

REPORT

FINAL REPORT

Evaluation of the Diffusion and Impact of the Chronic Care Management (CCM) Services: Final Report

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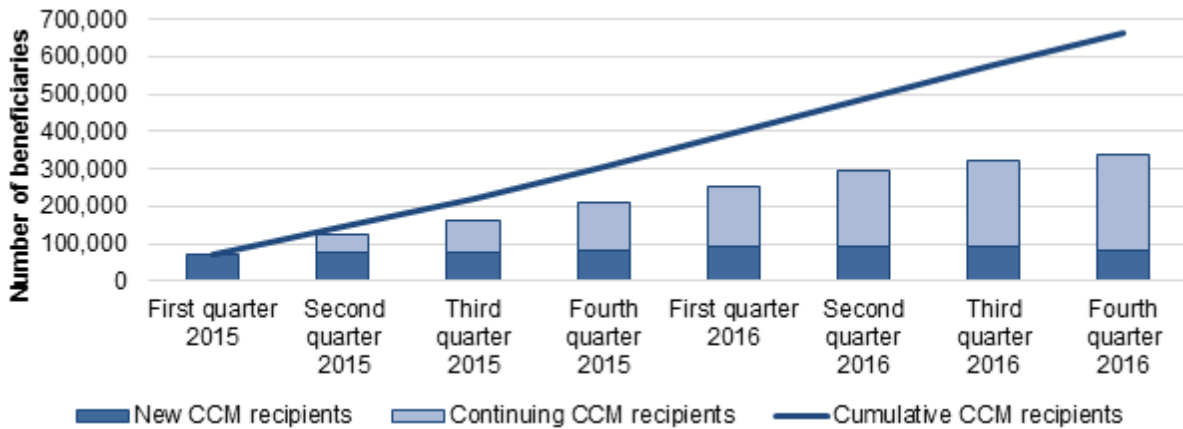
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EXECUTIVE SUMMARY

In January 2015, the Centers for Medicare & Medicaid Services (CMS) introduced a separately billable non-face-to-face Chronic Care Management (CCM) service. The goal of CCM is to improve Medicare beneficiaries’ access to chronic care management in primary care. Over 684,000 beneficiaries received CCM services during the first two years of the new payment policy (Figure ES.1). These beneficiaries were generally concentrated in the South and had poorer health status than the general Medicare fee-for-service (FFS) population. About 19 percent of beneficiaries only received one month of CCM services; however the majority of beneficiaries received between four and ten months of CCM services, on average. Primary care physicians (PCPs) billed for 68 percent of CCM claims and 42 percent of CCM billers were solo practitioners. Individual providers billed for \$105.8 million in CCM fees during the first 24 months of the program and, on average, managed about 47 patients per month. However, the median number of patients was 10, indicating that the average was skewed by a small number of providers delivering CCM services to many beneficiaries. This translates to about \$300 in CCM fees per month for providers furnishing CCM services to 10 beneficiaries.

Figure ES.1. Trends in Medicare beneficiary uptake of CCM services, January 2015–December 2016



Source: 2015–2016 Medicare FFS claims and enrollment data.

Interviews with 71 eligible professionals (or their specialty societies) revealed that providers and care managers perceived several positive outcomes for beneficiaries from CCM including: improved patient satisfaction and adherence to recommended therapies, improved clinician efficiency, and decreased hospitalizations and emergency department (ED) visits. Most noted patients’ enhanced access to the practice through the care manager, which enabled telephonic condition monitoring between visits and more time for medication monitoring and reconciliation. While several providers, particularly those caring for numerous complex patients, noted that the CCM payment amount was inadequate for the CCM work required, some providers, small practices in particular, were pleased with the new payment policy, noting that they were finally receiving at least some payment.

During semi-structured interviews with 48 CCM beneficiaries or their caregivers, beneficiaries reported general satisfaction with CCM services and would recommend the service

to others. A few beneficiaries did, however, question whether they were in worse health than they thought, after their doctor spoke with them about initiating CCM services. A larger proportion of beneficiaries suggested they would not participate if they had to pay out of pocket. Some of these beneficiaries explained that they recognized the potential value of the program for patients with complex health conditions, but they did not feel they fit that criterion.

We conducted a difference-in-differences analysis to study expenditure, service utilization, and quality outcomes over a 6-, 12-, and 18-month period. We compared beneficiaries receiving CCM services beginning January 2015 through June 2016 and a set of comparison beneficiaries who were matched on demographics, health status, frailty, expenditures, service utilization and geography. Beneficiaries received CCM services for varying lengths of time during the first 18 months of the new payment policy (January 2015–June 2016). We found that the average rate of growth in estimated Medicare per-beneficiary-per-month (PBPM) expenditures for CCM beneficiaries relative to the comparison beneficiaries decreased in the 12- and 18-month follow-up periods—\$28 in the 12-month follow-up period and \$74 in the 18-month follow-up period (Figure ES.2). The average rate of growth in the 6-month follow-up period increased by \$14 on average, but the estimated impact was not statistically significant. The decreased rate of growth was driven by decreases in facility expenditures for inpatient hospital services, skilled nursing facility services, and outpatient services. We observed a higher rate of expenditures for home health and for ambulatory procedures among CCM beneficiaries. Providers with whom we spoke reported that the CCM payment helped them better support staff who connected patients to home- and community -based services. Thus, it is not surprising that engaging CCM beneficiaries would increase use of community-based services, such as home health, because of increased care management, concomitant recognition of patients' formerly unmet needs, and the potential desire to reduce acute care utilization.

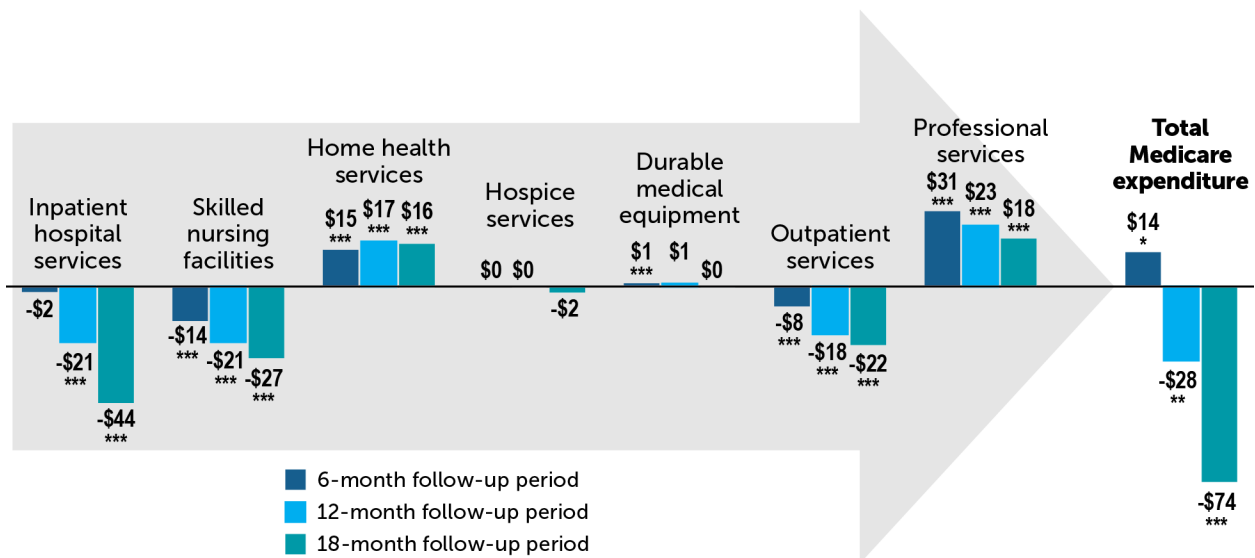
We also found evidence that beneficiaries who received services early in the new CCM payment policy period were less healthy and frailer compared to those who received CCM services later on. Baseline total Medicare expenditures—an indicator of overall health status and care needs—decreased over time. For example, the pre-CCM period PBPM expenditures for beneficiaries who received CCM services in the first six months of 2015 were \$1,395 compared to \$1,192 for those who received services in the first six months of 2016.

Lastly, we found evidence that CCM was more effective at reducing Medicare expenditures among beneficiaries who died during the follow-up period suggesting better management of end-of-life care. We did observe a higher rate of advance care planning among CCM beneficiaries, of 10 percent, relative to the 1 percent present among the general Medicare FFS population.

Our findings are consistent with the views expressed in our interviews with eligible professionals that some primary care providers (and perhaps other clinicians) want to provide CCM services to their patients in need but feel discouraged to do so by face-to-face, encounter-based FFS payments. Our findings suggest that some of these clinicians chose to use the new CCM payment as a rationale to undertake meaningful care management for specific Medicare beneficiaries, with attendant increases in primary care visits and home care services and reductions in emergency department (ED) visits, hospitalizations, and use of skilled nursing facilities (SNFs). Interestingly, the uptake of the CCM was greater in small and independent practices, where respondents perceived self-motivated clinicians and where frontline staff might

have greater flexibility and autonomy. This might influence clinicians' effectiveness in identifying and recruiting patients who are likely to benefit from CCM, as well as using the CCM payments to change care processes that are relevant to their patients and setting. Further, beneficiaries had to consent to receive CCM services; they therefore knew they were part of a clinical intervention and may have been more willing to engage in care management and more amenable to care coordination and monitoring than the comparison group of Medicare FFS beneficiaries. Combined, these factors may limit the generalizability of our results across a broad range of practices and beneficiaries.

Figure ES.2. Estimated PBPM impact of CCM on total expenditures and by expenditure category: 6-, 12-, and 18-month follow-up periods



Source: Medicare 2014–2016 enrollment and FFS claims data.

Note: 18-month follow-up period: Includes beneficiaries who received their first CCM service between January 1, 2015, and June 30, 2015; number of CCM beneficiaries = 130,646 and number of comparison beneficiaries = 97,091.

12-month follow-up period: Includes beneficiaries who received their first CCM service between January 1, 2015, and December 31, 2015; number of CCM beneficiaries = 273,225 and number of comparison beneficiaries = 202,679.

6-month follow-up period: Includes beneficiaries who received their first CCM service between January 1, 2015, and June 30, 2016; number of CCM beneficiaries = 434,443 and number of comparison beneficiaries = 324,081.

*Significantly different from zero at the .10 level, two-tailed test.

**Significantly different from zero at the .05 level, two-tailed test.

***Significantly different from zero at the .01 level, two-tailed test.

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I. BACKGROUND AND OVERVIEW OF REPORT

In January 2015, the Centers for Medicare & Medicaid Services (CMS) introduced a separately billable non-face-to-face Chronic Care Management (CCM) service to improve Medicare beneficiaries' access to CCM in primary care. CCM aims to reduce rate of functional decline and improve health. It includes services to enhance continuity of care, coordination across providers, and development of comprehensive care plans. Historically, physicians have not been compensated separately for these types of activities when performed outside a face-to-face office visit. Primary care clinicians have long argued that visit-based payment undervalues the work they and their teams do for patients between visits (Press 2014). Furthermore, a growing percentage of primary care physicians (PCPs) experience burnout (Shanafelt et al. 2012), and they lack support to help patients manage multiple chronic conditions in a coordinated and comprehensive manner.

Under the CCM payment policy, eligible professionals may bill for care management that is furnished outside office visits to fee-for-service (FFS) Medicare beneficiaries with two or more chronic conditions putting them at significant risk for functional decline or death. To do so, the health care professional must provide at least 20 minutes of clinical staff time for CCM services in a given month (CMS-1612-FC 2014). Alternatively, an eligible professional may supervise his or her own staff, such as a registered nurse, or contract with a third party to provide CCM services.¹ These services include ensuring that each patient has a designated clinician; developing and revising a plan of care in collaboration with the beneficiary; communicating with other health professionals, including hospitalists, specialists, and other providers; and managing medication. Practices must also have a certified electronic health record and ensure that the care plan is available electronically at all times to anyone providing CCM services. Medicare beneficiaries need to consent to receive CCM services and are generally responsible for the 20-percent coinsurance for the service.

On November 15, 2016, CMS finalized revisions to the physician fee schedule to reduce the administrative burden and increase payment for CCM services provided to beneficiary with complex chronic conditions (81 Fed. Reg. 80170). The rule was released after the qualitative portion of our evaluation had been completed; changes went into effect on January 1, 2017, after the end of our quantitative evaluation period.² As a result, this report does not assess the impact of these changes to the CCM policy.

As the new CCM services may significantly affect health care costs and primary care delivery, this evaluation has three primary aims: (1) to assess the uptake and diffusion of CCM

¹ Under CCM payment policy, independent eligible professionals are allowed to bill a Medicare beneficiary only once a month for CCM services when supervising their own staff or contracting with a third party. In contrast, hospital outpatient departments may bill a Medicare beneficiary twice for the supervision and provision of CCM services for employed eligible professionals supervising hospital staff or service providers under contract to a hospital.

² A summary of the changes can be found in the Medicare Learning Network's "Chronic Care Management Services Changes for 2017" fact sheet. Available at <https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/Downloads/ChronicCareManagementServicesChanges2017.pdf>. Accessed May 2, 2017.

services from January 2015 to December 2016, (2) to explore the experiences of providers and Medicare FFS beneficiaries with CCM services and fee, (3) and to examine the impact of the introduction of the service on an existing primary-care innovation model being tested by the Center for Medicare and Medicaid Innovation (CMMI) and other care management services. To achieve the first two aims, we used a mixed-method qualitative and quantitative design and primary and secondary data and methods to examine the uptake and diffusion of CCM services across Medicare beneficiaries and providers. Primary data collection included semistructured interviews with providers billing for CCM services (and several who do not bill); professional medical societies representing the predominant types of billing providers, such as family practice, geriatrics, and internal medicine physician associations, nurse practitioner and physician assistant associations, and medical specialty associations; and Medicare FFS beneficiaries of CCM services. Secondary data came from Medicare claims and other administrative and secondary data sources.

The remainder of this report presents our evaluation findings. Chapter II presents findings about the experiences of Medicare FFS beneficiaries and eligible providers who received and provided CCM services, respectively. We also discuss the changes in CCM payment policy enacted January 1, 2017. Chapter III presents descriptive statistics on the uptake and diffusion of CCM services from January 2015 through December 2016; the impact of the CCM payment policy on the Comprehensive Primary Care (CPC) and Multi-payer Advanced Primary Care Practice (MAPCP) models and other care management services; and the methods and results from multivariate regression analyses of whether the new CCM payment policy is having the intended effect—that is, reducing Medicare expenditure growth and improving health outcomes for the Medicare FFS population with chronic disease by facilitating effective care management. In Chapter IV, we discuss the quantitative findings relative to the experiences reported by Medicare beneficiaries and providers and methodological considerations when comparing results from our study with those of other primary care models that have been or are currently being tested.

II. MEDICARE BENEFICIARY AND PROVIDER EXPERIENCE

A. Beneficiary experience

As part of the evaluation of CCM uptake and dissemination, we conducted 48 semi-structured telephone interviews with Medicare beneficiaries for whom eligible professionals have billed for CCM services. The purpose of these interviews was to help CMS understand beneficiaries' experience with CCM services, and whether CCM scope of service elements are in place at the practice, per beneficiary self-report. These interviews were conducted prior to the announcement on July 15, 2016 of proposed changes to the CCM payment policy. This section of the report summarizes the results of those interviews.

1. Methods

Interview topics. We developed a semistructured patient interview protocol to address five sets of research questions:

- How do beneficiaries experience the practices' approaching them about the CCM service/fee?
- Does secondary insurance (Medigap policy) affect beneficiaries' consent decision?
- What did the consent process entail from the beneficiaries' perspective, and how did this make beneficiaries feel?
- Did CCM affect care continuity, coordination with specialists and timely access to needed care?
- How do beneficiaries experience the CCM practices' scope of service elements and, more generally, the CCM services?

The protocol was reviewed and approved by Dr. Sai Ma, at CMS. Pilot testing of the interview protocol among three beneficiaries resulted in minor changes to improve flow. The full semi-structured interview protocol may be found in the Appendix A.

Beneficiary sampling process. We identified beneficiaries receiving CCM services from Medicare Part B and outpatient claims from January–September 2015 to craft the sampling frame for the beneficiary interviews. Mathematica staff stratified beneficiaries by age, geography, and provider type (to reflect the distribution of the types of providers billing for CCM services). To create the initial interview list, we selected a stratified random sample of 500 beneficiaries from the sample frame. We verified that the list included beneficiaries from a range of states, provider types and beneficiary ages, and dual eligibility for Medicaid. This list produced a balanced distribution of the number of CCM claims per beneficiary, ranging from one to nine, including more recent as well as early users of CCM services. To maximize the chances that the sampled beneficiary had been exposed to CCM services and gained some familiarity with the concept, we limited our interviews to those who had been billed for at least two CCM services.

Data collection. To ensure that we have accurate contact information for beneficiary outreach, we matched the mailing address from the Medicare Enrollment Database

([EDB]/address file) to beneficiaries' phone numbers through Telematch. The distribution of selected beneficiaries was roughly representative of the Medicare population with respect to age, gender, state of residence and dual eligibility for Medicare and Medicaid.

Advance letters were sent to beneficiaries on a rolling basis, via Federal Express, and followed up with each recipient by phone within a few days of the mailing. The advance letter explained the study and requested the beneficiary's participation, noting the decision to participate was purely voluntary, had no bearing on their insurance coverage, and that beneficiary identities and comments would never be linked to their names or their practices. The letter also included a toll-free number for reaching an interviewer, and stated that beneficiaries would receive \$25 as a token of appreciation for their participation.

Interviewers screened each beneficiary by phone before conducting the interview, to determine the patient's capacity to answer questions about the chronic care management services they receive. The screening procedure involved explaining CCM services using examples that beneficiaries typically recognized, such as having someone from the CCM provider's practice check in with them by phone between office visits, and asking the beneficiaries whether the services sounded familiar. Interviewers further explained that different practices may use different terminology when telling patients about chronic care management services, such as ongoing care management or care coordination. Finally, interviewers asked all beneficiaries whether they remembered signing a letter of consent allowing their clinician to provide CCM services.

Beneficiaries who had no awareness of being enrolled in chronic care management services were considered ineligible, because they would not be able to answer many of the interview questions. Some beneficiaries had died between sampling and initial attempt at contact and others could not be interviewed for other reasons³; these beneficiaries were also coded as ineligible. Beneficiaries who did not recall signing the consent form but were familiar with CCM services were considered eligible to participate in an interview.

We attempted to reach 401 beneficiaries by phone. Of those, 233 could not be contacted for multiple reasons, including the beneficiary's phone no longer being in service, no one answered the phone and no voicemail was available, or the interviewer left multiple voicemails but never actually spoke with the beneficiary. Of the 168 beneficiaries we did reach by phone, 49 were ineligible, 71 refused and 48 completed the interview. Three of the forty-eight completed interviews were with caregivers of a beneficiary, while 45 beneficiaries responded on their own behalf. After completing 40 interviews, we were no longer hearing unique responses to questions.

The vast majority of responding beneficiaries were between the ages of 65 and 84 and fairly evenly split between males and females (Table II.1). Interviewers aimed to complete a larger proportion of interviews with beneficiaries from the four states that have the largest population of Medicare beneficiaries: California, Florida, New York, and Texas. Table I shows the distribution for these States and the other States, combined. The other states included Alabama, Arizona, Colorado, Georgia, Idaho, Illinois, Indiana, Kentucky, Louisiana, Massachusetts,

³ Other reasons included being in the hospital or being deaf, and having no caregiver who could serve as a proxy.

Maryland, Michigan, Minnesota, New Jersey, Nevada, Ohio, Rhode Island, South Carolina, Tennessee, and Virginia. The vast majority of beneficiaries had supplemental insurance in addition to Medicare and 7 beneficiaries had both Medicare and Medicaid. The majority of the respondents had received 3 or more months of CCM services.

Table II.1. Characteristics of beneficiary respondents

Respondent characteristics	Number
Age	
64 and younger	6
65-75	24
76-84	16
85 and over	2
Sex	
Female	22
Male	26
State of residence	
California	3
Florida	6
New York	5
Texas	4
Other States	30
Medicare eligibility	
Medicare only	4
Medicare and commercial supplemental	37
Dual eligible (Medicare and Medicaid)	7
Number of CCM claims between January–September 2015	
2	16
3 to 6	20
7 to 10	12

Coding and analysis. With permission from the responding beneficiaries, interviews were recorded and transcribed for purposes of coding and analysis. Three beneficiaries did not consent to having the interview recorded. In these cases, the interviewer took notes on the beneficiary's responses. After completing several interviews and reviewing the transcripts, the team of interviewers developed a coding rubric based on the research questions and the themes that emerged from the data. Interviewers also met on a weekly basis to discuss questions and beneficiary responses. Each interviewer coded their own transcript using NVivo11, a qualitative software program. The lead reviewed each complete transcript and compared it to the coded text for quality control purposes.

After reviewing all responses for a given code or theme, the lead researcher developed a descriptive summary that captured the full range of responses, while also distinguishing commonly reported responses from those that were reported by only a few beneficiaries. That analysis formed the basis of the results that follow.

2. Results

How beneficiaries felt about their doctor’s office approaching them about CCM services and payment. Beneficiaries most commonly learned about CCM services from their primary care physician, or another member of their primary care team, such as a nurse practitioner. Two beneficiaries learned about it through their cardiologist, who billed for CCM services. Two beneficiaries reported learning about it through a letter they received in the mail from their primary care doctors.

When asked about their first impressions, many beneficiaries reported positive reactions to the discussion about CCM services, and felt the conversation reflected the provider’s commitment to their well-being. Some beneficiaries said they were glad their doctor was getting paid for time spent communicating with them outside of regular office hours. Others liked the idea of not having to wait until their next office visit to share concerns that came up along the way. As one beneficiary noted, *“I thought it was a pretty good process to stay on top of my health.”*

A few beneficiaries reported mixed first impressions. Some said being asked to participate made them feel a bit apprehensive, because it seemed to suggest that their health was worse than they realized. One beneficiary explained, *“I wasn’t sure if I needed it or not, to be honest with you. ... I didn’t think I was in that bad a health”*. Two people, a beneficiary and a caregiver, wondered whether the services might feel intrusive. The caregiver expressed her initial concerns when the provider first mentioned CCM services: *“How long is this program? Does it cost anything? Can my mom quit any time she wants to? Can we tell you what information we want you to know, or do we have to tell you everything under the sun?”*

Informed Consent Procedures. For most beneficiaries, the informed consent process was not a salient event. Approximately half of the interviewed beneficiaries remembered providing written consent for CCM services. None of those beneficiaries reported any concerns about signing the consent form. The other beneficiaries did not remember signing any paperwork related to CCM, although many guessed they probably had signed something if it was required. A few beneficiaries stated they did not sign any form, and thought they were automatically enrolled after they received a letter about CCM services from their provider’s practice.

Few beneficiaries remembered talking with their CCM provider about who can bill for CCM services and how often a provider can bill for non-face-to-face services. Seven beneficiaries did recall such a conversation, and understood that only one of their physicians could serve as their CCM provider. Those beneficiaries used various terms to communicate their understanding of their CCM provider’s role, referring to him or her as a “quarterback,” “a gatekeeper,” or a “first line of defense.”

For the most part, beneficiaries understood that they could stop receiving CCM services at any time, even if they did not remember having a specific conversation with their doctor about how to stop the services. Generally, beneficiaries assumed that they could simply tell their doctor or someone else from the practice that they no longer wished to receive CCM services, and they were not very concerned about the process. As one patient stated, *“I think she said I can stop it, but I don’t know how I would stop it. I assume I would just call the office and tell them.”*

Few beneficiaries remembered their doctor telling them they could choose a different provider to be their chronic care manager. Some of the beneficiaries who did not remember said it was a moot point because they were very happy with their provider and would not want anyone else to be their chronic care manager. As one patient stated, *“That’s what I wanted at the time, so I didn’t really question or ask anything about can somebody else do this.”*

Role of supplemental insurance in beneficiary decision making. About half of the beneficiaries with supplemental insurance said that not having to pay out of pocket was an important factor in their decision to receive CCM services. Some said the fact that the services were covered made it easy for them to *“at least give it a try.”* Others said they would not have opted for CCM if they had to pay for it out of pocket. One such beneficiary explained, *“If you get it out of Medicare and out of the insurance company, that’s good, but I’m not taking anything out of my pocket just because you called me.”* Other beneficiaries who would not pay out of pocket explained that they did not feel they needed chronic care management, or they already paid a lot for their supplemental insurance and would not be able to afford CCM if it were not covered. Several beneficiaries with supplemental insurance did not remember any discussion of fees or co-pays associated with CCM services and could not say with certainty whether they would have elected to receive CCM services if they had known about the cost sharing and had to pay for it out of pocket.

Approximately one in five beneficiaries said they would receive CCM services regardless of whether they had to pay for it out of pocket. As one beneficiary with supplemental insurance explained, *“I just thought that this process would be beneficial to help manage my care, and that was the most important thing. Not necessarily the copay or whatever, it’s the staying on top of medical conditions.”* Another patient stated *“What he is getting is certainly reasonable, if not, a little bit underpaid, so the fee would not be an issue, no. The coordination is very important to me.”* A few beneficiaries paid out of pocket, and felt the co-pay was *“well worth it because you know how busy doctors are now.”*

Reasons for providing consent. Beneficiaries described several reasons for agreeing to receive CCM services. The most common reason beneficiaries gave for providing consent was that it was covered by their supplemental insurance, so there was no harm in trying it. The second most common reason was simply that it sounded like a good idea when the practice explained CCM services. Many of the beneficiaries who thought CCM sounded like a good idea mentioned new or ongoing health problems that had become a growing concern, and they felt they could benefit from more regular communication with their practice. As one beneficiary explained, *“I felt, at that point, that it was to my advantage for them to be able to coordinate between different doctors for senior care.”* Another beneficiary said, *“It sounded like a good idea to have somebody else in there that you could call and talk to and ask questions and then she would find the answer and get back to us.”*

Others reasons for providing consent included: beneficiaries’ trust in the doctor who recommended it, knowing they could withdraw at any time, and feeling that the doctor should be compensated for time spent managing or providing patient care outside of office visits. One patient stated, *“I don’t think he gets paid enough. I thought, “Okay”— if my doc needs a little more money, and I think he does, then that’s okay.”*

Four beneficiaries believed that participation was a requirement under Medicare; one of these noted that their provider was now requiring CCM participation for particular patients if they wanted to continue to receive care in the practice.

Beneficiary perceptions of the informed consent process and their CCM provider. Most beneficiaries felt the discussion had no effect on their relationship with their provider; this was particularly true of beneficiaries who had a long history with the same provider. As one beneficiary stated, *“I trusted him then, trust him now, and felt like it was just maybe an additional service that could be beneficial.”* A few beneficiaries reported some initial skepticism about CCM services, but those feelings did not influence their opinion of the provider who explained CCM to them. As one of these beneficiaries described, *“When we first started talking about it, it was a matter of, what are you trying to sell me. After I had learned a little bit more about it by reading the form and getting a little bit more clarification, I was comfortable with it.”*

Other beneficiaries said their perceptions of their provider improved following the initial discussion about CCM services. One caregiver of a beneficiary explained, *“It shows me that he really cares about his patients.”* Another beneficiary stated he was *“impressed that (my doctor) was doing something to stay in touch with me a little more than he had been doing before.”*

Beneficiary experience with the CCM practices’ scope of service elements. The CCM scope of services requires participating providers to: create a patient-centered care plan that is shared with the beneficiary and his/her other providers; provide care continuity, enhanced opportunities for communication with the practice and timely access to needed care, and; provide comprehensive care management, including medication review and coordination of care with specialists and during care transitions. To assess how patients experienced their practices’ scope of service elements, interviewers asked about each one.

Patient-centered care plan. After explaining what a care plan is, interviewers asked beneficiaries if their CCM provider had given them a written or electronic copy of their care plan. Beneficiaries were evenly divided among those who said they had a copy of their care plan and those who did not. Generally beneficiaries who did not have a copy of their care plan were not concerned about it because they talked with their doctor on an ongoing basis about their goals and health concerns. One such beneficiary explained, *“Not in that format, but there is such a thing. I’ve got a list on the computer of the medications I take. We know what to watch in terms of food intake, alcohol intake. I don’t smoke. There’s nothing formal, but it’s simply evolved over the last 20 years. I could ask for one, but I see no need in it.* Other beneficiaries said they did not need a care plan because they understood how to maintain their health. *“I would have to say that I really don’t need such a thing. I know exactly what I need to do. I would imagine that there certainly could be people that would need some really large document to take care of themselves. For me, that’s not the case.”*

Five beneficiaries said they had no care plan in place with their doctor. One patient responded by saying, *“No. We talk. I know if I get tests or something like that, like blood work or panels or metabolic panels or stuff like that, he’ll review all those with me and anything that’s not within the appropriate numbers, then we’ll share a game plan. He’ll give me a copy of my results, but we don’t... lay out a work plan, so to speak, that addresses every issue and what we’re going to do and then a follow up plan and all that.”*

Among the beneficiaries who knew what a care plan was and had a copy of it, some reported that their CCM provider had shared the care plan with other physicians, but about an equal number of beneficiaries did not know whether the care plan had been shared.

Beneficiaries did not generally have strong opinions about their care plan, but those who did express opinions about it felt it was beneficial. One of the described benefits was having all medical information available in one document. Others felt a care plan would be particularly helpful for beneficiaries with memory problems.

Care continuity, coordination and communication. Most beneficiaries reported no changes in who they regularly see or how frequently they see their usual clinician since signing up for chronic care management services. Many patients noted enhanced communication with their practice since signing up for CCM, typically by phone calls to them by a nurse, care manager or other provider. Some patients noted that their practice also made sure it was the same person who contacted the patient between appointments to check in and address any ongoing health concerns. One beneficiary expressed his appreciation of that continuity, saying *“You’re talking to the same person every time. It’s somebody that knows my history, knows my medications, knows the doctors I’m seeing, knows what I’m being treated for.”* Patients also noted being given the opportunity to note their preference for mode of communication (e.g., phone, secure email).

