

Exploring Patient Spending in an ACO-Sponsored Care Management Program: A Case Study

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ABSTRACT

Objectives: This case study was designed to examine patient spending before and after participation in an accountable care organization care management program.

Study Design: Interrupted time series cohort case study.

Methods: Data include 2 years of the care management program, 2017-2018, and 2692 Medicare beneficiaries. Patients in this group were compared with 2 matched comparison groups derived from fee-for-service beneficiaries. The care management program includes a medical model of care coordination while also embedding a process to screen for and address social determinants of health. The care management team includes registered nurse care coordinators, certified pharmacy technicians, licensed clinical social workers, clinical pharmacists, and community paramedics. Patient spending was defined as the Medicare allowed amount on paid claims and included the Medicare payment for services along with the Medicare beneficiaries' out-of-pocket costs.

Results: Findings from this case study indicate that despite increases in per-beneficiary per-month spending at the start of the observation period for individuals in this particular care management program, spending during the next 14 months decreased by a mean of \$74 per participant each month. After 24 months, per-beneficiary per-month spending had increased the least in the care management group vs the comparison groups.

Conclusion: Patients enrolled in our multidisciplinary care management program designed to address social determinants of health saw spending reductions. However, these reductions in spending took time to materialize. Thus, we learned the value of long-term data when studying our care management programs.

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Health care costs in the United States are at an all-time high and continue to increase.¹ Strategies to reduce spending continue to be developed and tested. One approach is accountable care organizations (ACOs), which bring a team of health care providers and hospitals together to collaborate on care to reduce costs and maintain quality of care for patients.² The primary goals of an ACO are to prevent medical errors, reduce service duplication, and ensure that patients with complex needs and health conditions receive the right care at the right time.³ ACOs have been shown to decrease emergency department (ED) and inpatient use and improve measures of preventive care and chronic disease management.⁴ Previous research has found that ACO-affiliated hospitals are using care coordination strategies to a greater extent than hospitals not affiliated with ACOs.⁵

The Medicare Shared Savings Program is CMS' flagship ACO program and includes our ACO in western North Carolina (Mission Health Partners [MHP]), which integrates and coordinates care for 3 hospital systems, independent practices, and an Area Health Education Center. Care management is a broad category of services designed to coordinate care across health care settings, address psychosocial needs, and improve outcomes for patients with complex health needs. Numerous studies have shown that care management can be an effective tool for reducing costs among patients who frequently use health care services such as emergency care or hospital admissions.⁶ Qualitative data also indicate that both physicians and hospitals see the value in care management as a key strategy for success in providing high-quality, value-based health care.⁷

Several studies have found that positive impacts of care management include significant reductions in hospital use, readmission, and ED use rates along with increases in patient engagement rates and care satisfaction.^{6,8-11} Hudon and colleagues⁶ also noted certain trends in the most

effective care management programs. Specifically, targeted interventions for patients with complex health care needs were correlated with positive clinical outcomes and reduced costs and utilization. However, 2 recent studies' findings indicate little to no difference in outcomes for ACOs that report having more comprehensive care management practices.^{12,13} These mixed results warrant further investigation into ACO care management programs.

Importantly, few studies have examined patient spending within a care management program, especially over an extended period. Although some health care spending may be more acute, it is important to examine spending over time to determine the sustainability of these programs in reducing costs. One recent study found a 22% reduction in total medical expenditures 6 months after a care management program compared with a matched control group.⁹ In addition, Hsu and colleagues⁸ found that participation in a care management program was associated with a 6% reduction in spending among participants, although results reached significance only after 6 months in the program. Last, in a study comparing care management with usual care across 12 months, participation in the care management program was associated with a \$7732 reduction in spending per patient per year.¹¹ Although these results are encouraging, additional research is warranted, especially over longer durations. Thus, the purpose of this case study was to examine patient spending over a 24-month period before and after participation in our ACO care management program that combines a medical model of care management strategies with a system to address social needs.

MATERIALS AND METHODS

Study Population

Data for this study include all Medicare institutional (Part A) and clinician (Part B) bills for beneficiaries in the study for 12 months before and 12 months after enrollment in our care management group or selection into a comparison group. Eligibility information and other demographics were derived from the Master Beneficiary Summary File (MBSF), an annual enrollment file from CMS.

