone, suggesting progression.

Results

As noted in the main report, DID analysis showed no impact of OCM on improved adherence among patients taking TKIs for CML or enzalutamide or abiraterone for prostate cancer (**Exhibit D-26**). Results were similar in sensitivity analyses excluding the two largest OCM practices, for which no similarly sized comparison practices were available).

Exhibit D-26: No Impact of OCM on Adherence (Proportion of Days Covered) to TKIs for CML or Enzalutamide or Abiraterone for Prostate Cancer

Adherence	# of Episodes		OCM		COMP		Impact Estimates Through PP11			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Percentage Point Impact	90% LCL	90% UCL	Percent Change
Abiraterone/ enzalutamide for prostate cancer	43,676	52,434	89.0%	85.4%	89.6%	85.6%	0.3pp	-0.4pp	1.0pp	0.4%
TKIs for CML	19,280	20,368	87.7%	85.8%	87.9%	86.7%	-0.7pp	-1.6pp	0.1pp	-0.8%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: OCM: OCM intervention group. COMP: Comparison group. DID: Difference-in-differences. Int.: Intervention period. LCL: Lower confidence limit. PP: Performance period. UCL: Upper confidence limit. TKI: Tyrosine kinase inhibitor. CML: Chronic myeloid leukemia. pp: Percentage points.

D.7. Use of Bone-Modifying Agents for Patients with Bone Metastases

We evaluated the impact of OCM on the use of bone-modifying agents to prevent fracture in patients with bone metastases from breast cancer, prostate cancer, or lung cancer. We included episodes for breast cancer (high-risk or low-risk), prostate cancer (high-intensity or low-intensity), and lung cancer, where there was a Medicare Part A or Part B claim with a diagnosis code for bone metastases during the episode or within the 180 days before the start of that episode.

We assessed any use of a bone-modifying agent during the episode and then assigned episodes to the class of the first bone-modifying agent received during the episode: bisphosphonates (zoledronic acid or pamidronate) versus denosumab. First, we tested whether OCM affected the use of any bone-modifying agent during a six-month OCM episode. Second, we tested whether OCM affected the choice of Part B bone-modifying agent, among episodes with any bone-modifying agent.

Results

As noted in the main report, there were no relative differences in use of any bone-modifying agents for patients with bone metastases, but OCM led to relative reductions in the use of low-value bone-modifying agents during episodes for breast cancer, prostate cancer, or lung cancer with bone metastases. These impacts increased over time, as indicated in **Exhibit D-27**.

Exhibit D-27: Use of Bisphosphonates versus Denosumab Increased over Time

Use of Bone-Modifying Agents	PP 1–3 DID	PP 4–6 DID	PP 7–9 DID	PP 10-11 DID
Breast cancer and bone metastases	-3.7pp	-6.9pp	-11.7pp	-13.6pp
Prostate cancer and bone metastases	-2.5pp	-6.4pp	-11.2pp	-13.3pp
Lung cancer and bone metastases	-3.4pp	-5.8pp	-12.3pp	-15.9pp

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: DID: Difference-in-differences. PP: Performance Period. pp: Percentage points.

Results were largely similar in sensitivity analyses excluding the two largest OCM practices, for which no similarly sized comparison practices were available. In the sensitivity analysis of lung cancer episodes OCM led to a statistically significant 3.1 percentage point reduction in the use of any bone-modifying agent; there was no statistically significant effect of OCM on use of any bone-modifying agent in breast or prostate cancer episodes in the sensitivity analysis.

D.8 Antiemetic Use for High-Risk Chemotherapy Regimens

We assessed the use of prophylactic antiemetics for initial chemotherapy regimens with high-risk of nausea and vomiting. Analyses focused on two classes of antiemetic medications: palonosetron (a long-acting serotonin antagonist) and neurokinin 1 (NK1) antagonists (aprepitant, fosaprepitant, netupitant, fosnetupitant, and rolapitant).

Measures and Analytic Approach

We assigned an emetic risk (risk of vomiting) to each chemotherapy agent as outlined in the NCCN antiemesis guideline. We identified OCM and comparison chemotherapy episodes for patients initiating chemotherapy (i.e., no episode in the prior year), and the dates of chemotherapy infusion in each episode. We then assigned the emetic risk category to each episode, based on the chemotherapy agent with the highest emetic risk given during the episode, and focusing on the first episode of a defined emetic risk category. We selected episodes with use of high-emetic-risk chemotherapy and identified the first infusion date associated with high emetic risk. We required that all patients be enrolled in both Parts B and D of FFS Medicare so that we would capture all oral as well as infused antiemetics.

We measured the use of clinic-administered antiemetic medications (oral and intravenous) in Part B claims and used Part D event records to identify pharmacy-dispensed antiemetic medications. The following antiemetics were included: NK1 receptor antagonists (aprepitant, fosaprepitant, rolapitant, and the combination medications netupitant/palonosetron and fosnetupitant/palonosetron), serotonin (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 there was wide use of these low-cost agents. We considered antiemetic use to be prophylactic (i.e., given with the first dose of a high-emetic-risk chemotherapy) if the antiemetic agent was administered or dispensed within 14 days before through one day after the first chemotherapy date during the episode.

We performed descriptive analyses to evaluate the components of prophylactic antiemetic treatment for each included episode. We then performed DID analyses to evaluate the impact of OCM on prophylactic use of palonosetron, NK1 antagonists, and guideline-recommended antiemetic regimens (drug combinations). We considered an antiemetic regimen to be consistent with guideline recommendations if it included either (1) an NK1 antagonist, with any serotonin antagonist; or (2) palonosetron, with olanzapine (without an NK1 antagonist).

Results for Overall OCM Impacts

As described in Section 6.2 in the main report, OCM had no impact on use of palonosetron, and no apparent impact on use of NK1 antagonists or guideline-recommended antiemetic combinations (**Exhibit D-28**). However, differences in baseline trends for use of NK1 antagonists and guideline-recommended antiemetics limits definitive interpretation of the findings for analyses of the use of NK1 antagonists and guideline-recommended antiemetic therapies. Results of these three analyses were generally similar in sensitivity analyses, excluding the two largest OCM practices, for which no similarly sized comparison practices were available. However, the sensitivity analysis for use of palonosetron showed a significant OCM impact, with lower use of palonosetron in OCM versus comparison episodes when the two largest practices were excluded.

Exhibit D-28: OCM Had No Net Impact on Antiemetic Use for Patients Receiving Chemotherapy with High Emetic Risk

Measure	OCM		COMP		Estimated OCM Impact	
	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Estimate	Percent Change
Use of palonosetron	76.6%	68.2%	68.9%	65.5%	-5.1 pp	-6.7%
Use of NK1 antagonist[a]	80.0%	84.5%	75.8%	80.5%	-0.1 pp	-0.1%
Use of guideline-recommended therapy	79.2%	83.9%	74.5%	78.2%	1.1 pp	1.3%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: [a]Baseline trends were not parallel for OCM and comparison episodes in receipt of NK1 antagonists or receipt of guideline-recommended therapy, precluding definitive interpretation of OCM impact. OCM: OCM intervention group. COMP: Comparison group. Int: Intervention period. DID: Difference-in-differences. pp: Percentage points. NK1: Neurokinin-1.

Although the main analysis did not find a net impact of OCM on prophylactic use of antiemetics for high-emetic-risk chemotherapy, this overall finding obscures variable trends in antiemetic use during the course of OCM, with notable differences in these trends for OCM and comparison episodes. OCM led to reduced use of palonosetron in PP1–3 and PP4–6. However, OCM had no impact on use of palonosetron in PP7–PP9 and PP10–PP11 (see **Exhibit D-29**), coinciding with a period when the cost of palonosetron was declining substantially. There was an apparently similar time-varying impact of OCM on use of NK1 receptor antagonists, also coinciding with substantially reduced costs (for NK1 receptor antagonists). These time-variable trends in prophylactic use of antiemetics appear to demonstrate greater cost sensitivity for antiemetic drugs in OCM versus comparison episodes.

Exhibit D-29: OCM Impacts on Use of Antiemetics Varied Over Time

Measure	PP 1–3 DID	PP 4–6 DID	PP 7–9 DID	PP 10-11 DID
Use of palonosetron	-6.7pp	-9.2pp	-3.9pp	4.6pp
Use of NK1 antagonist	-1.6pp	-7.6pp	6.1pp	4.8pp
Use of guideline-recommended therapy	-2.1pp	-4.8pp	7.2pp	6.2pp

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: DID: Difference-in-differences. PP: Performance Period. pp: Percentage points.

D.9. Use of White Blood Cell Growth Factors

D.9.1 Use of Any White Blood Cell Growth Factors

We assessed guideline-recommended use of prophylactic white blood cell growth factors (granulocyte colony-stimulating factors (GCSFs)) for patients with colorectal, breast, or lung cancer, when chemotherapy regimens had varying risk of causing fever and neutropenia (high, intermediate, low). According to ASCO's 2012 ***Choosing Wisely*** campaign, prophylactic GCSFs should be given to all patients receiving chemotherapy regimens with high risk for fever and neutropenia, and generally should not be given to those receiving low-risk chemotherapy regimens. Patients receiving intermediate-risk chemotherapy may benefit from prophylactic GCSFs if patient characteristics indicate increased risk for fever and neutropenia, but in most cases such use reflects low-value care.

Measures and Analytic Approach

We identified new chemotherapy episodes for patients with breast cancer, colorectal cancer, or lung cancer. We restricted the analysis to patients who had not received chemotherapy in the previous 12 months, to focus on those who were candidates for prophylactic GCSFs (i.e., starting with the first chemotherapy infusion). Using the date of the first chemotherapy claim as the index date, we assigned patients to treatment regimens by identifying all chemotherapy agents received on the index date or in the seven days following the index date. For regimens that can be given at standard or "dose-dense" intervals, we identified dose-dense regimens by counting the days between the first and second treatment cycle. Patients receiving any form of white blood cell growth factor (i.e., filgrastim, pegfilgrastim, or related biosimilars) within eight days after the index date were classified as receiving prophylactic GCSF therapy. We categorized all chemotherapy regimens as high, intermediate, or low risk for causing fever and neutropenia, using NCCN guidelines; when a regimen was not specifically listed in the NCCN guidelines, we used other published sources to classify the regimen's fever and neutropenia risk. Chemotherapy regimens for breast cancer, lung cancer, or colorectal cancer are presented in **Exhibits D30-D32**, stratified by risk of neutropenia. We performed DID analyses to assess the use of prophylactic GCSF therapy in OCM and comparison episodes, stratified by cancer type and chemotherapy regimen-associated risk for fever and neutropenia.

Results

As described in **Section 6.3** in the main report, OCM led to reduced use of prophylactic GCSFs relative to the comparison group for breast cancer chemotherapy regimens that had intermediate risk of causing neutropenia. OCM also led to relative reductions for colorectal cancer chemotherapy regimens with low risk of causing neutropenia, and lung cancer chemotherapy regimens with intermediate risk of causing neutropenia. The observed reductions in use of prophylactic GCSFs for three subgroups of episodes in each of the three cancer types evaluated suggest more value-sensitive use of GCSFs under OCM.

Exhibit D-30: Breast Cancer Regimens Classified by Neutropenia Risk

High-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 D-31: Lung Cancer Regimens Classified by Neutropenia Risk

Intermediate-Risk Regimens	Low-Risk Regimens
Docetaxel monotherapy	All other regimens
Docetaxel + bevacizumab	
Docetaxel + ramucirumab	
Carboplatin-paclitaxel	
Carboplatin-paclitaxel + bevacizumab	
Carboplatin-paclitaxel + pembrolizumab	
Carboplatin-etoposide	
Carboplatin-etoposide + atezolizumab	
Cisplatin-paclitaxel	
Cisplatin-docetaxel	
Cisplatin-vinorelbine	
Cisplatin-etoposide	

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

Exhibit D-32: Colorectal Cancer Regimens Classified by Neutropenia Risk

Intermediate-Risk Regimens	Low-Risk Regimens
FOLFOX (5-FU + oxaliplatin)	All other regimens
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	

We conducted sensitivity analyses omitting episodes from the two largest OCM practices, for which no similarly sized comparison practices were available. There were no substantial changes in the findings from the breast and colorectal cancer sensitivity analyses. In the lung cancer sensitivity analyses that omitted episodes from the two largest OCM practices, OCM led to a relative reduction in prophylactic GCSF use of 2.3 percentage points during low-risk lung cancer chemotherapy episodes (P=0.03).

D.9.2 Biosimilar versus originator white blood cell growth factors

Measures

We assessed the use of white blood cell growth factors (GCSFs) in OCM and comparison episodes. First, we evaluated the use of less costly filgrastim (which requires multiple subcutaneous injections per chemotherapy cycle) versus use of the more costly but more convenient pegfilgrastim (which requires only a single injection per chemotherapy cycle, given 24 hours after the chemotherapy). Second, among patients receiving filgrastim, we evaluated use of biosimilar filgrastim versus the more costly originator filgrastim during PP1–PP11 when biosimilar filgrastim was available. Third, we assessed the use of biosimilar pegfilgrastim versus originator pegfilgrastim during PP4–PP11, when biosimilar pegfilgrastim was available. Fourth, among patients receiving pegfilgrastim, we assessed the use of pegfilgrastim with the on-body injector. The on-body injector is a novel drug administration device that attaches to the body and automatically injects originator pegfilgrastim 24 hours after chemotherapy is delivered, avoiding the need for a patient to return to the clinic for this injection. The on-body injector is only available for originator pegfilgrastim.