Several beneficiaries reported that CCM services had improved coordination across their care team. As one beneficiary stated, *“I see so many different doctors. The main thing is to keep everybody on the same track. Everybody knows that they have to send everything that I have done at their office to my primary doctor so that they know what’s been going on with me, and they don’t have to sit and call around and ask for lab work or test results.”* Another beneficiary explained: *“Sometimes things that happen to you, where you’re seeing a specialist or you’re having this checked, sometimes you have a tendency to forget something that was pretty important for (the primary care provider) to know in your care going forward...this was a way to keep them involved in my total care, whether they were administering it or somebody else was administering it.”*

Timely access to care. Many beneficiaries felt that participating in CCM services had provided them with more timely access to their CCM practice. Beneficiaries appreciated having ready access to a nurse or care manager who could communicate with the physician or schedule an appointment more quickly than the patient could have. As one beneficiary explained, *“I felt like I had an in to the doctor, like there was somebody else to help me through that process [rather] than just calling the main number and then you wait on hold and then they have to type it in the computer and then they have to get it to the doctor.”* Another beneficiary described how prompt attention from her primary care office helped prevent a potentially dangerous drug interaction, *“When I had a blood test, my iron was low, so the doctor said that I should go to the drugstore and buy some iron medicine. (...) I was just looking at it one day and it said on there do not take iron medicine with the thyroid medicine, that it could have serious repercussions. I called (the nurse) and asked her... Within five minutes, she had talked to the doctor and he had given her different instructions and she relayed it to me and we changed the medicine and it was all done like in 15 minutes.”*

A small number of beneficiaries, who previously had concerns about taking up too much of their doctors' time, reported feeling more comfortable calling the office with a question or concern, knowing that there was someone available who could respond promptly, and could put them in touch with the doctor if the situation merited that kind of attention.

Care management. Beneficiaries generally appreciated the monthly check-ins and described them as “reassuring” and “a good reminder.” One beneficiary described how the monthly phone calls helped him and his wife, who was also receiving CCM services, to remain mindful of their health, “*We think about our health more and what we’re doing right or wrong with these phone calls that we’re getting every month now. It’s a good thing.*” Another beneficiary described how having more regular communication with his provider influenced him to continue taking his medications despite some undesirable side effects, “*For one thing, I think I’m more conscious of taking my medication. ...Being in constant contact with him, you begin to realize, look, yes, it’s going to have some side effects here and there, but its doing what it’s supposed to do.*”

Other beneficiaries described additional benefits of the regular check-ins, “*They call when it’s convenient for me to chat. If I can’t immediately, they ask questions if there’s anything I need, boom, I get a quick, rapid response from the doctor’s office.*” Several beneficiaries felt that receiving regular calls from the practice spared them unnecessary visits to the office, and freed the doctor from spending time on questions or problems that a nurse or care coordinator could address. One explained, “*I’ve got a lot of different physical problems, and having somebody coordinating them, it’s easier to do with the nurse practitioner and less expensive for me than to try and do it with an internist. It’s simply the sort of thing that a professional without an MD’s training is perfectly capable of doing. It’s useful to be able to speak to somebody monthly about ongoing problems or something new that has come up.*” A small number of respondents said their level of communication with the practice had not changed significantly.

Almost all beneficiaries reported that their doctor or someone else from their primary care practice spoke with them about their medications to make sure they understood them. A small number of beneficiaries who did not speak with their doctor about their medications explained that they had been taking the same medications for many years, so the conversation was not necessary, but the opportunity was there.

About one-quarter of the 48 beneficiaries reported an emergency department visit or overnight hospital stay in the past 3 months, among whom reported of follow-up by the practice were mixed. Some beneficiaries said their CCM providers contacted them after they were discharged, others said they initiated contact with the practice, and a couple of patients did not recall any follow-up from their CCM practice.

Beneficiaries’ views on whether they would continue CCM Services. Many beneficiaries felt CCM services were beneficial and planned to continue participating. A beneficiary, representing the opinion of many, said he would continue to participate “*until my heart stops beating.*” Other beneficiaries who planned to continue simply noted, “*Its fine, I mean, it doesn’t cause any problems*” and “*it doesn’t matter. [I’ll continue for] however long they think I need it.*”

Three beneficiaries expressed uncertainty about whether they would continue to participate because they did not think they really needed it. Three other beneficiaries were planning to discontinue the service for similar reasons. One explained, “*It doesn’t really have any value to me. It may be better to discontinue it and save the taxpayers money.*”

Three beneficiaries had already discontinued their participation. One had switched doctors for reasons unrelated to CCM, and the other two beneficiaries stopped participating after they learned about the co-pay, which they said they were not aware of when they gave their consent.

3. Discussion

CCM services are intended to improve care coordination and care management of beneficiaries with multiple chronic conditions by reimbursing providers for time spent on these essential aspects of health care. CCM providers, however, may have concerns about inviting patients to participate, because of potential unintended consequences. For example, providers may worry about how patients might perceive the informed consent procedures, or the discussion about cost-sharing. The findings from this study suggest that beneficiaries are generally accepting of the informed consent procedures and many do not remember much about the process. A few beneficiaries did, however, question whether they were in worse health than they thought, after their doctor spoke with them about CCM services, suggesting that it may be important for providers to emphasize that patients do not need to be severely ill to experience benefits of participating.

Most of the beneficiaries we interviewed had supplemental insurance or dual eligibility. Among them, several were not aware of any fees or co-pays associated with CCM, and it was not entirely clear whether their provider never discussed cost-sharing, knowing the beneficiary would pay nothing out of pocket, or whether the beneficiary simply did not remember the conversation.

Though about one in five beneficiaries said they would participate in CCM services whether or not the service was covered by supplemental insurance or Medicaid, a larger proportion of beneficiaries suggested they would not participate if they had to pay out of pocket. Some of these beneficiaries explained that they recognized the potential value of the program for patients with complex health conditions, but they did not feel they fit that criterion. This finding may mean that some providers “*over-recruit*” for CCM services, alternatively, it may mean that some patients do not recognize the seriousness of their chronic conditions, particularly conditions which may be asymptomatic such as hypertension, hyperlipidemia and early stage diabetes. Some beneficiaries may need to have someone from the CCM practice explain some of the ways they can engage more fully with the services, and derive more benefits into the future.

B. Provider experience

This section of the report describes the findings from the 71 semi-structured interviews with eligible professionals (primary care physicians, nurse practitioners and physician assistants), care managers, and/or a member of their practice team knowledgeable about their provision of CCM services. Going forward, we refer to eligible professionals as “providers.” We examine providers’ perceptions of and experiences with CCM, barriers and facilitators to CCM provision and billing, and potential implications for CCM going forward. Conducting qualitative

interviews allowed respondents to provide us with rich details about our main research questions related to the provision of and billing for CCM services. Interviews with billing and nonbilling providers as well as with professional society representatives produced findings on why some providers decide not to provide and bill for CCM services. Again, these interviews were conducted prior to the announcement on July 15, 2016 of proposed changes to the CCM payment policy and do not reflect these changes.

1. Methods

Interview topics. The research questions and questions we asked respondents broadly encompassed the following topics: (1) barriers and facilitators to providing (and billing for) CCM services; (2) changes in processes, resources, and personnel needed to render and bill for CCM services; (3) the understanding of the scope-of-service elements required to bill for CCM; and (4) the opinions on the adequacy of the CCM payment. The full semi-structured interview protocols for eligible professionals may be found in Appendix B and for professional society representatives may be found in the Appendix C; they covered all of the research questions below:

1. **Practice characteristics and CCM.** How do practice size, ownership, and affiliations affect the ability to provide CCM services?
2. **CCM billing.** How well do practices understand the requirements for billing? How did the practice decide to bill for the CCM services? Was the decision motivated by the local providers or the larger practice organization (for larger groups and system-owned practices)? In large, multispecialty, or system-owned practices, was there a strategic approach to deciding which providers should bill for the CCM fee? What was it, and why was it used? Were any changes in care processes, resources or personnel needed to bill for CCM services? What were the barriers to billing?
3. **Providing CCM services.** What changes (personnel, processes, resources) were needed to provide CCM services? We asked about the care processes, resources, and personnel (existing, newly hired, or repurposed staff) needed to render CCM services. We also probed for barriers and facilitators to providing (and billing for) CCM services, and examples of each. Did barriers include, for instance, consent, patient push back, or EHR access? How were they overcome? Do practitioners meet the scope-of-service elements?
4. **Perceptions of beneficiaries' reactions to CCM.** How often do beneficiaries who are offered CCM decide not to consent? Why do billing providers think some beneficiaries declined the CCM services, initially, and subsequently?
5. **Impact of CCM on continuity and coordination of care.** Does provision of CCM services affect care continuity or coordination? Does it affect care continuity at the practice of the provider(s) billing the code (positively or negatively)? Does it increase coordination of care between providers? If so, what led to increased care coordination? To what extent has it been possible for your practice to have a clinician or staff member providing CCM services available to patients 24/7? Does that person have access to the patients' medical record 24/7?
6. **Perceived impact of CCM on utilization.** If providers think that CCM services decreased Medicare beneficiaries' utilization, what do they think led to the decreases?

Provider sampling process. To identify CCM-billing providers, we combined information from claims for CCM services billed from January 2015 through September 2015 with the National Plan and Provider Enumeration System (NPPES) and Provider Enrollment, Chain, and Ownership System (PECOS) files to obtain characteristics of billing providers. We produced descriptive statistics on CCM diffusion and the characteristics of billing practices and providers. We first stratified the sample by state and then by specialty within each state. To the extent that the different types of providers were present in each state, (for example, some states had few nurse practitioners), we included them in our sample. From this sample we then drew a random sample within strata to obtain a total of 511 billing providers. We de-duplicated the sample of 511 and also excluded providers with the same address to avoid interviewing providers from the same practice, and excluded providers who could not be contacted due to missing phone numbers or mailing addresses. From the remaining 443 providers, we purposively chose 400 providers that represented a variation in rural/urban location, specialty type, type of clinician (physician assistant, nurse practitioner, or physician), geographic location, number of CCM claims, practice size, and gender of the provider. To identify nonbilling providers, we asked professional society representatives for references because we believed that cold calling providers who had not billed for CCM would produce a low yield.

Data collection. First, we identified professional society representatives who “took the pulse” of their membership on the topic of CCM. We secured interviews with representatives from the following organizations: the American Medical Association, the American College of Physicians, the American Academy of Family Medicine, the American Geriatric Society, the American Osteopathic Association, the American Association of Nurse Practitioners, the American Association of Physician Assistants, and the Medical Group Management Association.

To schedule interviews with CCM-billing providers, we staggered the mailing of advance letters to 100 providers per month from our sample of 400 providers from January through April 2016. Thirty-five of these were returned to us due to an invalid address. The letter introduced ourselves and our study, emphasized confidentiality, and provided contact information for practices to proactively volunteer to be interviewed. Three to five days after mailing the letters, we placed up to three phone calls to each practice that received an advance letter (not just to those that proactively volunteered) to schedule an interview. Practices were not compensated for participating in the interview.

We sought to interview one provider at each practice that had billed for CCM services, but if the provider was not available for an interview then we spoke with one, and in some cases two, other staff at the practice most knowledgeable about CCM—usually a care manager or a practice manager. At eight practices, we interviewed a provider who did not have full knowledge of some of the details around CCM services or billing, so we also interviewed a second respondent in addition to the provider. Interviews lasted between 30 minutes and one hour. Two senior researchers, with extensive experience interviewing providers on the topic of primary care redesign, conducted the interviews using semi-structured interview protocols.

To schedule interviews with nonbilling providers, we used the contact information provided to us by the professional societies for five practices. Four providers in four different practices agreed to be interviewed. Interviews lasted between 30 minutes and one hour and covered

providers' perceptions of CCM, barriers to CCM provision and billing, and potential implications for CCM going forward.

From January through April 2016, we conducted a total of 71 semi-structured telephone interviews, of which 56 were with providers and staff from billing practices, 4 were with providers from non-billing practices, and 11 were with professional society representatives. The 60 practice respondents came from a total of 50 unique practices with good variation by practice size (defined as the number of independent clinicians at the practice site where the respondent spent most of their time seeing patients), region, ownership type and respondent type and specialty (Table II.2). By the time we had interviewed the 55th practice respondent, we were no longer hearing new themes and all comments fit into our existing codes. Eighteen of the 50 practices were recognized patient-centered medical homes (PCMHs).

Coding and analysis. With permission from the respondents, interviews were recorded and transcribed for purposes of coding and analysis. A trained research analyst took verbatim notes during each interview and then verified the notes using the interview audio recording. No respondent refused. The lead interviewer reviewed and clarified the analyst's notes as needed after the interviews and before analysis. A team of four researchers developed a codebook² with codes based on the individual research questions as well as relevant probes. For the purposes of training and codebook development, each member of the research team coded the first five interviews and then met to discuss their application of codes, and revise the codebook and its definitions as needed to ensure codes were being applied consistently across coders. Two analysts coded the remaining interviews and continued to meet once a week to iterate and cross-check their coding.

After coding was finished, we used Atlas.ti to run queries on each research question. Each member of the research team then read the query reports and outlined the common themes, which included: (1) barriers and facilitators to implementing CCM, (2) changes to the practice's workflow after implementing CCM, and (3) the provider's and professional society representative's opinions about CCM and how it can be improved.

2. Results

Practice characteristics and CCM. Practice size and ownership characteristics seemed to be factors affecting providers' interest in and ability to provide and bill for CCM services. Of our 60 interviews across 50 practices, most were small: 29 were in practices of 5 or fewer providers, 3 had 6-10 providers, and 18 had 11 or more providers. Thirty-four of the 50 practices were independently owned by providers, with the remainder (16) being system-owned.

Respondents noted that practices owned by hospital systems and very large medical groups faced more bureaucracy from their parent organizations in setting up billing and documentation for CCM services than did smaller independent practices. As a professional society representative described, *"It's more of a challenge for them [providers in large group practices and hospital systems] to implement [CCM] because there is more bureaucracy. They are less nimble, they have less control over their practice. They have to wait for approvals, etc."*

Table II.2. Characteristics of respondents and their practices

Respondent characteristics	Number
Total completed interviews	71
Professional society representatives	11
Respondents from billing practices	56
Respondents from nonbilling practices	4
Type of respondent (spread across a total of 50 practices)^a	
Physician (M.D. or D.O.)	39
Nurse practitioner	4
Physician assistant	2
Nurse (RN LPN), social worker, or medical assistant	7
Other (practice manager, business officer, etc.)	8
Respondent gender	
Female	31
Male	29
Practice characteristics^b	
Respondents' practice locations	
Urban/suburban	32
Rural	18
Top six states with highest CCM billing	
Number of practices from California, Florida, Georgia, Michigan, New York, and Texas	11
Number of providers^c at the practice site	
Solo provider	18
2–5 providers	11
6–10 providers	3
11+ providers	18
Respondents' practices' medical specialties	
Family practice medicine	25
Internal medicine	15
Geriatric medicine	5
Cardiology	5
Number of CCM claims in 2015 per billing provider at the practice	
1–5	11
6–25	11
26–100	12
101–499	8
500+	1
Ownership type	
Physician-owned practice	34
Hospital/system—owned practice	16
Practice is recognized PCMH	
Yes	18
No	32

^a We interviewed 60 respondents in 50 practices. In 13 of the 60 interviews, we interviewed the practice manager, nurse care manager or social worker and/or another staff member who was heavily involved in their CCM program because the provider (physician, nurse practitioner or physician's assistant) was unavailable for an interview.

^b Practice characteristics of the 50 unique practices from which we interviewed respondents. In cases where we interviewed multiple respondents in one practice (for example, the practice manager and the provider from the same practice), we only counted the practice once.

^c Providers refers to physicians, nurse practitioners and physician assistants eligible to bill for CCM.

Professional society representatives lacked systematic data on participation in CCM by their members, but noted that they had received more calls about CCM from members in small independent practices than those from large or system-owned practices.

CCM billing. Providers' understanding of CCM billing requirements varied by the particular requirement. Respondents were able to articulate most of the key requirements for CCM, namely: having "two chronic conditions" (although only few added that these conditions needed to place the patient at significant risk of exacerbation, decline or death), having a consent letter from the patient, and spending 20 minutes on non-face-to-face care. Many others also identified having 24/7 access to a provider from the practice and developing a care plan with the patient as key requirements.

Respondents had different interpretations of the CCM requirement for 24/7 electronic access to the care plan and some noted that it was a barrier to pursuing CCM. A nonbilling general internist noted, *"This idea that when you are in a coverage group that everyone must have access to the care plan, it is fine if everyone is using the same EMR. But many groups and their coverage, especially in smaller areas, they aren't using the same EMR. A professional society representative noted, "We thought CMS could reduce the requirements for 24/7 access to the care plan...it is not always possible to have the care plan available 24/7 electronically...we keep hearing [from our members] that the requirement is too onerous."*

Providers faced challenges understanding billing requirements on whether medical assistants (MAs) qualified as "clinical staff" for the 20 minutes per month requirement. They wanted more clarity from CMS on this issue. Several providers felt that some of the CCM activities could be performed by a medical assistant, an EP noted, *"The kind of [phone] messages I would ask my MA to do would have been messages that were capable of being handled by medical assistants. But, the requirements for the code were that it had to be licensed staff. So, we had to use licensed staff to meet the requirement."*⁴

Providers commonly noted that their professional societies were a source of support for understanding CCM requirements and facilitating CCM uptake. Professional society support included training and materials around the four topics: the CPT (current procedural terminology) code and its requirements, how to talk to patients about copay, templates for the letter of consent letter, and general FAQs.

Motivation and decision to pursue CCM. Respondents were motivated to bill for CCM services to obtain compensation for work that they were already doing as well as new work to improve the quality of care for patients. Echoing the comments of most providers, an internist said, *"We were already providing these services before we were allowed to bill for it. We spent a lot of time on the phone with our chronically ill patients. It was good news for us that we could finally be paid for it."* Providers and their staff also noted that the new CCM funding allowed them to expand their staff dedicated to care management. Some respondents noted that CCM

⁴ The CMS CCM materials refer providers to the CPT definition of clinical staff which does not specifically indicate whether medical assistants fall under that group. Under the Medicare physician fee schedule, medical assistants are auxiliary staff and not clinical staff. Guidance from some professional societies note that medical assistants qualify as clinical staff if they are a medical technical assistant or a credentialed medical assistant.

resources helped them to initiate more formal care plans and a few noted that prior to CCM, they were not doing care plans at all.

Decision making about whether or not to pursue CCM varied by practice characteristics. In small independent practices as well as larger physician-owned group practices, the decision to pursue CCM was made by the local clinician(s). In practices owned by hospital systems, the decision was largely made at the system level. In system owned practices, respondents were not generally aware of any strategic discussion about which providers should bill for CCM; a few said that their corporate office was still thinking about this.

Providing CCM services. To explore whether providers were meeting the CCM scope of service elements (DHHS 2015), we asked respondents to describe how they were delivering each element (that is, identifying eligible patients, obtaining the letter of consent, delivering care management, developing and using care plans, managing care transitions and coordinating with home and community based providers). We also asked about changes in personnel and resources required to carry out care management activities. Within each service element, we note the respective barriers and facilitators that respondents raised to accomplishing that activity.

Patient population and identification for CCM services. Most providers reported that the requirement of two chronic conditions set forth by CMS was the key signal for identifying patients eligible for CCM services and commonly identified patients with diabetes, hypertension, and heart disease as good CCM candidates. Providers also referred their more complex patients to CCM on a case-by-case basis. Some, particularly smaller practices, were able to easily recognize which of their patients qualified for CCM. Other practices identified these patients in a more automated manner, using their EMRs and patient registries for example. Additionally, many respondents prioritized patients that were in greater need, such as those with multiple chronic conditions who frequently called the office, were dual enrolled in Medicare and Medicaid, or who had frequent emergency department (ED) visits. One respondent described this somewhat informal process at their practice as, *“You tend to have...patients who you seem to get calls from all the time, sometimes we just look at each other, and say ‘oh my goodness, they need to be on CCM.’”*

Initiating visit. Most providers understood that they needed to provide an annual wellness exam, an initial preventive physician examination, or a comprehensive evaluation and management (E&M) visit prior to billing for the CCM service. Several providers and professional society representatives wanted more clarification from CMS on which levels of E&M visits qualified as the initiating visit. Not all providers seemed to understand that they needed to initiate the CCM service as part of this visit, and a few instead mailed letters about CCM with the letter of consent to their patients with 2 or more chronic conditions.

Letter of consent. Most practices approached patients about CCM when they came in for appointments, frequently the annual wellness visit. The doctor or a nurse introduced the concept of CCM, reviewed the CCM services and requirements in detail and provided the consent letter. In other practices, the provider introduced the patient to the care manager or a staff member leading CCM at the practice, who then reviewed CCM services in more detail. In a few cases, office managers or front desk staff would reach out to patients during a visit about CCM and offer a letter of consent to sign, either there or at home and mailed back. Most practices drafted

their own consent letter, often after referring to example consent letters published online by the AAFP, the ACP and the AMA. In two cases, CCM billing practices did not ask patients to sign a consent letter because they were uncomfortable doing so or because they were not aware that it was a requirement.

Some providers felt that the triple requirements of explaining CCM services and cost sharing to patients as well as obtaining patient consent put too much of a burden on the provider. A few providers, especially those who did not bill for CCM, expressed hesitancy to discussing consent with patients out of fear of damaging the doctor-patient relationship. A professional society representative said, *“You don’t have to ask other people if you can bill for an office visit. It is reasonable for patient to be informed that they may get a bill in a month that they did not see the provider. But it created an atmosphere that it’s something we would be getting away with, and the patients won’t trust us. But if it was promoted publicly so patients don’t think it is fraud, that would help.”* Providers also noted that asking patients with low-incomes who don’t have supplementary coverage, and are not dually eligible for Medicaid, to pay the fee is a burden for those patients, *“In Tennessee, 30% of Medicare beneficiaries live on social security alone. The copayment is an issue for needy groups.”* A nurse from another practice said, *“There are so many people who could benefit from it [CCM] but don’t want to be a part of it [because of copay].”* Providers noted that they’d like for CMS to promote CCM to patients and better educate them about the service so there is less of the burden on the providers to “sell” the program to “a cost-conscious and potentially skeptical population.” They also would like CMS to ensure that materials on CCM are easily obtainable by practices and presented in language providers can understand rather than in regulatory language.

Tracking time for billing. Practices put in place processes and tools to track time spent on CCM activities. Some practices created a form or “bill sheet” to log the time and dates of encounters with CCM patients, which were then reviewed by the biller who determined whether the requirements for billing were met for the month. A billing family practitioner noted, *“That is how we do our chart audits. We have every line: reviewed this lab, that lab. She [the NP] can check off on these boxes in the EMR, and we’ve assigned a time value [for each CCM activity]. If we get 20 [minutes], she checks the box for billing, and we bill the patient.... We copied off of other programs... to determine what time commitment is.”* A small group of providers adopted CCM specific software as an add-on to their EHR, which tracked time for their CCM patients and automatically billed once CCM activities reached the 20 minute mark. For those without CCM software add-ons, work arounds were required. Some practices for example had to create an encounter on their schedule that incorporated all the CCM work they’ve done for that patient that month so they could generate a CCM bill. Others simply kept paper logs of CCM activities for billing.

Most providers said that the documentation of the 20 minutes of time and of other CCM activities was a burden. A family practitioner noted that while CCM is worthwhile, *“It takes 20 minutes to do the work around the work.”* Some found tracking time in some EHRs to be challenging because care managers and providers had to remember to navigate to a different CCM module to document time and describe their CCM activities, which can be time consuming and redundant with information already being recorded in the patient’s medical record.

Providers overwhelmingly reported meeting and exceeding the twenty minute requirement for providing CCM services. Typically, these providers reported spending between 45 minutes and an hour per month on CCM services for each patient. Depending on the severity of the patient's needs, that time could range anywhere between 20 minutes and several hours per month. A few practices that hired a nurse to act as care manager for the CCM service and that enrolled a large proportion of their patients in CCM made an effort to actively reach out to beneficiaries to provide and document 20 minutes per month of non-face-to-face activity, but such practices were not the norm.

Care management models. Care management models for CCM services delivery and related staff responsibilities fell into four categories:

- **Care manager-centric model.** While providers continue to manage their patients during and between office visits, in about half of practices interviewed, care managers led the CCM activities, with some (limited) interaction with the clinician. The care manager could be a nurse practitioner (NP), physician assistant (PA), registered nurse (RN), or a licensed practical nurse (LPN). In this model, the care manager usually handles most of the care management activities including enrollment, care plan creation, between-visit communication with patients, reviewing patient charts, reviewing medications, conducting health assessments, and more. The clinician is usually consulted during key points, for example, to sign off after the care plan has been created, or to address exacerbations of a patient's condition(s) between visits. In large practices with multiple care managers, and CCM patients may be distributed among care managers based on the complexity of the patient and care managers' training. A challenge to the use of the care manager-centric model noted by several providers was that there needs to be a bigger supply of "trained care managers sent out to practices" for CCM uptake to increase. An additional challenge to this model is the cost of care managers given the relative payment from CCM (see section on payment below.)
- **Shared responsibility model.** In one-third of practices interviewed, both providers and care managers played large roles in CCM operations. The provider was in charge of CCM activities, but delegated specific tasks and responsibilities to nurses or other clinical staff. Often, care managers conducted most of the CCM activities, but communicated often with the clinician who signed off on the care managers' notes. In this model, the provider and care manager met frequently to discuss patients. As a provider stated, "*Our entire practice is involved with CCM. It is the heart and soul of what our practice does.*"
- **Physician-centric model.** In just over one-tenth of the practices we interviewed, the physician handled most of the responsibilities related to chronic care management. This was especially common in solo practices where the provider said they are knowledgeable about both the clinical and administrative activities in the practice. Oftentimes, these solo providers either could not afford to hire a new person to support CCM operations, could not find a qualified care manager to hire, or could not find the time to provide care management training to a new or existing staff person. In general, across the "physician-centric CCM models," an RN, MA, NP, or PA often provided limited CCM support by helping with data entry or occasionally calling patients. In all three of the above models, medical assistants were sometimes delegated less clinically complex aspects of care management.

- **Use of a third party organization.** While many of the respondents noted that they have been approached by numerous third party vendors for CCM, just four of the practices had used a third party vendor at some point in the past 12 months to provide CCM services. Practices that had engaged vendors did so because their staff did not have enough time to understand the CCM requirements or maintain the documentation required to bill for CCM. Three of the four practices that used vendors for CCM were unhappy with them and had discontinued their work with the vendor by the time of our interviews. Providers reported firing vendors because they felt the vendors contributed to fragmented care, created unnecessary paperwork that practice staff then had to review, only communicated electronically with the provider, and were not providing clinically meaningful care to patients. Like other providers, an internist described his experience, *“Third party companies out there turn this into a racket. They have call centers where their social workers or LPNs in Wichita, KS rack up all these phone calls for 20 minutes. ... if this was your mother, who would your mother respond better to? Some call center in Wichita, Kansas? Or Suzie Q who has worked in my office for years. My staff knows this person and they know what her frailties are.”* After dropping the vendors, the practices either used their existing staff or hired a new care manager to provide CCM services on site at the practice.

Care plan. Practices varied when it came to who created the care plan. In over half of practices interviewed, the care manager and provider worked together to develop the care plan. In about a third of practices, the provider developed the care plan and the care manager was in charge of updating it after following up with patients. In the remaining practices the care manager developed the care plan with little or no input from the provider.

Respondents noted that care plans most commonly included the following topics:

- Summary of previous office visits
- List of diagnoses/problem list
- Next steps, including new treatments patient will start, information about labs being drawn, or information about referrals being made to specialists or outside agencies
- List of specialists patient sees
- Medication list
- General health education

They tended to less frequently mention other elements of the care plan outlined in the payment rule, in particular “expected outcome and prognosis” and “measurable treatment goals.”

Prior to CCM, most practices did not give patients a comprehensive care plan. Many had been giving patients post-visit summaries or more basic care plans. With CCM, these practices modified their care plans to make them “more detailed” and systematic. As a nurse practitioner noted, *“Before care plans were just there, but now I actually use them in my practice because it helps direct me what I really need to do with my patient.”* A family practitioner noted that, of all the required CCM activities, the care plan is the biggest change in their practice, *“Not really anything changed [with CCM], except for the care plan page and having all that centralized data. It [CCM] just makes us think about the care plan, and every time we get a phone call [for*

even a medication refill] it's not just a refill. The patient's information goes before my eyes a lot more often than I used to. It's been a change for the better from the patient perspective."

Some providers continued to refer to their post visit summaries when asked about care plans. A few providers do not provide or use care plans at all, citing insufficient support for developing, updating and maintaining them. Some respondents felt that CCM care plans as defined by CMS (DHHS, 2015) were overly complex and less clinically useful to providers and to patients and thus expensive and time consuming to create. As a physician noted, *"The comprehensive care plan is more than most patients need. The care plan is rather simple. Take hypertension [medication] once a day. Take insulin every day, check your blood sugar every day. Care plans can be laborious and complicated documents when the message may not be that big. The ability to make a simpler care plan would be wonderful."* A few providers noted that they do not count the time they take to create the plan towards the 20 minutes required to bill for CCM, and they find this burdensome.

Facilitators to developing and using care plans included having prior experience developing care plans, having care plan templates from professional societies, having a staff member who can customize the EHR to create a care plan template or having an EHR with a care plan module, a care manager with dedicated time and resources to help develop the care plan with the provider and the patient, and a patient portal through which to share care plans with patients. Practices that used care plans prior to the CCM policy (e.g. recognized patient centered medical homes) noted that this facilitated meeting the care plan requirement for CCM. A physician who was had done additional vendor supported training on use of their EHR (i.e., an EHR "superuser") noted that it was helpful to have someone at the practice who is invested in, and has the care management and HIT skills to devote, to creating the care plan: *"You take a general EMR and use it for something [for which] it is not specifically designed."* Even among those EHRs that come with a care plan template, heavy customization was needed and practices often lacked the IT staff to help with that. *"They use pre-populated templates that often have things that don't apply to the specific patients."* Several providers had EHRs with the CCM modules or care plan functionalities. A physician noted, *"We would not do this unless we had [this EMR's care plan functionality]."*

Respondents perceived having a patient portal facilitated sharing care plans with patients and caregivers. One provider noted that the requirement to share care plans with patients promoted the concept of shared goals and helped patients take more responsibility for their health.

