Total cost of care of Medicare Advantage beneficiaries participating in an appointment-based model in a national pharmacy chain

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Plain language summary

This study set out to determine whether a pharmacy service affects total health care costs, amounts paid by individuals plus insurance. The pharmacy service is called the appointment-based model (ABM), in which pharmacists work with their patients to allow them to pick up their medications on the same day and address other medication-related issues. Total costs for patients who participated in the ABM were lower than for those matched controls who did not participate.

Implications for managed care pharmacy

Community pharmacy ABM provides medication synchronization and medication review, plus other services such as medication therapy management, adherence counseling, vaccine administration, multimedication packaging, and medication reconciliation. Medicare beneficiaries who participated in an ABM program had significantly less total (medical and pharmacy) costs, driven by pharmacy costs, than those who did not. Medication adherence was also higher in ABM participants. Insight from this study can assist payers with determining member eligibility and coverage for the ABM.

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ABSTRACT

BACKGROUND: The appointment-based model (ABM) is a pharmacy service to improve medication-related health outcomes. ABM involves medication synchronization and medication review, plus other services such as medication reconciliation, medication therapy management, vaccine administration, and multimedication packaging. ABM can improve medication adherence, but the economic impact is unknown.

OBJECTIVE: To assess the effect of a national pharmacy chain's ABM program for Medicare Advantage beneficiaries on total cost of care (TCOC).

METHODS: This study analyzed administrative claims data from April 7, 2017, through February 29, 2020, for Medicare Advantage beneficiaries with Part D using a propensity score–matched cohort design. The national pharmacy chain provided a list of ABM participants. Eligibility criteria for the ABM and control (non-ABM) groups included age 65 years or older on the index date (initial participation, ABM; random fill date, control) and continuous enrollment from at least 6 months pre-index (baseline) date through at least 6 months post-index (follow-up) date. Medical inflation-adjusted (2020) TCOC was calculated as the sum of all health care spending from Medicare Advantage beneficiaries with Part D plan and patient paid amounts, standardized to per patient per month (PPPM), during the follow-up period. Secondary outcomes included medication adherence calculated across prevalent maintenance therapeutic classes using proportion of days covered (PDC).

RESULTS: Each group contained 5,225 patients with balanced characteristics after matching: 64% female, 73% White, mean age 75 years, mean Quan-Charlson comorbidity index score 0.9, and hypertension and dyslipidemia, each >65%. Median baseline all-cause PPPM health care costs in the ABM and control groups, respectively, were $517 and $548 ($221 and $234 medical, $135 and $164 pharmacy). Baseline PDC of at least 80% was 83% in the ABM group and, similarly, 84% in the control group. The mean (SD) follow-up was 604 (155) days for the ABM group and 598 (151) days for the control group. During the follow-up period, the median PPPM TCOC for the ABM group was $656 and was $723 for the control group ($P = 0.011$). Median pharmacy costs were also significantly less in the ABM group

ABSTRACT *continued*

($161 vs $193, $P < 0.001$), whereas median medical costs were $328 in the ABM group and $358 among controls ($P = 0.254$). More patients in the ABM group were adherent during follow-up, with 84% achieving PDC of at least 80% vs 82% among controls ($P = 0.009$).

CONCLUSIONS: The ABM program was associated with significantly lower follow-up median total costs (medical and pharmacy), driven primarily by pharmacy costs. More patients were adherent in the ABM program. Payers and pharmacies can use this evidence to assess ABM programs for their members.

At least 1 prescription medication is taken by 89% of individuals older than 65 years and 42% are taking 5 or more.[1] Greater medication use increases the risk for medication nonadherence, which is associated with higher total health care costs.[2,3] A systematic review reported that each nonadherent patient costs between $5,271 and $52,341 in direct, indirect, or avoidable costs per year (n = 14 studies).[3] The large range in costs may be the result of differences in study population, disease focus, and types of costs.

One nonadherence intervention is to improve convenience by simplifying the steps to obtain and manage multiple medications. Medication synchronization coordinates refills so all medications can be picked up at the same time. A meta-analysis found that patients with synchronized medications had a 2.3 greater odds of adherence (95% CI = 1.99–2.64) compared with usual care.[4] Specifically, the appointment-based model (ABM) had the largest effect on adherence (odds ratio 3.1, 95% CI = 2.72–3.63) compared with telephone reminder calls, automated refills, and other non-ABM program types.