Our care management program started in 2015 in Asheville, North Carolina. This study focuses on 2 years of our care management program, 2017 through 2018, and includes 2692 Medicare beneficiaries. The ACO as a whole included approximately 52,000 beneficiaries during the study period.

Two matched comparison groups were derived from fee-for-service (FFS) beneficiaries residing in North Carolina but outside the 20-county area in the northwestern part of the state that makes up the MHP catchment area. To be eligible

for matching, beneficiaries needed to have had 24 continuous months of Part A and Part B coverage and no end-stage cancer or transplant. Those with end-stage renal disorder were retained in the sample because these beneficiaries are eligible for the ACO and care management. One comparison group comprised beneficiaries assigned to non-MHP ACOs in North Carolina, and the other group was attributable but not assigned to an ACO (traditional FFS).

Given the large number of beneficiaries available for matching, we used a 2:1 caliper matching with a 1-SD caliper. Beneficiaries were matched on reason for entitlement (disability, dually eligible for Medicaid and Medicare), sum of Elixhauser comorbidities, heart failure/valve disorder, and diabetes with replacement.

Intervention

The MHP ACO's care coordination strategy provides a medical model of care coordination while embedding a process to screen for and address social determinants of health. The care management team includes registered nurse (RN) care coordinators, certified pharmacy technicians, licensed clinical social workers (LCSWs), clinical pharmacists, community resource specialists, and community paramedics. Using clinical cost and utilization data, the team identifies patients who could benefit most from care coordination. Primary care providers, specialists, health systems, and human service organizations refer identified patients to care coordination services at MHP. Through partnerships with the patients' primary care providers and other partners in the community, the care management team connects patients with the resources they need. The team supports patient transitions in care after hospital or ED visits, and team members review medication changes and ensure that the patient has a plan for filling and taking medications as prescribed.

After a referral, a hospitalization, or identification of a high-cost/high-utilizing patient, the RN or LCSW would reach out to the member to obtain consent and complete an initial assessment. Patients were assigned to care coordinators in the MHP team based on their primary care provider. Every practice in the ACO had an RN care coordinator and an LCSW who would provide direct care coordination services, depending on the patient's primary needs. Patients included in the study had at least 1 care coordination interaction. If needs were identified, a care plan was developed and care managers provided services for a mean of 3 to 6 months until the plan was complete. Nurses followed medically complex patients and served a minimum caseload of 40. Social workers followed patients with behavioral health conditions and carried a caseload of at least 25, as they were commonly used

Table 1. Demographics for the Care Management and Comparison Groups

	Care management	Population without care management	ACO and FFS combined	P comparing care management and ACO/FFS combined
Total, n	2692	52,257	5384	—
Female sex, %	57	58	59	.171
White race, %	94	95	73	<.0001
Age in years, mean	71.51	72.00	71.11	.177
Dual Medicaid-Medicare eligibility, %	31	16	31	>.99
Chronic disease, %				
ESRD	3	0	3	.928
Heart failure	44	—	44	>.99
Diabetes	38	—	38	>.99
Disabled, %	22	14	22	.027
Mean Elixhauser sum (range, 0-30)	5.16	2.81	5.16	.558

ACO, accountable care organization; ESRD, end-stage renal disease; FFS, fee-for-service.

to consult on medical patients. The nurse care coordinator or social worker working with the patient engaged additional team members based on medication, social service, behavioral health, or home assessment and treatment needs. Community paramedics were used to complete home assessments, provide health education, and coordinate with the care team to support patients' health goals.

This chronic care management initial assessment took 2 to 3 phone encounters lasting a minimum of 3 hours total. This assessment process was thorough, including medical, behavioral health, and social history and needs. A care plan was created with the patient focusing on goals and action steps for the patient and care coordinator. During initial outreach, the care coordinator would assess for a home visit need, and if the patient agreed, a community paramedic would make a home visit to inventory the patient's medications, provide health education, and complete a home safety assessment. If patients had social barriers, such as food insecurity, the paramedic would take a food box with them on the home visit as needed and available.