Analyses focused on all cancer episodes with any use of filgrastim or pegfilgrastim. For each episode, we characterized GCSF use based on the first administration in the episode (Exhibit D-33). This table includes the filgrastim and pegfilgrastim products examined.

Analytic Approach

We used DID analyses to assess the use of filgrastim versus pegfilgrastim. Because the biosimilar GCSFs and on-body injector were not available during most or all of the baseline period, DID analyses were not possible. Therefore, for analyses of biosimilar filgrastim, biosimilar pegfilgrastim, and on-body pegfilgrastim, we evaluated the adjusted average proportion of episodes with use as well as the rate of adoption during the intervention period quarters when

the treatments were available. Analyses of biosimilar pegfilgrastim excluded episodes using on-body pegfilgrastim, as that was only available for the originator product. However, since a clinician choosing pegfilgrastim has three options (originator pegfilgrastim, biosimilar pegfilgrastim, or on-body pegfilgrastim (originator only)), we conducted sensitivity analyses where we also included on-body pegfilgrastim in the denominator. Results were similar and are not presented.

Exhibit D-33: White Blood Cell Growth Factor (GCSF) Drug Types

Drug Name	Code Description	Code
Filgrastim	Filgrastim 300 mcg injection	J1440
Filgrastim	Filgrastim 480 mcg injection	J1441
Filgrastim	Injection filgrastim excluding biosimilar	J1442
Filgrastim-aafi	Injection, filgrastim-aafi, biosimilar, (nivestym), 1 microgram	Q5110
Filgrastim-sndz	Injection filgrastim biosimilar	Q5101
Pegfilgrastim	Injection, pegfilgrastim 6 mg	J2505
Pegfilgrastim	Injection, pegfilgrastim 0.5 mg	J2506
Pegfilgrastim	Pegfilgrastim, 1 mg	Q4053
Pegfilgrastim-cbqv	Injection, pegfilgrastim-cbqv, biosimilar, (udenyca), 0.5 mg	Q5111
Pegfilgrastim-jmdb	Injection, pegfilgrastim-jmdb, biosimilar, (fulphila), 0.5 mg	Q5108
Pegfilgrastim-apgf	Injection, pegfilgrastim-apgf, biosimilar, (Nyvepria), 0.5 mg	Q5122
Pegfilgrastim-bmez	Injection, pegfilgrastim-bmez, biosimilar, (Ziextenzo), 0.5 mg	Q5120
Pegfilgrastim-bmez	Injection, pegfilgrastim-bmez, biosimilar, (Ziextenzo) 0.5 mg	C9058

Notes: We did not include Tbo-filgrastim (J1446, J1447) in analyses. Tbo-filgrastim is a product similar to other biosimilar products that was approved before the FDA established the regulatory definition of a biosimilar agent.
Filgrastim-ayow was approved in February 2022; the codes became available in July 2022 (Q5125) and October 2022 (Q5125). Because PP11 had ended by June 2022, this was not included in analyses. Code refers to Healthcare Common Procedure Coding System code.

Use of Filgrastim versus More Costly Pegfilgrastim

Among patients receiving any GCSF, pegfilgrastim was used more often than the less costly filgrastim in both OCM and comparison episodes (approximately 75 percent at baseline). We found some evidence for differential baseline trends (P for trend = 0.05). DID models show a statistically significant OCM impact of 3.1 percentage points greater use of filgrastim rather than pegfilgrastim for OCM relative to comparison episodes. Results were similar in sensitivity analyses excluding the two largest OCM practices, for which no similarly sized comparison practices were available (Exhibit D-34).

Exhibit D-34: OCM Led to a Relative Increase in Use of Less Costly Filgrastim versus Pegfilgrastim

Filgrastim vs. Pegfilgrastim (Originator + Biosimilar) Breast, Lung, Colorectal	# of Episodes		OCM		COMP		Impact Estimates Through PP11			
	OCM	COMP	Baseline Mean	Int. Mean	Baseline Mean	Int. Mean	DID Percentage Point Impact	90% LCL	90% UCL	Percent Change
Filgrastim vs. pegfilgrastim	222,582	231,173	27.5%	28.0%	28.9%	26.3%	3.1pp	1.5pp	4.7pp	11.2%
Filgrastim vs. pegfilgrastim (dropping 2 largest practices)	179,806	198,640	25.4%	26.1%	27.5%	24.9%	3.3pp	1.9pp	4.6pp	12.8%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: CRC: Colorectal. OCM: OCM intervention group. COMP: Comparison group. DID: Difference-in-differences. Int.: Intervention period. LCL: Lower confidence limit. PP: Performance period. UCL: Upper confidence limit. pp: Percentage points.

Use of Biosimilar Filgrastim

Biosimilar filgrastim products were approved in March 2015 (filgrastim-sndz) and July 2018 (filgrastim-aafi). With almost no use of biosimilar filgrastim in the baseline period, DID analyses were not possible. Instead, we examined trends in adoption and rates of use of biosimilar filgrastim (filgrastim-sndz or filgrastim-aafi) for OCM and comparison episodes during the intervention period among patients receiving either biosimilar filgrastim or originator filgrastim. As reported in Section 6.3 in the main report, OCM was associated with greater use of biosimilar filgrastim in the intervention period, with a similar rate of adoption of biosimilar filgrastim. Results were similar in sensitivity analyses that excluded the two largest OCM practices, for which no similarly sized comparison practices were available.

Use of Biosimilar Pegfilgrastim

As reported in Section 6.3 and in Exhibit 39, in adjusted analyses, OCM was associated with greater use of biosimilar pegfilgrastim in the intervention period, with a similar rate of adoption. The size of the adjusted difference was even larger in sensitivity analyses that excluded the two largest OCM practices, for which no similarly sized comparison practices were available. Our primary analyses did not include originator pegfilgrastim used with the on-body injector, because that is only available for originator pegfilgrastim. Results were similar in sensitivity analyses that included on-body originator pegfilgrastim in the denominator (not shown).

Use of the Pegfilgrastim with the On-Body Injector

There were no differences in use of on-body pegfilgrastim during OCM versus comparison episodes overall, and this was true after excluding the two largest practices (**Exhibit D-35**).

Exhibit D-35: No Difference in Use or Adoption of On-Body Pegfilgrastim for OCM versus Comparison Episodes (Among Episodes with Any Pegfilgrastim)

Adoption of On-Body Pegfilgrastim	# of Episodes		Intervention Mean		Difference in Use	90% LCL	90% UCL	Rate of Adoption	90% LCL	90% UCL
	OCM	COMP	OCM	COMP						
All practices	121,811	128,149	30.1%	32.8%	-2.7pp	-6.5pp	1.1pp	0.2%	-0.3%	0.6%
Excluding two largest practices	103,669	109,251	31.0%	32.8%	-1.9pp	-5.5pp	1.7pp	0.1%	-0.3%	0.4%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014–2022.
Notes: OCM: OCM intervention group. COMP: Comparison group. DID: Difference-in-differences. LCL: Lower confidence limit. UCL: Upper confidence limit. pp: Percentage points.

D.10 Use of Leucovorin Products with Flourouracil-Containing Chemotherapy

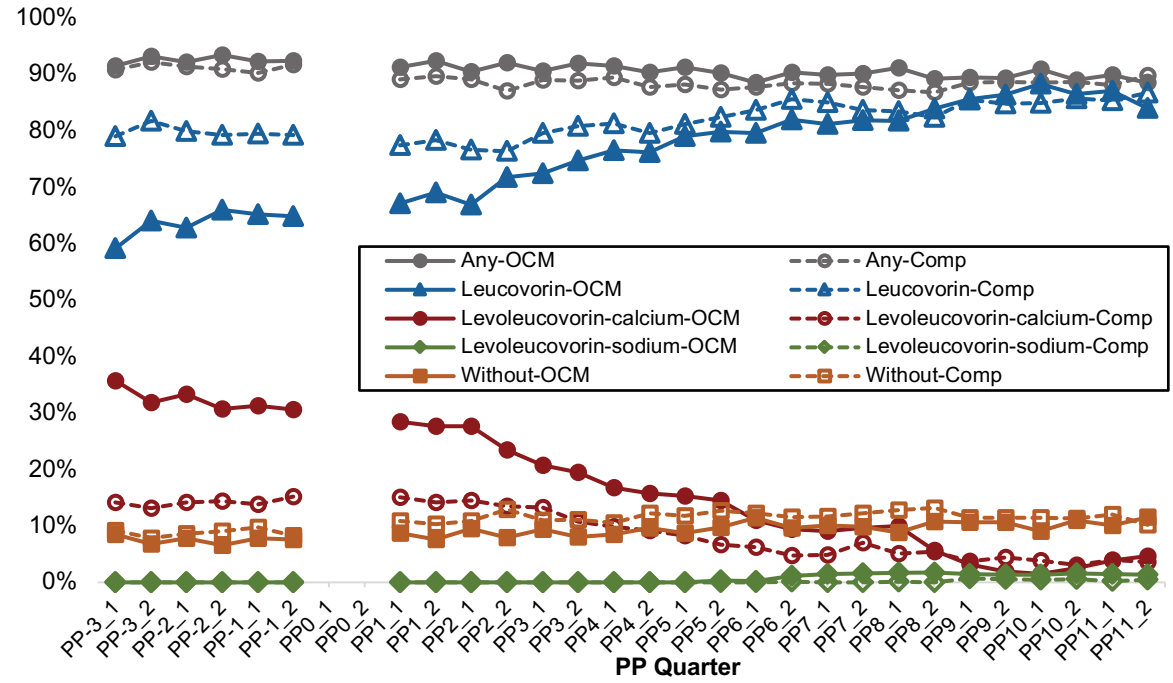
Leucovorin is a medication that is used together with fluorouracil chemotherapy to inhibit the degradation of fluorouracil. Levoleucovorin calcium and levoleucovorin sodium are derivatives of leucovorin that have similar effectiveness to leucovorin during fluorouracil chemotherapy, but higher cost. As described in Section 6.4, we evaluated use of leucovorin products during colorectal cancer episodes with any use of fluorouracil-containing chemotherapy. We plotted the unadjusted use of leucovorin, levoleucovorin, and any leucovorin product over time in OCM and comparison episodes. We also plotted drug payments for leucovorin products over time. We conducted DID analyses of the OCM impact on use of leucovorin products and episode spending for leucovorin products.

Results

As described in the main report, OCM led to relatively more use of leucovorin and relatively less use of (more costly) levoleucovorin formulations. Time trends of leucovorin and levoleucovorin use are shown in Exhibit D-36.

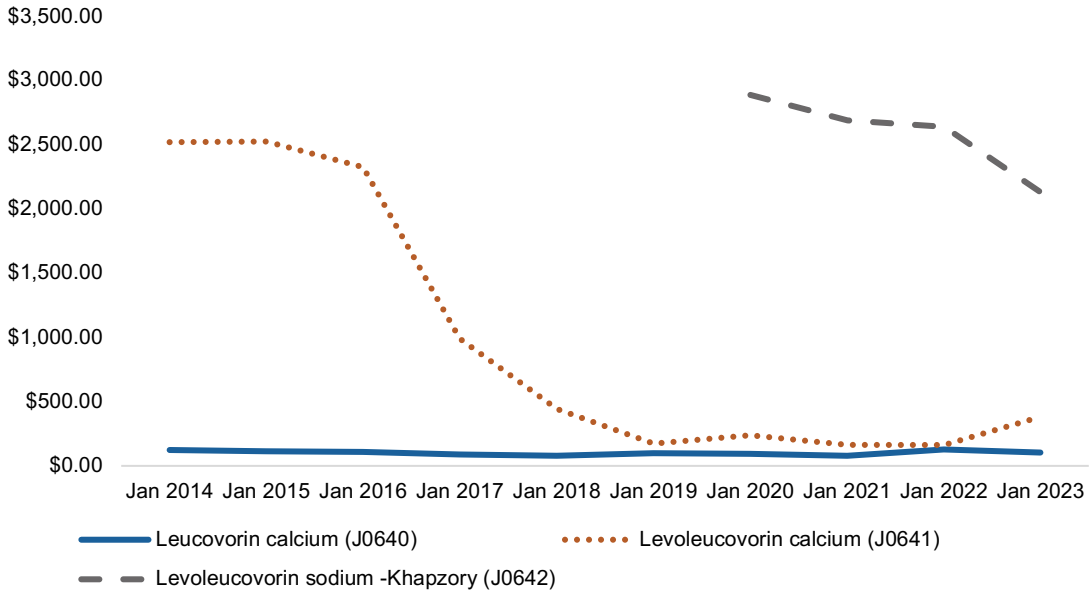
DID analyses showed significantly reduced use of levoleucovorin in OCM episodes overall, as well as increased use of leucovorin. Accordingly, DID impact analyses indicated reduced spending for leucovorin products overall.

Exhibit D-36: Proportion of Episodes Treated with Leucovorin, Levoleucovorin, or Neither



Source: Medicare claims 2014–2022.

Exhibit D-37: Estimated Monthly Cost for Leucovorin & Levoleucovorin, 2014-2023



Notes: Estimated costs based on Medicare Average Sale Price data from January 2014-January 2023.