An ABM is a proactive approach to filling prescriptions, which includes medication synchronization. The pharmacy staff reviews medications, obtains doctor authorizations for refills and prior authorizations, and ensures all medications are ready for a scheduled pick-up. During the patient's pick-up time, additional services can be provided, such as medication therapy management, adherence counseling, vaccine administration, multimedication packaging, and medication reconciliation.[5-8]

The evidence supports the positive effects of ABM programs on medication adherence, but the economic impact remains largely unknown. This study aims to fill an evidence gap by assessing the effect of an ABM on the cost of care and providing insight for health care payers. The objective of this study was to assess the impact of a national pharmacy chain's ABM program for Medicare Advantage beneficiaries on total cost of care (TCOC) and, secondarily, to explore medication adherence. Additionally, this study explored cost drivers between patients who experience cost savings and cost increases to understand which therapeutic areas may be most impacted by the ABM.

Methods

This observational study used a retrospective cohort design to compare the TCOC for Medicare Advantage beneficiaries based on participation in a national pharmacy chain ABM program. The ABM program followed The American Pharmacists Association's description of a patient care service that has a designated appointment day to pick up all medications. In advance of the appointment day, pharmacy staff completed a comprehensive medication review with identification and resolution of drug therapy problems, reviewed changes to medications, and confirmed each prescription should be refilled. Additional services were offered, such as vaccinations.[5] The research was exempt from institutional review board by Advarra.

DATA SOURCES

Data for US-based Medicare Advantage beneficiaries with Part D prescription drug coverage (MA-PD) were extracted from the US-based Optum deidentified Clinformatics Data Mart (CDM). CDM is derived from a database of administrative health claims for members of large commercial and Medicare Advantage health plans. The CDM contains observations for approximately 8 million Medicare Advantage lives, equating to about one-fifth of the enrollee population in Medicare Part C. Paid amounts from medical and pharmacy claims used to calculate costs were linked from the Optum Research Database.

The national pharmacy chain provided data on participants in the ABM program, including the date of entry and the disenrollment date (if it occurred). Datavant, a health data connectivity company, deidentified, tokenized, and linked the ABM data and claims data, enabling patient records to be matched across datasets. Mirador Analytics performed disclosure risk analyses on the resultant dataset from the linkage of ABM participants to claims data to determine and certify that the data were sufficiently deidentified under the Health Insurance Portability and Accountability Act of 1996 (HIPAA) statistical deidentification requirements.

STUDY PERIOD

The study analyzed administrative claims data from April 7, 2017, through February 29, 2020 (the entire study period) (Supplementary Figure 1, available in online article). The end date for the study period was chosen to exclude the impact of COVID-19 on health care resource utilization and costs.

Eligibility. Medicare Advantage beneficiaries with at least 1 prescription fill from the pharmacy chain between October 4, 2017, and December 31, 2018 (ie, patient identification period), were eligible for inclusion.

The ABM group consisted of beneficiaries who were enrolled in ABM for a minimum of 6 months after their index date, defined as the first date of entry into the ABM program during the patient identification period (Supplementary Figure 1). The control group comprised beneficiaries who had not participated in the national pharmacy chain's ABM program at any time during the entire study period. The index date for this group was assigned as a random prescription fill date during the patient identification period.

Additional inclusion criteria included age 65 years or older in the index year and continuous enrollment in MA-PD from 6 months (180 days) pre-index date (baseline period) through a minimum of 6 months post-index date (follow-up period). The follow-up period continued until the earlier of MA-PD disenrollment or the end of the study period, regardless of ABM disenrollment for the ABM group. Patients with *International Classification of Diseases, Tenth Revision, Clinical Modification* (ICD-10-CM) diagnosis codes for cancer (except nonmelanoma skin cancer), multiple sclerosis, muscular dystrophy, Wilson disease, or cystic fibrosis during the baseline or follow-up periods were excluded because of high costs. Patients with baseline or follow-up ICD-10-CM or Current Procedural Terminology procedure codes for transplant, end-stage renal disease, or renal dialysis were excluded because they likely had Medicare fee-for-service coverage. Patients from California were excluded because of privacy policies.