Manage care transitions. Providers were not always able to obtain patient information necessary to manage care transitions. They faced several challenges obtaining patient information from hospitals due to a lack of incentive or interoperability for hospitals to share patient information with the providers' practice. This was particularly challenging for small independent practices in some areas. As one provider noted, *"Making sure the hospital actually notifies you is a barrier."* Additionally, respondents perceived fear of violating HIPAA as keeping hospitals from sharing patient information with providers. On the other hand, respondents of practices in large systems where all providers used the same EHR reported better support for the CCM activities that required communication with persons outside of the billing provider's practice, (e.g. care transitions, 24/7 access to the record for the on-call provider).

Changes in personnel and resources to deliver CCM Services. The CCM elements that required most change in clinical personnel and resources were care management activities, including the care plan and HIT tools to support it, and transitions of care. For these activities many practices felt they needed to add a full or part time nurse care manager. Several practices hired an RN, an LPN, or a medical assistant. Larger practices occasionally hired more than one care manager. A small number of practices did not hire a new care manager, but instead repurposed the role of an existing nurse or medical assistant. Others added available staff time by extending the hours of a part-time nurse to a full-time position. A small number of practices were unable to hire or repurpose any new staff due to financial constraints. Small independent practices also faced fewer administrative hurdles to hiring a care manager or redefining nurse and medical assistant roles compared to hospital system-owned practices.

Respondents in many independent and system-owned practices noted the challenge of supporting a full-time RN's salary on revenue from CCM payments alone and a few of these felt this limited the number of patients for whom they can provide CCM services. As a physician said, *"So RNs who are doing care coordination should only do care coordination, in my opinion, but unfortunately my RN has also had to room patients, take vital signs, go do labs... so she has not been able to concentrate all her time on care management and care coordination, transitions of care and so forth. So I feel like she's not doing as much of it [CCM] as she ought to be and that's why we haven't added more patients to [CCM]."*

The extent to which practices changed how they use their EHR to meet CCM requirements varied. Practices were already recording structured data in their EHR, so this CCM requirement did not entail changes. Some practices purchased an EHR module (e.g. from Cerner or eClinicalWorks vendors) to support documentation of CCM tasks, time tracking and billing. Practices that used EHRs with limited CCM functionality often used computer programs outside of the EHR to track CCM information—such as a Microsoft Access database or Microsoft Excel workbook to track enrolled patients, creation of care plans, time spent furnishing CCM services, and other operational information.

Some practices relied on the care manager or practice manager to handle any changes to documentation in the EHR, meaning the provider or other practice staff were unaffected in their use of the EHR after implementing CCM. As one practice manager in a care manager-centric model described, *"I think the only change was that our doctors at [the visit where they enroll the patient] are encouraged to put in the care plan ...but other than that, it didn't change anything."*

Other CCM requirements typically did not require changes in personnel or care processes. Almost all respondents said that their practices already provided well over 20 minutes of non-face-to-face time managing and coordinating care for patients with two or more complex conditions. Similarly almost all said that they provided continuity of care with a designated practitioner or care team member. Some practices also already had patient portals and many others had other forms of enhanced access (for example, telephone or secure messaging). Most providers stated that their practice already had in place 24/7 access to a provider. In most of these cases, the provider also had access to the patient's medical records in the EHR (and in some cases, the care plan) prior to implementing CCM. Solo practitioners faced a challenge meeting this 24/7 access requirement if they did not share interoperable EHRs with the other practices with whom they rotate on call responsibilities.

Coordinate with home and community based clinical service providers. Respondents noted that the CCM payment helped them to better support staff who connected patients to home and community based services. Care manager and social worker respondents noted that with CCM support, they could spend more time connecting complex patients, frail elderly patients and patients with insufficient social supports to needed services.

CCM payment. While appreciating that they were now being reimbursed for some of the time they spent on care management outside of office visits, just over one-half of providers believed the payment amount did not adequately cover the cost of the increased documentation required for CCM, the expanded outreach and care management for complex patients, modification of workflows to support CCM activities, and the upfront set-up costs including modifications to their EHRs. One provider echoed the thoughts of other respondents, saying *“I think it’s too little money for what we do, I think that it is a lot of hoops to jump through to get paid for what we were already doing, but at least it’s a recognition that we were doing it.”*

Geriatricians and general internists in particular felt that the CCM payment was inadequate for complex patients. These providers and representatives from two professional society organizations noted that the geriatric community has been interested in seeing the higher paying codes (99487 and 99489) as part of the CCM payment policy.

Some providers, on the other hand, felt CCM payment was sufficient, noting that it provided reimbursement for work they largely already did. The general sentiment of this group was well expressed by a physician, *“I’ve been a doctor for 30 years. So much of what we do occurs outside of the payment. Older docs like me are so used to doing this stuff for free. It’s nice that we can be compensated for this...Now CMS does this and I applaud them because I think over time, it will make for better care, particularly for people who don’t do what they’re supposed to do because they don’t get paid for it.”*

Small practices in particular, credited the CCM payment with helping them to continue as an independent practice and to continue accepting Medicare patients. A nurse noted that CCM helps them provide high quality care and avoid being bought by a hospital, *“It [CCM] improves the quality of care. Risk management has come to the forefront in the last few years. Without contracts and the money we generate from them [CCM and other commercial payers care management payments], there is no way that I’ll be able to be on my own in the next few years. I’ll have to be bought by a hospital.”* Another provider noted that the CCM helps them extend what they’re already doing for commercial payers to the fee-for-service Medicare population. A family practitioner in a two-physician practice noted that the CCM payments have helped their practice continue to accept Medicare patients because of the additional income, *“The [CCM] reimbursement that we have received is actually encouraging to us to continue taking Medicare patients.”*

Perceptions of beneficiaries’ reactions to CCM. Practice respondents reported that patients who consented to CCM had overwhelmingly positive views of CCM services. Practices heard that their patients appreciate having a dedicated point of contact and increased access to their medical providers. They appreciate having an advocate and someone to come to if they have questions or concerns about their medications. As one provider noted, *“People like the idea*

of having an advocate for them, being able to talk on the phone, not having to come to a visit, having messages passed to the provider.”

Providers reported that most patients consented to receiving the CCM services. Respondents cited the following factors as facilitating obtaining patient consent:

- Having a trusted clinician or primary care team member with whom the patient has an ongoing relationship introduce the CCM concept
- Framing the discussion about CCM around the benefits of the program to the patient, (e.g. keeping them healthy, coordinating care with specialists, and helping them avoid hospitalizations, having an accessible point of contact at the practice who reaches out to them and who they can also call (in addition to their continuity clinician)
- Mentioning the benefits to the practice (that CCM helped to pay for the work providers and staff did “behind-the-scenes”) for providers with strong and trusted patient relationships
- Patients having secondary insurance coverage which often covered the copay. Where patients lacked secondary insurance and had low-income, there were several providers who stated they did not collect the copay
- For patients concerned about the copay, some providers noted to the patients that the copay for CCM is much smaller than the copay they’d have to pay for a hospital stay, something CCM helps them to try to prevent

Providers reported that patients rarely revoked CCM services; when they did, their reasons were that they felt stable enough that they did not need the program and did not want to continue to pay for it.

Among the few patients that did not consent, respondents identified the following barriers to obtaining their consent:

- Lack of secondary insurance to cover the cost sharing and the ensuing burden among low income patients
- Asking for a copay, even among patients with secondary insurance, raised suspicions in some patients
- Beneficiary felt that the services were being provided already for free and without additional paperwork
- A small number of respondents stated that they had a few patients who refused CCM because they were wary of government programs
- A few patients simply felt that they did not need the service and did not want to, or did not have the time to, spend the extra twenty minutes a month on the phone with their doctor’s office. A nurse in a CCM billing practice noted, *“Some of the patients did not understand the program especially when we first started and were trying to figure out how it worked. They opted out because they did not feel that they needed the services at the time. I think that was on us, because we did not quite understand which ones qualified and needed our services.”*

When asked how CMS could help with patients' reaction to CCM, providers and professional society representatives suggested that Medicare provide more education or materials to the public about the program so less of the burden is on the providers to "sell" the program to a cost-conscious and potentially skeptical population. One provider noted, *"I think Medicare needs to educate patients about why the code has been implemented. Families and patients think that it's a cash cow. Medicare never told them the value of this code and why providers should bill for it. That has been the biggest challenge for us....The reality is that we work really hard for our patients outside of office visits, and the families never realized it."*

Impact of CCM on continuity and coordination of care. Providers and professional society representatives, by and large, experienced few unintended consequences of the CCM. Most commented that the CCM helped them to improve coordination of care for patients by enabling more phone contact with other specialists and patients between visits and providing more resources for outreach to hospitals after patient discharges and ED visits so that the patient could be contacted by the practice. Capturing the sentiment of others, a family practitioner said, *"[CCM] is another way to put our eyes on patients; we monitor them closely."* While a few had heard concerns prior to initiation of CCM that it might pose barriers to patient-clinician continuity of care (if other specialists like cardiologists billed for CCM for a PCP's patients), none had experienced this problem. A small number of respondents expressed uncertainty over the possibility of multiple providers billing for the same patient once CCM uptake increases. Even though they had not encountered it, they did fear the possibility of a "race to bill."

Perceived impact of CCM on utilization. Providers perceived several positive outcomes for beneficiaries from CCM including: improved patient satisfaction and adherence to recommended therapies, improved clinician efficiency, and decreased hospitalizations and ED visits. An internist said, *"When we have done this [CCM] in our practice and surveyed our patients, the patient sees it as a very desirable service for the practice to have."* A few providers noted that CCM funding allowed them to hire a nurse or medical assistant to do pre-visit planning and more phone outreach to patients before and after visits which improved efficiency, ensured things didn't "fall through the cracks," and allowed the clinician to spend more of the office visit focusing on the patient. One provider who hired a medical assistant noted, *"The paradigm shifts when there is a reimbursement [for care coordination activities]."* Another provider said, *"I think it's a great program. It decreases hospitalizations, increases compliance. Overall helps everyone."*

Most respondents credited particular aspects of CCM activities with improved outcomes, in particular patients' enhanced access to the practice via the care manager, which enabled condition monitoring via between visit phone calls with patients and more time for medication monitoring and reconciliation. An RN in an internal medicine practice noted, *"We have quite a few patients who require extra help managing their [chronic conditions]...What I found, is that talking with the patient, or giving the patient the opportunity to call us, so they can talk to us about their concerns, helps us keep them out of the emergency room."* As another respondent noted, *"Patients slowly become confident in the [CCM] services and call us themselves for help with their conditions, instead of calling the ER."* Another provider credited CCM funding for a care manager with improving patients' condition management, *"One patient came in and lost 40 pounds in 6 months, and she attributed the weight loss to the care manager. She was motivated, she got support from the care manager, she got great ideas from her."* Respondents also cited the

additional attention to medication management and monitoring as helping to improve patient outcomes. They also noted that care managers can connect patients with services that can improve their health and quality of life. A respondent noted, “*Patients get more comprehensive care outside of medical decision making... [including] increased awareness of community programs/resources.*”

3. Discussion

Overall, practice respondents noted that patients who consented to CCM had overwhelmingly positive views of CCM services. Providers and care managers perceived several positive outcomes for beneficiaries from CCM including: improved patient satisfaction and adherence to recommended therapies, improved clinician efficiency, and decreased hospitalizations and ED visits. Most respondents credited particular aspects of CCM activities with these perceived improved outcomes, in particular patients’ enhanced access to the practice via the care manager, which enabled condition monitoring via between visit phone calls and more time for medication monitoring and reconciliation. Respondents also noted that CCM funding helped enhance staff time spent on coordinating care with other specialists, reaching out to hospitals to obtain ED and discharge data and to follow-up with patients after such events.

While several providers, particularly those caring for numerous complex patients, noted that CCM payment was inadequate for the CCM work required, some providers were pleased with the CCM services and payment. Those who were pleased and noted that they were finally getting at least some payment for the time they spend helping manage and coordinate patients’ care outside of office visits. Small practices in particular, credited the CCM payment with helping them to continue as an independent practice and to continue accepting Medicare patients.

Practices had to most heavily alter their workflows, personnel and resources to carry out particular nonclinical CCM activities, including tracking time, and documenting service delivery to justify CCM billing. In terms of clinical activities, the CCM elements that required most change in personnel and resources were care management activities, the care plan, and monitoring transitions of care. For all three of these activities many practices felt they needed to add a full or part time care manager, but many noted the challenge of supporting a full-time RN’s salary on revenue from CCM billing.

Facilitators to delivering CCM services included prior experience as a patient-centered medical home, a trusted relationship between the provider and patient, patient coverage with supplemental insurance to cover the cost-sharing, prior experience developing care plans, having a staff member or HIT support to customize the EHR to track time and to document care plans and CCM activities, and having a care manager with dedicated time and resources to help deliver and document CCM services.

Several barriers the respondents in our study identified were addressed by changes in the policy that went into effect on January 1, 2017, among them written consent, clarification on the initiating visit requirement, higher payment for time spent on CCM for more complex patients, and after-hours access to the care plan. The changes specifically include documented verbal rather than written consent; reduced health information technology (IT) requirements for the care plan and clinical summaries; greater alignment with CPT code descriptor language; and a number of additional administrative simplifications concerning documentation. The changes also

stipulate that an initiating visit is required only for new patients or for those who were not seen in the year before the first CCM service. CMS also increased the payment for more complex CCM beneficiaries by adopting two additional, higher-paying CCM codes describing complex CCM (a base code 99487 for 60 minutes of time, and its add-on code 99489 for additional 30-minute time increments). The same CCM service elements would be required for complex CCM as for non-complex CCM (the current code), except complex CCM would include more significant care planning and complex medical decision making by the billing practitioner, as well as more clinical staff time. A new add-on G code (G0506), created to improve payment for the CCM initiating visit, accounts specifically for a billing practitioner's additional work in personally performing a face-to-face assessment of a beneficiary requiring CCM services, and personally performing CCM care planning that is not reflected in the initiating visit or in the monthly CCM service code.

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III. UPTAKE, DIFFUSION, AND IMPACT OF THE CHRONIC CARE MANAGEMENT SERVICE

In this chapter, we report on the (1) uptake and diffusion of CCM services during the first two years of the payment policy, characteristics of CCM recipients, and providers who furnish the services; (2) impact of the CCM payment policy on the CPC model and other care management services; and (3) data and methods used in our quantitative analyses and the impact of CCM services on beneficiary expenditures, utilization, and quality of care.

A. Descriptive statistics on uptake and diffusion of CCM services, characteristics of CCM beneficiaries and providers, and overlap CCM services with other care management services

In this section, we first describe the uptake of CCM services by beneficiaries during the first two years after the implementation of the CCM billing code and examine the characteristics of those who received CCM services relative to the general Medicare FFS population. We then present the billing trends of providers who billed for CCM services and describe the characteristics of those providers. We conclude this section with a discussion of the degree of overlapping billing for CCM services with other care management services.

1. Beneficiary uptake and characteristics

During the first two years of the program, 684,584 unique Medicare beneficiaries received CCM services (Figure III.1).⁵ There was a fairly steady increase in the total number of beneficiaries who received CCM services in each quarter.

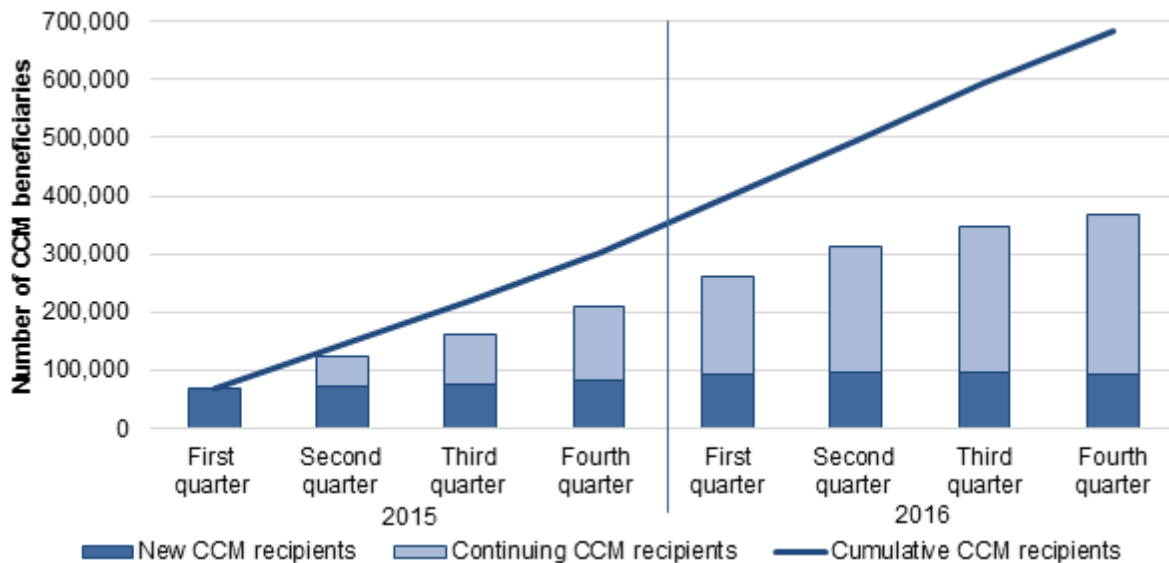
However, the increase in the cumulative number of CCM beneficiaries masks the variation in the number of *new* CCM recipients in each quarter (Figure III.2). The largest period of growth occurred between the third quarter of 2015 and the first quarter of 2016. This could represent greater knowledge in the provider community about CCM services as the program matured. It is also possible that the practice-level changes providers needed to make took time to implement during the first few months of the program. After a period of steady enrollment of new beneficiaries, however, the number of new enrollees began to modestly decline.

Key findings from descriptive analysis

- Over 684,000 beneficiaries received CCM services in the first two years of the payment policy. These beneficiaries were generally concentrated in the South.
- The number of new CCM recipients increased throughout 2015. However, there was a decline starting in the second quarter of 2016.
- Beneficiaries did not consistently receive CCM services. About 19 percent of beneficiaries had only one month of CCM services. Those who received CCM services in the first quarter of 2015 received on average about ten months of CCM services.
- CCM beneficiaries had poorer health status compared with the general Medicare FFS population.
- Solo practitioners and primary care providers furnished the majority of CCM services.
- Individual providers billed for \$105.8 million in CCM fees during the first 24 months of the program.

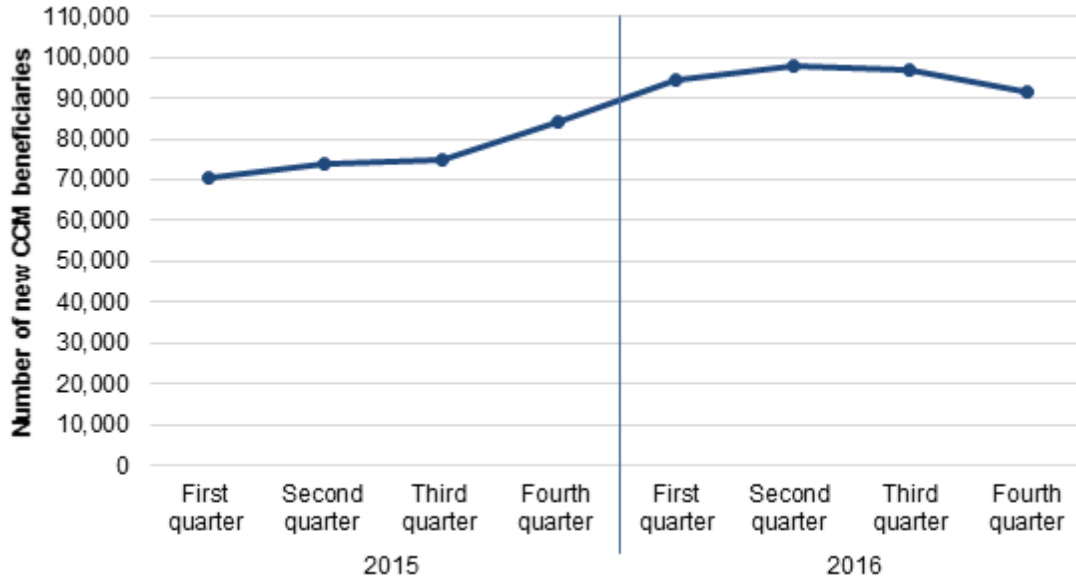
⁵ The 684,584 beneficiaries include those who were enrolled in a managed care plan in the year prior to first receipt of CCM services. Subsequent analyses in this report exclude these beneficiaries.

Figure III.1. Trends in Medicare beneficiary uptake of CCM services, January 2015–December 2016



Source: 2015–2016 Medicare FFS claims and enrollment data.

Figure III.2. Number of new CCM recipients, January 2015–December 2016



Source: 2015–2016 Medicare FFS claims and enrollment data.

From January 2015 to December 2016, CCM recipients received, on average, six months of CCM services. However, 19 percent of those recipients received only a single month of CCM services (Table III.1). The CCM recipients who received services in the first quarter of 2015 received ten total months of services on average. Those who received services in the third quarter of 2016 received four total months of services, on average. Billing in subsequent months after

initial receipt of CCM services is based on beneficiaries continuing to meet medical necessity criteria and the practice providing at least 20 minutes of care management services. Influencing factors may also include inconsistent engagement by beneficiaries or changes within a practice.

Table III.1. Months of CCM services received, January 2015–December 2016

	January 2015– December 2016	First quarter 2015	Second quarter 2015	Third quarter 2015	Fourth quarter 2015	First quarter 2016	Second quarter 2016	Third quarter 2016	Fourth quarter 2016
Percentage of CCM recipients with one month of CCM services	19	14	15	16	16	17	20	22	30
Average number of months of CCM services	6	10	8	7	7	6	5	4	3
Number of new CCM recipients	684,584	70,598	74,048	74,825	84,283	94,639	97,692	96,975	91,524

Source: 2015–2016 Medicare FFS claims and enrollment data.

There is significant geographic variation in the percentage of potentially⁶ eligible beneficiaries who received services (Figure III.3). The greatest concentration of CCM services is in the South, where the prevalence of beneficiaries with multiple chronic conditions is higher than in other parts of the United States (Lochner and Shoff 2012). In eight states (Mississippi, South Carolina, Nevada, Florida, Texas, Alabama, Georgia, and Kentucky), more than 5 percent of potentially eligible beneficiaries received CCM services. The distribution may also be influenced by Medicare primary care initiatives supporting enhanced care management, which were not implemented in these states. For example, the percentage receiving CCM services is low in states that participated in the MAPCP and the CPC initiatives, which disallow separate billing for CCM services beyond what Medicare provides for patients participating in the initiatives.⁷ Colorado, Maine, Oregon, Rhode Island, and Vermont are among the states in which these initiatives operated during our analysis period, with less than 3 percent of potentially eligible beneficiaries receiving CCM services.

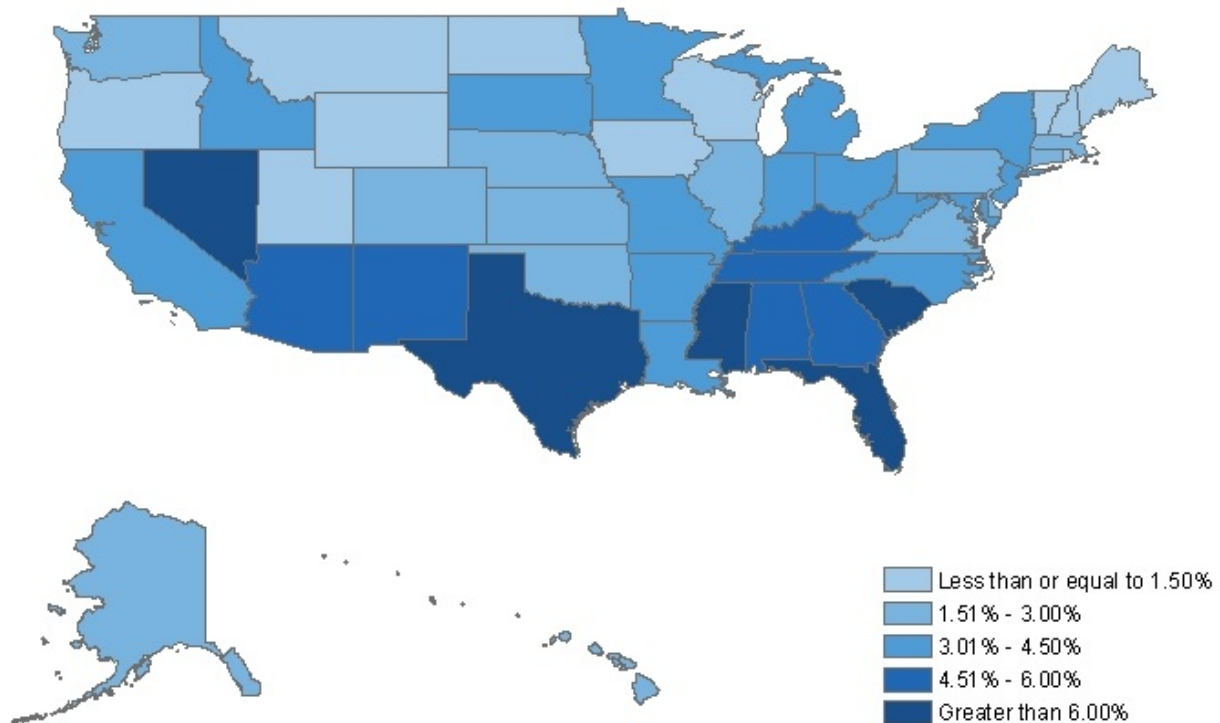
Compared with FFS beneficiaries in Medicare’s random 20 percent sample who did not receive CCM services during the first two years of the CCM payment policy, beneficiaries who

⁶ We defined the pool of potentially eligible beneficiaries in a given state as those who had two or more chronic conditions and received one of the following services between January 2014 and September 2016: a level 5 comprehensive evaluation and management (E&M) office visit (CPT codes 99205, 99215), annual wellness exam (HCPCS codes G0438, G0439), and/or an initial preventive physical exam (HCPCS code G0402).

⁷ States participating in CPC initiative are Arkansas, Colorado, New Jersey, New York (Capital District Hudson Valley region), Ohio (Cincinnati and Dayton region), Oklahoma (Greater Tulsa region), and Oregon. The MAPCP initiative ended on December 31, 2014, in Minnesota, North Carolina, and Pennsylvania. The initiative ended in the remaining participating states or regions (Maine, Michigan, New York, Rhode Island, and Vermont) on December 31, 2016.

did receive CCM services tended to have poorer health status (Table III.2). Beneficiaries receiving services have an average hierarchical condition category (HCC) risk score of 1.37, compared with 1.00 for non-CCM recipients, reflecting a 37 percent higher burden of disease. Twenty-four percent of those receiving services are dually eligible for Medicare and Medicaid, compared with 17 percent of the non-CCM recipients. CCM beneficiaries were also more likely than the general Medicare FFS population to receive advanced-care planning services, which were first offered in 2016.

Figure III.3. Geographic variation in receipt of CCM services: Percentage of Medicare beneficiaries who received CCM services, January 2015–December 2016



Source: 2015–2016 Medicare FFS claims and enrollment data.

We found substantial differences in the health status and frailty between CCM beneficiaries and the general Medicare FFS population. To capture beneficiary health status and frailty, we constructed 81 HCCs, which are used to estimate the CMS-HCC risk score, and 55 claims-based frailty indicators, based on work by Faurot et al. (2015). About 18 percent of CCM beneficiaries had none of the HCCs, compared with 48 percent of beneficiaries in the 20 percent sample. At the other end of the spectrum, 25 percent of CCM beneficiaries had five or more HCCs; only 9 percent of the general Medicare FFS population had five or more HCCs. A similar pattern emerged for selected claims-based frailty indicators: 5 percent of CCM beneficiaries had no frailty indicators, compared with 30 percent of the general Medicare FFS population. About 16 percent of CCM beneficiaries had 15 or more of the 55 claims-based frailty indicators that we examined, whereas only about 6 percent of the Medicare FFS sample had this many.

Table III.2. Demographics and health status of Medicare FFS CCM recipients and the general Medicare FFS population, January 2015–December 2016

	CCM recipients	20 percent sample of Medicare FFS beneficiaries
	Mean/percentage	Mean/percentage
Age	74	71
Female	60%	53%
Race		
White	80%	82%
Black	12%	10%
Other	7%	8%
Original reason for entitlement		
Age	75%	76%
Disability	24%	24%
ESRD	<1%	<1%
Disability and end-stage renal disease	<1%	<1%
Died between January 2015 and December 2016	2.7%	5%
Used hospice services between January 2015 and December 2016	1%	1%
Used advanced-care planning services in 2016 ^a	10%	1%
Average HCC score	1.37	1.00
Medicare/Medicaid dually eligible (any month)	24%	17%
Number of HCC chronic conditions		
0	18%	48%
1	18%	18%
2	17%	12%
3	13%	8%
4	10%	5%
5 or more	25%	9%
Number of claims-based frailty conditions		
0	5%	30%
1–3	17%	19%
4–6	27%	24%
7–9	22%	14%
10–12	13%	7%
13 or more	15%	6%
Number of beneficiaries	648,394^b	7,771,132

Source: 2014–2016 Medicare FFS claims and enrollment data.

Note: Percentages do not total 100 because of rounding.

^a The billing code for advanced-care planning became available on January 1, 2016.

^b The number of beneficiaries is lower than in previous tables/figures because those who were enrolled in a managed care plan for only part of the year are excluded.