E. Supporting Analyses for Health Equity Impacts

This appendix contains additional detail on the analytic methods and findings related to the equity analyses presented in Chapter 7.

E.1. Analytic Methods for Equity Analyses

In this section, we present a detailed discussion on our approach to analyzing the association of OCM with equity for historically underserved populations. The discussion is organized as follows: Section E.1.1 identifies the definition of historically underserved populations included in this report; Section E.1.2 identifies the outcome measures that we analyzed for the study; and Section E.1.3 presents a detailed discussion on the analytic methods.

E.1.1 Study Population

For this report, we studied four historically underserved populations, with two corresponding reference populations. **Exhibit E-1** presents the definition for each population, which was based on the Medicare beneficiary enrollment data.

Exhibit E-1: Study Population

Historically Underserved Population	Definition	Reference Population
Non-Hispanic Black	RTI race code lists beneficiary as "Black or African American"	Non-Hispanic White
Hispanic	RTI race code lists beneficiary as "Hispanic"	Non-Hispanic White
Dual Medicare-Medicaid eligibility[a]	Enrollment data indicate Medicaid full-dual or partial-dual eligibility	Medicare-only; patients
High-deprivation neighborhood	Area Deprivation Index (ADI) code lists beneficiary in highest ADI quintile (national percentile > 80)	Lower-deprivation neighborhoods (national percentile <80, or missing)

Notes: [a]Dual eligibility is a proxy for low-income status. It is recognized as an independent social risk factor for value-based payment programs by the Department of Health and Human Services Office of the Assistant Secretary for Planning and Evaluation, per the following Report to Congress.

E.1.2 Outcome Measures for Equity Analyses

We focused on a subset of payment, utilization, and clinical outcomes measures selected for three reasons: (1) measures that had significant impacts in the main analyses, (2) measures with conceptual justification for potential differential impacts, and (3) measures with reasonably large sample sizes. We also included patient-reported care experience measures to incorporate patient perspectives. **Exhibit E-2** shows the outcome measures we examined. **Exhibits A-4** to **A-6**, found in Appendix A, describe the payment and utilization outcome measures. Appendix D provides additional detail on the clinical outcome measures. Appendix Exhibit C-4 describes the patient-reported experience measures.

Exhibit E-2: List of Measures Included in the Equity Analyses

Domain	Outcome Measures
Inpatient utilization	Probability of any 30-day readmission
	Probability of any ACH ICU admission
Inpatient admission and ED utilization	Probability of any ED visit without inpatient admission (includes observation stays)
	Probability of any ACH inpatient admission
Service use at end of life	Any chemotherapy in last 14 days of life
	Any hospitalization in last 30 days of life
	ED use (2+ visits) in last 30 days of life
	Any ICU stay in last 30 days of life
	Hospice stay 1-2 days prior to death
	Hospice stay three or more days prior to death

Domain	Outcome Measures
Chemotherapy-related hospitalizations	Chemotherapy-associated hospitalizations Chemotherapy-associated ED visits Chemotherapy-associated ED visits without a hospital admission
Payments	TEP, including Parts A, B, and D
	Part A payments Part B non-chemotherapy drug payments Part B chemotherapy payments Part D payments
Treatment with recommended supportive care medications	White blood cell growth factors[a] Antiemetics[b] Bone-modifying drugs[c]
Chemotherapy initiation within 60 days after surgery for presumed curative intent	Breast cancer Colorectal cancer
Adherence to high-priced oral cancer treatments	Enzalutamide or abiraterone for prostate cancer TKIs for chronic myelogenous leukemia
Patient-reported experience	Rating of the cancer care team Shared decision making Access Communication Exchanging information Enabling patient self–management Symptom management

Notes: [a]Includes breast cancer episodes where the chemotherapy regimen had a high risk of causing neutropenia; b Includes episodes with chemotherapy regimens with high risk of causing nausea and vomiting; c includes chemotherapy episodes for patients with bone metastases.

E.1.3 Approach for Equity Analyses

In this section, we describe the methodology for the equity study, including:

Difference-in-Difference-in-Differences (DDD) approach

Parallel trend tests conducted to ensure the internal validity of our DID and DDD estimations

Model specification for each outcome measure

Risk-adjusting covariates used in the DDD estimations

Impact Analyses

We analyzed OCM's differential impact on historically underserved populations using the DDD approach. In this case, the DDD approach includes three separate impact estimates of interest: (1) OCM impact on each subpopulation, (2) OCM impact on the reference subpopulation for each subpopulation, and (3) the difference between the two OCM impacts to determine if OCM impacted the subpopulation of interest differently than the corresponding reference subpopulation. The estimation of all three impacts takes place in a single regression, subject to the constraint that the coefficients on risk-adjustment covariates are the same for both the focal and reference subpopulations.

All analyses used data from baseline through all intervention periods (PP1–PP11).

Model

We employed a specification similar to the overall DID analysis with inclusion of additional interaction terms for the equity groups to estimate the marginal effect of all categories within an interest area.

The linear form of the DDD specification is as follows:

$$Y = \beta + \varphi OCM + \sum_{q=1}^{N} \gamma_q PPQ_q + \sum_{c=1}^{G} \partial_c Can_c + \sum_{q=1}^{N} \alpha_q OCM \cdot PPQ_q + \sum_{c=1}^{G} \theta_c OCM \cdot Can_c + \sum_{q=1}^{N} \left(\sum_{c=1}^{G} \delta_{qc} Can_c \cdot PPQ_q \right) + \sum_{q=1}^{N} \left(\sum_{c=1}^{G} \rho_{qc} OCM \cdot Can_c \cdot PPQ_q \right) + \sum_{k=1}^{K} \left(\sum_{q=1}^{N} \tau_{qk} OCM \cdot Subpopulation_k \cdot PPQ_q \right) + \sum_{k=1}^{K} \left(\sum_{q=1}^{N} \vartheta_{qk} Subpopulation_k \cdot PPQ_q \right) + \sum_{k=1}^{K} \mu_k Subpopulation_k \cdot OCM + \pi' X + \varepsilon, \quad (5)$$

where ***Y*** is an outcome for each episode originating in quarter ***q; OCM*** is an indicator variable equal to one for OCM practices and zero for comparison practices; ***PPQ*** is an indicator distinguishing each quarter of intervention data from the baseline data; ***Can*** is an indicator distinguishing the 24 cancer types ***c***, including the group of non-reconciliation-eligible cancer types; and ***X*** is a vector of pre-determined risk-adjustors for each episode. The indicators for OCM, PPQ, and Can are interacted to account for cancer-specific trajectories in payments between the baseline and intervention periods.

The key DDD variable is ***Subpopulation,*** which is a binary indicator variable distinguishing each underserved population from its reference population. The subscript k denotes each subpopulation. The coefficient τ_{qk} reveals the differential OCM impact between the underserved populations of interest k and its reference population, in quarter q. The coefficient α_q captures the marginal impact of the OCM intervention on outcome Y, in quarter q, for the reference population. Therefore, the marginal impact of the OCM intervention on outcome Y, in quarter q, for underserved population k can be calculated by $\alpha_q + \tau_{qk}$. Using this model, we estimated the overall differential impact of OCM by taking linear combinations of the estimates of the appropriate PP quarters for each underserved population of interest. We weighed the PP quarter estimates by the number of episodes in each PP quarter to obtain the average cumulative impacts and used the delta method to assign significance to combined estimates. For all impact analyses, we excluded episodes with a COVID-19 diagnosis during the episode from the estimation sample, consistent with our main analyses.

We applied nonlinear analogs of equation (*5*) for binary and count outcomes as discussed in **Appendix A.1.8**.

For clinical analyses, because of smaller sample sizes for most measures, a modified approach was used. Specifically, clinical analyses used a single intervention variable instead of quarterly intervention dummies. In addition, as most clinical outcomes involved a single cancer type, these analyses did not include cancer type interactions (with either OCM or intervention dummies), although outcomes that included more than one cancer type included fixed effects for cancer type.

Parallel Trends

To ensure the internal validity of our DID and DDD estimation, we conducted parallel trend tests using the baseline periods within subpopulations (DID) and across subpopulations (DDD). Our results show that parallel trends testing rejected equal trends for two outcomes at the $p<0.05$ level.

Parallel trends were rejected for Part B non-chemotherapy drug payments between the Black subpopulation and the reference white subpopulation; parallel trends were rejected for appropriate use of antiemetics within the white population.

Estimated changes in these outcomes may be meaningfully biased and should be interpreted with caution.

Patient Survey

For the survey outcomes, we did not have survey data from comparison group episodes. Therefore, we assessed baseline differences and differences in trends over time in OCM Patient Survey outcome measures between populations.

The equity analysis of patient-reported outcomes used the following regression model:

$$y = \beta_0 + \beta_1 Subpopulation + \beta_2 Wave + \beta_3 (Subpopulation * Wave) + \beta_4 X + \varepsilon \quad (6)$$

where y is a survey outcome, ***Subpopulation*** is a binary indicator variable distinguishing each underserved population from its reference population, ***Wave*** is a continuous measure indicating the wave of each survey response, and ***X*** represents a set of patient- and practice-level covariates for patient i. In this model, the coefficient β_1 captures the baseline difference between groups, the coefficient β_2 captures the trend over time for the reference population, and the coefficient β_3 captures the difference in the trend over time between the underserved population and the reference population.

Estimates were weighted for sampling and nonresponse weights and adjusted for demographic characteristics, health status, cancer type, treatment duration, the calendar month when the episode was triggered, practice characteristics, and the incidence and prevalence of COVID-19 cases and deaths during each episode. Patients with a COVID-19 diagnosis during the episode were excluded from analysis.

All measures included in the equity analysis were scaled over a range of 0–10. Accordingly, we used linear regression in conducting risk adjustment.

E.2. Descriptive Statistics for Equity Analyses

E.2.1 Sample Sizes Associated with Each Outcome

Exhibit E-3: Patient-Level Characteristics, by Race and Ethnicity

Population	Full Sample	Black	Hispanic	White
Sample size	1,400,487	114,703	64,409	1,158,808
Age (%)				
Under 65	8.0	18.0	16.6	6.6
65 to 70	24.2	25.2	25.6	23.4
70 to 75	25.4	22.4	22.6	25.6
75 to 80	20.3	16.5	17.2	21.1
80 to 85	13.0	10.5	10.5	13.6
Over 85	9.2	7.4	7.5	9.6
HCC score	2.9 (2.0)	3.0 (2.1)	2.9 (2.0)	2.9 (2.0)
Sex (%)				
Female	59.2	59.7	61.0	59.3
Male	40.8	40.3	39.0	40.7
Race and ethnicity (%)				
Asian and Pacific Islander (API)/ American Indian or Alaska Native (AIAN)	4.5	0.0	0.0	0.0
Black	8.2	100.0	0.0	0.0
Hispanic	4.6	0.0	100.0	0.0
White	82.7	0.0	0.0	100.0
Medicaid enrollment status (%)				
Medicare-only	87.2	68.7	56.4	91.4
Dual eligible	12.8	31.3	43.6	8.6
Neighborhood disadvantage (%)				
Top ADI quintile	12.5	31.0	19.6	10.5
Lower four ADI quintiles[a]	87.5	69.0	80.4	89.5
Part D for all months (%)				
No	16.5	18.8	13.7	16.6
Yes	83.5	81.2	86.3	83.4
Had a prior OCM episode (%)				
No	49.2	47.5	48.7	49.4
Yes	50.8	52.5	51.3	50.6

Population	Full Sample	Black	Hispanic	White
Type of chemotherapy (%)				
Part B only	52.2	51.3	48.0	52.7
Part D only	35.4	33.4	37.3	35.4
Part B and Part D	12.4	15.3	14.6	11.9

Source: Medicare claims 2014–2022.

Notes: [a]Roughly 4 percent of episodes are missing ADI, for both the OCM and comparison groups, in all time periods. Standard deviation in parentheses for continuous variables. HCC: Hierarchical condition category. API: Asian and Pacific Islander. AIAN: American Indian or Alaska Native. ADI: Area deprivation index.

Exhibit E-4: Patient-Level Characteristics, by Medicaid Eligibility and Neighborhood Disadvantage

Population	Full Sample	Dual Eligible	Medicare-Only	Top ADI Quintile	Lower Four ADI Quintiles
Sample size	1,400,487	179,631	1,220,856	175,056	1,225,431
Age (%)					
Under 65	8.0	32.6	4.4	14.7	7.1
65 to 70	24.2	22.1	24.5	24.1	24.2
70 to 75	25.4	16.8	26.7	23.1	25.7
75 to 80	20.3	12.6	21.4	18.2	20.6
80 to 85	13.0	8.8	13.6	11.9	13.1
Over 85	9.2	7.1	9.5	8.0	9.3
HCC score	2.9 (2.0)	3.4 (2.2)	2.8 (1.9)	3.0 (2.0)	2.9 (2.0)
Sex (%)					
Female	59.2	66.9	58.0	60.4	59.0
Male	40.8	33.1	42.0	39.6	41.0
Race and ethnicity (%)					
API/AIAN	4.5	8.8	3.8	3.1	4.7
Black	8.2	20.0	6.5	20.3	6.5
Hispanic	4.6	15.6	3.0	7.2	4.2
White	82.7	55.5	86.7	69.4	84.7
Medicaid enrollment status (%)					
Medicare-only	87.2	0.0	100.0	73.8	89.1
Dual eligible	12.8	100.0	0.0	26.2	10.9
Neighborhood disadvantage (%)					
Top ADI quintile	12.5	25.5	10.6	100.0	0.0
Lower four ADI quintiles[a]	87.5	74.5	89.4	0.0	100.0
Part D for all months (%)					
No	16.5	1.0	18.8	16.4	16.5
Yes	83.5	99.0	81.2	83.6	83.5
Had a prior OCM episode (%)					
No	49.2	47.9	49.4	49.8	49.1
Yes	50.8	52.1	50.6	50.2	50.9

Population	Full Sample	Dual Eligible	Medicare-Only	Top ADI Quintile	Lower Four ADI Quintiles
Type of chemotherapy (%)					
Part B only	52.2	42.9	53.5	53.2	52.0
Part D only	35.4	40.6	34.6	34.9	35.5
Part B and Part D	12.4	16.4	11.8	11.9	12.5

Source: Medicare claims 2014–2021.