Matching. Propensity score matching (PSM) was used to mitigate the potential for selection bias between ABM participants and non-ABM Medicare Advantage beneficiaries. To find a suitable comparison for each ABM participant, PSM creates a propensity score using demographic and clinical characteristics to determine the probability of being in the ABM group.[9] Individuals with a similar probability to the ABM group are matched to create the non-ABM group. Baseline characteristics included in the logistic regression model for creating the propensity score were quarter and year of index date, demographics, baseline comorbidity status, count of distinct medication classes, count of medication fill dates, and health care resource utilization. The closest available propensity score within a caliper of ±0.01 was selected for a 1:1 match.

Outcome Assessment. The follow-up period was used to assess outcomes. ABM and control group members were included in multiple nested subsets based on the length of follow-up: 6 or more, 12 or more, 18 or more, and 24 or more months.

The primary outcome, TCOC, was the sum of medical and pharmacy health care expenditures from MA-PD health plan and patient paid amounts. Costs were computed per patient per month (PPPM) to account for the variable length of follow-up. Costs were adjusted using the annual medical care component of the Consumer Price Index to reflect inflation between the date of the claim and 2020.[10] Costs were calculated during the first 6 months of follow-up, in cumulative 6-month increments, and over the entire follow-up period. The difference in TCOC from baseline to follow-up was determined for patients with at least 6 months, at least 12 months, at least 18 months, and at least 24 months of follow-up.

Secondary outcomes included medication adherence among selected therapeutic areas (ie, lipid-lowering, antihypertensive, antidiabetic, antiosteoporosis, asthma/chronic obstructive pulmonary disease, antidepressant, antipsychotic, antirheumatic and heart failure).[11] The PDC was calculated by dividing days covered across each therapeutic area by the number of days from the first relevant claim in the first 6 months of the follow-up period through the end of the first 6 months of the follow-up period. An overall PDC was determined as the mean across all therapeutic areas.[11] Medication adherence was reported as the percentage of patients with an overall PDC of at least 80%.

The TCOC difference was assessed by baseline disease state measured with Clinical Classification Software from the Agency for Healthcare Research and Quality.[12] All postmatched patients were placed into quintiles of changes in all-cause TCOC. The cost-saving quintile consisted of observations in which the difference between follow-up and baseline PPPM TCOC was negative (follow-up PPPM TCOC was lower than baseline PPPM TCOC). The cost-increasing quintile consisted of observations in which the positive differences between follow-up and baseline PPPM TCOC were the greatest. Baseline demographics, comorbidities, and utilization were examined for differences in the percentage of ABM group patients in the cost-saving vs cost-increasing quintiles.

Statistical Analysis. Results were stratified by ABM and control groups, and univariable comparisons of baseline characteristics were reported using mean, SD, and median for continuous variables and counts and percentages for categorical variables. Outcome measures of cost and adherence include mean ± SD, median, and percentiles.

In the prematched group, differences in variables between groups were tested with 2-sample *t* tests for continuous variables and Pearson chi-square tests for

categorical variables. PSM was evaluated with standardized differences of at least |10%| as the threshold.[13]

In the postmatched groups, baseline variables were analyzed using Rao-Scott tests for categorical variables, and *z*-test using robust SEs in ordinary least-squares regressions for continuous variables. Wilcoxon signed-rank tested for differences in the distributions of follow-up costs because of the nonnormal distribution. $P < 0.05$ was considered significant.

PPPM follow-up costs were modeled with a generalized linear model with a gamma distribution and log link. Adjustments were made for baseline all-cause utilization after PSM. Baseline utilization variables included all-cause utilization for outpatient visits, emergency department visits, and inpatient stays. Regression diagnostics assessed goodness of fit, and corrections were made for violations of model assumptions.

Residual plots on all-cause TCOC PPPM revealed one highly influential observation pair because of an extreme outlier TCOC. This individual had a lengthy, costly hospitalization during a relatively short follow-up period. A sensitivity analysis revealed that removal of the highly influential observation and its match increased the treatment term's β coefficient by 24.1% (absolute change in log of TCOC cost = 0.012) and reduced its SE by 6.8% (absolute change 0.002), thereby improving model fit. Statistical analysis was performed using SAS statistical software, version 9.4 (SAS Institute Inc).