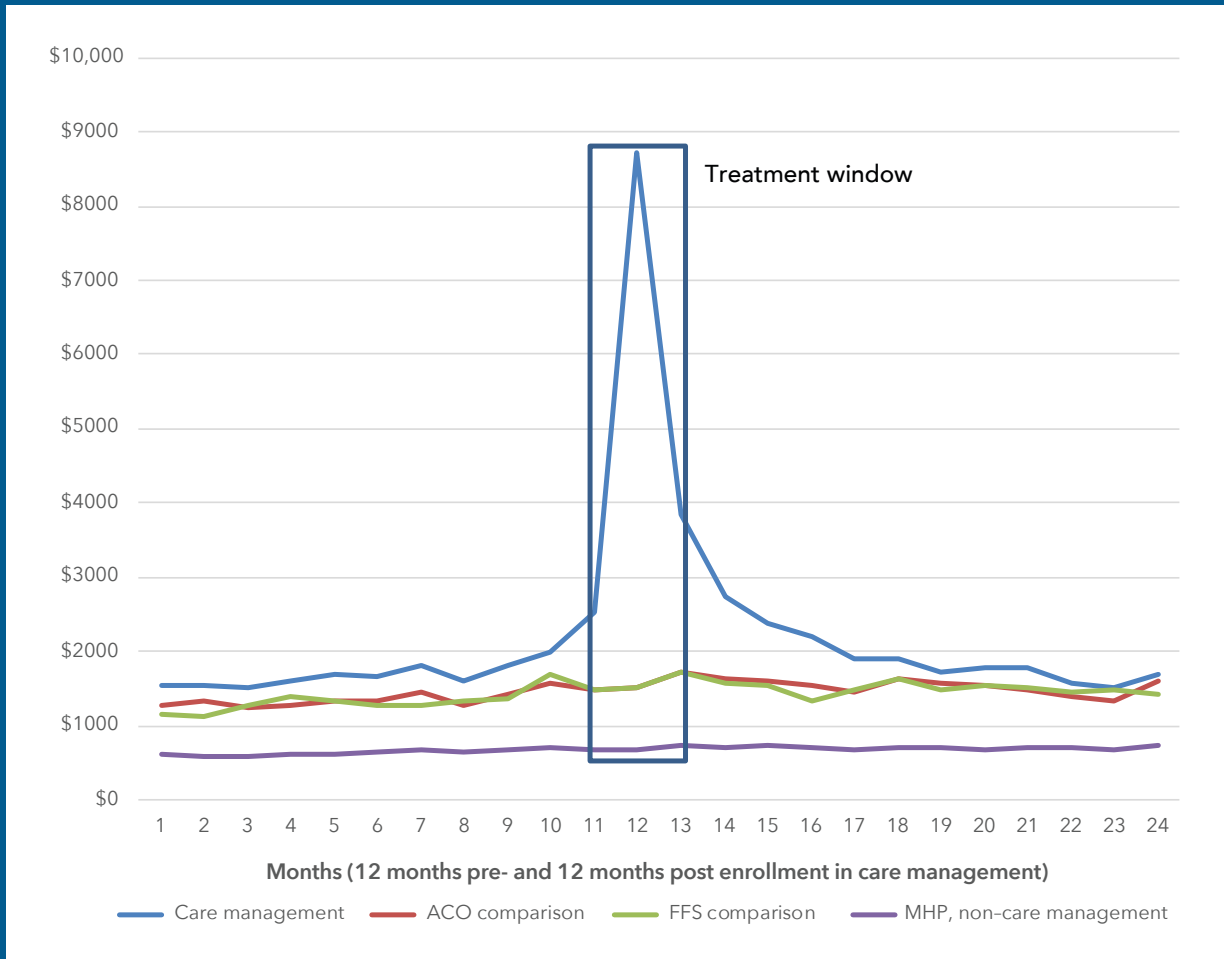
In addition, the team built solid relationships with community partners, expanding their scope and ensuring that patients received local and specialized assistance when necessary, including addressing various social, medical, and behavioral health goals. If a social need was identified, a community resource specialist referred patients to human

service organizations through the population health platform and then tracked the progress of the referral to its completion. The community resource specialist would ensure that the patient connected with the referred resource and the identified barriers were being successfully addressed. This type of closed-loop referral process is just emerging in the field of care management. In 2017 and 2018, the team documented 1134 referrals for social needs, including assistance with medication costs, transportation, food, legal needs, and housing. The MHP care management model is built on a holistic approach to incorporate medical, behavioral health, and social determinant goals in the plan of care.