Notes: [a]Roughly 4 percent of episodes are missing ADI, for both the OCM and comparison groups, in all time periods. Standard deviation in parentheses for continuous variables. API: Asian and Pacific Islander. AIAN: American Indian or Alaska Native. HCC: Hierarchical condition category. ADI: Area deprivation index.

Exhibit E-5: Equity Analysis Sample Sizes—Claims-Based Utilization and Payment Outcomes

Outcome	Population	OCM		Comparison	
		Baseline	Intervention	Baseline	Intervention
TEP ($)	Black	31,180	114,703	37,359	118,681
	Hispanic	16,726	64,409	17,706	66,006
	White	286,091	1,158,808	334,971	1,248,956
	Dual eligible	49,904	179,631	68,260	222,511
	Medicare-only	295,977	1,220,856	337,345	1,291,400
	Top ADI quintile	48,826	175,056	65,462	203,760
	Lower four ADI quintiles	296,939	1,225,023	339,961	1,309,475
Part D payments ($)[a]	Black	25,393	93,095	30,693	96,588
	Hispanic	14,286	55,553	15,369	57,947
	White	228,940	966,477	270,544	1,048,373
	Dual eligible	49,281	177,873	67,511	220,635
	Medicare-only	229,205	991,405	262,257	1,052,276
	Top ADI quintile	40,076	146,425	54,406	171,420
	Lower four ADI quintiles	238,410	1,022,853	275,362	1,101,491
Likelihood of hospitalizations (%)[b]	Black	9,006	29,604	10,242	29,289
	Hispanic	3,041	13,905	4,547	15,282
	White	77,197	276,238	85,228	287,292
	Dual eligible	15,665	51,463	20,325	60,451
	Medicare-only	78,164	284,095	83,234	287,959
	Top ADI quintile	14,214	46,215	18,714	52,548
	Lower four ADI quintiles	79,615	289,343	84,845	295,862

Source: Medicare claims 2014-2022.

Notes: [a]For Part D-related outcomes, sample was restricted to those with Part D coverage. b For readmission related outcomes, sample was restricted to those with at least one hospitalization. Black, Hispanic, and White define mutually exclusive groups of patients based on race and ethnicity. Dual eligible and Medicare-only define mutually exclusive groups of patients based on Medicaid enrollment status. ADI: Area deprivation index. TEP: Total episode payments.

Exhibit E-6: Equity Analysis Sample Sizes—End-of-Life Claims-Based Utilization Outcomes

Outcome	Population	OCM		Comparison	
		Baseline	Intervention	Baseline	Intervention
Any chemotherapy in last 14 days of life	Black	3,165	14,197	3,602	14,651
	Hispanic	1,642	7,902	1,704	7,970
	White	30,459	147,495	34,267	155,677
	Dual eligible	5,662	26,340	7,504	31,822
	Medicare-only	30,836	150,513	33,608	155,780
	Top ADI quintile	5,559	25,039	7,330	28,807
	Lower ADI quintiles	30,939	151,814	33,782	158,795
Any hospitalization in the last 30 days of life	Black	3,165	14,197	3,602	14,651
	Hispanic	1,642	7,902	1,704	7,970
	White	30,459	147,495	34,267	155,677
	Dual eligible	5,662	26,340	7,504	31,822
	Medicare-only	30,836	150,513	33,608	155,780
	Top ADI quintile	5,662	26,340	7,504	31,822
	Lower ADI quintiles	30,939	151,814	33,782	158,795
ED use (2+ visits) in last 30 days of life	Black	3,165	14,197	3,602	14,651
	Hispanic	1,642	7,902	1,704	7,970
	White	30,459	147,495	34,267	155,677
	Dual eligible	5,662	26,340	7,504	31,822
	Medicare-only	30,836	150,513	33,608	155,780
	Top ADI quintile	5,662	26,340	7,504	31,822
	Lower ADI quintiles	30,939	151,814	33,782	158,795
Any ICU stay in last 30 days of life	Black	3,165	14,197	3,602	14,651
	Hispanic	1,642	7,902	1,704	7,970
	White	30,459	147,495	34,267	155,677
	Dual eligible	5,662	26,340	7,504	31,822
	Medicare-only	30,836	150,513	33,608	155,780
	Top ADI quintile	5,662	26,340	7,504	31,822
	Lower ADI quintiles	30,939	151,814	33,782	158,795
Hospice stay three or more days prior to death	Black	3,165	14,197	3,602	14,651
	Hispanic	1,642	7,902	1,704	7,970
	White	30,459	147,495	34,267	155,677
	Dual eligible	5,662	26,340	7,504	31,822
	Medicare-only	30,836	150,513	33,608	155,780
	Top ADI quintile	5,662	26,340	7,504	31,822
	Lower ADI quintiles	30,939	151,814	33,782	158,795
No hospice care use	Black	3,165	14,197	3,602	14,651
	Hispanic	1,642	7,902	1,704	7,970
	White	30,459	147,495	34,267	155,677
	Dual eligible	5,662	26,340	7,504	31,822
	Medicare-only	30,836	150,513	33,608	155,780
	Top ADI quintile	5,662	26,340	7,504	31,822
	Lower ADI quintiles	30,939	151,814	33,782	158,795

Source: Medicare claims 2014-2022. *(Note continued on next page.)*

Notes: ADI: Area deprivation index. ED: Emergency department. ICU: Intensive care unit. Black, Hispanic, and White define mutually exclusive groups of patients based on race and ethnicity. Dual eligible and Medicare-only define mutually exclusive groups of patients based on Medicaid enrollment status.

Exhibit E-7: Toxicity Equity Analysis Sample Sizes—Chemotherapy-Associated Acute Care Utilization Outcomes

Outcome	Population	OCM		Comparison	
		Baseline	Intervention	Baseline	Intervention
Any chemotherapy-associated hospitalization	Black	20,750	77,703	23,768	78,396
	Hispanic	11,367	43,966	11,645	45,358
	White	191,976	780,408	214,499	824,942
	Dual eligible	33,771	129,072	45,320	160,293
	Medicare-only	198,598	816,254	215,361	843,999
	Top ADI Quintile	32,979	120,882	43,042	139,410
	Lower ADI quintiles	199,390	824,444	217,639	864,882
Any chemotherapy-associated ED visit without a hospital admission	Black or African American	20,750	77,703	23,768	78,396
	Hispanic	11,367	43,966	11,645	45,358
	White	191,976	780,408	214,499	824,942
	Dual eligible	33,771	129,072	45,320	160,293
	Medicare-only	198,598	816,254	215,361	843,999
	Top ADI quintile	32,979	120,882	43,042	139,410
	Lower ADI quintiles	199,390	824,444	217,639	864,882

Source: Medicare claims 2014-2022.

Notes: ADI: Area deprivation index. ED: Emergency department. Black, Hispanic, and White define mutually exclusive groups of patients based on race and ethnicity. Dual eligible and Medicare-only define mutually exclusive groups of patients based on Medicaid enrollment status.

Exhibit E-8: Equity Analysis Sample Sizes—Clinical Analyses

Outcome	Population	OCM		Comparison	
		Baseline	Intervention	Baseline	Intervention
WBC growth factors[a]	Black	391	1,514	469	1,559
	Hispanic	135	651	133	567
	White	2,582	11,551	2,785	11,436
	Dual eligible	433	1,595	637	2,063
	Medicare-only	2,792	12,745	2,905	12,201
	Top ADI quintile	500	1,960	663	2,230
	Lower ADI quintiles	2,725	12,380	2,879	12,034
Antiemetics[b]	Black	438	1,225	584	1,374
	Hispanic	316	957	340	1,129
	White	4,928	17,345	6,187	19,059
	Dual eligible	1,384	3,947	2,032	5,323
	Medicare-only	4,520	16,572	5,367	17,597
	Top ADI quintile	986	2,914	1,372	3,575
	Lower ADI quintiles	4,918	17,605	6,027	19,345
Bone-modifying drugs[c]	Black	3,853	14,549	4,508	15,408
	Hispanic	1,946	7,655	1,969	7,555
	White	34,462	138,795	40,104	150,785
	Dual eligible	5,876	22,724	7,615	26,514
	Medicare-only	35,787	145,641	40,840	156,723
	Top ADI quintile	5,653	20,969	7,606	24,661
	Lower ADI quintiles	36,010	147,396	40,849	158,576

Outcome	Population	OCM		Comparison	
		Baseline	Intervention	Baseline	Intervention
Timeliness of chemotherapy for breast cancer	Black	553	1,741	636	1,767
	Hispanic	203	800	231	708
	White	4,013	14,406	4,421	14,588
	Dual eligible	636	2,059	965	2,561
	Medicare-only	4,292	15,658	4,529	15,391
	Top ADI quintile	743	2,365	1,042	2,660
	Lower ADI quintiles	4,185	15,352	4,452	15,292
Timeliness of chemotherapy for colorectal cancer	Black	392	1,065	472	1,039
	Hispanic	281	730	190	587
	White	3,599	10,811	4,079	10,792
	Dual eligible	707	1,879	910	2,170
	Medicare-only	3,759	11,438	4,067	10,980
	Top ADI quintile	733	2,023	1,031	2,324
	Lower ADI quintiles	3,733	11,294	3,946	10,826
Adherence for prostate cancer	Black	1,006	3,992	1,261	4,641
	Hispanic	459	1,956	500	2,089
	White	6,396	27,617	8,197	32,775
	Dual eligible	1,173	5,460	1,511	7,102
	Medicare-only	6,958	30,085	8,847	34,974
	Top ADI quintile	1,096	4,100	1,535	4,933
	Lower ADI quintiles	7,035	31,445	8,823	37,143
Adherence for CML	Black	384	1,256	488	1,441
	Hispanic	293	1,164	289	992
	White	3,492	11,673	3,969	12,211
	Dual eligible	1,033	4,158	1,456	4,853
	Medicare-only	3,316	10,773	3,465	10,594
	Top ADI quintile	721	2,296	995	2,808
	Lower ADI quintiles	3,628	12,635	3,926	12,639

Source: Medicare claims 2014-2022.

Notes: [a]Includes breast cancer episodes where the chemotherapy regimen had a high risk of causing neutropenia. b Includes episodes with chemotherapy regimens with high risk of causing nausea and vomiting. c Includes chemotherapy regimens for patients with bone metastases. ADI: Area deprivation index. WBC: White blood cells. CML: Chronic myeloid leukemia. Black, Hispanic, and White define mutually exclusive groups of patients based on race and ethnicity. Dual eligible and Medicare-only define mutually exclusive groups of patients based on Medicaid enrollment status.

Exhibit E-9: Sample Sizes for the Patient Experience Equity Analyses

Outcome	Population	OCM	
		Baseline	Intervention
OCM Patient Survey respondents	Black	741	12,691
	Hispanic	271	5,543
	White	8,774	167,584
	Dual eligible	1,121	17,806
	Medicare-only	10,270	180,687
	Top ADI quintile	1,271	21,545
	Lower ADI quintiles	10,120	176,948

Source: OCM Patient and Caregiver Surveys. Includes episodes initiated from April 2016 through December 2020; data collection for these episodes occurred from January 2017 through June 2021.

Notes Comparison group sample sizes were not included in this table, because the patient experience analyses included only responses from OCM patients. Black, Hispanic, and White define mutually exclusive groups of patients based on race and ethnicity. Dual eligible and Medicare-only define mutually exclusive groups of patients based on Medicaid enrollment status. ADI: Area deprivation index.

E.3. Findings from Equity Analyses

Exhibit E-10: OCM Decreased TEP Similarly for Black and White Patients

Outcome	OCM Baseline			Estimate Associated with OCM		
	Black	White	Difference (Difference %)	Black (A)	White (B)	Differential (A-B)
TEP without MEOS	$30,936	$28,847	$2,090 (7.2%)	-$659	-$536	-$123
Part A payments	$6,962	$6,136	$825 (13.4%)	-$144	-$171	$27
Part B chemotherapy payments	$7,225	$7,802	-$578 (-7.4%)	$192	$33	$159
Part B non-chemotherapy drug payments	$2,715	$2,686	$30 (1.1%)	-$319	-$279	-$40
Part D payments	$8,978	$6,224	$2,754 (44.3%)	-$242	$20	-$262

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014-2022.
Notes: We did not conduct tests for the statistical significance of baseline differences for the claims-based measures of utilization and payment, because of the large sample sizes. [a]Baseline trends were not equal between Black and White patients, which may suggest meaningful bias in this estimate. The estimated differential for Part B non-chemotherapy drug payments should be interpreted with caution.
MEOS: Monthly Enhanced Oncology Services payment. TEP: Total episode payments.