Results

Of the 33,689 ABM enrollees, 32,916 were identified in the CDM, with 5,225 (16%) meeting inclusion criteria (Supplementary Figure 2). The eligible control group consisted of 110,813 individuals.

Demographics of the ABM and control groups before and after PSM are reported in Table 1. Pre-PSM in the ABM and control groups, respectively, the mean (SD) age was 74.7 (6.3) vs 74.4 (6.4) years, 63.7% vs 62.1% female, 72.8% vs 79.9% White, 18.6% vs 11.4% Black, and 4.3% vs 3.6% Hispanic. Maintenance medication use averaged 6.8 (3.0) vs 4.2 (3.3) distinct medications per patient and 83.8% vs 79.3% had an overall PDC of at least 80% across all therapeutic areas. The mean (SD) follow-up time was 604 (155) days in the ABM group vs 612 (144) in controls. Only 2 of the 5,225 patients had a follow-up period that ended after ABM program disenrollment. Baseline all-cause PPPM median TCOC in the ABM and control groups, respectively, was $5,17 and $548 ($221 and $234 medical, $135 and $164 pharmacy).

After PSM, no comparison in demographic or baseline variables between the ABM and control group exceeded the at least |10%| standardized difference criterion, indicating patients were well-balanced on demographic and baseline variables of age, sex, and comorbid conditions. However, because of the large sample size, some between-group comparisons remained statistically significant (geographic region, race, outpatient utilization, and emergency department visit utilization).

PRIMARY OUTCOME

Cost data were right-skewed, with mean costs higher than median. The median PPPM follow-up TCOC was $656 and $723 ($P = 0.011$) for the ABM and control groups, respectively, with medical costs contributing approximately two-thirds to total cost in both groups. Median pharmacy costs were also significantly less for the ABM group at $161 vs $193 for the control group ($P < 0.001$). The approximate $30 PPPM difference in median medical costs between the ABM and control groups was not statistically significant (Table 2).

The cost analysis by time intervals after the first 6-month follow-up period applied to smaller subsets of patients because of the requirement for continuous enrollment. The median within-patient changes in all-cause TCOC PPPM from baseline are displayed by time interval in Figure 1. A negative difference meant that follow-up cost was lower than baseline. The median change in cost increased in each time interval for both the ABM and the control groups. Examining 6-month follow-up TCOC PPPM, the median change from baseline was negative (-$3.55) in the ABM group and positive (+$19.22) in the control group ($P = 0.013$). The median differences in cost between the ABM and control groups were not statistically significant for any of the longer periods of follow-up.

For the generalized linear model analysis with the outlier and match removed, the cost ratios and 95% CIs for PPPM TCOC, medical costs, and pharmacy costs in the variable follow-up and first 6-month follow-up periods are presented in Table 3. The TCOC cost ratios (0.942, 95% CI = 0.893-0.994) and pharmacy cost ratios (0.901, 95% CI = 0.833-0.975) remained consistent with the descriptive comparisons. The cost ratios for TCOC and pharmacy costs were significantly lower than 1.0 in both the first 6-months and the variable follow-up periods. However, when adjusted for baseline utilization, the TCOC ratio was only significant in the first 6-month follow-up period. Pharmacy cost ratios remained significant in both follow-up time frames after adjustment.

Medication Adherence. During follow-up, adherence was higher in the ABM group, with 84.0% achieving PDC of at least 80% over all therapeutic areas vs 82.1% among controls ($P = 0.009$). Across 10 therapeutic areas, the only significant difference was for antihypertensives (95% in the ABM group