Study Variables

Cost was defined as the Medicare allowed amount on paid claims, including the Medicare payment for services and the Medicare beneficiaries' out-of-pocket costs. Total cost of care was defined as the sum of total Part A, or inpatient, allowed amounts and total Part B, or clinician, allowed amounts for the preenrollment and postenrollment periods. All ambulatory ED visits were identified using clinician bills (Part B) with a service code for an ED visit (99281-99285). Each billing event was counted as a single visit. Finally, inpatient admissions were calculated by the presence of an inpatient bill for an acute care stay (Part A) during the preintervention or postintervention period.

Figure. Costs for Care Management Beneficiaries vs Comparison Groups and MHP (Non-Care Management), 2017-2018



ACO, accountable care organization; FFS, fee-for-service; MHP, Mission Health Partners.

Table 2. Unadjusted Per-Beneficiary Per-Month Spending by Group

	Baseline	12 months	24 months	Difference, 24 months – baseline
Care management	\$1533	\$8712	\$1701	\$168
ACO comparison	\$1278	\$1518	\$1589	\$311
FFS comparison	\$1259	\$1501	\$1431	\$272

ACO, accountable care organization; FFS, fee-for-service.

Table 3. Interrupted Time Series Model for Total Cost of Care by Group, Care Management vs the ACO and FFS Comparison Groups

	ACO		FFS	
	Parameter estimate	P	Parameter estimate	P
Intercept	\$1240	<.0001	\$1186	<.0001
Time (in months)	\$16	.002	\$18	.0007
Care management ^a	\$414	<.0001	\$456	<.0001
Treatment ^b	\$767	<.0001	\$755	<.0001
Time by treatment ^c	-\$115	<.0001	-\$117	<.0001
Adjusted R ²	0.71		0.73	

ACO, accountable care organization; FFS, fee-for-service.

^aCare management indicates that a beneficiary was enrolled in Mission Health Partners ACO care management at the start of the study.

^bTreatment is an indicator for the start of treatment. This parameter estimate indicates the change in slope after the start of the intervention.

^cTime by treatment is an interaction term that captures the change in slope after the start of the intervention. This is the primary parameter of interest.

Table 4. Interrupted Time Series Model for Total Cost of Care by Group, Care Management vs the ACO and FFS Comparison Groups With Treatment Window Dropped

	ACO				FFS			
	Parameter estimate	SE	T test	P	Parameter estimate	SE	T test	P
Intercept	\$1266	42	30	<.0001	\$1199	39	31	<.0001
Time	\$12	3	4	.0002	\$14	3	6	<.0001
Care management ^a	\$314	44	7	<.0001	\$368	41	9	<.0001
Treatment ^b	\$547	111	5	<.0001	\$528	103	5	<.0001
Time by treatment ^c	-\$73	13	-6	<.0001	-\$75	12	-6	<.0001
Adjusted R ²	0.79				0.84			

ACO, accountable care organization; FFS, fee-for-service.

^aCare management indicates that a beneficiary was enrolled in Mission Health Partners ACO care management at the start of the study.

^bTreatment is an indicator for the start of treatment. This parameter estimate indicates the change in slope after the start of the intervention.

^cTime by treatment is an interaction term that captures the change in slope after the start of the intervention. This is the primary parameter of interest.

Dual Medicaid-Medicare eligibility status was defined as 1 or more months of state buy-in, meaning the state subsidized the beneficiary's Medicare premium for at least 1 month during the calendar year (as indicated in the MBSF). This variable serves as a proxy for poverty and identifies approximately 75% of dually eligible beneficiaries. Disability status was defined by disability as the original reason for entitlement.

Clinical severity for each beneficiary is captured by the Elixhauser comorbid conditions. The 30 comorbidities are identified through the diagnostic codes on all of a beneficiary's ambulatory (Part B) and institutional (Part A) paid claims in 2017. Individual comorbidity flags were used to identify beneficiaries with a major or minor diabetes event or a major cardiac event defined as heart failure or valve disease.

Statistical Analysis

Descriptive statistics were used to compare the treatment and comparison groups before and after matching. An interrupted time series analysis with 12 months before and 12 months after enrollment into care management or the comparison group was conducted to examine differences in patient spending before and after participation in care management. Because the periods before and after enrollment were marked by a steep rise and fall in costs for those in care management, the 1 month before and 1 month after enrollment were dropped from the analysis. This allowed a specific analysis on the slope and intercept of the “steady-state” period before and after the acute exacerbation time window associated with treatment entry. Each time series model included a covariate for time (measured in months), treatment status (0 for the comparison group and 1 for the treatment group), time since the start of treatment, and an interaction term of time and time since the start of treatment. The interaction term indicates a change in slope in the period after treatment. This model was initially run for the care management group alone and then with the comparison groups added. Models were estimated using ordinary least squares.