Exhibit E-11: OCM Was Associated with Similar Reductions in TEP for Dual Eligible and Medicare-Only Patients, but Part D Reductions Were Higher for Dual Eligible Patients

Outcome	OCM Baseline			Estimate Associated with OCM		
	Dual	Non-Dual	Difference (Difference %)	Dual (A)	Non-Dual (B)	Differential (A-B)
TEP without MEOS	$34,586	$28,301	$6,285 (22.2%)	-$687	-$534	-$152
Part A payments	$7,772	$5,971	$1,801 (30.2%)	-$63	-$195	$132
Part B chemotherapy payments	$6,750	$7,868	$-1,118 (-14.2%)	$65	$17	$48
Part B non-chemotherapy drug payments	$2,266	$2,736	-$469 (-17.2%)	-$300	-$290	-$9
Part D payments	$10,633	$5,892	$4,741 (80.5%)	-$293	$80	-$373

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014-2022.
Notes: We did not conduct tests for the statistical significance of baseline differences for the claims-based measures of utilization and payment, because of the large sample sizes. MEOS: Monthly Enhanced Oncology Services payment. TEP: Total episode payments.

Exhibit E-12: OCM Decreased TEP Similarly for Patients in High-Deprivation Neighborhoods Compared to Patients in Less-Deprived Neighborhoods

Outcome	OCM Baseline			Estimate Associated with OCM		
	ADI Top 20%	ADI Lower 80%	Difference (Difference %)	ADI Top 20% (A)	ADI Lower 80% (B)	Differential (A-B)
TEP without MEOS	$30,088	$29,096	$98 (3.4%)	-$539	-$637	$98
Part A payments	$6,861	$6,141	$720 (11.7%)	-$66	-$193	$127
Part B chemotherapy payments	$7,529	$7,730	-$200 (-2.6%)	-$43	$42	-$85
Part B non-chemotherapy drug payments	$2,720	$2,665	$55 (2.1%)	-$323	-$285	-$38
Part D payments	$7,071	$6,647	$424 (6.4%)	$75	-$73	$149

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014-2022.
Notes: We did not conduct tests for the statistical significance of baseline differences for the claims-based measures of utilization and payment, because of the large sample sizes. MEOS: Monthly Enhanced Oncology Services payment. TEP: Total episode payments.

Exhibit E-13: OCM Was Not Associated with Differential Changes between Black and White Patients for Measures of Utilization

Outcome	OCM Baseline			Estimate Associated with OCM		
	Black	White	Difference (Difference %)	Black (A)	White (B)	Differential (A-B)
Any ED visit without admission	29.9%	24.0%	5.9 pp (24.7%)	0.8 pp	0.0 pp	0.7 pp
Any inpatient stay	29.6%	27.8%	1.9 pp (6.7%)	0.2 pp	-0.1 pp	0.3 pp
Any 30-day readmission	30.1%	26.0%	4.0 pp (15.5%)	0.4 pp	-0.3 pp	0.7 pp
Any ICU admission	10.5%	10.1%	0.5 pp (4.6%)	-0.01 pp	-0.3 pp	0.3 pp

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014-2022.
Notes: We did not conduct tests for the statistical significance of baseline differences for the claims-based measures of utilization and payment, because of the large sample sizes. For our equity analysis, we chose to examine ED visits and observation stays not resulting in inpatient stay. pp: Percentage points. ED: Emergency department. ICU: Intensive care unit..

Exhibit E-14: OCM Was Not Associated with Differential Changes between Dual Eligible Patients Relative to Medicare-Only Patients for Measures of Utilization

Outcome	OCM Baseline			Estimate Associated with OCM		
	Dual	Non-Dual	Difference (Difference %)	Dual (A)	Non-Dual (B)	Differential (A-B)
Any ED visit without admission	33.0%	23.0%	10.0 pp (43.5%)	0.3 pp	0.0 pp	0.3 pp
Any inpatient stay	32.7%	27.0%	5.7 pp (21.1%)	0.5 pp	-0.2 pp	0.7 pp
Any 30-day readmission	29.3%	26.2%	3.2 pp (12.1%)	0.3 pp	-0.4 pp	0.7 pp
Any ICU admission	12.0%	9.8%	2.2 pp (22.9%)	0.1 pp	-0.3 pp	0.4 pp

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014-2022.
Notes: We did not conduct tests for the statistical significance of baseline differences for the claims-based measures of utilization and payment, because of the large sample sizes. For our equity analysis, we chose to examine ED visits and observation stays not resulting in inpatient stay. pp: Percentage points. ED: Emergency department. ICU: Intensive care unit.

Exhibit E-15: OCM Was Not Associated with Changes in End-of-Life Service Use among Black and White Patients

Outcome	OCM Baseline			Estimate Associated with OCM		
	Black	White	Difference (Difference %)	Black (A)	White (B)	Differential (A-B)
Any chemotherapy in last 14 days of life	11.2%	12.0%	-0.8pp (-6.7%)	0.5pp	-0.1pp	0.6pp
Any hospitalization in last 30 days of life	59.0%	51.8%	7.2pp (13.9%)	-0.9pp	-0.4pp	-0.4pp
ED use (2+ visits) in last 30 days of life	18.3%	14.3%	4.0pp (28.0%)	0.1pp	-0.2pp	0.3pp
Hospice stay 3 of three or more days prior to death	51.7%	59.8%	-8.1pp (-13.5%)	1.9pp	-0.2pp	2.1pp

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014-2022.
Notes: We did not conduct tests for the statistical significance of baseline differences for the claims-based measures of utilization and payment, because of the large sample sizes. pp: Percentage points. ED: Emergency department.

Exhibit E-16: OCM Was Associated with Reduced ED Use at the End of Life among Hispanic Patients Relative to White Patients

Outcome	OCM Baseline			Estimate Associated with OCM		
	Hispanic	White	Difference (Difference %)	Hispanic (A)	White (B)	Differential (A-B)
Any chemotherapy in last 14 days of life	12.0%	12.0%	0.1pp (0.8%)	-0.4%	-0.1pp	-0.3%
Any hospitalization in last 30 days of life	56.9%	51.8%	5.0pp (9.6%)	-1.4%	-0.4pp	-1.0%
ED use (2+ visits) in last 30 days of life	18.9%	14.3%	4.5pp (31.5%)	-2.4%	-0.2pp	-2.2%
Hospice stay 3 or more days prior to death	55.3%	59.8%	-4.4pp (-7.3%)	2.3%	-0.2pp	2.5%

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014-2022.
Notes: We did not conduct tests for the statistical significance of baseline differences for the claims-based measures of utilization and payment, because of the large sample sizes. pp: Percentage points. ED Emergency department.

Exhibit E-17: OCM Was Associated with Increased ED Use and Decreased Use of Hospice Care at End of Life Among Dual Eligible Patients Relative to Medicare-Only Patients

Outcome	OCM Baseline			Estimate Associated with OCM		
	Dual	Non-Dual	Difference (Difference %)	Dual (A)	Non-Dual (B)	Differential (A-B)
Any chemotherapy in last 14 days of life	11.9%	11.9%	-0.0pp (0.0%)	0.0pp	-0.1pp	0.1pp
Any hospitalization in last 30 days of life	54.7%	52.6%	2.1pp (4.0%)	0.2pp	-0.8pp	1.0pp
ED use (2+ visits) in last 30 days of life	17.5%	14.5%	3.0pp (20.7%)	1.1pp	-0.6pp	1.6pp
Hospice stay three or more days prior to death	54.5%	59.5%	-5.0pp (-8.4%)	-2.1pp	0.5pp	-2.6pp

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014-2022.
Notes: We did not conduct tests for the statistical significance of baseline differences for the claims-based measures of utilization and payment, because of the large sample sizes. pp: Percentage points. ED Emergency department.

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Exhibit E-18: OCM Was Not Associated with Changes in End-of-Life Service Use among Patients in High-Deprivation Neighborhoods or Those in Lower-Deprivation Neighborhoods

Outcome	OCM Baseline			Estimate Associated with OCM		
	ADI Top 20%	ADI Lower 80%	Difference (Difference %)	ADI Top 20% (A)	ADI Lower 80% (B)	Differential (A-B)
Any chemotherapy in last 14 days of life	12.2%	11.9%	0.3 pp (2.5%)	0.4 pp	-0.2 pp	0.5 pp
Any hospitalization in last 30 days of life	54.9%	52.6%	2.3 pp (4.2%)	-1.4 pp	-0.5 pp	-0.9 pp
ED use (2+ visits) in last 30 days of life	17.7%	14.5%	3.2 pp (18.1%)	-0.7 pp	-0.2 pp	-0.5 pp
Hospice stay three or more days prior to death	55.9%	59.2%	-3.3 pp (5.9%)	0.3 pp	0.0 pp	0.3 pp

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014-2022.
Notes: We did not conduct tests for the statistical significance of baseline differences for the claims-based measures of utilization and payment, because of the large sample sizes. ADI: Area deprivation index. pp: Percentage points. ED: Emergency department.

Exhibit E-19: OCM Differentially Increased the Probability of a Chemotherapy-Associated ED Visit That Did Not Lead to a Hospital Admission among Black Patients Relative to White Patients

Outcome	OCM Baseline			Estimate Associated with OCM		
	Black	White	Difference (Difference %)	Black (A)	White (B)	Differential (A-B)
Any chemotherapy-associated hospitalization	14.3%	12.7%	1.6pp (12.6%)	0.0pp	0.1pp	-0.1pp
Any chemotherapy-associated ED visit without a hospital admission	11.0%	7.9%	3.1pp (39.2%)	0.5pp	-0.3pp	0.8pp

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014-2022.
Notes: We did not conduct tests for the statistical significance of baseline differences for the claims-based measures of utilization and payment, because of the large sample sizes. pp: Percentage points. ED: Emergency department.

Exhibit E-20: OCM Was Not Associated with Differential Changes in Chemotherapy-Related Use of Hospital Services for Hispanic Patients Relative to White Patients

Outcome	OCM Baseline			Estimate Associated with OCM		
	Hispanic	White	Difference (Difference %)	Hispanic (A)	White (B)	Differential (A-B)
Any chemotherapy-associated hospitalization	14.0%	12.7%	1.3pp (10.2%)	0.6pp	0.1pp	0.5pp
Any chemotherapy-associated ED visit without a hospital admission	9.5%	7.9%	1.6pp (20.3%)	0.2pp	-0.3pp	0.5pp

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014-2022.
Notes: We did not conduct tests for the statistical significance of baseline differences for the claims-based measures of utilization and payment, because of the large sample sizes. pp: Percentage points. ED: Emergency department.

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Exhibit E-21: Dual Eligible Patients Had Greater Utilization of Chemotherapy-Associated Acute Care at Baseline, and OCM Did Not Affect These Differences

Outcome	OCM Baseline			Estimate Associated with OCM		
	Dual	Non-Dual	Difference (Difference %)	Dual (A)	Non-Dual (B)	Differential (A-B)
Any chemotherapy-associated hospitalization	15.7%	12.4%	3.3pp (26.0%)	0.2pp	0.1pp	0.1pp
Any chemotherapy-associated ED visit without a hospital admission	12.1%	7.5%	4.6pp (61.3%)	0.1pp	-0.2pp	0.3pp

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014-2022.
Notes: We did not conduct tests for the statistical significance of baseline differences for the claims-based measures of utilization and payment, because of the large sample sizes. pp: Percentage points. ED: Emergency department.

Exhibit E-22: OCM Was Not Associated with Differential Changes in Chemotherapy-Related Use of Hospital Services for Patients in High-Deprivation Neighborhoods Relative to Patients in Less-Deprived Neighborhoods

Outcome	OCM Baseline			Estimate Associated with OCM		
	ADI Top 20%	ADI Lower 80%	Difference (Difference %)	ADI Top 20% (A)	ADI Lower 80% (B)	Differential (A-B)
Any chemotherapy-associated hospitalization	14.4%	12.7%	1.7pp (13.4%)	0.2pp	0.1pp	0.1pp
Any chemotherapy-associated ED visit without a hospital admission	10.9%	7.7%	3.2pp (41.6%)	-0.4pp	-0.1pp	-0.2pp

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014-2022.
Notes: ADI: Area deprivation index. ED: Emergency department.