TABLE 1 Baseline Characteristics Before and After Propensity Score Matching

Characteristic	Prematch						Postmatch					
	ABM (n=5,225)		Control (n=110,813)		*P* value	Stand diff (%)	ABM (n=5,225)		Control (n=5,225)		*P* value	Stand diff (%)
Age, mean (SD), years	74.7 (6.3)		74.4 (6.4)		<0.001	5.1	74.7 (6.3)		74.6 (6.3)		0.40	1.6
Quan-Charlson comorbidity index, mean (SD)	0.93 (1.3)		0.60 (1.1)		<0.001	27.7	0.93 (1.3)		0.94 (1.3)		0.56	-1.1
No. of maintenance medications, mean (SD)	6.8 (3.0)		4.2 (3.3)		<0.001	81.3	6.8 (3.0)		6.9 (3.0)		0.24	-2.0
All-cause PPPM total costs, mean (SD), $	1,109 (1,872)		795 (1,658)		<0.001	17.8	1,109 (1,872)		1,151 (1,870)		0.25	-2.2
All-cause PPPM medical costs, mean (SD), $	749 (1,631)		584 (1,485)		<0.001	10.6	749 (1,631)		764 (1,612)		0.64	-0.9
All-cause PPPM pharmacy costs, mean (SD), $	360 (767)		211 (620)		<0.001	21.4	360 (767)		387 (827)		0.08	-3.4
	n	%	n	%			n	%	n	%		
Female sex	3,328	63.7	68,756	62.1	0.02	3.41	3,328	63.7	3,356	64.2	0.57	-1.1
US Census region					<0.001						<0.001	
Northeast	1	0.0	411	0.37	<0.001	-8.0	1	0.0	12	0.2	0.00	-6.0
Midwest	1,465	28.0	35,207	31.8	<0.001	-8.2	1,465	28.0	1,591	30.5	0.01	-5.3
South	2,842	54.4	51,504	46.5	<0.001	15.9	2,842	54.4	2,794	53.5	0.34	1.8
West	917	17.6	23,690	21.4	<0.001	-9.7	917	17.6	828	15.9	0.02	4.6
Other	0	0.0	1	0.0	0.83	-0.4	0	0.0	0	0.0	–	–
Race					<0.001						0.02	
White	3,801	72.8	88,517	79.9	<0.001	-16.8	3,801	72.8	3,832	73.3	0.49	-1.3
Black	969	18.6	12,627	11.4	<0.001	20.1	969	18.6	910	17.4	0.13	2.9
Hispanic	222	4.3	3,957	3.6	0.01	3.5	222	4.3	207	4.0	0.46	1.5
Asian	110	2.1	2,254	2.0	0.72	0.5	110	2.1	102	2.0	0.58	1.1
Unknown	123	2.4	3,458	3.1	0.002	-4.7	123	2.4	174	3.3	0.003	-5.9
Comorbidities												
Hypertension	4,132	79.1	65,884	59.5	<0.001	43.5	4,132	79.1	4,155	79.5	0.57	-1.1
Disorders of lipid metabolism	3,442	65.9	58,026	52.4	<0.001	27.8	3,442	65.9	3,456	66.1	0.77	-0.6
Heart disease	2,205	42.2	35,792	32.3	<0.001	20.6	2,205	42.2	2,230	42.7	0.62	-1.0
Diabetes w/o complications	2,293	43.9	32,786	29.6	<0.001	30.0	2,293	43.9	2,323	44.5	0.55	-1.2
All-cause utilization (≥1 encounter)												
Office visit	4,942	94.6	100,777	90.9	<0.001	14.1	4,942	94.6	4,979	95.3	0.09	-3.2
Outpatient visit	3,361	64.3	64,598	58.3	<0.001	12.4	3,361	64.3	3,458	66.2	0.04	-3.9
Emergency department visit	1,041	19.9	17,452	15.8	<0.001	10.9	1,041	19.9	1,141	21.8	0.02	-4.7
Inpatient stay	476	9.1	7,286	6.6	<0.001	9.44	476	9.1	489	9.4	0.66	-0.9
Percentage with overall PDC ≥ 80%[a]	4,334	83.8	70,201	79.3	<0.001	11.42	4,334	83.8	4,328	83.3	0.51	1.3
Follow-up period											0.42	
<12 months	–	–	–	–	–		178	3.4	210	4.0	0.10	-3.2
12 to <18 months	–	–	–	–	–		1,868	35.8	1,862	35.6	0.90	0.2
18 to <24 months	–	–	–	–	–		1,921	36.8	1,907	36.5	0.77	0.6
24 to <30 months	–	–	–	–	–		1,258	24.1	1,246	23.9	0.78	0.5

[a]*Denominator for PDC was patients with at least 1 therapeutic area medication in baseline: n=5,175 in prematch ABM group and n=88,500 in prematch control group.*

PDC=proportion of days covered; PPPM=per member per month; stand diff=standardized difference.