RESULTS

As shown in **Table 1** and the **eAppendix** (available at ajmc.com), our care management group was similar to the ACO and non-ACO comparison groups in terms of demographic and clinical factors except for valve disease, which was significantly higher in the care management group, and hypothyroidism and hypertension, which were both significantly higher in the comparison groups combined. All 3 groups had significantly higher rates of chronic illness than the remaining MHP ACO beneficiaries.

In terms of service utilization and health care expenditures, the **Figure** illustrates the pattern of per-beneficiary per-month (PBPM) spending, including the treatment phase for care management participants. This graphic shows that our care management group was more expensive than the 2 comparison groups at the start of the observation period. Over time, our care management group began to escalate in spending in the month before entering the program and then began to come down in spending a month later. However, it took almost 6 months for our care management group to come down in spending to their preescalation level.

In the unadjusted analysis (**Table 2**), our care management group started with \$1533 PBPM spending compared with \$1278 for the ACO group and \$1259 for the FFS group, reflecting the higher needs among patients in this group. This

pattern continued in the multivariate analysis (**Table 3**), where PBPM spending was higher for individuals in our care management program at the start of the observation period (by \$414 per month compared with the ACO group and \$456 per month compared with the FFS group). Despite this spike in spending during our care management program (by \$767 compared with the ACO group and \$755 compared with the FFS group), analyses demonstrate that once the treatment commenced, spending during the next 12 months in our care management group decreased by a mean of \$115 per participant each month compared with the ACO group and \$117 compared with the FFS group. By the end of the 24-month study period, PBPM spending had increased for all groups but had increased the least for our care management group (**Table 2**).

In **Table 4**, the same model is repeated, dropping out the month before and the month after entry into our care management program. As with the first set of models, higher spending was found upon entry into our program (by \$547 compared with the ACO comparison group and \$528 compared with the FFS comparison group). However, after the program commenced, this analysis showed that spending throughout the program in our care management group decreased by a mean of \$73 per participant each month compared with the ACO group and \$75 compared with the FFS group.

DISCUSSION

A primary goal of a care management program is to mitigate excess spending via the coordination of care across settings. In the present case study, reductions in patient spending were seen, especially when the spending spike was removed from analysis. After removing the high health care spending among patients in our care management program that triggered their enrollment, the drop in PBPM spending was \$116 for patients in our care management group.

The decrease in health care spending found in this case study is similar to results seen in previous research. In an examination of an ACO care management program using data on participants from 2009 to 2014, participation in the care management program was associated with a reduction in Medicare spending of \$101 per participant per month, a 6% decline.⁶ Similar to that found in our particular care management program, the decreases in health care spending took time. Specifically, Hsu and colleagues⁸ found that significance in reduced spending for the care management program was reached after only 6 months in the program. Another recent study demonstrated even larger decreases in spending among patients in a care management program.¹¹ Comparing 71 patients in a care management group with 127 patients in

usual care, Powers and colleagues¹¹ found a decrease in total medical expenditures of \$7732 per member per year among the care management group.

The present results show us that we need strategies to mitigate the spike in spending before entry into our care management program that reflects an increase in service use associated with acute illness exacerbation triggering enrollment of the ACO beneficiary in care management. The increase in cost before care management raises the question to us: Can beneficiaries be identified earlier? Also, after entry into our care management program, we learned that it takes many months for beneficiaries' costs to return to their preexacerbation baseline. These costs may be associated with complications or ongoing care needs after the acute illness exacerbation. We learned that we need to further investigate to examine whether these costs can be managed more effectively and reduced sooner.

Strengths and Limitations

Few studies have examined patient spending before and after participation in care management programs within ACOs. This study was strengthened by the inclusion of 2 comparison groups and an analysis of data over an extended period (24 months). Despite these strengths, several limitations must be considered when interpreting the results. First, this study included nonrandomized groups. However, on analysis, preintervention spending trends were similar by group. Although groups were matched on most variables, matching groups on escalation in spending is highly challenging because almost all high-acute, high-complexity beneficiaries in the area were already attributed to the MHP ACO. A challenge when examining health care spending in a care management program is finding a comparable comparison group.¹² Those in the treatment group are experiencing an acute health event and are thus sicker than clinically stable or healthy ACO beneficiaries. Thus, the phase of illness is an important consideration when matching. The approach used herein requires a relatively close match on multiple clinical factors but does not directly account for the acute exacerbation. This most likely explains the difference in mean spending PBPM at the start of the study and is an area for further development in the future. An additional limitation of this case study was that we did not examine changes in spending on prescriptions, a factor that could affect overall patient spending.