Exhibit E-23: OCM Not Associated with Change in Supportive Care Medication Use Among Any Population

Treatment with Recommended Supportive Care Medications	OCM Baseline			Estimate Associated with OCM		
	Black	White	Difference (Difference %)	Black (A)	White (B)	Differential (A-B)
Bone-modifying drugs[a]	64.5%	67.6%	-3.1pp (-4.6%)	0.6pp	0.6pp	1.1pp
WBC growth factors[b]	87.3%	85.5%	1.8pp (2.1%)	-0.5pp	1.9pp	-2.1pp
Antiemetics[c]	78.2%	79.3%	-1.0pp (-1.3%)	2.3pp	0.9pp[d]	1.3pp
	Hispanic	**White**	**Difference (Difference %)**	**Hispanic (A)**	**White (B)**	**Differential (A-B)**
Bone-modifying drugs	67.9%	67.6%	0.3pp (0.4%)	-0.2pp	0.6pp	0.3pp
WBC growth factors	84.5%	85.5%	-1.0pp (-1.2%)	-1.4pp	1.9pp	-3.4pp[e]
Antiemetics	77.4%	79.3%	-1.9pp (-2.4%)	3.3pp	0.9pp	2.4pp
	Dual	**Non-dual**	**Difference (Difference %)**	**Dual (A)**	**Non-Dual (B)**	**Differential (A-B)**
Bone-modifying drugs	64.6%	67.9%	-3.2pp (-4.7%)	-0.1pp	-0.6pp	0.5pp
WBC growth factors	84.8%	85.9%	-1.1pp (-1.3%)	-1.0pp	1.7pp	-2.8pp[f]
Antiemetics	77.5%	79.7%	-2.2pp (-2.8%)	1.4pp	1.1pp	0.3pp

Treatment with Recommended Supportive Care Medications	OCM Baseline			Estimate Associated with OCM		
	Black	White	Difference (Difference %)	Black (A)	White (B)	Differential (A-B)
	ADI Top 20%	ADI Lower 80%	Difference (Difference %)	ADI Top 20% (A)	ADI Lower 80% (B)	Differential (A-B)
Bone-modifying drugs	67.5%	67.4%	0.1pp (0.1%)	-1.4pp	-0.4pp	-1.0pp
WBC growth factors	85.5%	85.8%	-0.3pp (-0.3%)	2.3pp	1.1pp	1.2pp
Antiemetics	79.1%	79.3%	-0.2pp (-0.3%)	1.5pp	1.1pp	0.4pp

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: Medicare claims 2014-2022.
Notes: [a]Includes chemotherapy regimens for patients with bone metastases [b]Includes episodes where the chemotherapy regimen had a high risk of causing neutropenia. [c]Includes episodes with chemotherapy regimens with high risk of causing nausea and vomiting. [d]Baseline trends were not equal between White OCM and White comparison patients, which may introduce meaningful bias in this estimate. Estimated changes in antiemetic use among White patients should be interpreted with caution. e After dropping the two largest practices, the DDD became significant (-4.7 percentage points, 90% CI: -9.2, -0.1). f After dropping the two largest practices, the DDD became non-significant (-2.3 percentage points, 90% CI: -5.6, 1.0).
WBC: White blood cell. pp: Percentage points. ADI: Area deprivation index.

Exhibit E-24: At Baseline, Black Respondents Reported Better Experiences Relating to Symptom Management and Patient Self-Management Than White Respondents but Worse Experiences Relating to Shared Decision Making

Outcomes[a]	OCM Baseline[b]			Trend for Black Patients (A)	Trend for White Patients (B)	Difference in Trends (A-B)
	Black	White	Difference (Difference %)			
Rating of cancer care team	9.2	9.3	-0.2 (-1.8%)	0.006	0.000	0.007
Shared decision making	7.2	7.5	-0.4 (-5.1%)	0.016	0.011	0.005
Access	8.8	8.9	-0.1 (-0.6%)	0.008	0.004	0.004
Communication	8.9	9.1	-0.1 (-1.3%)	0.001	0.001	-0.001
Exchanging information	8.4	8.6	-0.2 (-2.1%)	0.000	-0.003	0.003
Enabling patient self–management	6.2	5.9	0.3 (5.3%)	0.005	0.002	0.003
Symptom management	7.8	7.3	0.4 (5.5%)	-0.019	-0.017	-0.002

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.
Source: OCM Patient and Caregiver Surveys. Includes episodes initiated from April 2016 through December 2020; data collection for these episodes occurred from January 2017 through June 2021.
Notes: [a]Patient-reported measures are all scaled 0–10. [b]Baseline survey wave included episodes initiated from April to September 2016. Estimates were weighted for sampling and nonresponse and regression adjusted.

Exhibit E-25: At Baseline, Hispanic Respondents Reported Better Experiences Relating to Access, Communication, Self-Management and Symptom Management Than White Respondents but Worse Experiences Relating to Shared Decision Making

Outcomes[a]	OCM Baseline[b] Hispanic	White	Difference (Difference %)	Trend for Hispanic Patients (A)	Trend for White Patients (B)	Difference in Trends (A-B)
Rating of cancer care team	9.3	9.3	0.0 (0.1%)	0.005	0.000	0.006
Shared decision making	7.1	7.5	-0.5 (-6.6%)	0.012	0.011	0.002
Access	9.3	8.9	0.4 (4.1%)	0.013	0.004	0.010
Communication	9.4	9.1	0.3 (3.4%)	0.015	0.001	0.013
Exchanging information	8.6	8.6	0.1 (0.6%)	0.009	-0.003	0.012
Enabling patient self–management	6.3	5.9	0.4 (6.3%)	0.013	0.002	0.011
Symptom management	7.8	7.3	0.5 (5.8%)	0.000	-0.017	0.017

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Source: OCM Patient and Caregiver Surveys. Includes episodes initiated from April 2016 through December 2020; data collection for these episodes occurred from January 2017 through June 2021.

Notes: [a]Patient-reported measures are all scaled 0-1. [b]Baseline survey wave included episodes initiated from April to September 2016. Estimates were weighted for sampling and nonresponse and regression adjusted.

Exhibit E-26: Dual Eligible and Medicare-Only Respondents Reported Similar Care Experiences at Baseline

Outcomes[a]	OCM Baseline[b] Dual	Non-Dual	Difference (Difference %)	Trend for Dual Patients (A)	Trend for Non-Dual Patients (B)	Difference in Trends (A-B)
Rating of cancer care team	9.3	9.3	0.0 (0.2%)	-0.006	0.001	-0.008
Shared decision making	7.7	7.5	0.2 (3.0%)	0.003	0.013	-0.010
Access	8.8	8.9	-0.1 (-1.6%)	0.012	0.004	0.008
Communication	8.9	9.1	-0.1 (-1.5%)	0.002	0.002	0.000
Exchanging information	8.4	8.5	-0.1 (-1.6%)	-0.003	-0.002	-0.001
Enabling patient self–management	6.2	5.9	0.3 (4.4%)	0.001	0.003	-0.002
Symptom management	7.4	7.3	0.1 (1.0%)	-0.017	-0.015	-0.002

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Source: OCM Patient and Caregiver Surveys. Includes episodes initiated from April 2016 through December 2020; data collection for these episodes occurred from January 2017 through June 2021.

Notes: [a]Patient-reported measures are all scaled 0-1. [b]Baseline survey wave included episodes initiated from April to September 2016. Estimates were weighted for sampling and nonresponse and regression adjusted.

Exhibit E-27: Respondents Living in High- and Lower-Deprivation Neighborhoods Reported Similar Care Experiences at Baseline

Outcomes[a]	OCM Baseline[b]			Trend for ADI Top 20% (A)	Trend for ADI Lower 80% (B)	Difference in Trends (A-B)
	Top 20%	Lower 80%	Difference (Difference %)			
Rating of cancer care team	9.3	9.3	0.0 (0.1%)	0.005	0.000	0.005
Shared decision making	7.3	7.5	-0.2 (-3.0%)	0.012	0.012	0.000
Access	8.9	8.9	0.0 (-0.1%)	0.007	0.005	0.002
Communication	9.0	9.1	0.0 (-0.3%)	0.000	0.003	-0.003
Exchanging information	8.5	8.5	0.0 (-0.5%)	-0.007	-0.001	-0.006
Enabling patient self–management	6.0	5.9	0.1 (1.1%)	-0.003	0.004	-0.007
Symptom management	7.3	7.4	0.0 (-0.3%)	-0.029	-0.013	-0.015

Shading indicates statistically significant estimates at p≤0.01, p≤0.05, and p≤0.10, indicated by dark blue, medium blue, or light blue shading.

Source: OCM Patient and Caregiver Surveys. Includes episodes initiated from April 2016 through December 2020; data collection for these episodes occurred from January 2017 through June 2021.

Notes: [a]Patient-reported measures are all scaled 0-1. [b]Baseline survey wave included episodes initiated from April to September 2016. Estimates were weighted for sampling and nonresponse and regression adjusted. ADI: Area deprivation index.

F. Interviews of Patients with Cancer

We interviewed a diverse group of 30 patients covered by FFS Medicare (Medicare Parts A and B) who were being treated for cancer. Because we wanted to learn from people with a wide variety of care experiences, we used Medicare administrative data to stratify patients on several characteristics including race and ethnicity, rurality, and neighborhood socioeconomic status (as measured by the Area Deprivation Index).[50] We also ensured that the sample included both Medicare-only and Medicare-Medicaid dually eligible beneficiaries. About half received their cancer care from physician groups participating in the Oncology Care Model, and the rest received care from other physicians who did not participate. Our purpose was not to compare insights from patients treated by practices that were and were not participating in the Oncology Care Model, but rather to understand what matters most to people with cancer, regardless of where they get treatment.

Thirty patients spoke with us about their cancer care experiences, at length and with an openness that we greatly appreciate. Several told us that this was the first time anyone had asked about their cancer care experiences and thanked us for interviewing them. We asked about their cancer journey and loosely guided the conversations to focus on: finding an oncologist to work with, communicating with their care team, making treatment decisions, managing symptoms, handling financial issues, getting help, and anything else that was important to them. Throughout the interviews, which lasted for up to one hour, we asked, "what was most important to you," and "what went well, what could have gone better."[51]

Interviewees Were Not Representative of All Cancer Patients

The 30 patients we interviewed are not representative of all cancer patients with FFS Medicare. Among the 504 people who received recruitment calls, 30 agreed to be interviewed (a 5.9% recruitment rate), and they were probably different from those who did not agree. It is therefore important to interpret the information from these interviews as contributing detail and context beyond what is available from standardized surveys, but not as a replacement for surveys from a representative population.

Additionally, all the patients who agreed to be interviewed were able to participate in the interviews, which lasted for up to an hour, and which occurred over a year after they had received chemotherapy. (We conducted the interviews in summer 2022 with patients who had begun chemotherapy episodes between January and March 2021.) Some people who did not participate in interviews may have been too sick to do so. Others may have since passed away, and we therefore would not have been able to interview them.

Sample Characteristics

We present sample characteristics for the 30 interviewees in **Exhibit F-1**. About two-thirds were female, and roughly half were between 70 and 74 years of age. The most common cancer types among them were breast cancer, multiple myeloma, and lymphoma., all of which were among the ten most common cancer types in OCM Six of the 30 patients were enrolled in both Medicaid and Medicare, and 24 had FFS Medicare but not Medicaid. Interviewees represented a range of races and ethnicities: 9 Black, 9 Hispanic, 5 White, and 7 identified as other races or ethnicities. Roughly one-quarter lived in a rural area.

One-fifth lived in the lowest-resourced neighborhoods and one-fifth lived in the most resourced neighborhoods. Half were in the midst of their first cancer treatment experience. Many had prior experience receiving cancer treatment.

[50] To ensure that the sample was diverse, we stratified the sample by race, ethnicity, rural versus urban location, and Area Deprivation Index (ADI) values. ADI is a validated measure of community resources that enable better health and access to care. Unfortunately, we had no prior information about English proficiency and therefore could not deliberately select people facing this challenge to participate in interviews, but we did recruit people of Hispanic ethnicity and offered to conduct interviews in Spanish rather than English. We also had no prior information about social determinants of health, but we did try to select people living in disadvantaged areas.

[51] None of these people were nearing the end of their lives and we did not discuss hospice or end-of-life care.

Exhibit F-1: Characteristics of interviewees

Interviewee characteristics	Number of interviewees
Age	
65-69	11
70-74	15
75+	4
Gender[a]	
Female	19
Male	11
Race and Ethnicity[a]	
Asian, Pacific Islander, American Indian, Alaska Native, and other races or ethnicities	7
Black	9
Hispanic	9
White	5
Enrollment in Medicare and Medicaid	
Enrolled in Medicare and Medicaid (i.e., dually eligible)	6
Enrolled in Medicare only	24
Previous six-month cancer episode	
First six-month cancer episode	15
Had one or more previous six-month cancer episodes	15

Interviewee characteristics	Number of interviewees
Cancer type	
Breast cancer	6
Multiple myeloma	5
Lymphoma	3
Chronic leukemia	2
Lung cancer	2
Prostate cancer	2
Colorectal cancer	2
Bladder cancer	1
Other	7
Urbanicity	
Metropolitan	11
Micropolitan	12
Rural	7
Area Deprivation Index (ADI) quintile[b]	
First (most resourced areas)	6
Second	5
Third	8
Fourth	4
Fifth (lowest-resourced areas)	7

Source: 2021 Medicare Fee-For-Service Claims data.

Notes: [a] We identified the characteristics in this table using Medicare administrative data. This was true for all measures, including gender, race, and ethnicity. We did not ask the interviewees to confirm their demographic characteristics. [b] ADI is a validated measure of community resources that enable better health and access to care ranging from 0 to 100. Higher values of the ADI indicate greater levels of community deprivation and lower levels of resource availability. To understand the ADI values of the interviewees' communities, we categorized the ADI into five groups, one for each quintile grouping (i.e., communities in the lowest 20 percent of the ADI, the second lowest twenty percent, the middle twenty percent, the second highest 20 percent, and the highest 20 percent).