TABLE 2 Postmatch All-Cause Follow-Up Health Care Costs (Per Patient Per Month)[a]

All-cause per patient per month health care costs ($)		ABM treatment (n = 5,225)	Control (n = 5,225)	*P* value[a]
Total (medical + pharmacy) costs	Mean	1,193	1,252	
	SD	1,939	1,771	
	p25	290	324	
	Median	656	723	0.011
	p75	1,437	1,486	
Medical costs	Mean	806	822	
	SD	1,659	1,447	
	p25	140	153	
	Median	328	358	0.254
	p75	886	918	
Pharmacy costs	Mean	387	429	
	SD	801	881	
	p25	70	80	
	Median	161	193	<0.001
	p75	472	508	

[a]*Wilcoxon signed-rank test was used for medians due to skewed distribution of data.*

ABM = appointment-based model.

reaching PDC threshold compared with 93% in the control group, P = 0.002).

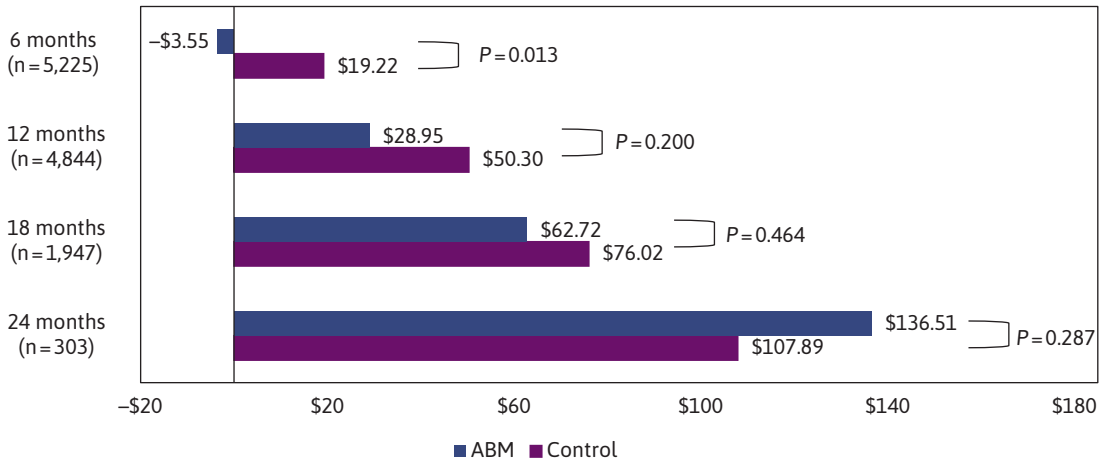
COMPARISON OF BASELINE CHARACTERISTICS BY TOP AND BOTTOM QUINTILES OF TCOC CHANGE

The TCOC changes from baseline to follow-up for the top and bottom 20% quintiles were an increase of $672 or more in the cost-increasing quintile and a decrease of $281 or more in the cost-saving quintile. Although demographic characteristics were similar between the cost-increasing and cost-saving quintiles in the ABM group, those in the cost-increasing quintile had significantly lower mean (SD) Quan-Charlson comorbidity index scores than those in the cost-saving quintile (1.17 [1.34] vs 1.55 [1.59], P < 0.001) and lower prevalence of nearly every comorbidity, including hypertension, disorders of lipid metabolism, diseases of the heart, and diabetes mellitus without complication (Table 4).

Discussion

The ABM program aims to improve outcomes by synchronizing medication refills, conducting a medication review, identifying and resolving medication-related problems, and providing other services such as vaccinations.[5] Prior research found positive impacts of ABM on medication adherence and patient satisfaction.[4,14]

FIGURE 1 Postmatch Median Change From Baseline in All-Cause Total Cost of Care (Per Patient Per Month) by Follow-Up Time Interval



Wilcoxon signed-rank test on median costs due to right-skewed distribution of data.

ABM = appointment-based model.