Beneficiaries who resided in rural areas and received CCM services in 2016 looked largely similar to the larger pool of CCM recipients in terms of health status and demographics.⁸ About 21 percent of the CCM recipients in 2016 resided in rural areas compared to 23 percent of the general Medicare population, the latter as estimated by MedPAC (MedPAC 2017). The average HCC score of beneficiaries residing in rural areas was 1.40, which was only slightly greater than the overall average of 1.37. A larger percentage of rural CCM receipts' original reason for entitlement was disability compared to all CCM recipients—30 percent versus 25 percent, respectively. This was also reflected in the age distribution with 16 percent of rural CCM recipients being under 65 years of age compared to 14 percent of all CCM beneficiaries.

When examining the most prevalent HCCs and claim-based frailty indicators, we found that CCM beneficiaries indeed had conditions that likely placed them at risk for functional decline (Table III.3). Diabetes (with and without complications), vascular disease, and chronic obstructive pulmonary disease are the most frequently occurring HCCs. Lipid abnormalities were common—more than three-quarters of CCM recipients were identified as having a lipid abnormality. Arthritis and fractures were also common among these beneficiaries. Although sepsis was not 1 of the top 10 frailty conditions, just over 20 percent of CCM beneficiaries had the condition, which is particularly dangerous in the frail population.

Table III.3. Top 10 HCCs and claims-based frailty indicators among CCM beneficiaries

HCC condition ^a	Percentage
Diabetes without complications	38
Vascular disease	28
Diabetes with chronic complications	24
Chronic obstructive pulmonary disease	23
Congestive heart failure	22
Specified heart arrhythmias	21
Major depressive, bipolar, and paranoid disorders	12
Breast, prostate, and other cancers and tumors	10
Rheumatoid arthritis and inflammatory connective tissue disease	10
Acute renal failure	9
Claims-based frailty indicator	
Lipid abnormalities	76
Arthritis (rheumatoid arthritis and osteoarthritis)	51
Other non-hip/pelvic fractures	51
Back problems (includes ankylosing spondylitis and other inflammatory spondylopathies, intervertebral disc disorders, disorders of cervical region, and other and unspecified disorders of the back)	43

⁸ We use the zip code of residence from Medicare enrollment data and the definition of rural areas by the Federal Office of Rural Health Policy (FORHP) at the Health Resources & Services Administration to assign beneficiaries to a rural area. FORHP produces a list of zip codes considered rural and beneficiaries residing in one of these zip codes were classified as rural residing. A list of the zip codes is available here:

<https://www.hrsa.gov/ruralhealth/aboutus/definition/datafiles.html>. Accessed August 7, 2017.

TABLE III.3 (CONTINUED)

Claims-based frailty indicator	
Hip/pelvic fractures	39
Coronary artery disease	34
Psychiatric illness (includes dementias, anxiety, depressive disorders, and mental disorders due to brain damage)	32
Chronic obstructive pulmonary disease	32
Cancer screening	29
Renal failure	24

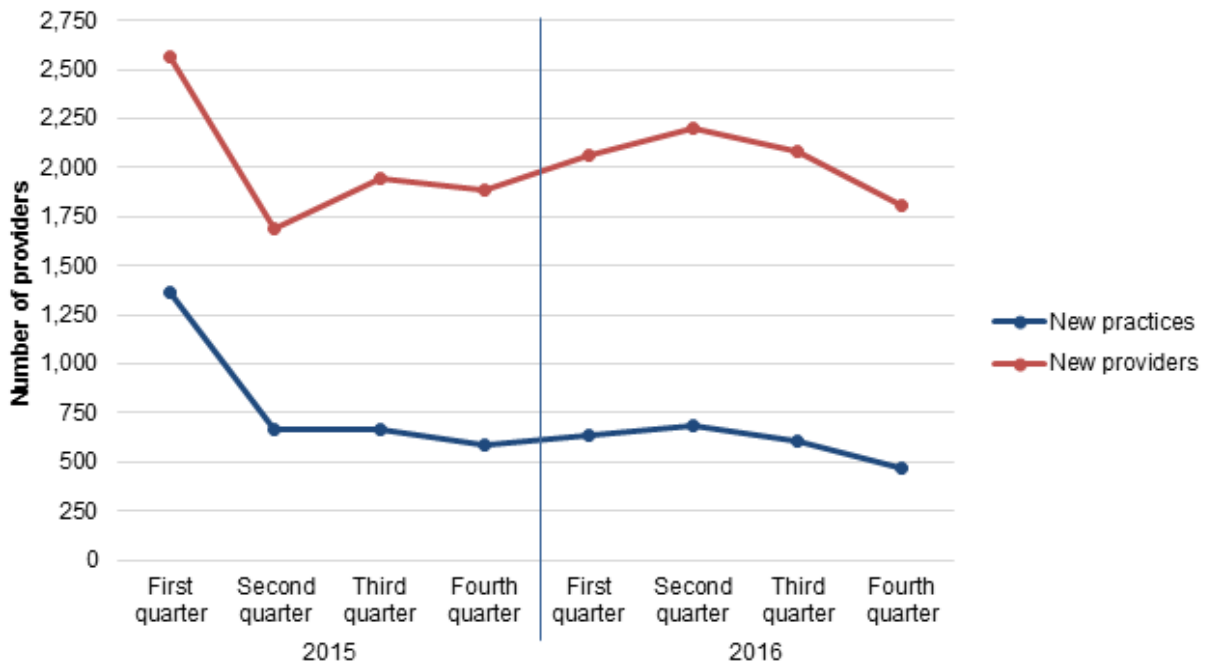
Source: 2014–2016 Medicare FFS claims and enrollment data.

^a The HCCs are not mutually exclusive. A beneficiary may have diabetes without complications and also have diabetes with complications if the diagnosis changes during the year.

2. Provider uptake and characteristics

As with beneficiary uptake, the total number of providers who billed for CCM services increased fairly steadily, but we also observed a decline in the number of new providers and practices furnishing CCM services at the end of 2016. During the first two years, 16,549 providers (defined by National Provider Identification number) billed for CCM services under 5,683 unique tax identification numbers (our proxy for a practice). As shown in Figure III.4, we see a sharp decline in the growth of new providers and practices between the first and second quarters of 2015 and a more gradual decline at the end of 2016. The general increase over the next year, starting in the second quarter of 2015, may in part be the result of growing awareness of CCM or of providers and practices making changes needed to provide CCM services. This trend correlates with new beneficiary enrollment. The decline between the second and fourth quarters of 2016 also aligns with our beneficiary-level findings: a gradual decline between the second and third quarters of 2016 and a steeper decline at the end of the year.

Figure III.4. Number of new providers and practices furnishing CCM services, January 2015–December 2016

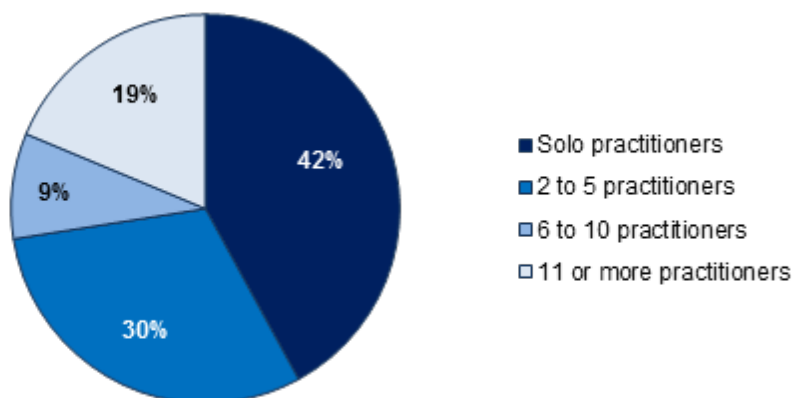


Source: 2015–2016 Medicare FFS claims and enrollment data.

Nearly three-quarters of those billing for CCM services were practices with five or fewer providers, and 42 percent were solo practitioners (Figure III.5). The dominance of solo providers and small practices helps to explain the similarity we see above in the trends between newly billing providers and practices. In responding to CMS’s proposed CCM payment policy, commenters worried that some requirements, such as a certified EHR, would disadvantage small practices and prevent them from billing for the provision of CCM services. However, this issue has not seemed to deter small practices from providing CCM services.

Primary care physicians (PCPs), defined as physicians with a specialty in internal medicine, family practice, general practice, or geriatric medicine, furnished the majority of CCM services—about 68 percent (Table III.4). This was a decrease from 73 percent during the first 15 months of the program (Schurrer et al. 2016). Nurse practitioners and physician assistants provided 17 percent of CCM services. The two non-PCP specialties with the largest billing fraction of CCM services were cardiology and nephrology, with 2.3 and 1.1 percent, respectively.

Figure III.5. Percentage of practices providing CCM services, by practice size



Source: 2015–2016 Medicare FFS claims and enrollment data.

Individual providers billed for \$105.8 million in CCM fees during the first 24 months of the program and, on average, managed about 47 patients per month. However, the median number of patients was 10, indicating that the average was skewed by a small number of providers delivering CCM services to many beneficiaries. This translates to about \$300 in CCM fees per month for providers furnishing CCM services to 10 beneficiaries.

Table III.4. CCM claims submitted by specialty, January 2015–December 2016

Provider type	Number of billers	Percentage of billers ^b	Number of claims for CCM services	Percentage of CCM services
PCP physicians	11,238	68	2,863,034	81
Non-PCP physicians	1,831	11	371,927	11
Nurse practitioners	2,244	14	190,529	5
Physician assistants	718	4	44,143	1
Other providers ^a	141	1	4,899	<1
Outpatient facility only	377	2	38,647	1
Total	16,549		3,513,179	

Source: 2015–2016 Medicare FFS claims and enrollment data.

Note: Medical doctors and doctors of osteopathic medicine are classified as physicians. The total number of billers differs from above because providers can bill under multiple specialties and this table includes outpatient facilities.

^a Other providers include podiatrists, clinical psychiatrists, licensed social workers, optometrists, registered dietitians, licensed clinical social workers, certified clinical nurse specialists, and chiropractors.

^b Percentages do not total 100 because of rounding.

3. Impact of the CCM payment policy on the CPC and MAPCP models and other care management service provision

During the past five years, CMS has made a strong commitment to supporting primary care and has increasingly recognized care management as an important component of primary care that contributes to improved health for beneficiaries and reduced expenditure growth. This

support is reflected in CMMI's implementation and testing of alternative service delivery and payment models that provide payment for care management services. Examples of these models include the Medicare Shared Savings Program, Primary Care Incentive Payment Program, MAPCP Demonstration, and CPC initiative. Concurrently, CMS has also enacted other payment policies within the Medicare Physician Fee Schedule (PFS) to support primary care and care coordination and management. For example, the 30-day transitional care management service from a facility, which reimburses community-based providers for delivering care management services to Medicare beneficiaries with high medical or psychosocial problems requiring a moderate or high level of medical decision making complexity.

In this section, we report the degree of overlapping payment for CPC and MAPCP care management services and CCM services that occurred during the first two years of the CCM payment policy—2015 and 2016. These include CPC and non-CPC practices as well as MAPCP and non-MAPCP practices. We report MAPCP overlap in billing for only those states or regions that continued participation through December 31, 2016. Minnesota, North Carolina, and Pennsylvania ceased participation in the MAPCP demonstration on December 31, 2014, or prior to the start of the CCM payment policy. Of particular note, the majority of CPC practices are participating in the CPC+ model that began on January 1, 2017. If considerable overlapping payment occurred, additional payment policy considerations might be needed to minimize this happening in the future. We also report the degree of overlapping billing for CCM services and other care management services explicitly excluded in the CCM rulemaking.

In its rulemaking, CMS addressed the intersection between the provision of CCM services and participation in demonstrations and models, which provide additional supports to primary care through care management fees. CMS did not exclude providers participating in other demonstrations or models from billing for the provision of CCM services as long as the beneficiary was not attributed to that practice for the MAPCP Demonstration or CPC initiative. Providers participating in MAPCP and CPC could bill for CCM services provided to all nonattributed beneficiaries whom they treat because no care management payment was made to the MAPCP and CPC practices for these beneficiaries. In the proposed rule (79 FR67729), there was a discussion about whether this particular provision of the payment policy could cause confusion regarding the interaction of CCM services and the MAPCP and CPC models. Concern was also raised that providers would likely not know if overlapping payment (MAPCP or CPC fee and CCM fee) was occurring. In response, CMS commented that it would engage in extensive communications with the CPC and MAPCP practices to explain that they cannot bill in the same month for beneficiaries attributed to their practice for either initiative. However, CMS recognized that overlapping billing would likely occur to some degree. Therefore, CMS established a process to recoup payment from MAPCP or CPC practices for overlapping billing.

Two types of overlapping payment recoupment have occurred. The first is a recoupment of the MAPCP or CPC care management fee if a provider,⁹ other than the MAPCP or CPC practice to which the beneficiary was attributed, billed for the provision of a CCM service in the same month. We call this a demonstration fee recoupment. The second is a recoupment of the CCM fee from the MAPCP or CPC practice if the practice also billed for the provision of a CCM

⁹ This other provider may or may not be in a MAPCP or CPC practice.

service for a beneficiary who was attributed to it in that same month. We call this a CCM fee recoupment.

Between January 1, 2015, and December 31, 2016, over 684,000 Medicare beneficiaries received CCM services. Providers billed for 3,513,179 claims for CCM services for a total of \$105.8 million in fees. Table III.5 displays the number of recoupments and the Medicare payments associated with these recoupments by type for the same time period. Despite concern raised about potential billing confusion, little overlap in billing for CPC care management fees and CCM has occurred. Fewer than 6,000 recoupments have occurred, resulting in \$144,103 in payment recoupments. The number of demonstration fee and CCM recoupments were similar but the total CCM fee payment amount recouped was modestly higher (\$87,181 versus \$56,922). We see a similar low level of overlap in billing for MAPCP care management and CCM fees. Roughly 12,000 recoupments occurred, which resulted in \$65,000 in payment recoupments. Although the number of demonstration fee recoupments are five times higher than those for CCM, the total CCM fee payment amount recouped was only modestly higher (\$37,194 versus \$28,507).

Table III.5. Overlap in payment for care management services provided by CPC practices and other providers to beneficiaries attributed to CPC and MAPCP practices: January 1, 2015, through December 31, 2016

Model	Demonstration fee recoupments		CCM fee recoupments	
	Number of recoupments	Total recoupment (\$)	Number of recoupments	Total recoupment (\$)
CPC	2,877	56,922	2,818	87,181
MAPCP	10,996	28,507	1,252	37,194

Source: CMS CPC and MAPCP program data.

In developing the CCM payment policy, CMS identified a set of care management services for which it would not allow billing during the same month as a provider billed for a CCM service. For example, the 30-day transitional care management service (TCM) cannot be billed during the same calendar month as CCM—except when the TCM service period ends before the end of a given calendar month and a qualifying amount of time is spent furnishing CCM services subsequently during that month. Medicare does not allow the CCM service codes to be billed during the same service period as home health care supervision (HCPCS G0181), hospice care supervision (HCPCS G0182), or certain ESRD services (CPT 90951-90970) because the comprehensive care management included in CCM could significantly overlap with these services. Complex and non-complex CCM cannot be billed for a given beneficiary during the same service period (the practitioner would bill one or the other, depending on what services were furnished).

During the first two years of the CCM payment policy, we found minimal billing in the same month for other care management services explicitly excluded during the CCM rulemaking. Of the 684,584 Medicare beneficiaries who received CCM services between January 1, 2015, and December 31, 2016, about six-tenths of 1 percent, or 3,825 beneficiaries, received

services in the same month as they did for 30-day transitional care management, home health or hospice care supervision, or certain end-stage renal disease care management services.

B. Data and methods for impact estimation

Our outcome analyses focused on CCM beneficiaries who received their first CCM service between January 1, 2015, and July 31, 2016 (to allow for a minimum of six months of potential CCM services), and a matched set of comparison beneficiaries. We used several data sources to construct a matched comparison group that was similar to our pool of CCM beneficiaries along important characteristics. Using the matched sample, we estimated the impacts of the CCM program on our outcome measures by specifying a series of difference-in-differences regression models. In this section, we describe the data used in our analyses as well as the matching and regression methods.

1. Data

Our main data sources are Medicare enrollment and FFS claims, supplemented with institutional and home health assessment data and county-level data from the Area Health Resource File (AHRF). We used Medicare enrollment data from 2014 through 2017 to identify Medicare program eligibility and beneficiary demographic characteristics. We used FFS claims to construct a selected set of utilization, expenditure, and quality-of-care measures, described below. We used data from the Nursing Facility Minimum Data Set (MDS), Inpatient Rehabilitation Facility Patient Assessment Instrument (IRF-PAI), and Home Health Outcome and Assessment Information Set (OASIS) to identify beneficiaries who received an assessment in a skilled nursing or inpatient rehabilitation facility or during an episode of home health care, respectively. We used the same data to identify claims-based frailty measures associated with high need for assistance with independent activities of daily living (ADL). Finally, to identify health care supply-and-demand factors that might affect health care utilization and expenditures—level of urbanicity, availability of health services, and income, for example—we used county-level data from the AHRF.

2. Identification of a matched comparison group

The key methodological challenge in estimating the effects of CCM on outcomes lies in approximating the counterfactual—that is, the outcomes that we would have observed in the absence of CCM services. Those who receive CCM services by definition have a high level of frailty and are at risk for functional decline or death. Thus, they are different from the general Medicare population. Indeed, as we described above, CCM beneficiaries tend to exhibit a higher disease burden, are more likely to be dually eligible, and are older than the general Medicare FFS population.

To find a group of beneficiaries resembling CCM beneficiaries, we used a matching procedure commonly referred to as propensity score matching (Rosenbaum and Rubin 1983). Matching allows for an approximation of an experimental design by assuming that the decision to participate in a program is random, conditional on a set of observable characteristics. The propensity score is estimated from a logistic regression model fitted on our analytic sample that includes both CCM beneficiaries and non-CCM beneficiaries. The non-CCM beneficiaries who entered the matching process are those in the Medicare 20 percent random sample who (1) did not receive CCM services in 2015 or 2016, (2) resided in the 50 states or the District of

Columbia, and (3) were not enrolled in a managed care plan in 2014. The CCM beneficiaries included in our propensity score matching are those who (1) resided in the 50 states and the District of Columbia; (2) first received CCM services between January 1, 2015, and June 30, 2016; and (3) were not enrolled in managed care in the year prior to their first receipt of a CCM service. The model's dependent variable is CCM participation. The independent variables are characteristics that are hypothesized to be related to the receipt of CCM services.

We estimated the propensity score and conducted matching six times—once for each quarter between January 2015 and June 2016—and conducted our matching within states. We did this because we do not have an event to anchor our look-back and follow-up periods for potential comparison group members, as we do for CCM beneficiaries. This allows us to reduce potential temporal differences in service utilization and expenditure patterns between the two sets of beneficiaries in the baseline and follow-up periods in our difference-in-differences analysis. Matching CCM beneficiaries to comparison beneficiaries within a state helps account for unobserved geographic characteristics of health care supply-and-demand factors not present in the Medicare enrollment and claims data.

To estimate the propensity score, we specified six separate logistic regressions and estimated the predicted probability for each beneficiary of receiving CCM services. This predicted probability is the propensity score. We identified a set of key characteristics from the 12 months before first receipt of CCM services for CCM beneficiaries and in the 12 months prior to the start of the quarter for potential comparison group beneficiaries as the independent variables in our models (Table III.6). In addition to baseline demographic characteristics and utilization and expenditure variables, we included several measures related to health status and frailty:

- We constructed the 81 CMS HCC flags (Pope et al. 2011) for CCM beneficiaries and for potential comparison group beneficiaries. The flags identify clinical conditions predicted to be costly in the subsequent year and are used to estimate the CMS-HCC risk score, which is used to risk-adjust CMS's Medicare Advantage payments. For our model, we included a count of the number of conditions identified for each beneficiary, as well as the CMS-HCC risk score derived from the HCCs.
- We also constructed 55 claims-based frailty indicators that Faurot et al. (2015) used to predict dependency in ADLs as proxy measures for frailty. Examples include the presence of a hospital bed in the home, oxygen use, and paralysis. A prerequisite for receipt of CCM services is an individual's risk for functional decline. The inclusion of these indicators is a proxy for functional status before the start of the CCM program. The models include a count of the number of frailty indicators.
- In addition to the above variables, we included select indicators that had a strong positive association with ADL dependency. Examples include dementia and paralysis and use of medical equipment such as wheelchairs or home hospital beds. We identified these variables by first restricting the sample of FFS beneficiaries to those who had IRF-PAI, MDS, or OASIS assessment data. We then created binary variables corresponding to each data source to indicate whether a beneficiary had high ADL dependency, based on the distribution of

ADLs in the assessment data.¹⁰ Next, we performed a series of logistic regressions with high ADL dependency as the dependent variable; the independent variables were the claims-based frailty measures. We included the claim-based frailty measures with an odds ratio of at least 1.5 as individual indicator variables in our matching models.

- Finally, we included indicators for a stay in a skilled nursing or inpatient rehabilitation facility or a visit from a home health professional in the baseline period.

Table III.6. Baseline variables used in the propensity score models

Beneficiary-level variables	County-level variables (year)
Age	Beneficiary resides in an area with a shortage of health professionals (2015)
Gender	
Race: Black, white, and other	Number of skilled nursing facilities (2014)
Original reason for entitlement: Age and disability or ESRD	Number of primary care physicians (2013)
Dually eligible in any month	Number of medical specialists (2013)
HCC score	Number of emergency medicine specialists (2013)
Number of HCCs (total of 81 HCCs constructed)	Number of hospital beds (2012)
Number of claims-based frailty indicators ^a (total of 55)	Total of actual fee-for-service Medicare expenditures (2013)
HCC indicator for major depression	Median household income (2013)
Dementia (claims-based frailty indicator)	Rural continuum code ^c
Paralysis (claims-based frailty indicator)	
Parkinson's disease (claims-based frailty indicator)	
Home hospital bed (claims-based frailty indicator)	
Wheelchair (claims-based frailty indicator)	
Nursing facility visit by physician (claims-based frailty indicator)	
Had a record in the nursing home OASIS file	
Had a record in the nursing home MDS file	
Had a record in the nursing home IRF-PAI file	
Total Medicare expenditures	
Professional expenditures	
Outpatient expenditures	
Inpatient expenditures	
Home health expenditures	
Number of specialist visits	
Number of primary care visits	
Number of emergency department visits (including observation stays)	
Number of hospitalizations	
Hospitalizations for potentially preventable conditions ^b	

Note: For CCM beneficiaries, beneficiary characteristics are derived from claims and enrollment data in the year before the first CCM service. For non-CCM beneficiaries, data from 12 months prior to the quarter are used to determine beneficiary-level characteristics. All expenditures above the 99th percentile are assigned the value of the 99th percentile.

^a Claims-based frailty indicators are based on those described in Faurot et al. (2015).

^b The potentially preventable conditions are chronic obstructive pulmonary disease, diabetes, congestive heart failure, urinary tract infection, dehydration, and pneumonia.

^c There are 12 codes: (1) large metropolitan area of 1 million residents or more; (2) small metropolitan area of fewer than 1 million residents; (3) micropolitan area adjacent to a large metropolitan area; (4) noncore adjacent to a large metropolitan area; (5) micropolitan area adjacent to a small metropolitan area; (6) noncore adjacent to a small metropolitan area with a town of at least 2,500 residents; (7) noncore adjacent to a small metropolitan area and does not contain a town of at least 2,500 residents; (8) micropolitan area not adjacent to a metropolitan area; (9) noncore adjacent to a micropolitan area and contains a town of at least 2,500 residents; (10) noncore adjacent to micropolitan area and does not contain a town of at least 2,500 residents; (11) noncore not adjacent to a metropolitan or micropolitan area and contains a town of at least 2,500 or more residents; and (12) noncore not adjacent to a metropolitan or micropolitan area and does not contain a town of at least 2,500 residents.

¹⁰ High ADL dependency was defined as at least six ADLs in the MDS and more than three in the IRF-PAI and OASIS data.

Next, to construct the matched comparison group, we matched three comparison beneficiaries from the 20 percent Medicare FFS random sample (excluding any beneficiary who had received a CCM service in 2015 or 2016) to each CCM beneficiary. The comparison beneficiary had to (1) be alive at the beginning of the quarter and (2) have Medicare Parts A and B FFS. Each comparison beneficiary was matched to the CCM beneficiary with the closest propensity score. This process was conducted six times, once for each quarter.

We conducted the matching with replacement—once a comparison beneficiary was matched to a CCM beneficiary, the comparison beneficiary was returned to the pool of potential matches for the quarter. Matching with replacement has the benefit of potentially reducing bias by reducing the absolute differences in the propensity scores between matched and unmatched beneficiaries (Caliendo and Kopeinig 2008; Stuart 2010). This is most effective at the extremes of the propensity score distribution, where it may be difficult to find close matches. By matching with replacement, the variance increases by reducing the number of unique comparison observations. However, given the large sample sizes, this increase did not adversely affect our ability to detect impacts. Each matched comparison beneficiary was assigned a weight that was proportional to the number of times he or she was matched. Thus, a beneficiary who was matched multiple times would have a larger weight. (CCM beneficiaries were assigned a weight of 1.) These weights were used in our subsequent outcome modeling. Once a comparison group member is matched in a quarter, we excluded the beneficiary from subsequent iterations of matching.

Table III.7 shows the final sample sizes before and after matching. In each quarter, there were more than 5.5 million potential comparison beneficiaries who could be matched to CCM beneficiaries. The number of unique matched comparison beneficiaries (324,801) is smaller than the number of CCM beneficiaries (434,433) because comparison beneficiaries can be matched to multiple CCM beneficiaries.

After we constructed our matched comparison group, we conducted a series of post-matching diagnostics and found that our matching produced a comparison group that looked similar along the dimensions of interest. Following Caliendo and Kopeinig (2008), we examined reduction in standardized bias¹¹ for each variable included in the models and the mean and median bias for all variables in the models. We also checked the pseudo R^2 of the variables used in the matching process. Finally, we checked the ratio of the variance and absolute standardized differences of the means of the propensity scores between the two groups, as suggested by Rubin (2001). We did not focus on t-tests of the differences in means of the covariates included in the models or a joint significance test for all covariates. Given our large sample sizes, we may find statistically significant differences when the differences in absolute terms are not substantively meaningful. Appendix D provides detailed diagnostic output.

¹¹ The standardized bias is the difference of sample means in the treated and matched comparison subsamples as a percentage of the square root of the average of sample variances in both groups (Rosenbaum and Rubin 1985).

Table III.7. Sample sizes before and after matching

	CCM beneficiaries		Comparison beneficiaries		
	Pre-matching	Post-matching	Pre-matching	Post-matching	Average number of times a comparison beneficiary is matched
First quarter 2015	64,869	63,268	5,735,762	50,074	3.8
Second quarter 2015	68,945	67,378	5,760,959	47,017	4.3
Third quarter 2015	70,073	67,372	5,813,054	49,705	4.1
Fourth quarter 2015	79,209	75,207	5,863,926	55,883	4.1
First quarter 2016	85,564	80,372	5,902,965	61,226	4.0
Second quarter 2016	86,564	80,836	5,896,153	60,896	4.0
Total		434,433		324,801	

Note: We excluded CCM beneficiaries who resided outside the 50 states and the District of Columbia; those who first received CCM services after June 30, 2016; and those who were enrolled in managed care in the year previous to first receipt of CCM service. These exclusions, along with missing data for variables used in matching (such as HCC score), led to a smaller number of CCM beneficiaries after matching than before matching.

3. Impact methodology

We estimated difference-in-differences regression models to assess the effect of CCM services on outcomes. Although no perfect method exists for drawing inferences from non-experimental data, a well-known method in program evaluation—difference-in-differences—is the most reliable approach in most cases for drawing inferences based on observational data. The difference-in-differences model assumes that changes in outcomes for a well-selected comparison group will resemble those that would have been observed for the intervention group in the absence of the intervention.

Written in terms of outcome measure y , the difference-in-differences estimate of the CCM effect is as follows:

$$(1) y_{it} = \alpha + \beta X_i + \gamma CCM_i + \phi Post_t + \delta(CCM_i * Post_t) + \varepsilon_{it},$$

where $t=1,2$; y is an outcome for beneficiary i during time period t ; α is the intercept; and X is a vector of beneficiary and county control variables for beneficiary i in the baseline period. These are the same variables included in the propensity score model, with the exception of outcome variables as they are endogenous in the baseline period (total, professional, inpatient, outpatient, and home health expenditures; number of specialist visits, primary care visits, ED visits, and hospitalizations; and a hospitalization for a potentially preventable condition); CCM is an indicator for receiving one or more months of CCM services;¹² $Post$ is an indicator for the post-CCM period; and ε is the error term.

¹² The number of CCM services received—an indicator of the intensity of CCM services—was not included in our models for two reasons. First, the baseline characteristics included in the models, such as frailty level and health status, are likely to influence the number of CCM months. This would lead to one or more of our baseline characteristics predicting another characteristic that is used in the models. Second, we were also concerned that

The coefficient δ is the estimated impact of the CCM program and may be represented by Equation (2):

$$(2) \delta = [(y|t=1, CCM=1) - (y|t=0, CCM=1)] - [(y|t=1, CCM=0) - (y|t=0, CCM=0)].$$

The difference in changes for the two groups, δ , thus may be ascribed to the intervention—in this case, the receipt of CCM services.

In Table III.8, we present the regression specification for each outcome. All regressions were weighted by the product of the weight constructed in the matching process and the fraction of eligible months that the beneficiary was alive and had Medicare Parts A and B FFS during both our pre- and post-intervention periods. The baseline variables included in the propensity score models, with the exception of the baseline outcome variables, were control variables in our regressions to help control for additional variation that may remain after matching.¹³ Standard errors were clustered at the state level. Appendix E provides details on the construction of the outcome measures.