Acronyms

G. Acronyms

ACH	Acute-Care Hospitalization
ACO	Accountable Care Organization
ADI	Area Deprivation Index
AIAN	American Indian or Alaska Native
APM	Alternative Payment Model
AQS	Aggregate Quality Score
ASCO	American Society of Clinical Oncology
CAHPS	Consumer Assessment of Healthcare Providers and Systems
CanCORS	Cancer Care Outcomes Research and Surveillance
CDK	Cyclin-Dependent Kinase Clinical Decision Support
CI	Confidence Interval
CML	Chronic Myeloid Leukemia
CMS	Centers for Medicare & Medicaid Services
CNS	Central Nervous System COMP Comparison Group
CPC	Comprehensive Primary Care
CRC	Colorectal
DID	Difference-in-Differences
DDD	Difference-in-Differences-in-Differences
E&M	Evaluation and Management
ED	Emergency Department
EHR	Electronic Health Record
EOM	Enhancing Oncology Care Model
FDA	U.S. Food and Drug Administration
FFS	Fee-for-Service
GCSF	Granulocyte Colony-Stimulating Factor
HCC	Hierarchical Condition Category
HCPCS	Healthcare Common Procedure Coding System
HHA	Home Health Agency
HER2	Human Epidermal Growth Factor 2
HPSA	Health Professional Shortage Area
ICU	Intensive Care Unit
IRF	Inpatient Rehabilitation Facility
ITT	Intent-to-Treat
LCL	Lower Confidence Limit
LTCH	Long-term care hospital
MA	Medicare Advantage
MEOS	Monthly Enhanced Oncology Services
MIPS	Merit-Based Incentive Payment System
MSSP	Medicare Shared Savings Program
NCCN	National Comprehensive Cancer Network
NK1	Neurokinin-1
NP/PA	Nurse Practitioner/Physician Assistant
NPI	National Provider Identifier
NPPES	National Plan and Provider Enumeration System
OCM	Oncology Care Model
OIP	Other Inpatient Facility
OLS	Ordinary Least Squares
PAC	Post-Acute Care
PBP	Performance-Based Payment
PHE	Public Health Emergency
PP	Performance Period
PSM	Propensity Score Matching
QOPI	Quality Oncology Practice Initiative
QPP	Quality Payment Program
RTI	Research Triangle Institute
SNF	Skilled Nursing Facility
TEP	Total Episode Payments
TIN	Tax Identification Number
TKI	Tyrosine Kinase Inhibitor
UCL	Upper Confidence Limit
VRDC	Virtual Research Data Center

Glossary

H. Glossary

Accountable Care Organization (ACO)	An ACO is a group of doctors, hospitals, and other health care providers that come together voluntarily to give coordinated high-quality care to their Medicare patients. When an ACO succeeds both in delivering high-quality care and in spending health care dollars more wisely, the ACO will share in the savings it achieves for the Medicare program.
Adjuvant therapy	Adjuvant therapy is an additional cancer treatment given after surgery to lower the risk that the cancer will come back. Adjuvant therapy may include chemotherapy, radiation therapy, hormone therapy, targeted therapy, or biological therapy. Neo-adjuvant therapy is given before surgery, usually to shrink the tumor or make it more accessible.
Advance care planning	A conversation between a physician (or other qualified health care professional) and a patient to discuss the patient's wishes regarding their medical treatment, if they should become unable to communicate. This discussion may or may not include completing relevant legal forms, such as health care proxies or advance directives.
Advanced Alternative payment model	An advanced alternative payment model is a subset of alternative payment models (APMs) that let physician practices earn payments for taking on down-side risk related to patient outcomes. Practices that participate in an advanced APM are eligible for up to a 5-percent incentive payment beginning in 2019 and are excluded from the Merit-Based Incentive Payment System (MIPS) reporting requirements and payment adjustment.
Advanced practice provider	Medical professionals other than physicians who are authorized to prescribe medications, such as physician assistants and nurse practitioners.
Alternative Payment Model (APM)	An APM is a payment approach that rewards providers or practices with incentive payments for providing high-quality and cost-efficient care.
Anti-emetic	Anti-emetics are medications that prevent or reduce nausea and vomiting.
Baseline period	The baseline period is the evaluation's analytic time period during which outcomes are assessed prior the implementation of the Oncology Care Model (OCM), covering episodes that initiate July 1, 2014 to January 1, 2016.
Biosimilar drug	A biosimilar drug is a biological drug that is very much like another biological drug (called the reference drug) that has already been approved by the U.S. FDA. Biosimilar drugs and reference drugs are made from living organisms, but they may be made in different ways and of slightly different substances. To be called biosimilar, a biological drug must be shown to be as safe as, work as well as, and work in the same way as its reference drug. It must also be used in the same way, at the same dose, and for the same condition as the reference drug. Biosimilar drugs must be approved by the FDA and may cost less than the reference drugs.
Cancer bundle	The cancer bundle represents the primary cancer a patient has during their episode. An episode is assigned a cancer type using the plurality of diagnoses on evaluation and management (E&M) services in the carrier file that occurred during the episode, per OCM program rules. The 21 reconciliation-eligible cancer types in the original OCM methodology are then expanded to 24, with breast cancer divided into low- versus high-risk, prostate cancer divided into low- versus high-intensity, and bladder cancer divided into low- versus high-risk. The 25th bundle is for all non-reconciliation-eligible cancer types combined.

Care coordination/ care coordinators	Care coordination involves deliberately organizing care activities and sharing information among all of the participants involved in a patient's care, to ensure the safe, appropriate, and effective delivery of health care services. The individuals who coordinate care may be called care coordinators or nurse navigators.
Care Plan	Practices participating in OCM are required to document a Care Plan for every OCM patient that includes 13 components as outlined by the Institute of Medicine. The OCM Care Plan should include: 1) patient information (e.g., name, date of birth, medication list, allergies); 2) diagnosis, including specific tissue information, relevant biomarkers, and stage; 3) prognosis; 4) treatment goals; 5) initial plan for treatment and proposed duration, including surgeries and radiation therapy; 6) expected response to treatment; 7) treatment benefits and harms; 8) information on quality of life and patient's likely experience with treatment; 9) who will take responsibility for specific aspects of a patient's care; 10) advance care plans, including advance directives and other legal documents; 11) estimated total and out-of-pocket (OOP) costs of treatment; 12) a plan for addressing a patient's psychosocial health needs, including psychological, vocational, disability, legal, and financial concerns, and; 13) a survivorship plan.
Chemotherapy (chemo)	For OCM purposes, CMS defines chemotherapy as systemic therapies including cytotoxic chemotherapy, hormonal therapy, biologic therapy, immunotherapy, and combinations of these therapies.
Clinical guidelines	Systematically developed statements to assist practitioner and patient decisions about appropriate treatment in specific clinical circumstances. Guidelines contain recommendations based on evidence from a rigorous systematic review and synthesis of the published medical literature, and define the role of specific diagnostic and treatment modalities in the diagnosis and management of patients. A clinical guideline may be broad, with several acceptable treatment regimens considered as compliant with the guideline. While clinical guidelines identify and describe generally recommended courses of treatment, they are not presented as a substitute for the advice of a physician or other knowledgeable health care professional or provider.
Coinsurance	The patient's share of costs of a covered health care service, calculated as a percentage. For example, a patient may pay 20 percent for a lab test or 80 percent for a prescribed medication that is not listed on their insurance plan's approved medication list.
Comparison practice	A non-OCM oncology practice (identified by its TIN) selected to be in the evaluation comparison group. The evaluation team found selected comparison practices to be statistically similar to participating OCM practice(s) according to propensity score matching methods.
Copay/copayment	A fixed amount or percentage that a patient pays for a covered health service. For example, a patient may need to pay $20 to visit a doctor, or for a prescription.
Cost-sharing	What a patient pays for medical services covered by their health insurance. Typical cost-sharing includes deductible, copayment, coinsurance, and premium.
Deductible	The amount a patient must spend for health care services that the patient's plan covers, before their health insurance begins to pay. For example, if a patient's deductible is $1,000, their plan will not pay anything until they have met the $1,000 deductible for covered health care services.

Difference-in-Differences (DID)	A statistical technique that quantifies the impact of an intervention by comparing changes in outcomes of treatment cases (i.e., OCM episodes) to changes in outcomes in a matched comparison group (i.e., comparison episodes), from before to after OCM implementation.
Dual eligible	A beneficiary who is enrolled in Medicare and also receiving full or partial Medicaid benefits.
Emetic	An emetic agent induces vomiting.
Emetogenic	Emetogenic describes a substance that causes nausea and vomiting.
Enhanced oncology services	OCM practices are required to make the following enhanced services available to beneficiaries with traditional Medicare insurance: 24/7 patient access to an appropriate clinician who has real-time access to patient's medical records; 2) core functions of patient navigation; 3) a documented Care Plan that contains the 13 components recommended by the Institute of Medicine; and 4) therapies consistent with nationally recognized clinical guidelines (and explain deviations).
Episodes (for OCM)	A six-month period of care that is triggered by receipt of chemotherapy with at least one cancer-related E&M service occurring within six months of the initial chemotherapy. Episodes initiate upon the date of service for an initial Part B chemotherapy drug claim with a corresponding cancer diagnosis on the claim, or upon the fill date for an initial Part D chemotherapy drug claim with a corresponding Part B claim for cancer on the date of, or in the 59 days preceding, the drug claim. If treatment continues for a beneficiary after the six-month episode, a new episode begins when the episode criteria are met again (i.e., a Part B chemotherapy infusion or Part D chemotherapy prescription within 59 days after a Part B claim for cancer, followed by a cancer E&M within six months).
Evaluation and Management (E&M)	The billing code for a specific type of patient visit with a physician or advanced practice provider, which includes at minimum the following components: 1) history; 2) examination; and 3) medical decision making. An E&M service with a cancer diagnosis on the same claim line on a carrier claim is required to identify an OCM episode as well as assign the cancer bundle to the episode.
Evidence-based care	Evidence-based care incorporates three fundamental components: 1) individual clinical expertise; 2) best external evidence; and 3) patient values and expectations. Also referred to as evidence-based practice.
Fee-for-Service (FFS)	A method in which doctors and other clinicians are paid for each service performed. Examples of services include tests and office visits. Traditional Medicare is also referred to as FFS Medicare insurance.
Fractions	The full dose of radiation is usually delivered in separate sessions, called fractions. This allows healthy cells to recover between treatments. In Medicare, a separate claim is submitted for each fraction/session.
Generic drugs	Generic drugs are copies of brand-name drugs that have exactly the same dosage, intended use, effects, side effects, route of administration, risks, safety, and strength as the original drug. Their pharmacological effects are exactly the same as those of their brand-name counterparts.
Gross drug costs	Total spending for the prescription claim, including payments from Medicare, supplemental insurance, and beneficiary payments.
Growth factors	Proteins that help the body produce white blood cells. They are also called hematopoietic, meaning blood-forming, colony-stimulating factors (CSFs). White blood cells help fight infection and can be destroyed during some types of cancer treatment. Growth factors can be administered to cancer patients, to prevent neutropenia and infection.

Gynecologic oncology	The diagnosis and treatment of cancers located on a woman's reproductive organs (e.g., ovarian cancer).
Health system or integrated health system	An organization that includes at least one hospital, and at least one group of physicians who are connected with each other and with the hospital through common ownership or joint management and combine their activities to deliver comprehensive health care services.
Health care proxy	A legally designated person who will express a patient's wishes and make health care decisions for them if they are unable to speak for themselves.
Hematology-oncology	The diagnosis, treatment, and prevention of blood diseases and blood cancers, such as leukemia, lymphoma, and myeloma.
Hierarchical condition categories (HCC)	CMS-HCC flags are used to calculate risk scores that adjust capitation payments to MA health care plans for the health expenditure risk of their enrollees. HCC scores use clinical diagnoses and comorbidities (i.e., severity of illness) from the previous year to predict costs in the coming year.
Higher-risk episodes	Includes 22 of the 25 defined cancer bundles and excludes the following: low-risk breast cancer, low-intensity prostate cancer, and low-risk bladder cancer.
Hold-out period	The six-month time period prior to the implementation of OCM during which the evaluation does not include episodes in order to prevent overlap between baseline and intervention episodes.
Home health care	Medical care provided in a patient's home. Home health care can include skilled nursing care, physical therapy, occupational therapy, intravenous drug therapy, and non-medical home aide services.
Hormone therapy	A type of therapy that adds, blocks, or removes hormones. Hormones can cause certain cancers (such as prostate and breast cancer) to grow. To slow or stop the growth of cancer, synthetic hormones or other drugs may be given to block the body's natural hormones. Also called endocrine therapy, hormonal therapy, and hormone treatment.
Hospice care	End-of-life care provided by a team of health care professionals and volunteers. The goal of hospice care is to help people who are dying have peace, comfort, and dignity. Hospice care is covered by Medicare when a patient is terminally ill and expected to live for six months or less. Patients must stop active treatment for their terminal condition to receive Medicare-covered hospice services. Hospice care can take place at home, at a hospice center, in a hospital, or in a skilled nursing facility.
Hospital readmission	An admission to an acute care hospital within 30 days of discharge from an acute care hospital.
Hospital utilization measures	Hospital utilization measures include measures of inpatient care such as hospitalizations and length of stay (i.e., Medicare covered inpatient days per episode).
Imaging	A type of test that makes detailed pictures of areas inside the body. Imaging tests use different forms of energy, such as x-rays (high-energy radiation), ultrasound (high-energy sound waves), radio waves, and radioactive substances to help diagnose or treat cancer, and to monitor for cancer recurrence. Examples of imaging tests are computed tomography, ultrasonography, magnetic resonance imaging, and nuclear medicine tests.
Immunotherapy	A type of therapy that uses substances to stimulate or suppress the immune system to help the body fight cancer.