TABLE 3 Cost Ratios Per Member Per Month

	Variable follow-up								6-month follow-up							
	Unadjusted model				Adjusted for baseline utilization				Unadjusted model				Adjusted for baseline utilization			
	Cost ratio	Lower 95% CI	Upper 95% CI	*P* value	Cost ratio	Lower 95% CI	Upper 95% CI	*P* value	Cost ratio	Lower 95% CI	Upper 95% CI	*P* value	Cost ratio	Lower 95% CI	Upper 95% CI	*P* value
Total costs	0.942	0.893	0.994	0.03	0.953	0.904	1.004	0.07	0.923	0.863	0.987	0.02	0.926	0.868	0.989	0.02
Medical costs	0.964	0.902	1.030	0.28	0.990	0.928	1.056	0.75	0.951	0.870	1.041	0.28	0.966	0.883	1.058	0.46
Pharmacy costs	0.901	0.833	0.975	0.01	0.891	0.824	0.965	0.004	0.872	0.807	0.942	<0.001	0.866	0.803	0.934	<0.001

Outlier pair removed.

TABLE 4 Cost-Increasing vs Cost-Saving Quintiles in the ABM Group

	Cost-increasing quintile (n=1,019)		Cost-saving quintile (n=1,054)		
	Mean	SD	Mean	SD	*P* value
Age (continuous), years	75.5	6.6	75.0	6.3	0.09
Quan-Charlson comorbidity index score, (continuous)	1.2	1.3	1.6	1.6	<0.001
	n	%	n	%	
Sex					0.48
Female	644	63.2	682	64.7	0.48
Male	375	36.8	372	35.3	0.48
US Census region					0.71
Northeast	0	0.0	0	0.0	–
Midwest	281	27.6	295	28.0	0.83
South	540	53.0	569	54.0	0.65
West	198	19.4	190	18.0	0.41
Race					0.52
White	737	72.3	757	71.8	0.80
Black	186	18.3	206	19.5	0.45
Hispanic	55	5.4	45	4.3	0.23
Asian	20	2.0	17	1.6	0.55
Unknown	21	2.1	29	2.8	0.31
Comorbidities					
Hypertension	797	78.2	962	91.3	<0.001
Disorders of lipid metabolism	648	63.6	843	80.0	<0.001
Diseases of the heart	489	48.0	672	63.8	<0.001
Diabetes mellitus without complication	452	44.4	535	50.8	0.004

ABM = appointment-based model.

To our knowledge, this study is the first to assess the real-world impact of an ABM program on health care costs for MA-PD beneficiaries. Compared with the control group, median pharmacy costs and TCOC were significantly less for ABM participants in the follow-up period. In the follow-up period, the median PPPM TCOC was $67 less in the ABM group than in the control group; median PPPM pharmacy costs were $32 lower. At the 6-month follow-up, TCOC decreased by $3.55 PPPM in the ABM group and increased by $19.22 PPPM in the control group. When adjusted for baseline utilization, the pharmacy costs were significantly lower in both the variable follow-up periods and the 6-month periods.

The ABM literature demonstrates an increase in adherence with ABM programs.[15] Increases in adherence have previously shown an increase in pharmacy costs. For example, in a study of Medicaid recipients receiving specialized medication packaging and telephonic medication therapy management, dramatic differences in medication adherence were seen at 12-month follow-up (PDC ≥ 80%, 56.9% intervention vs 22.1% control; $P < 0.001$).[16] As expected, with more medication use, pharmacy costs at the 12-month follow-up were higher in the intervention arm (adjusted cost ratio [95% CI], 2.50 [2.36–2.66]; $P < 0.0001$).

In the present study, more patients in the ABM group were adherent during follow-up compared with usual care (PDC ≥ 80%, 84.0% ABM vs 82.1% control). Although statistically significant, the 1.9% difference was small. Other studies have found ABM-type services associated with dramatic differences in medication adherence. The small difference in adherence in the present study may be due to the high baseline medication adherence (PDC ≥ 80%, 83.8% ABM vs 83.3% control).