We examined outcomes across several different time periods, summarized in Figure III.6. In our 18-month analysis, we examined outcomes in the 18 months following the first receipt of CCM services, which would have occurred in the first six months of 2015. Beneficiaries who received their first CCM service in calendar year 2015 had a follow-up period of 12 months; those who received their first CCM service between January 1, 2015, and June 30, 2016, were included in our 6-month follow-up period. Of note in Figure III.6, the baseline length is the same for each cohort of beneficiaries but the calendar time period varies across beneficiaries based upon when they receive their first CCM service. For example, a beneficiary in the 12-month follow-up period analysis who received her first CCM service on January 1, 2015 would have a baseline period from January 1, 2014 through December 31, 2014. In contrast, a beneficiary in who received her first CCM service on December 31, 2015 would have a baseline period from December 31, 2014 through December 30, 2015.

observed outcomes during the follow-up period could affect the number of months of CCM services. For example, CCM services reduce the number of ED visits then the provider may feel that no further months of CCM services are required. We did, however, conduct a sensitivity test to exclude beneficiaries who only received one month of CCM services to reduce the effect of the one-time recipients on our estimates.

¹³ Baseline outcomes from the propensity score matching were not included in the regression models because they would be endogenous to the baseline outcomes in our analysis.

Table III.8. Outcome measures and corresponding regression models

Outcome	Regression model
PBPM expenditures^a	
Total	Ordinary least squares
Inpatient	Ordinary least squares
Outpatient	Ordinary least squares
Professional	Ordinary least squares
Durable medical equipment	Ordinary least squares
Home health	Ordinary least squares
Skilled nursing facility	Ordinary least squares
Hospice	Ordinary least squares
BETOS-based procedures, imaging, and tests ^b	Ordinary least squares
Utilization	
Number of ED visits (including observation stays)	Zero-inflated negative binomial
Number of hospitalizations	Zero-inflated negative binomial
Likelihood of hospice use	Logistic
Number of PCP visits ^c	Negative binomial
Number of specialist visits	Negative binomial
Quality	
Likelihood of a hospitalization for potentially preventable conditions ^d	Logistic

^a Expenditure measures were calculated by claim type. Expenditures above the 99th percentile were assigned the value of the 99th percentile. For example, the inpatient expenditure measure sums all of the claims in the inpatient file for a given beneficiary.

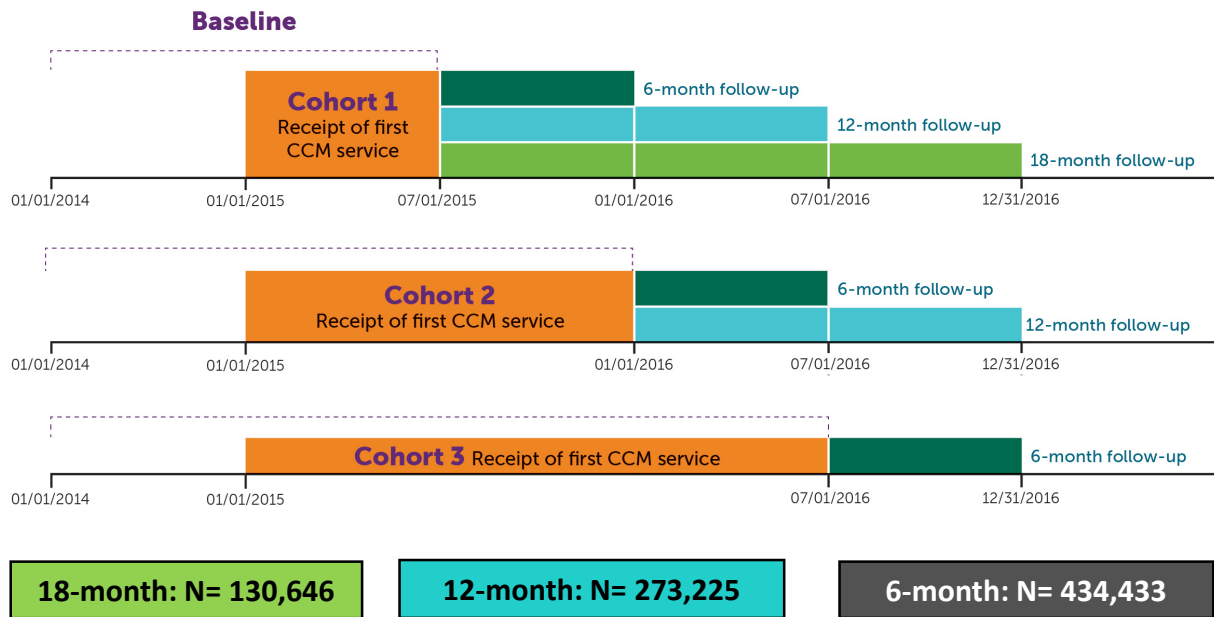
^b The BETOS-based procedures include major cardiovascular procedures, major other procedures, cataract removal, ambulatory procedures, minor procedures, and endoscopy. Imaging includes standard imaging, advanced imaging, and echography. Tests include lab tests and other tests. See Appendix E for a complete mapping of BETOS codes to these categories.

^c PCPs are those with a specialty of internal medicine, general practice, family practice, geriatric medicine, pediatric medicine, nurse practitioner, and physician assistant.

^d The potentially preventable conditions are chronic obstructive pulmonary disease, diabetes, congestive heart failure, urinary tract infection, dehydration, and pneumonia.

PBPM = per beneficiary per month, BETOS = Berenson-Eggers type of service

Figure III.6. Follow-up analysis periods after receipt of first CCM service and beneficiaries included in the analyses



Note: For nonexpenditure outcomes, the baseline period for the 6-month analyses is 6 months. This was done because we did not have PBPM versions of these outcomes. The 12-month baseline period varies by beneficiary because it is anchored to the first receipt of CCM services.

We also estimated additional total Medicare expenditure regressions by cohort—defined by the date when beneficiaries first received CCM services—to examine how the timing of receipt of CCM service relative to the start of the CCM payment policy affected outcomes. The regressions are as follows.

- Estimated three additional sets of regressions for the 6-month follow-up period:
 - Cohort 1: CCM beneficiaries who first received CCM services between January 1, 2015, and June 30, 2015, and their matched counterparts
 - Cohort 2: CCM beneficiaries who first received CCM services between July 1, 2015, and December 31, 2015, and their matched counterparts
 - Cohort 3: CCM beneficiaries who first received CCM services between January 1, 2016, and June 30, 2016, and their matched counterparts
- Estimated two additional sets of regressions for the 12-month follow-up period:
 - Cohort 1: CCM beneficiaries who first received CCM services between January 1, 2015, and June 30, 2015, and their matched counterparts
 - Cohort 2: CCM beneficiaries who first received CCM services between July 1, 2015, and December 31, 2015, and their matched counterparts

We also performed the following sensitivity tests for total expenditures:

- Estimated regressions without any control covariates
- Excluded beneficiaries who received only one month of CCM services
- Excluded beneficiaries who died
- Did not top-code expenditures to the 99th percentile

The following section presents results from our 12-month models on all outcomes, the cohort analysis of total Medicare expenditures, and the sensitivity tests for 12-month outcomes. Appendix F contains the results from the 6- and 18-month models. Appendix G presents the 6- and 18-month sensitivity tests on total Medicare expenditures.

C. Impact of CCM services on beneficiary expenditures, utilization, and quality of care

Our analytic approach was to examine the pre- and post-CCM differences in outcomes between CCM beneficiaries and our group of comparison beneficiaries to assess the relationship between the receipt of CCM services and the outcomes. In this section, we (1) provide a high level comparison of impacts on Medicare expenditures, in total and by major type of service across the three follow-up periods; (2) examine total Medicare expenditures across the three follow-up periods by cohort; and (3) present results from our 12-month models for all outcomes. Appendix F presents the results of the 6- and 18-month follow-up period regressions for all outcomes. Appendix G contains results from our sensitivity tests, which by and large were consistent with the findings of our main results presented in this section. We organized the outcomes into three domains: (1) expenditures, (2) utilization of services, and (3) quality of care (Table III.9).

Key findings from difference-in-differences analysis

- The rate of growth in total PBPM Medicare expenditures in the 12 months after first receiving CCM services was \$28 less than expenditures for the comparison beneficiaries.
- The decreased rate of growth in total Medicare expenditures was largely driven by a decreased rate of growth in inpatient, hospital outpatient, and SNF expenditures.
- We observed a higher rate of growth in expenditures for professional and home health services among CCM beneficiaries.
- Baseline expenditures—a proxy for overall health status and care needs—decreased over time, suggesting that sicker patients were among the first to receive CCM services after the start of the CCM payment policy.
- Among CCM recipients relative to the comparison beneficiaries, the rate of growth was lower for ED visits and hospitalizations while it increased for primary care visits.
- There were small but significant decreases in the likelihood of a hospitalization for many ambulatory care sensitive conditions.
- CCM services appeared to have the greatest impact on reducing Medicare expenditures among the beneficiaries who were near their end-of-life.
- Advanced care planning was 9 percentage points higher among CCM beneficiaries than the general Medicare FFS population.

Table III.9. Outcomes by domain

Expenditures ^a	Utilization	Quality
Total	Number of ED visits (including observations stays)	Likelihood of hospitalizations for potentially preventable conditions ^e
Inpatient	Number of ED visits (including observations stays)	Likelihood of hospitalizations for potentially preventable conditions ^e
Outpatient	Number of hospitalizations	Likelihood of hospitalizations for potentially preventable conditions ^e
Professional	Number of PCP visits ^c	
Durable medical equipment	Number of specialist visits ^d	
Home health	Likelihood of hospice use	
Skilled nursing facility		
Hospice		
BETOS-based procedures, imaging and tests		

^a The CCM fee was removed from our expenditure outcomes.

^b The BETOS-based procedures include major cardiovascular procedures, major other procedures, cataract removal, ambulatory procedures, minor procedures, and endoscopy. Imaging includes standard imaging, advanced imaging, and echography. Tests include lab tests and other tests. See Appendix E for a complete mapping of BETOS codes to these categories.

^cPCPs are those with a specialty of internal medicine, general practice, family practice, geriatric medicine, pediatric medicine, nurse practitioner, and physician assistant. Included in this category are visits to a Federally Qualified Health Center.

^d See Appendix E for a method to identify specialist visits.

^e The potentially preventable conditions are chronic obstructive pulmonary disease, diabetes, congestive heart failure, urinary tract infection, dehydration, and pneumonia.

ED = emergency department, BETOS = Berenson-Eggers Type of Service.

Our analysis revealed that our large sample sizes allowed us to detect small difference-in-differences estimates with a high degree of statistical precision across all three analytic periods. However, some of these differences may have little clinical or substantive meaning. We therefore report our two-sided statistical significance tests at the 0.05, 0.01, and 0.001 levels.

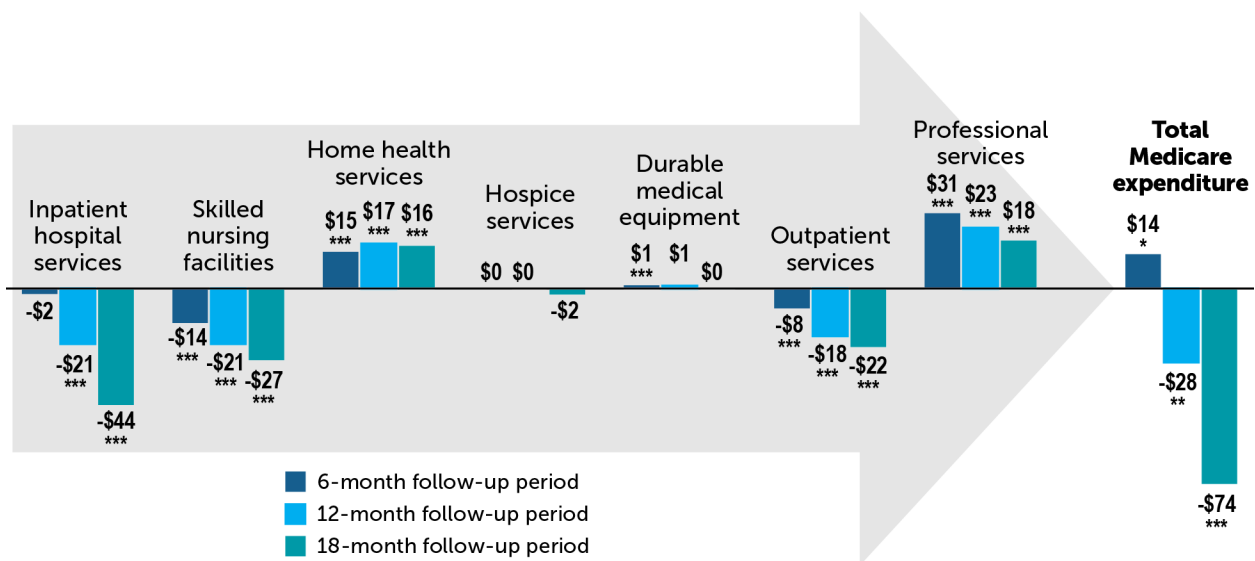
We present the results from our difference-in-differences modeling in Tables III.10, III.11, and III.12 by disaggregating the overall changes as follows:

- Differences in levels of outcomes between CCM and comparison beneficiaries in the baseline period (that is, prior to the start of CCM services, or the pre-CCM period) and during the intervention, or post-CCM period. For each outcome, these are the first two rows.
- Differences in the rate of growth between the pre-CCM and post-CCM periods, separately for the CCM and comparison beneficiaries. These are the first two columns.
- The difference-in-differences estimate, which is the lower-right cell of column labeled “Difference.”

1. Expenditures

We found that the average rate of growth in estimated Medicare PBPM expenditures for CCM beneficiaries relative to the comparison beneficiaries decreased in the 12- and 18-month follow-up periods, with a \$28 decrease in the 12-month follow-up period and \$74 decrease in the 18-month follow-up period (Figure III.7). The rate of growth in Medicare expenditures excluded the CCM fees paid to professionals and facilities. The average rate of growth in the 6-month follow-up period increased by \$14 on average, but the estimated impact was not statistically significant. The decreased rate of growth was driven by reductions in facility expenditures for inpatient hospital services, skilled nursing facility services, and outpatient services. (Outpatient services include the facility payment for emergency and observation services, outpatient clinic services, and tests and imaging services billed by hospitals.) We found that the rates of growth for professional services, including services provided by physicians and other health professionals, and for home health services increased during the follow-up periods. This partially offset decreases observed within other types of service expenditure categories.

Figure III.7. Estimated PBPM impact of CCM on total expenditures and by expenditure category: 6-, 12-, and 18-month follow-up periods



Source: Medicare 2014–2016 enrollment and FFS claims data.

Note: 18-month follow-up period: Includes beneficiaries who received their first CCM service between January 1, 2015, and June 30, 2015; number of CCM beneficiaries = 130,646 and number of comparison beneficiaries = 97,091.

12-month follow-up period: Includes beneficiaries who received their first CCM service between January 1, 2015, and December 31, 2015; number of CCM beneficiaries = 273,225 and number of comparison beneficiaries = 202,679.

6-month follow-up period: Includes beneficiaries who received their first CCM service between January 1, 2015, and June 30, 2016; number of CCM beneficiaries = 434,433 and number of comparison beneficiaries = 324,801.

PBPM = per beneficiary per month

*Significantly different from zero at the .10 level, two-tailed test.

**Significantly different from zero at the .05 level, two-tailed test.

***Significantly different from zero at the .01 level, two-tailed test.

To further examine the mechanisms of the observed changes, we estimated impacts based on when beneficiaries first received CCM services. We found evidence that it takes time for CCM services to have an impact on expenditures. For Cohort 1 (beneficiaries who received their first CCM service between January 1, 2015, and June 30, 2015), we found an increased rate of growth of \$40 PBPM for CCM beneficiaries relative to the comparison beneficiaries (Table III.10) when analyzing a 6-month follow-up period. These beneficiaries received, on average, 6 months of CCM. In the 12-month follow-up period, we observed a decline in the rate of growth in expenditures of \$32 PBPM, but the reduction was only statistically significant at the 10 percent level. Using an 18-month follow-up period, we observed a \$74 PBPM lower rate of growth in total Medicare expenditures. On average, these beneficiaries received eight months of CCM during the 18-month follow-up period. We saw a similar pattern for the second cohort (those who received their first CCM service between July 1, 2015, and December 31, 2015), with a higher rate of growth in the initial 6-month follow-up period and a lower rate of growth during the 12-month follow-up period.

We also found evidence that beneficiaries who received services early after the start of the CCM payment policy were less healthy and had higher needs compared to those who first received CCM services later on. Unlike Cohorts 1 and 2, there was a lower rate of growth of \$30 PBPM in total Medicare expenditures for Cohort 3 beneficiaries (those who received their first CCM service in the first 6 months of 2016) relative to their matched comparisons. This lower rate of growth could be, in part, influenced by the changing characteristics of the CCM beneficiaries over time. We found that the baseline expenditures—a proxy for overall health status and care needs—decreased over time. For example, the pre-CCM period PBPM expenditures for CCM beneficiaries for Cohorts 1, 2, and 3 were \$1,395; \$1,305; and \$1,192, respectively. The positive finding of a lower rate of growth among Cohort 3 CCM beneficiaries in the first 6-month follow-up period could also reflect more mature CCM programs, although we did not directly examine this hypothesis.

The difference in the direction of the impacts in the three 6-month follow-up periods likely explains why we find a marginally significant impact of CCM when examining expenditures for all CCM beneficiaries. The \$14 PBPM higher rate of growth in total expenditures is statistically significant at the 10 percent level and reflects the higher rate of growth in Cohorts 1 and 2 and the lower rate of growth in Cohort 3. However, Cohort 3 is the largest cohort with more than 161,000 CCM beneficiaries compared to 131,000 and 143,000 CCM beneficiaries in Cohorts 1 and 2, respectively, which reduces the significance of the estimate.

Focusing on the analytic sample from the 12-month follow-up period, baseline expenditures were similar between CCM beneficiaries and their matched counterparts across most expenditure categories (Table III.11). The large number of beneficiaries included in the analyses contributes to the findings of statistically significant results, but the actual differences tend to be small in magnitude. For example, the \$30 PBPM difference in total expenditures at baseline represents about 2 percent of the CCM beneficiaries' total PBPM baseline expenditures.

As noted above, there was a decreased rate of growth in total PBPM Medicare expenditures for CCM beneficiaries compared to the comparison group (\$28 PBPM), which was driven by decreases in the rates of growth for SNF, inpatient, and outpatient expenditures. The rate of growth in SNF expenditures among the comparison beneficiaries was more than double the rate

of growth for the CCM beneficiaries. The difference in the rates of growth for inpatient expenditures is also noteworthy: \$89 PBPM for comparison beneficiaries versus \$68 PBPM for CCM recipients. The PBPM difference in rates of growth for outpatient expenditures between the pre- and post-periods was \$34 for comparison beneficiaries and \$16 for CCM beneficiaries.

Table III.10. Estimated PBPM differences between CCM and comparison beneficiaries by cohort and follow-up period

	6-month follow-up			12-month follow-up			18-month follow-up		
	Non-CCM	CCM	Difference (CCM minus non-CCM)	Non-CCM	CCM	Difference (CCM minus non-CCM)	Non-CCM	CCM	Difference (CCM minus non-CCM)
Cohort 1									
Pre-CCM	1,432	1,395	-36***	1,402	1,370	-32**	1,376	1,346	-30**
Post-CCM	1,583	1,587	4	1,627	1,563	-64***	1,644	1,541	-104***
Difference (CCM minus non-CCM)	152***	192***	40**	225***	193***	-32*	269***	195***	-74***
Cohort 2									
Pre-CCM	1,334	1,305	-29***	1,305	1,278	-26**	-	-	-
Post-CCM	1,466	1,478	12	1,501	1,449	-52***	-	-	-
Difference (CCM minus non-CCM)	132***	173***	41***	196***	171***	-26**	-	-	-
Cohort 3									
Pre-CCM	1,207	1,192	-15*	-	-	-	-	-	-
Post-CCM	1,469	1,423	-45***	-	-	-	-	-	-
Difference (CCM minus non-CCM)	261***	231***	-30***	-	-	-	-	-	-
Combined Cohorts									
Pre-CCM	1,317	1,291	-26***	1,352	1,322	-30**	1,376	1,346	-30**
Post-CCM	1,502	1,491	-12	1,562	1,504	-58***	1,644	1,541	-104***
Difference (CCM minus non-CCM)	185***	200***	14*	210***	182***	-28**	269***	195***	-74***

Source: Medicare 2014–2016 enrollment and FFS claims data.

Note: Cohort 1 = Beneficiaries who first received CCM services between January 1, 2015, and June 30, 2015 (N = 130,646), and their matched counterparts (N = 97,091).

Cohort 2 = Beneficiaries who first received CCM services between July 1, 2015, and December 31, 2015 (N = 142,579), and their matched counterparts (N = 105,588).

Cohort 3 = Beneficiaries who first received CCM services between January 1, 2016, and June 30, 2016 (N = 161,208), and their matched counterparts (N = 122,222).

*Significantly different from zero at the .10 level, two-tailed test.

**Significantly different from zero at the .05 level, two-tailed test.

***Significantly different from zero at the .01 level, two-tailed test.

Table III.11. Estimated PBPM differences between CCM and comparison beneficiaries: 12-month expenditure outcomes (without CCM fee)

	Non-CCM	CCM	Difference (CCM minus non-CCM)
Average total Medicare expenditures (\$)			
Pre-CCM	1,352	1,322	-30**
Post-CCM	1,562	1,504	-58***
Difference (CCM minus non-CCM)	210***	182***	-28*
Average inpatient Medicare expenditures (\$)			
Pre-CCM	468	435	-33***
Post-CCM	557	503	-54***
Difference (CCM minus non-CCM)	89***	68***	-21***
Average outpatient Medicare expenditures (\$)			
Pre-CCM	168	170	2
Post-CCM	202	186	-16***
Difference (CCM minus non-CCM)	34***	16***	-18***
Average professional Medicare expenditures (\$)			
Pre-CCM	395	384	-11***
Post-CCM	399	411	12***
Difference (CCM minus non-CCM)	4	27***	23***
Average durable medical equipment Medicare expenditures (\$)			
Pre-CCM	27	29	2***
Post-CCM	29	31	2***
Difference (CCM minus non-CCM)	2***	2***	0
Average home health Medicare expenditures (\$)			
Pre-CCM	142	136	-6***
Post-CCM	128	139	11***
Difference (CCM minus non-CCM)	-14***	3	17***
Average skilled nursing facility Medicare expenditures (\$)			
Pre-CCM	110	119	9***
Post-CCM	145	133	-12***
Difference (CCM minus non-CCM)	35***	14***	-21***
Average hospice Medicare expenditures (\$)			
Pre-CCM	10	15	5***
Post-CCM	47	52	5
Difference (CCM minus non-CCM)	37***	37***	0

Source: Medicare 2014–2016 enrollment and FFS claims data.

Note: Number of CCM beneficiaries = 273,225; number of comparison beneficiaries = 202,679.

PBPM = per beneficiary per month

*Significantly different from zero at the .10 level, two-tailed test.

**Significantly different from zero at the .05 level, two-tailed test.

***Significantly different from zero at the .01 level, two-tailed test.

Higher rates of growth in professional and home health expenditures among CCM beneficiaries offset the decreased rates of growth in inpatient, outpatient, and SNF expenditures. Professional expenditures grew over time for both the CCM and comparison beneficiaries, but at a much higher rate for CCM beneficiaries. The difference in rates of growth was about \$23 PBPM—the difference-in-differences estimate. Conversely, home health expenditures decreased by \$14 PBPM over time for the comparison group and increased slightly for the CCM beneficiaries (\$3 PBPM), leading to a difference-in-differences estimate of \$17 PBPM.

We also decomposed professional expenditures into the Berenson-Eggers Type of Service (BETOS) categories. BETOS maps the Health Care Financing Administration Common Procedure Coding System (HCPCS) procedure codes into service categories such as evaluation and management services. We found that, with the exception of ambulatory procedures (such as those generally performed in an ambulatory surgery center or hospital outpatient surgery center) the estimated difference-in-differences impacts were generally less than \$1 PBPM. (These results are not reported.) The estimated impact for ambulatory procedures, however, was a positive \$16 PBPM, reflecting a higher rate of growth over time among CCM beneficiaries.

2. Service utilization

CCM recipients had more primary care visits on average compared to comparison group beneficiaries and about the same number of specialist visits (Table III.12), aligning with our findings of increased professional expenditures among CCM beneficiaries. These beneficiaries were high-volume users of both primary care and specialty services, with around one primary care and specialist visit per month in the 12 months before receipt of first CCM services. The rate of growth increased, on average, by about one primary care visit for CCM beneficiaries relative to the comparison beneficiaries. There was no impact on specialist visits. We did find a modest decrease in the number of specialist visits (-0.3 visits) in our 18-month follow-up period analysis.

On the other hand, the rate for both ED visits and hospitalizations among CCM beneficiaries relative to the comparison beneficiaries decreased on average, again aligning with our findings in the expenditure analysis above. The differences in the rates of growth between CCM beneficiaries and their comparisons for ED visits and hospitalizations were -23 and -47 visits per 1,000 beneficiaries on average, respectively.

There was a fairly substantial increase in the rate of hospice use over time among all beneficiaries. However, the difference-in-differences estimate was relatively small, with an impact of 0.6 percentage points. In our 6-month follow-up period analysis, the impact was only statistically significant at the 10 percent level. The estimated impact in the 18-month model was 0.05, which was statistically significant.

Table III.12. Estimated differences between CCM and comparison beneficiaries: 12-month follow-up utilization outcomes

	Non-CCM	CCM	Difference (CCM minus non-CCM)
Average number of primary care visits			
Pre-CCM	10.4	10.5	0.2*
Post-CCM	10.2	11.5	1.3***
Difference (CCM minus non-CCM)	-0.2**	1***	1.1***
Average number of specialty visits			
Pre-CCM	11.9	12.1	0.1
Post-CCM	12.8	12.9	0.1
Difference (CCM minus non-CCM)	0.8***	0.8***	0.0
Emergency department visits, including observation stays (per 1,000 beneficiaries)			
Pre-CCM	608	604	-5
Post-CCM	671	643	-28**
Difference (CCM minus non-CCM)	62***	39***	-23**
Hospitalizations (per 1,000 beneficiaries)			
Pre-CCM	470	482	12***
Post-CCM	621	586	-35***
Difference (CCM minus non-CCM)	152***	104***	-47***
Likelihood of hospice utilization (%)			
Pre-CCM	0.8	1.1	0.3***
Post-CCM	4.9	5.8	0.9***
Difference (CCM minus non-CCM)	4.1***	4.7***	0.6**

Source: Medicare 2014–2016 enrollment and FFS claims data.

Note: Number of CCM beneficiaries = 273,225; number of comparison beneficiaries = 202,679.

*Significantly different from zero at the .10 level, two-tailed test.

**Significantly different from zero at the .05 level, two-tailed test.

***Significantly different from zero at the .01 level, two-tailed test.

3. Quality of care

Our primary quality of care measure is the likelihood of admission for potentially avoidable clinical conditions. During interviews, providers said that they targeted beneficiaries who were recently hospitalized or had frequent ED visits for chronic conditions. We hypothesize that increased chronic care management in the ambulatory care setting would reduce admissions for chronic conditions common among CCM beneficiaries¹⁴. In this analysis, we examined the likelihood of admission with a primary diagnosis of diabetes, COPD, CHF, urinary tract infection, dehydration, and pneumonia. In terms of our results, a negative difference-in-differences estimate suggests that receipt of CCM services is associated with a reduction in the likelihood of these potentially preventable admissions.

¹⁴ The Statement of Work did not include a beneficiary survey so we assessed patient satisfaction qualitatively through interviews with beneficiaries.

Across all conditions, the rate of growth in the likelihood of an admission was the same or lower for CCM beneficiaries. The difference-in-differences estimates were significant for all conditions except COPD and dehydration (Table III.13). In general, we found that the likelihood of admission for these ambulatory care sensitive conditions was low in both the baseline and follow-up periods for both CCM and comparison beneficiaries. Thus, the difference-in-differences estimates tended to be small. The largest estimated impact was for congestive heart failure (CHF) admissions, where the likelihood of an admission decreased by 0.3 percentage points among CCM beneficiaries relative to the comparison beneficiaries.

Table III.13. Estimated differences between CCM and comparison beneficiaries: 12-month quality of care outcomes

	Non-CCM	CCM	Difference (CCM minus non- CCM)
Likelihood of hospitalization with a primary diagnosis of diabetes (%)			
Pre-CCM	0.7	0.7	0
Post-CCM	0.7	0.6	-0.1*
Difference (CCM minus non-CCM)	0.0	-0.1***	-0.1***
Likelihood of hospitalization with a primary diagnosis of COPD (%)			
Pre-CCM	1.3	1.4	0.1***
Post-CCM	1.3	1.4	0.1*
Difference (CCM minus non-CCM)	0.0	0	0
Likelihood of hospitalization with a primary diagnosis of CHF (%)			
Pre-CCM	1.7	1.9	0.2***
Post-CCM	2.0	1.9	-0.1**
Difference (CCM minus non-CCM)	0.4***	0.0	-0.3***
Likelihood of hospitalization with a primary diagnosis of UTI (%)			
Pre-CCM	1.2	1.3	0.1***
Post-CCM	1.4	1.4	0
Difference (CCM minus non-CCM)	0.2***	0.1***	-0.1***
Likelihood of hospitalization with a primary diagnosis of dehydration (%)			
Pre-CCM	0.8	0.9	0.1**
Post-CCM	1.1	1.1	0
Difference (CCM minus non-CCM)	0.3***	0.2***	-0.1
Likelihood of hospitalization with a primary diagnosis of pneumonia (%)			
Pre-CCM	1.2	1.4	0.2***
Post-CCM	1.5	1.5	0
Difference (CCM minus non-CCM)	0.2***	0.1**	-0.2**

Source: Medicare 2014–2016 enrollment and FFS claims data.

Note: Number of CCM beneficiaries = 273,225; number of comparison beneficiaries = 202,679.