This study also included the examination of 1 specific ACO care management program, and results may vary among other programs, especially given the known diversity in these programs.¹³ Despite the encouraging results of this case study,

some previous research using survey data found no differences in health care spending associated with care management programs.¹⁴ For example, a study examining the association between the intensity of care management programs and health care spending across 1.4 million Medicare beneficiaries found no difference in annual spending between beneficiaries receiving the most and least care management.¹⁵ Determining the specific components of care management programs that are effective is key to ensuring the efficiency and sustainability of these programs. Some possible ways that care management interventions may reduce health care spending for beneficiaries include reducing ED visits, hospital readmissions, and complications associated with barriers to adherence. Understanding which elements of a program affect cost drivers is essential to ensuring long-term effectiveness of ACO care management models, and future research is needed in these areas.

CONCLUSIONS

Patient spending for high-need, high-cost Medicare beneficiaries decreased after participation in our specific care management program. Thus, our multidisciplinary approach to care coordination shows promise, and we learned the value of long-term data when examining our program. Because this is just 1 care management program and these programs vary widely, the potential of care management programs needs further study and should be considered in future design of the Medicare Shared Savings Program. Future analyses would also benefit from evaluation of program costs, regional social and cost drivers, other health service investments, and program characteristics when studying spending among participants in these types of programs.

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eAppendix. Disease Rates for the Care Management and Comparison Groups

	<i>Mission, Care Management</i>	<i>Mission, Population Without Care Management</i>	<i>ACO Comparison</i>	<i>FFS Comparison</i>	<i>ACO and FFS Combined Comparison</i>
Number	2,692	52,257	2,692	2,692	5,384
Congestive heart failure	0.26	0.07	0.28	0.29	0.29
Valvular disease	0.37	0.15	0.28	0.27	0.28
Pulmonary circulation disease	0.07	0.02	0.05	0.04	0.04
Peripheral vascular disease	0.21	0.10	0.22	0.21	0.21
Hypertension	0.72	0.59	0.81	0.83	0.82
Paralysis	0.03	0.01	0.03	0.05	0.04
Other neurological disorders	0.26	0.12	0.25	0.27	0.26
Chronic pulmonary disease	0.34	0.17	0.32	0.32	0.32
Diabetes without chronic complications	0.33	0.20	0.33	0.34	0.33
Diabetes with chronic complications	0.27	0.13	0.27	0.26	0.26
Hypothyroidism	0.20	0.18	0.25	0.26	0.26
Renal failure	0.23	0.10	0.25	0.25	0.25
Liver disease	0.09	0.04	0.09	0.09	0.09
Peptic ulcer disease x bleeding	0.02	0.01	0.03	0.03	0.03
Acquired immune deficiency syndrome	0.01	0.003	0.01	0.01	0.01
Lymphoma	0.02	0.01	0.02	0.01	0.02
Metastatic cancer	0.05	0.02	0.03	0.02	0.03
Solid tumor without metastasis	0.15	0.11	0.16	0.12	0.14
Rheumatoid arthritis/collagen vas	0.09	0.07	0.09	0.08	0.09
Coagulopathy	0.06	0.02	0.07	0.06	0.06
Obesity	0.22	0.17	0.24	0.25	0.24
Weight loss	0.11	0.06	0.08	0.09	0.08
Fluid and electrolyte disorders	0.28	0.09	0.25	0.25	0.25
Chronic blood loss anemia	0.04	0.01	0.04	0.03	0.04
Deficiency anemias	0.25	0.11	0.31	0.34	0.33
Alcohol abuse	0.04	0.01	0.03	0.03	0.03
Drug abuse	0.07	0.02	0.04	0.05	0.05
Psychoses	0.13	0.06	0.11	0.11	0.11
Depression	0.24	0.13	0.21	0.24	0.23

ACO: accountable care organization, FFS: fee-for-service