The lower median PPPM pharmacy costs are noteworthy and potentially unique to an ABM program. Median PPPM pharmacy expenditures may be lower because of

addressing and resolving medication-related problems. For example, medication costs can be reduced by discontinuing unnecessary or redundant medications, decreasing medication doses for supratherapeutic or toxic dosing, or switching to less expensive therapeutic alternatives. In one study, an average of 1.6 medication-related problems were identified at the initial ABM visit.[6] The two most-common medication-related problems in ABM participants were therapeutic duplication (15.1%) and potential adverse drug reactions (9.6%). In another ABM study, medication-related problems identified by the pharmacist included unnecessary medication use, adverse drug reactions, medication overuse (ie, patients taking more medication than intended), medications with an excessive dose and/or duration, and medications for which lower cost alternatives with a similar mechanism of action were available.[7] In the present study, patients with more comorbidities at baseline experienced cost savings over time potentially indicating that pharmacists were able to assist in managing complex therapies. This study suggests that the ABM program offers benefits beyond medication adherence, which may have cost implications.

In this study, there was not a statistical difference in medical costs between the ABM and control groups. In a cost-benefit analysis, for each additional dollar spent on pharmacy costs in an ABM program, it was estimated that disease-specific medical savings could range from $1.25 to $36.96.[17] One potential reason there were no differences in medical costs in this real-world evidence study may be due to the limited follow-up time frame. The greatest differences in TCOC and pharmacy costs were seen in the first 6 months. Medication-related interventions likely have a more immediate impact on pharmacy costs (ie, discontinuing an unnecessary medication), but the downstream impact on medical costs (ie, reducing hospitalizations due to polypharmacy) may require longer follow-up. There were also fewer participants in the longer follow-up periods, so the lower sample sizes may have also impacted the assessment of costs. Further research is needed to assess the longer-term impact on medical costs of the ABM program.

Another notable trend identified in this study was the prematch demographic differences between ABM enrollees and the control group. Although this study did not specifically address racial disparities in pharmacy care, these trends provide insights into the demographics of patients who use ABM. The prematch Medicare Advantage enrollees in the ABM program had higher percentages of Black or Hispanic individuals and were more likely to live in the South than non-ABM beneficiaries. Medication-related problems are common in older adults, and disparities exist among different races. In a study of 200 community-residing older adults, Black patients had more medication-related problems than White patients (6.2 vs 4.9 respectively, $P < 0.01$).[18] This study also reported nonadherence was significantly higher in Black patients than in White patients (68% vs 42%, $P < 0.01$). In the present study, the ABM group also had a higher prevalence of hypertension, disorders of lipid metabolism, and heart disease—diseases which burden Hispanic patients, Black patients, and White patients differently.[19,20] Thus, the ABM program may help to address care inequities and should be further investigated.

Despite the positive evidence for ABM, the dissemination has been hampered by a lack of cost data, payer concerns about a clear definition of ABM, and how specific ABM programs compare to descriptions in the literature.[21] This study assists with providing an assessment of the impact of an ABM program on cost, but the pharmacy community can address the other aspects by standardizing ABM programs and engaging in conversations that resonate with payers.

LIMITATIONS

Observational research using administrative claims data are subject to limitations, such as missing or inaccurate data (eg, diagnostic codes, medication samples, cash pay). Prescription claims do not necessarily indicate that the medication was taken as prescribed. PSM was used to mitigate selection bias, but differences in unmeasured variables may remain between the matched ABM and non-ABM groups.

Another limitation is potential misclassification of exposure. For example, the pharmacy chain switched ABM platforms at the beginning of the study period. Although most patients were newly enrolled, a small percentage of patients may have been previously enrolled in older ABMs. This may have impacted the capture of initial interventions by the pharmacy team and lessened the impact on primary and secondary outcomes. Additionally, it is unknown if individuals in either group were enrolled in other medication-related interventions. The measure of adherence used in this study was a mean across multiple therapeutic classes so comparing adherence to other studies assessing PDC on an individual therapeutic class level may be difficult. The conclusions were based on a variable follow-up period. Although costs were standardized to PPPM, the number of patients with longer follow-up (>24 months) was small, which may impact cost, especially for health care resource use with higher costs and lower utilization such as hospitalizations. Lastly, the cost-driver analysis should be interpreted with caution because of the cross-sectional nature, as the duration, severity, and progression of the disease were unmeasured.

Conclusions

The ABM program is an option to help Medicare Advantage beneficiaries who are taking multiple maintenance medications. The ABM was associated with significantly lower median total costs (medical and pharmacy), primarily driven by lower pharmacy costs and a higher percentage of beneficiaries who were adherent to their medications in the follow-up period. Payers and pharmacies can use this evidence to assess ABM programs for their members.

DISCLOSURES

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