COPD = chronic obstructive pulmonary disease, CHF = congestive heart failure, UTI = urinary tract infection

*Significantly different from zero at the .10 level, two-tailed test.

**Significantly different from zero at the .05 level, two-tailed test.

***Significantly different from zero at the .01 level, two-tailed test.

4. Sensitivity tests

We conducted four sensitivity tests on the impact of CCM services provision on total Medicare expenditures (exclusive of the CCM fee):

1. Excluded CCM beneficiaries who received only one month of CCM services and their matched counterparts
 - Excluded beneficiaries who died during the follow-up period
 - Estimated regressions without control variables; that is, only included the pre-post indicator, CCM indicator, and the interaction of these two terms
 - Estimated regressions without top-coding expenditures above the 99th percentile to the 99th percentile

Table III.14 presents results from our 12-month follow-up period analysis; 6- and 18-month results are in Appendix G.

Table III.14. Sensitivity tests for 12-month PBPM total Medicare expenditure outcomes (without CCM fee)

	Non-CCM	CCM	Difference (CCM minus non-CCM)
Excluded CCM beneficiaries with only one month of CCM services (\$) ^a			
Pre-CCM	1,321	1,300	-22**
Post-CCM	1,555	1,484	-71***
Difference (CCM minus non-CCM)	234***	184***	-49***
Excluded who died (\$) ^b			
Pre-CCM	1,298	1,261	-37***
Post-CCM	1,434	1,392	-42***
Difference (CCM minus non-CCM)	136***	131***	-5
No control variables (\$) ^c			
Pre-CCM	1,390	1,374	-16
Post-CCM	1,561	1,504	-57**
Difference (CCM minus non-CCM)	171***	130***	-41***
Non-top-coded expenditures (\$) ^c			
Pre-CCM	1,389	1,343	-46***
Post-CCM	1,615	1,545	-70***
Difference (CCM minus non-CCM)	226***	202***	-24

Source: Medicare 2014–2016 enrollment and FFS claims data.

^a Number of CCM beneficiaries = 231,189; number of comparison beneficiaries = 155,910.

^b Number of CCM beneficiaries = 257,747; number of comparison beneficiaries = 188,405.

^c Number of CCM beneficiaries = 273,225; number of comparison beneficiaries = 202,679.

PBPM = per beneficiary per month

*Significantly different from zero at the .10 level, two-tailed test.

**Significantly different from zero at the .05 level, two-tailed test.

***Significantly different from zero at the .01 level, two-tailed test.

Compared to the main results with an estimated impact of a lower rate of growth in total Medicare expenditures of \$28 PBPM, removing beneficiaries who received only one month of CCM yielded a larger reduction in rate of growth, or \$49 PBPM. This finding suggests that beneficiaries who receive only one month of CCM services do not benefit as much as beneficiaries who receive more than one month of CCM services. It may be that these beneficiaries are healthier than beneficiaries who receive more than one month of CCM and thus the impact on Medicare expenditures may not be as great.

The results of the sensitivity test that excluded beneficiaries who died also suggest that CCM is more effective at managing the costs of those who are nearing the end of their lives compared to the general Medicare FFS population. We found no reduction in the rate of growth among beneficiaries who lived throughout the 12-month follow-up period.

The results from the other two sensitivity tests have less substantive interpretations. The inclusion of demographic and health status covariates in the expenditure model appears to capture the costliness of care associated with CCM beneficiaries' health and frailty status. The models that include these variables produce more conservative impact estimates. We observe no change in rate of growth between CCM beneficiaries and the comparison group when we do not top-code expenditures. This result is likely due to increased variance introduced by including observations with extreme expenditure values.

D. CCM and Medicare long-term program savings

CMS has made a strong commitment to supporting primary care and has increasingly recognized chronic care management as an important component of primary care that is likely to contribute to improved health for beneficiaries and long-term savings to the Medicare program.¹⁵ Using the \$28 PBPM dollar impact estimate of CCM, we calculated gross savings to the Medicare program associated with CCM over a 12-month period following first receipt of CCM services as \$88 million.¹⁶ During the same follow-up time period, CMS paid roughly \$52 million in CCM fees, generating net savings to the program of \$36 million. Although the PBPM estimate of savings is \$1 less than the average PBPM CCM fee of \$29, CCM fees were not paid for all months during the 12-month follow-up period; thus, producing a sizable net savings estimate. This is in contrast to other CMMI payment models that have been tested in which monthly fees are paid to providers for beneficiaries attributed to them, regardless of the level of intervention in any particular month. In these types of model tests, larger impacts are required to produce net savings to Medicare.

¹⁵ During the PFS rate setting for calendar year 2015, CCM services were newly described and separately paid by being *unbundled* from other services. CMS applied a budget neutrality adjustment to the PFS rates for calendar year 2015 to account for the estimated reporting of CCM as a separate, billable service.

¹⁶ The estimate of gross savings to the Medicare program is calculated as the difference-in-differences estimate of \$28 lower rate of Medicare expenditures times the total number of months CCM beneficiaries were alive and eligible for Medicare Parts A & B FFS. The CCM average payment of \$29 is excluded from the calculation of gross savings.

IV. DISCUSSION

Our analysis of the impact of the 2015 CCM payment policy found a slower rate of growth in total Medicare expenditures among CCM beneficiaries than among the comparison group over a 12- to 18-month follow-up period. We did not observe an impact of CCM on total expenditures when following beneficiaries during the first six months after their initial exposure to CCM. The lower rate of growth in total Medicare PBPM expenditures ranged from \$28 to \$74, after removing the average monthly CCM fee of \$29. A lower rate was also observed among Medicare FFS beneficiaries who received between four and nine months of CCM services, on average, during the 12- to 18-month follow-up period. The decreased rate of growth in total Medicare expenditures was driven by slower rates of growth in expenditures for inpatient hospital services, SNF services, and outpatient services among CCM beneficiaries. We similarly found a lower rate of growth among CCM beneficiaries in hospitalizations and all-cause ED visits. Receipt of CCM services was also associated with a reduced likelihood of an admission for the ambulatory care sensitive conditions of diabetes, CHF, UTI, and pneumonia among CCM beneficiaries, relative to the comparison beneficiaries. At the same time, we observed higher rates of growth in expenditures for professional services, reflecting a higher rate of primary care visits after initiation of CCM services. Last, we observed a higher rate of home health expenditures and expenditures for procedures provided in ambulatory surgery centers and hospital outpatient surgery centers among CCM beneficiaries. We did not examine, in this study, the impact of the policy revisions for CCM payments that went into effect January 1, 2017, which significantly increased payment for providing CCM to more medically complex patients. The impact of CCM services on Medicare expenditures may differ in the future.

The estimated effects on expenditures are large compared to other interventions being tested, despite their lack of financial incentive to reduce their patients' use of expensive Medicare services under CCM. The findings may raise the concern that the estimates overstate the true impacts of the intervention. We conducted a number of robustness tests that support the findings. When we excluded beneficiaries who received only one month of CCM services, the estimated effect associated with more months of CCM services increased, which is what one would expect. When we removed beneficiaries who died during the follow-up period, a costly subgroup, the estimated positive effect was no longer present, suggesting better management of end-of-life care. We did observe a higher rate of advance care planning among CCM beneficiaries, of 10 percent, relative to the 1 percent present among the general Medicare FFS population.

However, a number of factors regarding the nature of evaluating a new national payment policy, versus that of new care delivery and payment models being tested under a more rigorous randomized or quasi-experimental design, may lead to results that are more positive than those observed with more rigorous designs. First, it is typical in most evaluations of new models being tested to calculate savings across all attributed patients, even those who do not receive services, under an intent-to-treat (ITT) design that encourages providers to reach out and engage all beneficiaries attributed to them. In contrast, savings in this analysis were calculated only for those beneficiaries who consented to receive CCM services, so it was under a treatment-on-the-treated (TOT) approach. Because the percentage of all patients receiving CCM services from individual providers was very low—the median number of CCM beneficiaries per provider was 10—an ITT approach was not feasible. Thus, savings calculated from ITT models may be more diluted than savings calculated with the method used in this study.

A second factor that could account for the stronger effects of CCM than that of other interventions is that individual providers made active decisions to participate in CCM, in contrast to primary care models that have been tested by CMMI, in which practices apply on behalf of their providers, all of whom might not be equally engaged in the initiative.

Third, individual clinicians identified patients for CCM services, leading to the potential for patient selection bias. The guidelines for patient selection in the CCM regulation were designed to target a subgroup of Medicare beneficiaries with multiple chronic conditions and at immediate risk of functional decline. Thus, clinicians likely targeted patients who were much sicker than average and for whom CCM could have a larger impact. Further, practices identifying patients for CCM is likely to have resulted in physicians identifying beneficiaries whom they believed would be most amenable to care management. Similarly, beneficiaries had to consent to receive CCM services; they therefore explicitly agree to be part of a clinical intervention and may have been more willing to engage in care management and more amenable to care coordination and monitoring than the comparison group of Medicare FFS beneficiaries. Combined, these factors limit the generalizability of our results across a broad range of practices and beneficiaries and in comparison with findings from tests with different models of care, intent, and research designs.

We have good balance on observable beneficiary characteristics between the CCM and comparison groups used in this analysis. However, our lower expenditure growth might be biased if the two groups are not balanced on unobservable characteristics, such as family or community support or willingness to engage in one's own healthcare—characteristics that influence the rate of growth in Medicare expenditures. Further analyses focusing on practices that provide CCM services to a large percentage of their Medicare beneficiaries who meet eligibility criteria on factors observable in Medicare administrative data might provide useful information on the degree and direction of the potential bias in beneficiary selection in this analysis.

A further potential source of bias is the exclusion of provider characteristics in our propensity score matching for a number of methodological and logistical reasons. Historically, when CMMI introduces new payment models, there is a prespecified set of provider characteristics, a rigorous selection process for provider participation, and a defined method of attributing Medicare beneficiaries to the selected participating providers for evaluation purposes. In the case of practice-level models focusing on increasing care management, beneficiaries are attributed to a single practice that provides the plurality of their primary care services, generally for the duration of a testing period. Evaluations of these types of models typically use one of two approaches to constructing a matched comparison group. One is to select comparison practices that match treatment practices on practice characteristics and include all beneficiaries in both sets of practices in the analysis. The second is to select similar practices¹⁷ for the comparison group and select a set of patients from those comparison practices that match the patients of the treatment practices; practice characteristics would be included in the propensity score model, to account (to some degree) for potential provider selection bias. Both approaches use an algorithm

¹⁷ For example, if the model is testing care management in patient-centered medical homes (PCMHs), only beneficiaries who received their care from other PCMHs would be considered in the pool of potential comparison beneficiaries.

for beneficiary attribution that can be applied to both the model testing and comparison practices to reduce selection bias.

The problem we faced is that there is no compelling approach for attributing potential comparison beneficiaries to a particular practice or provider for purposes of identifying provider or practice characteristics, because the CCM beneficiaries need not meet any attribution criteria with their CCM provider. The decision to use CCM services is made between an individual provider and beneficiary, and the provider's billing for CCM services can change from month to month. A CCM beneficiary may see a general practitioner for most of her health care needs but her cardiologist may be the provider billing for CCM services, or both may bill for CCM services over the course of our evaluation (though not simultaneously). And an individual provider could change practices during the course of our evaluation yet continue to provide her CCM services, rather than another provider in the original practice.

Another important consideration is the national scope of the CCM program. The CCM payment policy is widely available to all eligible professionals, who must meet less rigorous requirements than providers participating in CMMI initiatives; thus, there is likely to be less practice selection bias in our evaluation of CCM. In the first two years of the CCM payment policy, more than 16,000 individual providers billed for CCM services. The national scope also presented the significant challenge of identifying practices, with a moderate to high degree of certainty, using only Tax Identification Numbers on claims. In most CMMI evaluations, practices participating in testing of new models will provide the list of providers within the practice, and the billing identifiers. That is not the case for CCM practices.

Despite the limitations noted above, these findings are consistent with practice respondents' descriptions of how they target high acute-care users for care management and their desired outcomes of those efforts. In qualitative interviews, we found that practices frequently recommended CCM services for beneficiaries with diabetes, hypertension, and heart disease who were heavy ED users. This reported behavior is consistent with our finding, from claims data, that these conditions were very common among CCM recipients. Small practices, which constituted the majority of CCM billers, relied particularly on this case-by-case approach to CCM enrollment. They found that beneficiaries who received CCM services faced particular challenges with managing their multiple chronic conditions. Thus, focusing CCM on these patients would likely require an increase in office visits to primary care physicians in the short term.

Providers with whom we spoke also noted that CCM funding helped enhance staff time spent on coordinating care with other specialists, reaching out to hospitals to obtain ED and inpatient discharge information, and follow-up with patients after such events. Thus, practices moved to conduct more systematic follow-up with recently hospitalized beneficiaries (a CCM requirement) that will naturally result in some increase in face-to-face visits with primary care physicians, which we observed.

Providers also reported that the CCM payment helped them to better support staff who connected patients to home- and community-based services. Care manager and social worker respondents noted that with CCM support they could spend more time connecting complex patients, frail elderly patients, and patients with insufficient social supports to needed services.

Thus, it is not surprising that engaging CCM beneficiaries would increase use of home- and community-based services, such as home health, because of increased care management, concomitant recognition of patients' formerly unmet needs, and the potential desire to reduce acute care use. Although we did not directly examine the drivers of this increase, it is possible that greater use of home health services served to reduce the likelihood of hospitalization.

When interviewed, beneficiaries reported that having ready access to a nurse or care manager improved communication with the physician, allowed for scheduling appointments more quickly if needed, and positively influenced beneficiaries to be mindful of their health and medication adherence. One beneficiary described how prompt attention from her primary care office helped prevent a potentially dangerous drug interaction. A desired outcome of better care coordination and prompt attention to medically complex patients was a reduction in hospitalizations for ambulatory care sensitive conditions, which we observed among CCM beneficiaries.

In summary, our evaluation of the first two years of the new CCM national payment policy, which reimburses providers for non-face-to-face care management services, yielded findings consistent with expectations and experiences of CCM providers and beneficiaries. The challenges of evaluating a national payment policy versus a more carefully designed test of a new service delivery or payment model may have produced estimates of savings that are overstated due to potential provider and beneficiary selection bias from unobservable characteristics. Yet, our sensitivity analyses provide clear support that CCM is having a positive effect on lowering the growth in Medicare expenditures on those that received CCM services; the estimated CCM effect on expenditure growth increased when restricting our analyses to those with more than one month of CCM services and was no longer present when removing those who died during the follow-up period, a costly subgroup of Medicare beneficiaries for whom CCM was intended.

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APPENDIX A:
SEMISTRUCTURED INTERVIEW PROTOCOLS
FOR BENEFICIARIES

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BENEFICIARY INTERVIEW PROTOCOL

I. Screener

II. Introduction

Today we'd like to talk with you about the care you get from your primary care doctor's office.

IF NOT ALREADY STATED: The interview is sponsored by the Centers for Medicare and Medicaid Services (CMS), the government agency that pays for the Medicare and Medicaid insurance programs.

There are a few things I want to review with you before we get started with the questions:

- First, your privacy is protected. All information that would let someone identify you will be kept private. We will not share your personal information or responses to the interview today with anyone. Your doctor's office will not know your responses. Your responses are completely confidential. Medicare will not know your response. We only send Medicare a summary.
- Second, your participation is voluntary. You do not have to complete the interview. If you choose not to, this will not affect the health care you get or your insurance coverage. You can stop at any time and do not have to answer any questions you don't want to.
- The interview today will take between 30 and 45 minutes. To thank you for your time, we will send you a check for \$25 as a token of our appreciation
- Finally, before we begin- we'd like to record this interview to make sure we accurately capture what you say today. Only the people on the study team will have access to the recording. Since we are conducting interviews with many people for this project, the recordings help us keep track of who said what. Would that be ok?
- Do you have any questions for me before we begin?

III. Beneficiaries Experience Learning about the CCM Service/Fee and Decision Making Factors

As I mentioned previously, we are asking patients about [insert patient's terminology for CCM services] they receive from their primary care practice (IF FILE INDICATES THE PATIENT'S CCM PROVIDER IS A SPECIALIST, SUBSTITUTE APPROPRIATE PROVIDER TYPE).

1. How did you first learn about [insert patient's terminology for CCM services]?

- a. Who initially talked to you about the service? (NOTE TO INTERVIEWER: Find out if person was a physician, nurse, or other person).
- b. Is this someone from your primary care practice, in other words, the provider you see for your routine health care needs, or is this another person?

OK, so (insert name or identified role) first talked to you about this service.

2. Tell me a little about that conversation.

- a. Did it happen in-person, or by phone?
- b. What were your first impressions when [CCM provider] brought this up?
PROBE: What thoughts or feelings came up?
- c. Did you have questions or concerns?
 - o IF SO, did you raise them during that conversation or at some later point?
- c. How did you feel about the amount of time [the CCM provider] took to explain what the service was about and to address any questions you may have had?

IV. Informed Consent Process (Also a CCM Standard)

Providers who offer [insert patient's terminology for CCM services] have to ask your permission before providing the services. They ask you to sign a consent form saying you allow them to be your chronic care management provider. They also need to tell you that there is a co-pay for this service just like there is with many other Medicare services.

3. Do you recall signing a consent form for [insert patient's terminology for CCM services]?

4. Was it easy or difficult to understand? What parts, if any, were confusing to you?

- a. Did you have questions for [CCM provider] about the form?

5. Why did you agree to receive [insert patient's terminology for CCM services]?

- a. PROBE (if answers to previous questions were vague): Did you have any concerns? If YES, ask Please tell us about your concerns.

6. What, if anything, did [CCM provider] tell you about who can provide [insert patient's terminology for CCM services]?

- a. Did [CCM provider] tell you that only one primary care practice can be paid for providing [insert patient's terminology for CCM services] for you each month? (CCM Standard)
PROBE: What, if any concerns did you have about this?

Patients who participate in [insert patient's terminology for CCM services] can stop or transfer the service at any time.

7. What, if anything, did [CCM provider] tell you about this? Did he or she explain how you could stop the service?

- a. Imagine if you wanted to stop receiving [insert patient's terminology for CCM services], what would you do?

8. What did [CCM provider] say about what to do if you wanted a different provider to handle your [insert patient's terminology for CCM services]?

Now I'd like to talk about fees associated with [insert patient's terminology for CCM services]. Doctors can submit a claim to Medicare and collect a co-pay from patients for these services. Sometimes that co-pay is covered by your second form of insurance such as Blue Cross or another health plan. Sometimes it is not.

9. Is this something you have heard about? (In other words, do you know about the co-pay?)

IF YES: What did [CCM provider] tell you about how you would be billed?

What did [CCM provider] tell you about the amount you would be billed?

IF YES: Did the fee influence your decision to participate?

10. Do you have any insurance in addition to your standard Medicare that helps pay for things that Medicare does not cover?

IF YES: Did you consider what this additional insurance covered before agreeing to the [insert patient's terminology for CCM services]?

Different patients sometimes have different reactions when providers explain (insert patient's terminology for CCM services) and everything that is involved in providing the service, such as asking the patient to sign a letter of consent, and letting patients know that the patient may have a co-pay. I have a few questions about how you felt when your (insert provider name or credential) first talked to you about the service and what it includes.

11. Do you think the conversation had any effect on the way you feel about [CCM provider]? IF SO, how did it make you feel?

Probe: Did anything about the [insert patient's terminology for CCM services], the letter of consent or the co-pay have any effect on your relationship with your [CCM provider]?

12. How, if at all, did this conversation affect who you consider to be your usual provider (the person you see for the majority of your routine as well as chronic care needs)?

(INTERNAL NOTE: because specialists or other docs may feel that they provide the majority of care for the patient, they may believe they are the most appropriate person to provide CCM).

V. Beneficiaries Experience with CCM**13. In general, how do you feel about the [insert patient's terminology for CCM services] you receive?**

- a. What would you say are the benefits?
- b. What are the downsides?
- c. Overall, are you happy or unhappy with the services? Do you have any regrets about agreeing to participate?
- d. Thinking about someone with similar healthcare needs to you, would you recommend [insert patient's terminology for CCM services] to them?

14. Tell me a bit about how getting [CCM services] has changed the way [CCM provider] or [CCM practice] helps you manage your care.

PROBE: Can you provide me with an example of that change? (Probe for as many examples as beneficiary can provide)

PROBE: Is there a person at the practice, like a nurse, who is spending more time with you helping you manage your health conditions?

15. Over the past year, how often have you been able to see your usual clinician? (Continuity of Care Standard)

- a. Has receiving [insert patient's terminology for CCM services] changed who you regularly see when you visit [CCM practice]?

16. What are the different ways [CCM provider/practice] contacts you about managing your health conditions?

- a. Who contacts you (e.g. nurse, medical assistant, physician etc.)
- b. Is the contact usually by phone or some other means? (e.g. email)
- c. Can you tell me more about how often they contact you?

17. How likely are you to continue to want to receive these services from [NAME OF CCM PROVIDER]?

Probe: And why?

VI. Beneficiaries' Report of Whether CCM Standards In Place at the Practice

Next, I have some questions about the care you get as part of the [insert patient's terminology for CCM services].

- 18. A care plan is a document that identifies your health problems, helps you remember how to manage your symptoms, and lists your medications. It also may list your health goals and how you plan to achieve them. Has [CCM clinician/practice] provided you with a written or electronic copy of your care plan?**

IF YES: What do you think of this care plan? Did your doctor explain it to you in a way you can understand?

Do you know if [CCM clinician/practice] shared your care plan with the other specialists who also care for you?

- 19. Has someone at your primary care practice talked with you about your medications to make sure you understand them?**

- 20. In the past year, have you had to contact [CCM provider] for health care needs on evenings or weekends?**

IF YES: Did your provider seem to have access to your electronic medical record?

- 21. Have you had to stay overnight in the hospital in the three months?**

IF YES: Did someone from [INSERT NAME OF CCM PROVIDER] contact you shortly after you were discharged from the hospital to see how you were doing?

Probe: [IF PATIENT UNCLEAR ON WHO CALLED THEM] Do you think this person worked for your [INSERT NAME OF CCM PROVIDER] or was this someone from the hospital or another organization?

- 22. Did you go to the emergency room in the last three months?**

IF YES: Did someone from [CCM practice] contact you shortly after you were discharged from the emergency room to see how you were doing?

- 23. Did [CCM provider] suggest that you see a specialist (like a lung or kidney doctor, or a surgeon or another type of specialist) in the last 12 months?**

IF YES: Did your [CCM provider] help you to understand what that specialist recommended for you? Did the CCM provider help you make the appointment?

- 24. Have you needed home-based care (like a home health aide or other special service that comes to your home) in the past 12 months?**

IF YES: Did your CCM provider, or someone at that practice, help arrange that service for you?

IF YES: Does your CCM provider communicate with that service about your needs?

Those are all of the questions I have for you today. Thank you so much for taking the time to complete this interview, the information you shared with me today was very helpful.

Before I go, I want to make sure we have your correct mailing address so we can send you the \$25 token of appreciation for participating.

[verify mailing address]

APPENDIX B:

**SEMI-STRUCTURED INTERVIEW PROTOCOL
FOR THE ELIGIBLE PROFESSIONALS (EP)**

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EP INTERVIEW PROTOCOL

I. Introduction

Thank you for taking the time to talk with me today. My name is _____ and I work for an independent research organization called, Mathematica Policy Research. We would like to hear from you about your practice's experiences with the new Chronic Care Management Services and Fee that became part of the physician fee schedule for Medicare starting in January of 2015. As you may recall, this new CCM fee, which is billed as CPT code 99490, reimburses practitioners for time that they and their staff spend managing patients' care outside of the office visit. This includes at least 20 minutes of clinical staff time for non-face-to-face services per calendar month for Medicare patients with 2 or more chronic conditions.

Your responses are important to help us understand how CCM services are being implemented and experienced by practices. We are talking with a random sample of practitioners from across the United States. There are no right or wrong answers to these questions.

This interview is completely confidential. Nothing you say today will ever be tied to you or to your practice. You and your practice are NOT being audited or evaluated. Rather, CMS has asked us to do an anonymous research study to hear directly from health care providers about their experience with CCM services and the CCM fee. Neither your name nor the name of your practice will be mentioned in any summary report we write for CMS.

May we have your permission to record this interview? [RA will take verbatim notes as well-but you don't have to mention that.]

Do you have any questions before we begin? [INTERVIEWER see our FAQs if needed.]

II. Practice characteristics

[INTERVIEWER: ALL interview questions should be asked of all eligible professionals or their practice manager/second respondent if they need one to complete the information]

- How many doctors or independent clinicians work at the practice location where you spend the most time seeing patients; we are referring to the number of clinicians with whom you share a front desk?
- Do you own your practice or is it owned by a larger entity?
- IF LARGER ENTITY, then is it a physician-owned organization or part of a hospital/health system?
- Is your practice a recognized patient-centered medical home?
- Why did the practice decide to bill for the CCM fee?

III. Decision to adopt CCM

[For system-owned practices and large independent practices]

- Was the decision motivated by the clinicians at your practice site, or by someone in the larger system?
- How was it decided which EPs should bill for the CCM fee?
- Does your practice's parent organization provide support for CCM services? What kind of support?

IV. Care management model

- **Care management delivery.** Please describe how care management is delivered at your practice. For example, is there a nurse care manager or are care management roles distributed among different team members in the practice?

Probe: Are all the staff that provide care management services physically located at your practice? (Please describe)

Probe: what are the key tasks that the care manager/key staff/outside contactor performs for CCM services?

How are the various elements of CCM services divided up among team members at your practice? (Who does what?)

- **Outside care management services.** Do you use care management services from outside your organization (e.g. a nurse care manager who is employed by another organization than the one that employs you)?

IF YES, THEN PROBE:

Could you tell me why your practice chose to use an outside organization?

What does that outside organization do for your CCM patients?

Probe: How often do you (the clinician) have personal contact with [outside organization] to discuss' chronic care management?

Probe: Do you feel that the work done by [outside organization] is having any impact on the quality of care for your patients?

Probe: Does [outside organization] send a person to your practice on a regular basis? If so, how often?

Probe: Does using [outside organization] for CCM services affect your personal relationship with patients? IF SO ASK, How?

- Patient population

How do you decide which patients you'll bill the CCM fee for?

Is there a combination of chronic conditions among patients in your practice for whom you bill the CCM fee? (Probe: have you decided, for example, to focus on patients with diabetes

and another chronic condition? Or are you just looking at patients with 2 chronic conditions more generally?)

[If they are focusing on patients with specific chronic conditions ask], How did you come to that decision? (Probe: participation in a prior initiative focused on that condition(s).)

V. Beneficiaries' consent and perceptions

- Consent process

How does your practice approach Medicare patients for CCM consent?

Who at the practice approaches the patient for consent?

How is CCM described to the patient? What terms do you or your staff use to refer to CCM to patients?

- Letter of consent

How did your practice develop the letter of consent you use?

Would you be willing to email us a copy of your letter of consent and if you have one, a pamphlet you use to describe CCM services to patients? Feel free to cross out your practice name before emailing it to us (Rumin rsarwar@mathematica-mpr.com or Patrick's pbalke@mathematica-mpr.com email). (This is just for our learning purposes, we will not tie your name to the letter or pamphlet.)

- Frequency of consent

How often do patients consent to CCM services when offered?

Alternative probe: How often are patients offered chronic care management services, but do not consent?

When asked if they would like to receive the services, why do patients consent or not consent?

Does having supplemental insurance make a difference in whether a patient agrees to sign up for the CCM service?

Have any of your patients that initially signed the letter of consent for CCM services revoked the service (or said they didn't want it anymore)?

Probe: If so, what reasons have they given? (Probe: out of pocket costs?)

- **Lessons learned.** Please describe any lessons learned about how to introduce the concept of CCM services and the CCM fee to patients.

Probe: Do patients typically understand what CCM services are?

- **Beneficiary perception.** What do your patients think about the CCM services?

VI. Scope of service elements

These next questions seek your experience and opinion about providing chronic care management services for your Medicare beneficiaries:

- Providing Care Management Services.

Has the practice's approach to providing care management services to patients changed with the CCM fee?

If so, how? (Probe for as many examples as possible)

Did providing CCM services alter the time and resources needed to provide care management services to patients at your practice, or is this time you were already spending on their care?

How much time do you (and your team) spend per month on the average CCM patient providing CCM services outside of the office visits?

- Access to Care

To what extent has it been possible for your practice to have a clinician or staff member providing CCM services available to patients 24/7? Does that person have access to the patients' medical record 24/7?

What does this arrangement look like for your practice? (e.g. on-call clinician has access to the patient's health record?)

Probe: What challenges, if any, do you face in providing 24/7 access?

If you had to estimate, what percentage of CCM patients have continuity of care with the same provider for routine appointments?

How useful do you or your team find telephone calls to patients or their caregivers in providing chronic care management services?

How useful do you or your team find secure email or other non-face-to-face communication methods in providing chronic care management services?

Probe: Do your patients face any barriers to using email and portals for this type of communication?

- **EHR**

Did the CCM fee impact how the practice documents care in its EHR?

IF YES: Do the changes focus simply on documentation needed for billing or do they affect clinical management?

[IF THEY AFFECT CLINICAL MANAGEMENT ASK] Can you tell me how?

How useful or challenging have you found your EHR for recording patient information required for CCM services?

Probe for examples of challenges, if any.

- **Care plan**

Do you create care plans for your patients? [If respondent is unfamiliar with the term say: Care plans typically list the patient's key health issues, goals for management and steps to achieving those goals.]

What challenges, if any, do you face in creating care plans?

Probe: Who typically creates the care plan?

Probe: When and how is the care plan used?

Has the content or structure of the care plan changed in any way since you started billing for the CCM service? (If yes, ask, HOW did it change?)

Are the people who need to see the care plan able to access it electronically 24/7?

If you had to estimate, for what percentage of your CCM patients is your practice able to provide patients with a written or electronic copy of the care plan?

Has your practice shared care plans electronically outside of the practice, for example with other specialists who also care for your patients? To what extent is it possible for your practice to do so? What challenges do you face in sharing the care plan with outside specialists?