Infusion	Treatment in which fluids, including drugs, are given through a needle or tube inserted into a vein, and travel through the blood. Also called intravenous infusion.
Inpatient care	Inpatient care is medical treatment administered to a patient who has been formally admitted to a hospital or other health care facility.
Intent-to-treat (ITT)	A method for analyzing results in a prospective study where all participants are included in the statistical analysis and analyzed according to the group they were originally assigned (intervention or comparison), regardless of what treatment (if any) they received. In the OCM evaluation, ITT analysis includes all originally participating practices, including those that terminate participation.
Intervention period	The intervention period is the analytic time period during which outcomes are assessed while the OCM intervention is in effect. For this report, the intervention period covers episodes that initiate in PP1–PP9.
Intravenous chemotherapy	Treatment in which anti-cancer drugs are given through a needle or tube inserted into a vein, and travel through the blood to kill cancer cells in the body.
Long-term care	A variety of services designed to meet a person's health or personal care needs when they can no longer perform everyday activities on their own. Long-term care is provided in different places by different caregivers, depending on a person's needs. It can be provided at home by unpaid family members and friends, or in a facility such as a nursing home.
Lower-risk episodes	Includes low-risk breast cancer, low-intensity prostate cancer, and low-risk bladder cancer.
Lumpectomy	Excision of a breast tumor with a limited amount of associated tissue.
Malignant	Cancerous. Malignant cells can invade and destroy nearby tissue and spread to other parts of the body.
Mastectomy	Surgery to remove part or all of the breast.
Medical homes	An approach to the delivery of primary care that is: 1) patient-centered; 2) comprehensive; 3) coordinated; 4) accessible; and 5) committed to quality and safety.
Medical oncology	The diagnosis and treatment of cancer using chemotherapy, hormonal therapy, biological therapy, and targeted therapy. A medical oncologist often is the main health care provider while a person is undergoing treatment for cancer. A medical oncologist also gives supportive care and may coordinate treatment given by other specialists.
Medicare Advantage (MA)	A type of Medicare health plan offered by a private company that contracts with Medicare. MA plans include: Health Maintenance Organizations, Preferred Provider Organizations, Private FFS Plans, Special Needs Plans, and Medicare Medical Savings Account Plans.
Medicare beneficiary	A person enrolled in Medicare insurance, whether traditional Medicare or an MA plan.
Merit-based Incentive Payment System (MIPS)	CMS operates a quality payment incentive program, referred to as the Quality Payment Program (QPP), which rewards value and outcomes in one of two ways: MIPS and Advanced APMs. Performance is measured in four areas: 1) quality; 2) improvement activities; 3) promoting interoperability of electronic health information; and 4) cost. All eligible clinicians were required to participate in MIPS starting in 2017 or be subject to a negative 4 percent payment adjustment on Medicare Part B

	reimbursements starting in 2019. Those who participate in an Advanced APM are eligible to receive up to a 5 percent bonus adjustment.
Metastasis	The spread of cancer cells from the place where they first formed to another part of the body. The new metastatic tumor is the same type of cancer as the primary tumor.
Monthly Enhanced Oncology Service (MEOS) payment	Payment intended to support care redesign and enhanced oncology services (see definition for enhanced oncology services). MEOS and PBPs are the financial incentives in OCM. OCM practices may bill Medicare a $160 per beneficiary fee for each month of a six-month episode, unless the beneficiary enters hospice care or dies. MEOS payments billed for beneficiaries who do not meet all episode eligibility criteria (e.g., those who switch to MA during the episode) will be recouped, since no episode will be identified for these beneficiaries.
Multi-specialty practice	Includes physicians certified in different specialties, for example, oncologists, cardiologists, surgeons, and pediatricians.
National Comprehensive Cancer Network (NCCN)	A not-for-profit alliance of leading cancer centers devoted to patient care, research, and education. NCCN is dedicated to improving and facilitating quality, effective, efficient, and accessible cancer care. NCCN develops resources that present valuable information to the numerous stakeholders in the health care delivery system, promote the importance of CQI, and create/update clinical practice guidelines for cancer care.
National provider identifier (NPI)	A unique identification number assigned to health care providers in the United States, used for administrative and financial transactions, such as submitting claims to Medicare for payment of services rendered to Medicare beneficiaries.
Neoplasm	An abnormal mass of tissue that results when cells divide more than they should or do not die when they should. Neoplasms may be benign (not cancer), or malignant (cancer). Also called tumor.
Neutropenia	A condition in which there is a lower-than-normal number of neutrophils (a type of white blood cell) in the blood. Neutrophils are made in the bone marrow. People who have neutropenia have a higher risk of getting serious infections.
Non-Reconciliation-Eligible Cancer	Types of cancer identified by CMS to be rare. OCM episodes for these cancer types are not included in PBPs, although practices may submit claims for MEOS payment during treatment episodes for these types of cancer.
Novel therapies	Novel therapies are treatments newly approved by the FDA for treatment of cancer. In OCM, PBPs are adjusted for novel therapies, which are often more costly than alternative therapies. Use of the novel therapy must be consistent with the FDA-approved indications. Most new oncology drugs/ indications are considered "novel" for two years after FDA approval for that specific indication. Payment adjustment is based on the percentage of each practice's average episode expenditures for novel therapies, compared to the average percentage for practices that are not participating in OCM.
OCM Data Registry	CMS requires practices participating in OCM to enter information about each patient's anatomic disease staging, and other clinically relevant data, into a data registry (e.g., molecular mutations that enable the use of targeted therapies). In addition, practices must report quality measurement data for the purposes of calculating PBPs and for measuring practice quality improvement.
OCM practice	An oncology practice that is participating in the OCM. OCM practices comprise the evaluation treatment group.

Oncologist	A physician who treats cancer and provides medical care for people with cancer.
Oncology	A branch of medicine that specializes in the diagnosis and treatment of cancer.
Oral chemotherapy	Treatment with drugs given by mouth to kill cancer cells or stop them from dividing.
Palliative care	Palliative care addresses symptoms of disease and treatment, to improve the quality of life of patients and their families facing life-threatening illness. Palliative care aims to prevent or relieve pain and other suffering, whether physical, psychosocial, or spiritual.
Part A	Medicare Part A is insurance coverage for inpatient care in a hospital, skilled nursing facility, inpatient rehabilitation facility, or long-term care hospital, as well as hospice care and home health care.
Part B	Medicare Part B is insurance coverage for outpatient/medical care, including medically necessary physician and other professional services and therapies, preventive services, and professionally administered prescription drugs such as chemotherapy infusions.
Part D	Medicare Part D is optional insurance coverage to help Medicare beneficiaries pay for self-administered prescription drugs. Medicare Part D plans are offered by private insurance companies.
Pathways	Pathways software programs provide CDS that guides physicians about which treatment regimen to select for a patient, based on clinical guidelines about the most efficacious or the best-value treatment option (for example, when more than one drug is equally efficacious, with equivalent toxicity risk, but they have different costs). Pathways software programs are sold by vendors and can be incorporated into or separate from a practice's EHR.
Patient navigator	A health professional who focuses on the patient's needs. The navigator helps guide the patient through the health care system and works to overcome obstacles that are in the way of the patient's receiving the care and treatment they require.
Performance period (PP)	OCM episodes are organized into six-month PPs. At each participating practice, all episodes that begin during a PP are reconciled together. For example, PP1 includes OCM-defined six-month treatment episodes that began between July 1, 2016, and January 1, 2017, the last of which ended by June 30, 2017.
Performance-based payment (PBP)	A practice participating in OCM may be eligible to receive a proportion of reductions in Medicare episode paymentsas compared with its historic benchmarks (less a discount retained by CMS). The PBP is calculated retrospectively for each PP, based on the practice's reductions in Medicare payments below a target price, adjusted for quality. The combination of these PBPs, along with monthly per-patient payments for enhanced oncology services (the MEOS payment), form the financial and quality incentives in OCM.
Post-acute care (PAC)	Includes rehabilitation or palliative services that beneficiaries receive after, or in some cases instead of, hospital care. Depending on the intensity of care the patient requires, PAC may be provided in a skilled nursing facility or in a patient's home by a home health agency.
Practice	Physician group or business entity that provides cancer care to patients, defined for OCM purposes by the unique TIN that the physicians use to submit claims for Medicare payment. Practices can be independently owned, health-system/ hospital owned, or part of an academic medical center.

Prognosis	The likely outcome or course of a disease; the chance of recovery or recurrence. A cancer prognosis may indicate the likelihood of cure, or the anticipated life expectancy when cure is not possible.
Propensity score matching	Propensity score matching is used to select a comparison group that is statistically similar to an intervention/treatment group. Propensity scores can be used to reduce or eliminate selection bias in observational studies by balancing observed covariates (the characteristics of participants' practices, markets and attributed episodes) between treatment and comparison groups. The goal is to approximate a random experiment, eliminating many of the problems that come with observational data analysis.
Prophylactic	A preventive measure. A medication or treatment designed to prevent a disease or other outcome from occurring.
Quality Payment Program (QPP)	The Medicare Access and CHIP Reauthorization Act of 2015 requires CMS to operate the Medicare QPP. There are two ways clinicians can participate in the QPP: MIPS or Advanced APMs. (See previous definitions.)
Radiation oncology	One of the three primary specialties in oncology, the other two being surgical and medical oncology, involved in the treatment of cancer. Radiation can be given as a curative modality, either alone or in combination with surgery and/or chemotherapy. It may also be palliative, to relieve symptoms (e.g., pain from bone metastases) in patients with incurable cancer.
Radiation therapy	The use of high-energy radiation from x-rays, gamma rays, neutrons, protons, and other sources to kill cancer cells or shrink tumors. Radiation may come from a machine outside the body (external-beam radiation therapy) or from radioactive material placed in the body near cancer cells (internal radiation therapy or brachytherapy). Also called irradiation and radiotherapy.
Regimen	A treatment plan that specifies the drug, dosage, schedule, and duration of treatment. A treatment regimen for a specific patient may include chemotherapy drugs as well as supportive therapy drugs such as white cell growth factors or antiemetics.
Shared decision making	A process in which clinicians and patients work together to make decisions and select tests, treatments, and Care Plans based on clinical evidence that balances risks and expected outcomes with patient preferences and values.
Office-Based Physician File	This proprietary data source of physician data contains information about every practice site in the United States where medical professionals provide care. It includes the ownership, size, address, and list of individual providers operating at the practice site, along with their health and hospital affiliations.
Skilled nursing facility (SNF)	An inpatient nursing facility where medical professionals provide skilled nursing care. Medicare Part A covers up to 100 days of care in an SNF each benefit period.
Stage	Cancer staging is usually based on the size of the tumor, whether lymph nodes contain cancer, and whether the cancer has spread from the original site to other parts of the body. Higher stages indicate larger, or more broadly spread, cancer in the body, and usually a poorer prognosis.
Supportive therapy	Medications that are used to ameliorate chemotherapy-related side effects that may occur during cancer treatments. Common types of supportive therapies include anti-nausea medications, blood cell growth factors, and bone-stabilizing medications.

Surgical oncology	Surgical oncology is one of the three primary specialties in the treatment of cancer and involves the use of surgery to remove cancerous tumors. Surgery can be used by itself or with other (adjuvant) treatments, such as chemotherapy and radiation.
Survivorship plan	A detailed plan given to a patient after successful treatment ends that contains a summary of the patient's treatment, along with recommendations for follow-up care. In cancer, the survivorship plan is based on the type of cancer and the treatment the patient received. A survivorship care plan may include schedules for physical exams and medical tests (also called surveillance) to detect whether the cancer has recurred or spread to other parts of the body. This follow-up care and surveillance usually continues for several years. A survivorship plan may also include information to help meet the emotional, social, legal, and financial needs of the patient, such as referrals to specialists and recommendations for a healthy lifestyle.
Tax identification number (TIN)	CMS uses IRS-assigned TINs to identify hospitals, physicians, and others that submit claims for payment, for services delivered to Medicare beneficiaries. The TIN is the same as the Federal Employer ID Number (FEIN) or Employer Identification Number (EIN). In OCM, all providers in a practice must submit claims for their services under one unified TIN.
Total episode payment (TEP)	The total gross Medicare Part A, B, and D payment for all cancer and non-cancer care for a patient during a six-month OCM-defined episode. Part A and B payments are standardized to remove geographic differences in labor costs and to exclude payments to providers that support larger Medicare program goals, such as disproportionate share payments. Part D payments are not standardized and are calculated as the sum of low-income cost-sharing and reinsurance. TEP does not include MEOS payments.
Toxicity	The extent to which treatment is poisonous or harmful, or causes side effects.
Two-sided risk	Participating OCM practices may voluntarily adopt two-sided risk, in which CMS recoups Medicare payments above the target. Accepting two-sided risk meets the QPP's criteria for being an advanced APM. Practices were required to move to two-sided risk (or their participation will be terminated) if they did not achieve a PBP for at least one of the first four PPs. Practices that had achieved a PBP in one of the first four PPs could choose to stay in OCM under one-sided risk.
Value-based payment models	Value-based payment models reward health care providers with incentive payments for the quality of care they provide to patients. These models are part of CMS's larger quality strategy to reform how health care is delivered and paid for.

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