INTERVIEWER NOTE: If the practice seems to have a care plan template, ask if they would be willing to send a copy of the template to Rumin/Patrick. Tell them that they can remove their practice name from the top of the care plan template.

- **Staffing**

Did the decision to provide CCM services change the roles within the primary care team? For example, did it change how each person spends their time or their duties?

Were any new staff added or were staff repurposed after the decision to provide CCM services?

VII. Changes involved for billing for CCM services

1. Billing Process

Has your practice set up a process for billing for CCM services? Can you describe that process?

How do you decide how often to bill the CCM fee for patients?

Why did your practice decide to bill this way?

2. Understanding of billing requirements

What do you see as the key requirements for billing the CCM fee? (ask of clinician and practice manager)

3. Barriers to billing/providing CCM services

What are the barriers to providing and billing for CCM services? (Let them answer first and then if they cannot provide a good description of barriers use these probes)

Probes: letter of consent requirement, patient's out-of-pocket cost, setting up billing process, EHR interoperability requirements, practice level autonomy to alter care processes (for those that are employed by large systems)?

How have you overcome challenges to billing for CCM services?

Are there providers you know who have not been billing for the CCM service?

Probe: What are their reasons for not billing? (Let them answer first and then if they cannot provide a good description of barriers use these probes)

Probes: letter of consent requirement, coinsurance, setting up the process for billing, EHR interoperability requirements? Other reasons?

4. Practitioners' perceptions on overall scope and payment

How do you feel about the overall scope of services required to bill for CCM payment?

Did the change in Medicare's compensation for CCM change the services your practice offers?

Are any of the services your practice put in place for CCM also being incorporated into the care of non-CCM patients in your practice? If so, which services?

Does the payment amount for CCM cover the CCM services you are required to offer?

IF NOT, what amount of reimbursement would cover your costs for providing CCM services? How did you estimate this amount?

VIII. Perceived impact of CCM

• Care continuity and coordination

Does the CCM service affect the continuity of your relationship with your patients? If so, how?

- Does the CCM service or fee have any impact on your practice's ability to coordinate your patients' care with other specialists?

Probe: Did coordination improve or get worse?

If coordination improved, what did your practice do that led to increased care coordination?

If coordination worsened, what caused that?

- **Patient outcomes.** Do you think that CCM services your practice provides have any impact on patients’:
 - Emergency department use?
 - Hospitalizations?
 - Rates of self-referral to specialists?
 - Other areas?
- **Expenditures**
 - If they answer “yes” to any above questions on patient outcomes, ask:** what specifically has your practice done that you think contributed to this reduction/increase in _____?
 - If they answer “no” to any above questions, say:** please say more about why you think the CCM is not influencing _____.
- **Unintended consequences.** Are you facing any unexpected challenges as a result of the CCM fee?
 - Probe: Any impact on the patient-physician (clinician) relationship?
 - Probe: Any confusion among patients about who their primary care provider is?
 - Probe: Please tell me more about this.
- Is there anything I have not asked you that you think is important for CMS to better understand about the CCM fee and CCM services?
 - Probe: What could improve uptake of this service and billing fee by clinicians?

Thank you for your time today. Your input will help us understand how the chronic care management program can be made more clinically useful for both clinicians and patients.

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APPENDIX C:

**SEMISTRUCTURED INTERVIEW PROTOCOL
FOR PROFESSIONAL SOCIETY REPRESENTATIVES**

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PROFESSIONAL SOCIETY REPRESENTATIVE INTERVIEW PROTOCOL

I. Introduction

Thank you for taking the time to talk with me today. My name is _____ and I work for an independent research organization called, Mathematica Policy Research. We would like to hear from you about your members' experiences with the new Chronic Care Management Services and Fee that became part of the physician fee schedule for Medicare starting in January of 2015. As you may recall, this new CCM fee, which is billed as CPT code 99490, reimburses practitioners for time that they and their staff spend managing patients' care outside of the office visit. This includes at least 20 minutes of clinical staff time for non-face-to-face services per calendar month for Medicare patients with 2 or more chronic conditions.

Your responses are important to help us understand how CCM services are being implemented and experienced by practices. We are talking with professional society representatives from a range of specialties. There are no right or wrong answers to these questions.

This interview is completely confidential. Nothing you say today will ever be tied to you or to your organization. Rather, CMS has asked us to do an anonymous research study to hear directly from health care providers about their experience with CCM services and the CCM fee. After interviewing representatives from leading medical professional organizations, we'll be interviewing clinicians identified from a random sample of Medicare Claims to hear about their experiences providing CCM services.

May we have your permission to record this interview? [RA will take verbatim notes as well-but you don't have to mention that.]

Do you have any questions before we begin?

Practice characteristics

- Have you found common characteristics among your members that have decided to bill for the Chronic Care Management fee?

Probe: smaller vs. larger practices

Probe: physician owned vs. hospital system owned

Probe: regional variation

Probe: participation in prior primary care initiatives

Probe: working in a market where commercial payers are paying their own CCM fee

[After each response ask the respondent to "tell me more" about why they think this pattern is present]

- **Decision to adopt CCM.** Why do practices decide to bill for the CCM fee?
What are you hearing from your members about challenges they face in billing for the CCM fee?
How have they overcome those challenges?
What are you hearing from your members about what is helpful to them in billing for the CCM fee?

Scope of service elements

- Which CCM service elements do your members find most challenging?
- Probes:
 - care plan creation,
 - making care plans accessible to staff at point of care,
 - providing patients with 24/7 access to a health care practitioner in the practice who has access to the patient's record,
 - EHR requirements,
 - follow-up of patients after hospital discharge or ED visits,
 - coordinate with other specialists the patient sees,
 - coordination with home and community based services,
 - obtaining letter of consent,
 - helping patients understand the 20% out of pocket payment for the CCM service.

How do you advise your members about who should sign the letter of consent for CCM services when a beneficiary is not able to do so?

To what extent are practices trying to risk stratify their patients before deciding which patients to provide CCM services to?

Probe: Are you noticing any difference in this for practices that are part of ACOs vs. not?
- Are you hearing from your members that they themselves (the clinicians) are spending more time performing CCM services, or do they tend to task that work to other members of the primary care team?
Probe: Could you provide any specific examples?
[Probe for as many examples as they have.]
Are practices that provide CCM services adding new staff or are they instead repurposing existing staff to provide CCM services?
Do you hear much about practices contracting with third parties to provide some of the CCM services?

Unintended consequences

- Are you facing any unexpected challenges as a result of the CCM fee?
Probe: Any impact on the patient-physician (clinician) relationship?
Probe: Any confusion among patients about who their primary care provider is?
Probe: Please tell me more about this.
Probe: Could you provide an example of this?
Probe: Any other examples you can provide?
- Do you know physicians (NPs, PAs) who have chosen NOT to bill for the CCM service that we might be able to interview?
Collect: Name, Email, Phone, Location
- Is there anything I have not asked you that you think is important for CMS to better understand about the CCM fee and CCM services?
- What could improve uptake of this service and billing fee by clinicians?

Thank you for your time today. Your input will help us understand how the chronic care management program can be made more clinically useful for both clinicians and patients.

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APPENDIX D:

PROPENSITY SCORE MATCHING DIAGNOSTICS

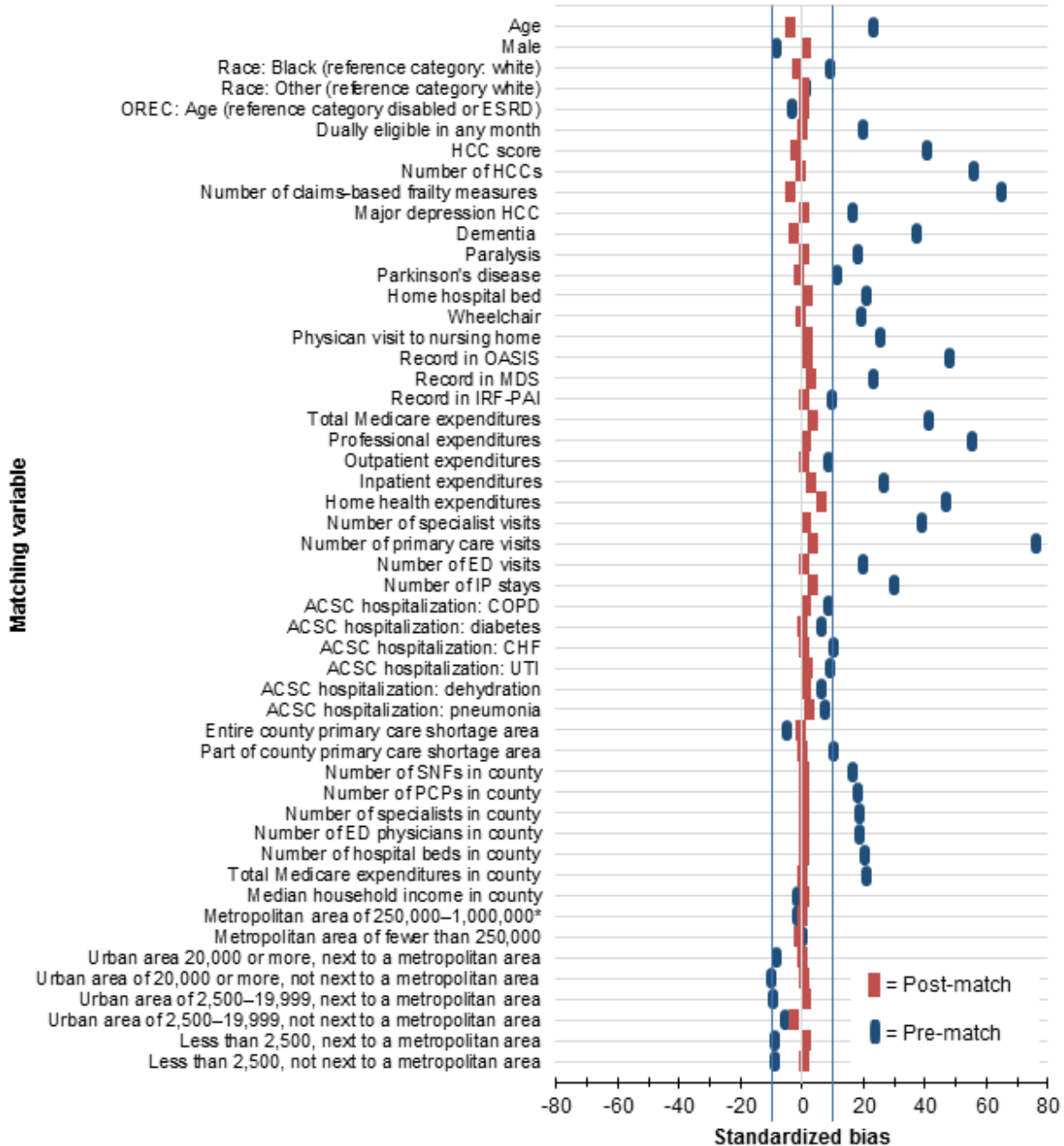
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To assess the quality of our matches, we conducted a series of postmatching diagnostics to check the balance between characteristics of the CCM beneficiaries and our matched comparison group. We found that our matching produced a comparison group that looked similar along the dimensions of interest.

- **Reduction in standardized bias of individual covariates in the matching models.** The standardized bias is the difference of sample means in the treated and matched comparison subsamples as a percentage of the square root of the average of sample variances in both groups (Rosenbaum and Rubin 1985). As a general rule, absolute bias of less than 10 percent after matching suggests reasonable balance (Normand et al. 2001).
- **Pseudo R^2 .** We compare the pseudo R^2 of the logistic regression model that estimates the propensity score on the unmatched sample to the pseudo R^2 on the matched sample. A small pseudo R^2 on the matched sample suggests that the model has little explanatory power to predict CCM uptake.
- **Mean and median bias across all variables in the model.** Again, we use a 10-percent threshold to assess the quality of our matches.
- **Absolute standardized difference of the means of the propensity scores between the treatment and matched comparison observations (Rubin's B).** As suggested by Rubin (2001), the absolute difference should be 0.25 or less to help provide assurance that the matching produces groups that are similar along the covariates included in the model.
- **Ratio of variance of the propensity scores from the treated observations to the variance of the matched observations.** Rubin (2001) proposed that a ratio between 0.5 and 2.0 suggests reasonable balance.

We did not focus on t -tests of the difference in means of the covariates included in the model or a joint significance test for all covariates because, given our large sample sizes, we may find statistically significant differences when the differences in absolute terms are not meaningful.

Figure D.1. Standardized bias before and after matching: January–March 2015



Source: 2014–2016 Medicare claims and enrollment data.

* Reference category: no part of county a primary care shortage area.

** Reference categories for size of county: metropolitan area of 1,000,000 or more.

OREC = original reason for entitlement category; ED = emergency department; HCC = hierarchical condition category; OASIS = Outcome and Information Set; MDS = Nursing Facility Minimum Data Set; IRF-PAI = Inpatient Rehabilitation Facility Patient Assessment Instrument; ACSC = ambulatory care sensitive condition; COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure; UTI = urinary tract infection; SNF = skilled nursing facility.

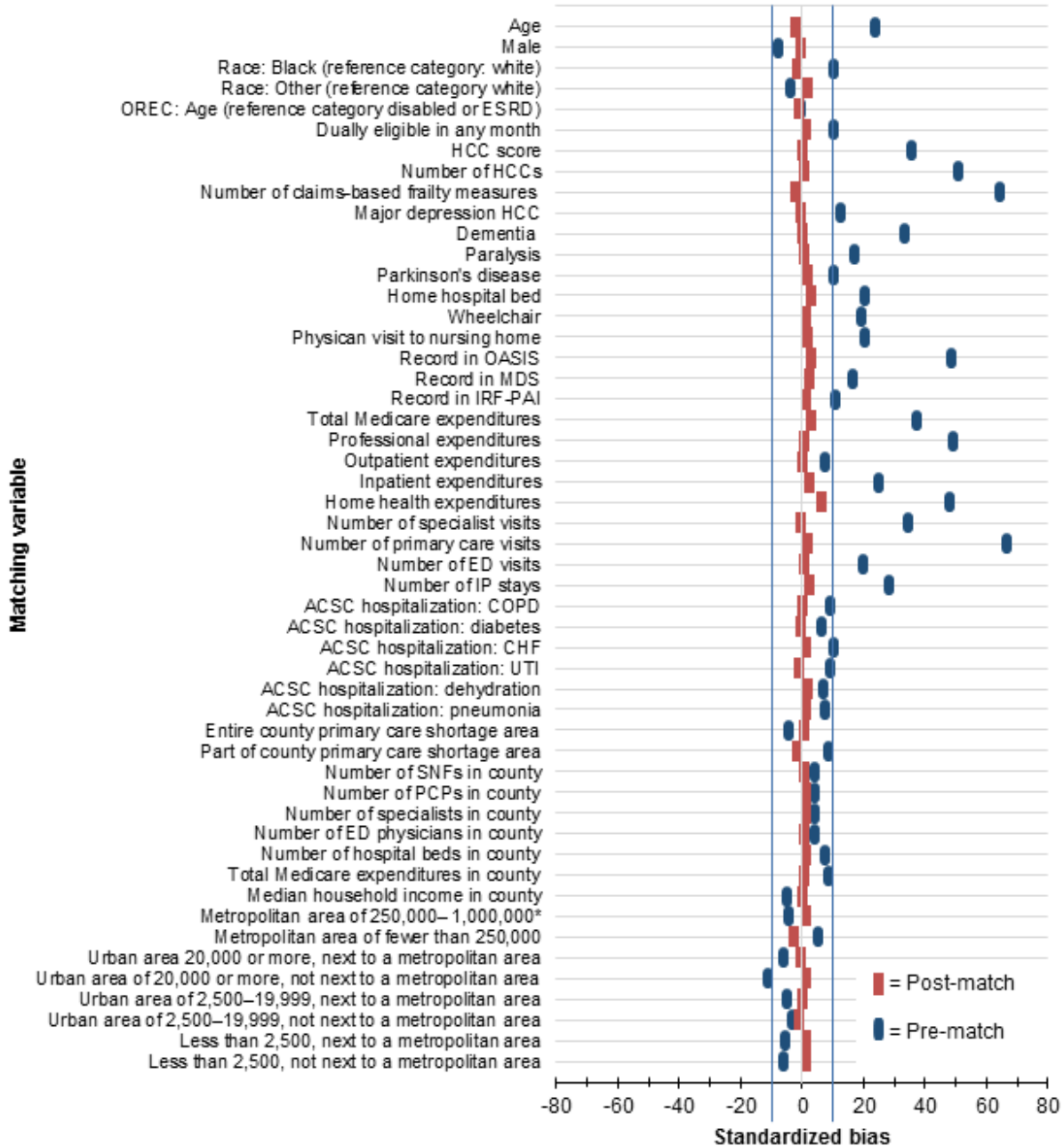
Table D.1. Matching model diagnostics: January–March 2015

	Pseudo R ²	Mean bias (percent)	Median bias (percent)	Standardized difference of the means of the propensity scores	Ratio of variance of the propensity scores
Unmatched	0.103	20.2	16.4	0.978	2.63
Matched	0.003	1.4	0.9	0.133	1.19

Source: Medicare 2014–2016 FFS claims and enrollment data.

Note: Sample sizes: CCM = 63,268; unmatched comparison = 5,531,831; and matched comparison = 50,074. The number of unmatched comparison beneficiaries is different from what is presented in Table III.7 because only observations that had a propensity score estimated and were on support are included in the matching diagnostics.

Figure D.2. Standardized bias before and after matching: April–June 2015



Source: 2014–2016 Medicare claims and enrollment data

* Reference category: no part of county a primary care shortage area

** Reference categories for size of county: metropolitan area of 1,000,000 or more

OREC = original reason for entitlement category; ED = emergency department; HCC = hierarchical condition category; OASIS = Outcome and Information Set; MDS = Nursing Facility Minimum Data Set; IRF-PAI = Inpatient Rehabilitation Facility Patient Assessment Instrument; ACSC = ambulatory care sensitive condition; COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure; UTI = urinary tract infection; SNF = skilled nursing facility.

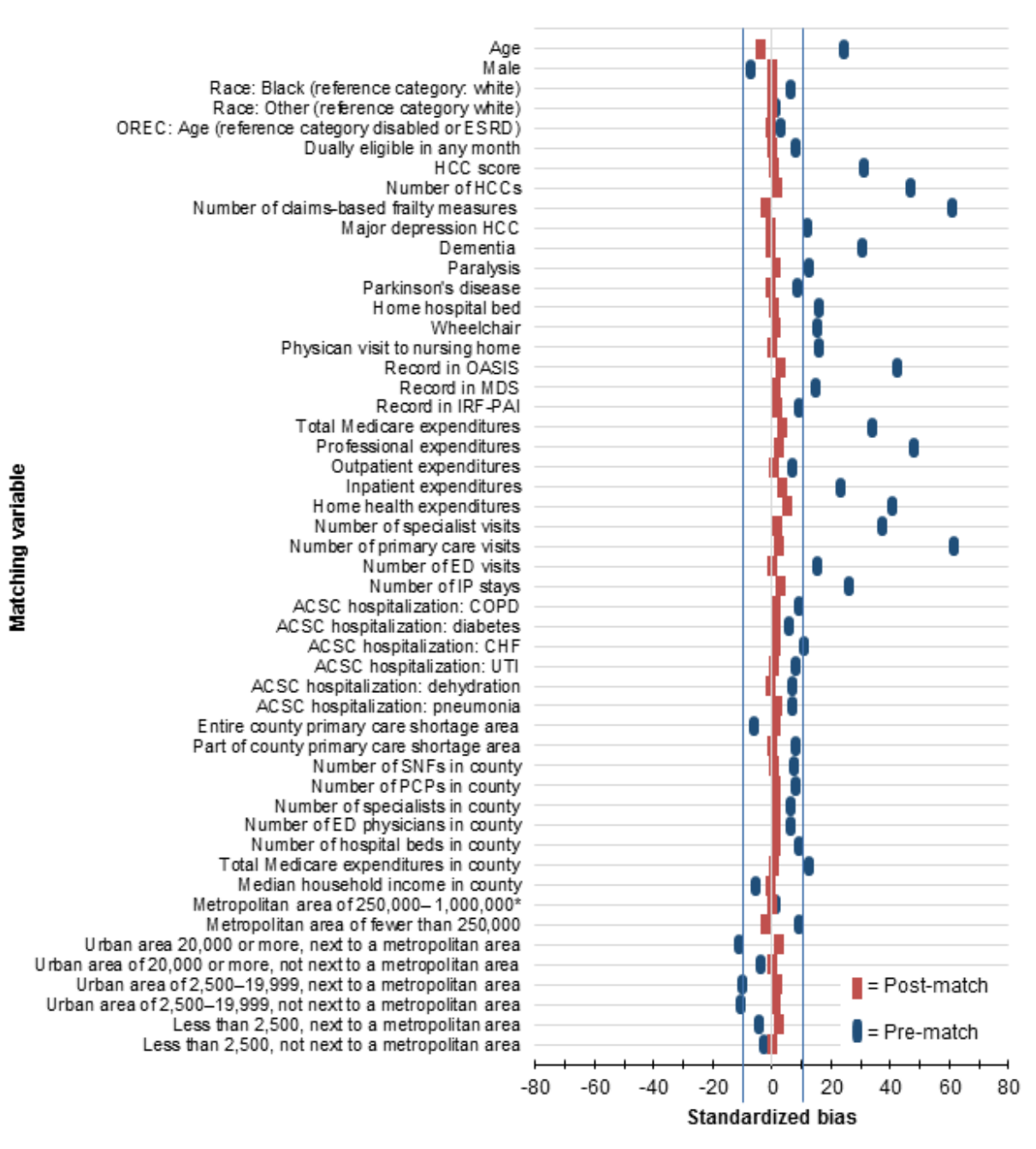
Table D.2. Matching model diagnostics: April–June 2015

	Pseudo R ²	Mean bias (percent)	Median bias (percent)	Standardized difference of the means of the propensity scores	Ratio of variance of the propensity scores
Unmatched	0.089	17.2	10.0	0.907	2.42
Matched	0.002	1.3	1.1	0.108	1.25

Source: Medicare 2014–2016 FFS claims and enrollment data.

Note: Sample sizes: CCM = 67,378; unmatched comparison = 5,525,904; and matched comparison = 47,017. The number of unmatched comparison beneficiaries is different from what is presented in Table III.7 because only observations that had a propensity score estimated and were on support are included in the matching diagnostics.

Figure D.3. Standardized bias before and after matching: July–September 2015



Source: 2014–2016 Medicare claims and enrollment data

* Reference category: no part of county a primary care shortage area

** Reference categories for size of county: metropolitan area of 1,000,000 or more

OREC = original reason for entitlement category; ED = emergency department; HCC = hierarchical condition category; OASIS = Outcome and Information Set; MDS = Nursing Facility Minimum Data Set; IRF-PAI = Inpatient Rehabilitation Facility Patient Assessment Instrument; ACSC = ambulatory care sensitive condition; COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure; UTI = urinary tract infection

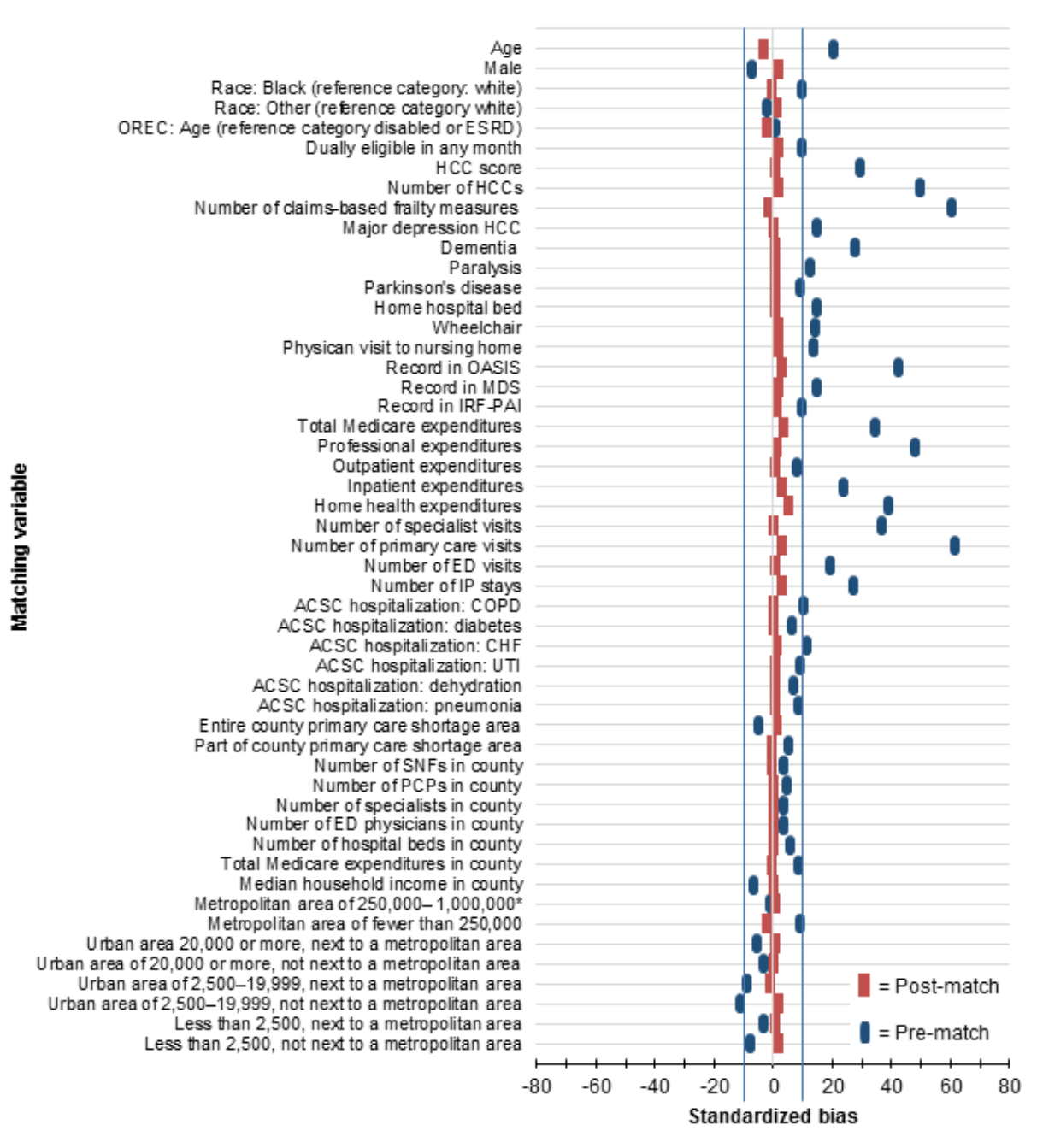
Table D.3. Matching model diagnostics: July–September 2015

	Pseudo R ²	Mean bias (percent)	Median bias (percent)	Standardized difference of the means of the propensity scores	Ratio of variance of the propensity scores
Unmatched	0.078	16.2	9.5	0.888	1.88
Matched	0.002	1.5	1.2	0.107	1.08

Source: Medicare 2014–2016 FFS claims and enrollment data.

Note: Sample sizes: CCM = 67,372; unmatched comparison = 5,506,908; and matched comparison = 49,705. The number of unmatched comparison beneficiaries is different from what is presented in Table III.7 because only observations that had a propensity score estimated and were on support are included in the matching diagnostics.

Figure D.4. Standardized bias before and after matching: October–December 2015



Source: 2014–2016 Medicare claims and enrollment data

* Reference category: no part of county a primary care shortage area

** Reference categories for size of county: metropolitan area of 1,000,000 or more

OREC = original reason for entitlement category; ED = emergency department; HCC = hierarchical condition category; OASIS = Outcome and Information Set; MDS = Nursing Facility Minimum Data Set; IRF-PAI = Inpatient Rehabilitation Facility Patient Assessment Instrument; ACSC = ambulatory care sensitive condition; COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure; UTI = urinary tract infection; SNF = skilled nursing facility.

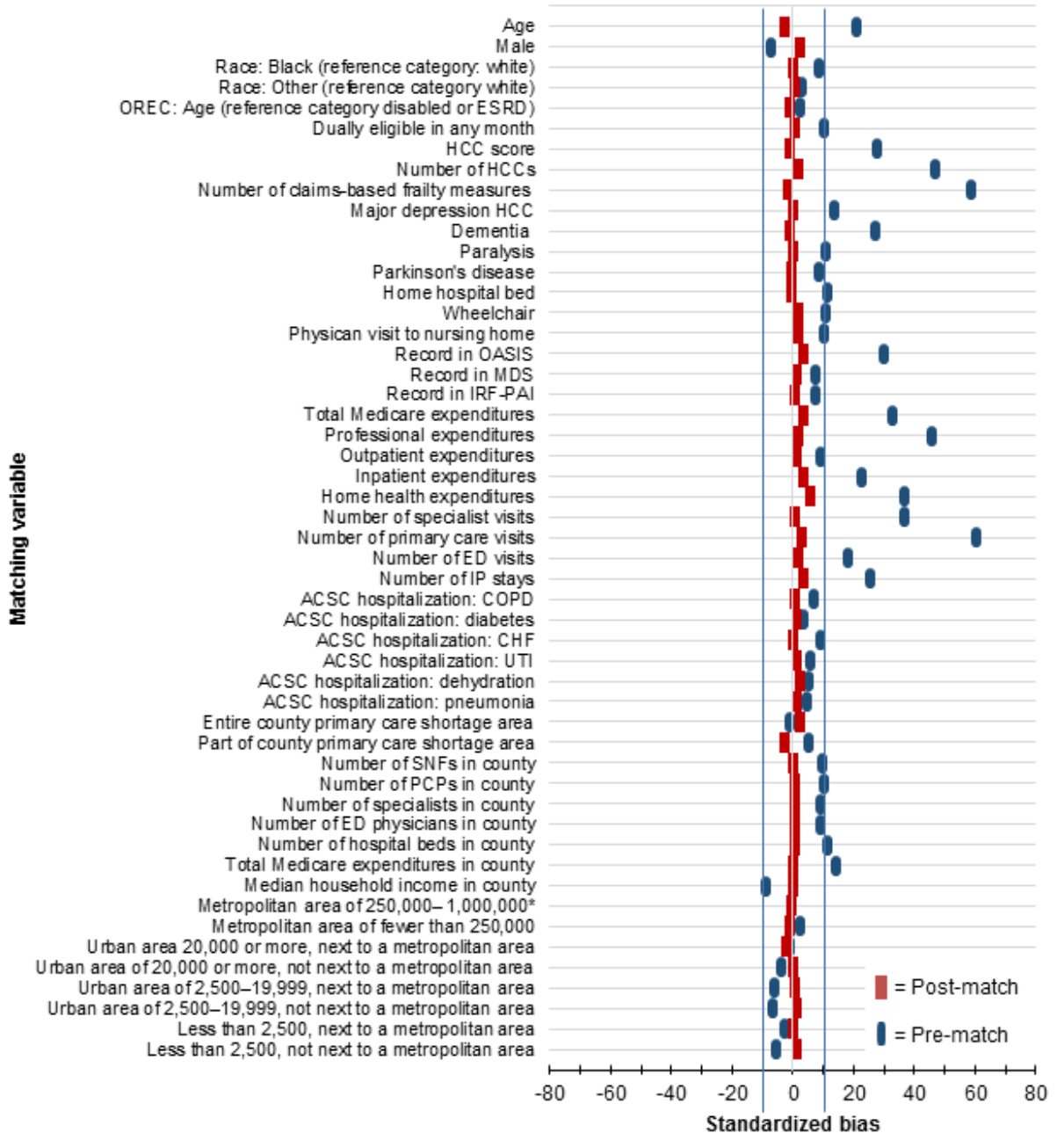
Table D.4. Matching model diagnostics: October–December 2015

	Pseudo R ²	Mean bias (percent)	Median bias (percent)	Standardized difference of the means of the propensity scores	Ratio of variance of the propensity scores
Unmatched	0.079	15.9	9.2	0.875	1.96
Matched	0.002	1.5	0.3	0.101	1.21

Source: Medicare 2014–2016 FFS claims and enrollment data.

Note: Sample sizes: CCM = 75,207; unmatched comparison = 5,478,553; and matched comparison = 55,883. The number of unmatched comparison beneficiaries differs from what is presented in Table III.7 because only observations that had a propensity score estimated and were on support are included in the matching diagnostics.

Figure D.5. Standardized bias before and after matching: January–March 2016



Source: 2014–2016 Medicare claims and enrollment data.

* Reference category: no part of county a primary care shortage area.

** Reference categories for size of county: metropolitan area of 1,000,000 or more.

OREC = original reason for entitlement category; ED = emergency department; HCC = hierarchical condition category; OASIS = Outcome and Information Set; MDS = Nursing Facility Minimum Data Set; IRF-PAI = Inpatient Rehabilitation Facility Patient Assessment Instrument; ACSC = ambulatory care sensitive condition; COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure; UTI = urinary tract infection; SNF = skilled nursing facility.

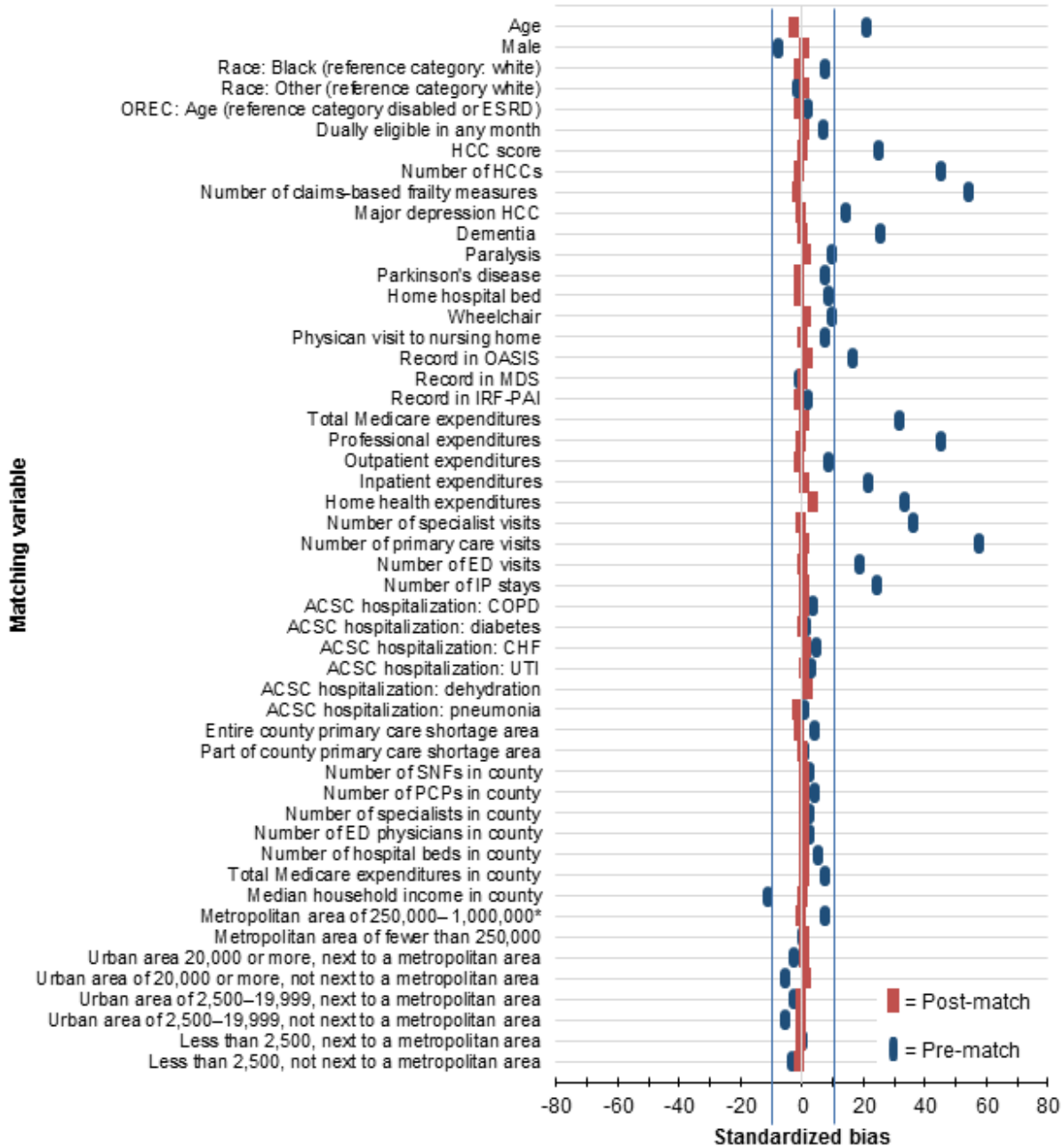
Table D.5. Matching model diagnostics: January–March 2016

	Pseudo R2	Mean bias (percent)	Median bias (percent)	Standardized difference of the means of the propensity scores	Ratio of variance of the propensity scores
Unmatched	0.075	14.7	9.0	0.847	1.93
Matched	0.002	1.2	0.8	0.111	1.05

Source: Medicare 2014–2016 FFS claims and enrollment data.

Note: Sample sizes: CCM = 80,372; unmatched comparison = 5,422,612; matched comparison = 61,226. The number of unmatched comparison beneficiaries differs from what is presented in Table III.7 because only observations that had a propensity score estimated and were on support are included in the matching diagnostics.

Figure D.6. Standardized bias before and after matching: April–June 2016



Source: 2014–2016 Medicare claims and enrollment data.

* Reference category: no part of county a primary care shortage area.

** Reference categories for size of county: metropolitan area of 1,000,000 or more.

OREC = original reason for entitlement category; ED = emergency department; HCC = hierarchical condition category; OASIS = Outcome and Information Set; MDS = Nursing Facility Minimum Data Set; IRF-PAI = Inpatient Rehabilitation Facility Patient Assessment Instrument; ACSC = ambulatory care sensitive condition; COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure; UTI = urinary tract infection; SNF = skilled nursing facility.

Table D.6. Matching model diagnostics: April–June 2016

	Pseudo R ²	Mean bias (percent)	Median bias (percent)	Standardized difference of the means of the propensity scores	Ratio of variance of the propensity scores
Unmatched	0.082	12.4	7.1	0.850	2.16
Matched	0.001	0.8	0.6	0.088	1.03

Source: Medicare 2014–2016 FFS claims and enrollment data.

Note: Sample sizes: CCM = 80,836; unmatched comparison = 5,415,072; matched comparison = 60,896. The number of unmatched comparison beneficiaries differs from what is presented in Table III.7 because only observations that had a propensity score estimated and were on support are included in the matching diagnostics.

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APPENDIX E:

DESCRIPTION OF OUTCOME MEASURES

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This appendix presents descriptions of the outcome measures included in our quantitative analysis. We constructed two versions of the measures: one for the 12 months prior to the first receipt of CCM services and one for the 12 months after the first receipt of CCM services. We assign a CCM beneficiary's date of first CCM service to his or her matched comparison beneficiary. We annualized expenditure and count measures, such as number of ED visits, by dividing the expenditure or count by the fraction of months a person was enrolled in Medicare FFS Parts A and B during the 12-month observation period.

A. Expenditures

1. Total and Claim-type Expenditures

Expenditures were calculated for each claim type (inpatient, outpatient, professional, durable medical equipment, home health, skilled nursing facility, and hospice) by summing the claim-level payment variable per beneficiary during our observation period. All expenditures above the 99th percentile are assigned the value of the 99th percentile. For the total expenditures measure, we summed the claim-level payment amount across all claim types. The claim "from date" was used to identify the service start and admission date in the case of inpatient claims.

2. BETOS Expenditures

We also constructed the expenditure measures (Table E.1) based on the Berenson-Eggers Type of Service (BETOS) categories:

Table E.1. BETOS expenditure outcome measures

Expenditure measure	BETOS codes
Procedures	
Major procedures, other	P1A-P1G
Major procedures, cardiovascular	P2A-P2F
Cataract removal	P4B
Ambulatory	P5A-P5E
Minor	P6A-P6D
Endoscopy	P8A-P8I
Imaging	
Standard	I1A-I1F
Advanced	I2A-I2D
Echography	I3A-I3F
Tests	
Lab	T1A-T1H
Other	T2A-T2D

To construct the measures, we summed the NCH_PMT_AMT on the line with the associated BETOS code in the carrier file. We used the EXPNSDT1 to identify the date of service.

B. Utilization

1. Number of ED Visits

This measure includes ED visits identified from outpatient data that did not lead to a hospital admission. Visits were identified if either of the conditions below were satisfied:

- If any line item in the outpatient claim had a revenue center code with a value of 0450, 0451, 0452, 0456, 0459, 0981
- If the claim had a revenue center code with a value of 0760 or 0762 and a CPT code of G0378

In the event where there were two ED visits for the same beneficiary on the same day, they were combined into one ED visit. However back-to-back visits on subsequent days remained as two separate ED visits.

2. Number of Inpatient Stays

To identify inpatient stays, we searched inpatient files for claims coded 60, which denote an inpatient claim. We then looked for a four-digit number under “provider” that was between 0001 and 0899 (representing short-term hospitals and hospitals participating in demonstrations) or between 1300 and 1399 (representing critical access hospitals). In cases where the discharge date of an inpatient stay was the same as the admission date for a second hospital stay, we counted the stay as a single one, using the admission date from the first claim and the discharge date from the second.

3. Hospice Utilization

A beneficiary was identified as using hospice if he or she had a record in the hospice claims file.

4. Number of Primary Care Visits

Primary care visits were identified if either of the following conditions were satisfied:

- A claim in the carrier file with a BETOS code M1A, M1B, M2A, M2B, M2C, M3, M4A, or M4B, or HCPCS code G0438 or G0439 from Part B claim lines where the performing provider (PRFNPI) has a primary care taxonomy code 1, 8, 11, 37, 38, 50, 89, 97, or 99 (Table E.2) at the Part B claim line item level. If the primary taxonomy code was missing for the performing provider, then we used the HCFASPCL field that is on the Part B claim line.
- A claim in the outpatient file for a visit to a federally qualified health center defined by the facility type and type of service data elements (FAC_TYPE=7 and TYPESRVC=7) and has a revenue code 0521 or 0522, and where the attending NPI (AT_NPI) has a primary care taxonomy code (1, 8, 11, 37, 38, 50, 89, 97, or 99). If the attending provider was missing, we checked the other provider fields for specialty (OP_NPI, OT_NPI). If they were missing as well, we assumed the provider is a PCP.

Table E.2. Primary care taxonomy codes

Medicare specialty code	Medicare provider / supplier type description	Provider taxonomy code	Provider taxonomy description
01	Physician/General Practice	208D00000X	Allopathic & Osteopathic Physicians/General Practice
08	Physician/Family Practice	207Q00000X	Allopathic & Osteopathic Physicians/Family Medicine
		207QA0000X	Allopathic & Osteopathic Physicians/Family Medicine, Adolescent Medicine
		207QA0505X	Allopathic & Osteopathic Physicians/Family Medicine, Adult Medicine
		207QG0300X	Allopathic & Osteopathic Physicians/Family Medicine, Geriatric Medicine
11	Physician/Internal Medicine	207R00000X	Allopathic & Osteopathic Physicians/Internal Medicine
		207RA0000X	Allopathic & Osteopathic Physicians/Internal Medicine, Adolescent Medicine
		207RG0300X	Allopathic & Osteopathic Physicians/Internal Medicine, Geriatric Medicine
37	Physician/Pediatric Medicine	208000000X	Allopathic & Osteopathic Physicians/Pediatrics
		2080A0000X	Allopathic & Osteopathic Physicians/Pediatrics, Adolescent Medicine
38	Physician/Geriatric Medicine	207RG0300X	Allopathic & Osteopathic Physicians/Internal Medicine, Geriatric Medicine
		207QG0300X	Allopathic & Osteopathic Physicians/Family Medicine, Geriatric Medicine
50	Nurse Practitioner	363L00000X	Physician Assistants & Advanced Practice Nursing Providers/Nurse Practitioner
		363LA2200X	Physician Assistants & Advanced Practice Nursing Providers/Nurse Practitioner, Adult Health
		363LF0000X	Physician Assistants & Advanced Practice Nursing Providers/Nurse Practitioner, Family
		363LG0600X	Physician Assistants & Advanced Practice Nursing Providers/Nurse Practitioner, Gerontology
		363LP0200X	Physician Assistants & Advanced Practice Nursing Providers/Nurse Practitioner, Pediatrics
		363LP2300X	Physician Assistants & Advanced Practice Nursing Providers/Nurse Practitioner, Primary Care

Medicare specialty code	Medicare provider / supplier type description	Provider taxonomy code	Provider taxonomy description
89	Certified Clinical Nurse Specialist	364S00000X	Physician Assistants & Advanced Practice Nursing Providers/Clinical Nurse Specialist
		364SA2200X	Physician Assistants & Advanced Practice Nursing Providers/Clinical Nurse Specialist, Adult Health
		364SC2300X	Physician Assistants & Advanced Practice Nursing Providers/Clinical Nurse Specialist, Chronic Care
		364SF0001X	Physician Assistants & Advanced Practice Nursing Providers/Clinical Nurse Specialist, Family Health
		364SG0600X	Physician Assistants & Advanced Practice Nursing Providers/Clinical Nurse Specialist, Gerontology
		364SH1100X	Physician Assistants & Advanced Practice Nursing Providers/Clinical Nurse Specialist, Holistic
		364SP0200X	Physician Assistants & Advanced Practice Nursing Providers/Clinical Nurse Specialist, Pediatrics
		364SS0200X	Physician Assistants & Advanced Practice Nursing Providers/Clinical Nurse Specialist, School
97	Physician Assistant	363A00000X	Physician Assistants & Advanced Practice Nursing Providers/Physician Assistant
		363AM0700X	Physician Assistants & Advanced Practice Nursing Providers/Physician Assistant, Medical
99	Physician/Undefined Physician Type	208D00000X	Allopathic & Osteopathic Physicians/General Practice
B4	Federally Qualified Health Center	261QF0400X	Ambulatory Health Care Facilities/ FQHC
		261QR1300X	Ambulatory Health Care Facilities/Clinic Center, Rural Health

5. Number of Specialist Visits

Specialist visits were identified if either of the following conditions were satisfied:

- A claim in the carrier file with a BETOS code M1A, M1B, M2A, M2B, M2C, M3, M4A, M4B, M5A, M5B, M5C, M5D, M6 from Part B claim lines where the performing provider (PRFNPI) does not have a primary care taxonomy code (1, 8, 11, 37, 38, 50, 89, 97, or 99) at the Part B claim line item level. If the primary taxonomy code were missing for the performing provider, then we used the HCFASPCL field that is on the Part B claim line.
- A claim in the outpatient file for a visit to a federally qualified health center defined by the facility type and type of service data elements (FAC_TYPE=7 and TYPESRVC=7) and has a revenue code 0521 or 0522, and where the attending NPI (AT_NPI) does not have a primary care taxonomy code (1, 8, 11, 37, 38, 50, 89, 97, or 99). If the attending provider was missing, we checked the other provider fields for specialty (OP_NPI, OT_NPI). If they

were missing as well, we assumed the provider is a primary care provider and not a specialist.

C. Quality of Care

Hospitalizations for potentially preventable conditions. We identified beneficiaries who had an admission for one of six potentially preventable conditions (chronic obstructive pulmonary disease, diabetes, congestive heart failure, urinary tract infection, dehydration, and pneumonia) using the logic from the Agency for Healthcare Research and Quality's (AHRQ) Prevention Quality Indicators. We used the portions of AHRQ's code that flag hospitalizations that are potentially preventable based on admission diagnosis codes, specifically the principal diagnosis from inpatient claims. More detail on the codes included in these measures may be found on the AHRQ website: http://www.qualityindicators.ahrq.gov/Modules/pqi_resources.aspx.

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APPENDIX F:

**6- AND 12-MONTH MEDICARE EXPENDITURE, UTILIZATION, AND QUALITY
OF CARE IMPACT ESTIMATES**

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Table F.1. Estimated PBPM differences between CCM and comparison beneficiaries: 6- and 18-month expenditure outcomes (without CCM fee)

	6-month outcomes			18-month outcomes		
	Non-CCM	CCM	Difference (CCM minus non-CCM)	Non-CCM	CCM	Difference (CCM minus non-CCM)
Average total Medicare expenditures (\$)						
Pre-CCM	1,317	1,291	-26***	1,376	1,346	-30**
Post-CCM	1,502	1,491	-12	1,644	1,541	-104***
Difference (CCM minus non-CCM)	185***	200***	14*	269***	195***	-74***
Average inpatient Medicare expenditures (\$)						
Pre-CCM	451	424	-27***	474	438	-36***
Post-CCM	517	488	-29***	596	516	-80***
Difference (CCM minus non-CCM)	66***	64***	-2	122***	78***	-44***
Average outpatient Medicare expenditures (\$)						
Pre-CCM	169	167	-2*	166	168	2
Post-CCM	199	189	-10***	206	185	-20***
Difference (CCM minus non-CCM)	30***	22***	-8***	40***	18***	-22***
Average professional Medicare expenditures (\$)						
Pre-CCM	384	375	-9***	400	388	-12***
Post-CCM	394	416	22***	410	416	6***
Difference (CCM minus non-CCM)	10***	41***	31***	10***	28***	18***
Average durable medical equipment Medicare expenditures (\$)						
Pre-CCM	26	27	1***	28	29	2***
Post-CCM	27	29	2***	30	32	2***
Difference (CCM minus non-CCM)	1***	2***	1***	3***	3***	0
Average home health Medicare expenditures (\$)						
Pre-CCM	127	124	-3**	155	147	-8**
Post-CCM	123	135	12***	136	145	8***
Difference (CCM minus non-CCM)	-4***	11***	15***	-18***	-3	16***
Average skilled nursing facility Medicare expenditures (\$)						
Pre-CCM	100	112	12***	112	121	10***
Post-CCM	125	123	-2	157	140	-17***
Difference (CCM minus non-CCM)	25***	11***	-14***	46***	19***	-27***
Average hospice Medicare expenditures (\$)						
Pre-CCM	10	13	3***	9	16	7***
Post-CCM	35	38	3	58	63	5
Difference (CCM minus non-CCM)	25***	25***	0	49***	46***	-2

Source: Medicare 2014–2016 enrollment and FFS claims data.

Note: 6-month outcomes: CCM beneficiaries = 434,433 and comparison beneficiaries = 324,801.

The baseline period in the 6-month difference-in-differences estimation is the 12 months prior to the first receipt of CCM services for CCM beneficiaries and the 12 months prior to the quarter of matching for the comparison beneficiaries.

18-month outcomes: CCM beneficiaries = 130,646 and comparison beneficiaries = 97,091.

The baseline period in the 18-month difference-in-differences estimation is the 12 months prior to the first receipt of CCM services for CCM beneficiaries and the 12 months prior to the quarter of matching for the comparison beneficiaries due to data availability.

Green shaded cells are the difference-in-differences estimate.

*Significantly different from zero at the .05 level, two-tailed test.

**Significantly different from zero at the .01 level, two-tailed test.

***Significantly different from zero at the .001 level, two-tailed test.

Table F.2. Estimated differences between CCM and comparison beneficiaries: 6- and 18-month utilization outcomes

	6-month outcomes			18-month outcomes		
	Non-CCM	CCM	Difference (CCM minus non-CCM)	Non-CCM	CCM	Difference (CCM minus non-CCM)
Average number of primary care visits						
Pre-CCM	5.1	5.6	0.5***	10.8	10.9	0.1
Post-CCM	5.0	5.7	0.7***	15.8	17.7	1.9***
Difference (CCM minus non-CCM)	-0.1***	0.1**	0.2***	5***	6.8***	1.8***
Average number of specialty visits						
Pre-CCM	6.0	6.2	0.2***	11.9	12.0	0.1
Post-CCM	6.3	6.5	0.2**	19.4	19.2	-0.2
Difference (CCM minus non-CCM)	0.3***	0.3***	0.0	7.5***	7.2***	-0.3***
Emergency department visits, including observation stays (per 1,000 beneficiaries)						
Pre-CCM	309	332	23***	615	609	-6
Post-CCM	331	323	-8**	1,035	953	-82***
Difference (CCM minus non-CCM)	22***	-9***	-31***	420***	344***	-76***
Hospitalizations (per 1,000 beneficiaries)						
Pre-CCM	236	267	31***	476	489	13*
Post-CCM	287	286	-1	967	881	-86***
Difference (CCM minus non-CCM)	50***	19***	-32***	491***	392***	-99***
Likelihood of hospice utilization (%)						
Pre-CCM	0.7	0.9	0.2**	0.9	1.3	0.4***
Post-CCM	2.5	3.3	0.8***	7.6	8.5	0.9**
Difference (CCM minus non-CCM)	1.8***	2.4***	0.6*	6.7***	7.2***	0.5***

Source: Medicare 2014–2016 enrollment and FFS claims data.

Note: 6-month outcomes: CCM beneficiaries = 434,433 and comparison beneficiaries = 324,801.

The baseline period in the 6-month difference-in-differences estimation is the 6 months prior to the first receipt of CCM services for CCM beneficiaries and the 6 months prior to the quarter of matching for the comparison beneficiaries to ensure symmetric baseline and follow-up periods for non-PBPM outcomes.

18-month outcomes: CCM beneficiaries = 130,646 and comparison beneficiaries = 97,091.

The baseline period in the 18-month difference-in-differences estimation is the 12 months prior to the first receipt of CCM services for CCM beneficiaries and the 12 months prior to the quarter of matching for the comparison beneficiaries due to data availability.

Green shaded cells are the difference-in-differences estimate.

*Significantly different from zero at the .05 level, two-tailed test.

**Significantly different from zero at the .01 level, two-tailed test.

***Significantly different from zero at the .001 level, two-tailed test.

Table F.3. Estimated differences between CCM and comparison beneficiaries: 6- and 18-month quality of care outcomes

	6-month outcomes			18-month outcomes		
	Non-CCM	CCM	Difference (CCM minus non-CCM)	Non-CCM	CCM	Difference (CCM minus non-CCM)
Likelihood of hospitalization with a primary diagnosis of diabetes (%)						
Pre-CCM	0.3	0.4	0.1***	0.8	0.8	0.0
Post-CCM	0.4	0.3	0	1.0	1.0	0.0
Difference (CCM minus non-CCM)	0.1***	0.0**	-0.1***	0.2***	0.2***	0.0
Likelihood of hospitalization with a primary diagnosis of COPD (%)						
Pre-CCM	0.6	0.8	0.2***	1.2	1.4	0.2***
Post-CCM	0.7	0.7	0	1.8	1.8	0
Difference (CCM minus non-CCM)	0.1***	-0.1***	-0.2***	0.6***	0.4***	-0.2*
Likelihood of hospitalization with a primary diagnosis of CHF (%)						
Pre-CCM	0.9	1.1	0.2***	1.6	1.9	0.3***
Post-CCM	1.0	1.0	0	2.8	2.6	-0.2**
Difference (CCM minus non-CCM)	0.2***	-0.1***	-0.2***	1.2***	0.7***	-0.5***
Likelihood of hospitalization with a primary diagnosis of UTI (%)						
Pre-CCM	0.5	0.7	0.2***	1.2	1.3	0.1**
Post-CCM	0.7	0.7	0*	2.0	2.0	0.0
Difference (CCM minus non-CCM)	0.2***	0.0	-0.2***	0.8***	0.7***	-0.1**
Likelihood of hospitalization with a primary diagnosis of dehydration (%)						
Pre-CCM	0.4	0.5	0.1***	0.7	0.9	0.2***
Post-CCM	0.5	0.6	0.1***	1.6	1.6	0.0
Difference (CCM minus non-CCM)	0.1***	0.1***	0***	0.9***	0.7***	-0.2**
Likelihood of hospitalization with a primary diagnosis of pneumonia (%)						
Pre-CCM	0.6	0.8	0.2***	1.2	1.4	0.2***
Post-CCM	0.8	0.7	0	2.2	2.1	-0.1
Difference (CCM minus non-CCM)	0.1***	-0.1***	-0.2***	1.0***	0.7***	-0.3**

Source: Medicare 2014–2016 enrollment and FFS claims data.

Note: 6-month outcomes: CCM beneficiaries = 434,433 and comparison beneficiaries = 324,801.

The baseline period in the 6-month difference-in-differences estimation is the 6 months prior to the first receipt of CCM services for CCM beneficiaries and the 6 months prior to the quarter of matching for the comparison beneficiaries to ensure symmetric baseline and follow-up periods for non-PBPM outcomes.

18-month outcomes: CCM beneficiaries = 130,646 and comparison beneficiaries = 97,091.

The baseline period in the 18-month difference-in-differences estimation is the 12 months prior to the first receipt of CCM services for CCM beneficiaries and the 12 months prior to the quarter of matching for the comparison beneficiaries due to data availability.

Green shaded cells are the difference-in-differences estimate.

*Significantly different from zero at the .05 level, two-tailed test.

**Significantly different from zero at the .01 level, two-tailed test.

***Significantly different from zero at the .001 level, two-tailed test.

COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure; UTI = urinary tract infection

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APPENDIX G:

**SENSITIVITY TESTS FOR 6- AND 18-MONTH PBPM TOTAL MEDICARE
EXPENDITURE IMPACT ESTIMATES**

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Table G.1. Sensitivity tests for 6- and 18-month PBPM total Medicare expenditure outcome (without CCM fee)

	6-month outcomes			18-month outcomes		
	Non-CCM	CCM	Difference (CCM minus non-CCM)	Non-CCM	CCM	Difference (CCM minus non-CCM)
Excluded CCM beneficiaries with only one month of CCM services (\$) ^a						
Pre-CCM	1,290	1,268	-22**	1,349	1,327	-22
Post-CCM	1,485	1,456	-29**	1,648	1,531	-117***
Difference (CCM minus non-CCM)	195***	188***	-7	299***	204***	-95***
Excluded CCM beneficiaries who died (\$) ^b						
Pre-CCM	1,286	1,253	-33***	1,316	1,274	-41**
Post-CCM	1,436	1,417	-19*	1,497	1,419	-78***
Difference (CCM minus non-CCM)	151***	164***	14	181***	144***	-37**
No control variables (\$) ^c						
Pre-CCM	1,331	1,313	-17	1,458	1,425	-33
Post-CCM	1,504	1,491	-14	1,653	1,541	-112***
Difference (CCM minus non-CCM)	174***	177***	3	195***	115***	-79***
Non-top-coded expenditures (\$) ^c						
Pre-CCM	1,401	1,341	-61***	1,388	1,347	-40**
Post-CCM	1,592	1,555	-36*	1,687	1,574	-113***
Difference (CCM minus non-CCM)	190***	215***	25***	299***	226***	-73***

Source: Medicare 2014–2016 enrollment and FFS claims data.

Note: Green shaded cells are the difference-in-differences estimate.

^a 6-month: Number of CCM beneficiaries = 359,600 and number of comparison beneficiaries = 248,928.

18-month: Number of CCM beneficiaries = 72,205 and number of comparison beneficiaries = 111,966.

^b 6-month: Number of CCM beneficiaries = 423,384 and number of comparison beneficiaries = 318,040.

18-month: Number of CCM beneficiaries = 119,998 and number of comparison beneficiaries = 86,472.

^c 6-month: Number of CCM beneficiaries = 434,433 and number of comparison beneficiaries = 324,801.

18-month: Number of CCM beneficiaries = 130,646 and number of comparison beneficiaries = 97,091.

*Significantly different from zero at the .10 level, two-tailed test.

**Significantly different from zero at the .05 level, two-tailed test.

***Significantly different from zero at the .01 level, two-tailed test.

PBPM = per-beneficiary-per-month

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