Association between health system specialty pharmacy use and health care costs among national sample of Medicare Advantage beneficiaries

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What is already known about this subject

- Health system specialty pharmacies leverage clinic-embedded relationships and electronic medical record access to provide comprehensive services, coordinate care, and deliver interventions for patients.
- Health system specialty pharmacies are associated with improvement in clinical outcomes, including access to medication and medication adherence rates.
- A matched cohort study from a single institution found that the health system specialty pharmacy model was associated with a lower total medical expenditure among Medicare members of an accountable care organization.

What this study adds

- This study presents the first multicenter health system specialty pharmacy claims analysis that examines the association of health system specialty pharmacy with improved health care costs and utilization.
- Follow-up year risk-adjusted analysis found lower per-patient per-month cost ($7,060) for a health system specialty pharmacy group than provider benchmark ($7,683, $P=0.31$) and network benchmark ($8,152, $P=0.03$) groups.
- Findings inform the future direction of research to shift focus to cost-effectiveness analysis and pseudo-randomized effectiveness study within specific specialty pharmacy disease states.

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ABSTRACT

BACKGROUND: Health care expenditures are growing rapidly. There is a growing body of literature showing that health system specialty pharmacy is associated with improvement in clinical outcomes; however, there is a lack of data on its effect on health care costs and utilization.

OBJECTIVE: To perform exploratory research assessing the association between health system specialty pharmacy use and health care costs and utilization.

METHODS: A retrospective cohort study was conducted examining medical and pharmacy claims from 2018 and 2019 of Medicare Advantage beneficiaries. Optum Advisory Service's proprietary deidentified Normative Health Information database was used, which includes claims, membership, and provider data for 12.6 million Medicare Advantage members. Members who filled a prescription at a health system specialty pharmacy and had a specialty provider participating in the health system specialty pharmacy care model in clinic were assigned to the intervention group. Members who did not use a health system specialty pharmacy but had the same provider (provider benchmark group) or different provider (network benchmark group) were considered as comparisons. The network benchmark group was further refined to match variation in health care cost due to geography. The primary outcome measure was total health care costs (across the medical and pharmacy benefit) on a per-patient per-month basis. Secondary outcomes were selected utilization drivers and cost subcomponents. Cost and utilization

metrics were calculated on a risk-adjusted basis using Centers for Medicare & Medicaid Services Hierarchical Condition Categories (CMS-HCC) risk score methodology. Differences were assessed for categorical variables with chi-square tests, and 2-tailed t-tests were used for continuous variables.

RESULTS: Of the analytic sample of 9,780 members used in this study, 208 (2.1%) used health system specialty pharmacy services. During the 2018 baseline period, total health care costs and utilization were similar after CMS-HCC risk score adjustment ($9,520 among health system specialty pharmacy users; $8,691 among the provider benchmark group; $9,510 among the network benchmark group) but lower in 2019 ($7,060, $7,683, and $8,152, respectively). The differences in 2019 were primarily driven by savings in pharmacy and free-standing physician-related costs.

CONCLUSIONS: Use of a health system specialty pharmacy is associated with a lower health care cost. Further study is required to analyze how drug and disease-specific interactions influence total health care costs and utilization for health system specialty pharmacy populations.

Growth in national health spending is expected to outpace growth in gross domestic product (GDP) over the next decade to reach nearly 20% of total GDP by 2028.[1] Within health care spending, growth in Medicare costs is expected to be disproportionately higher than Medicaid, private insurance, and other third-party cohorts over this time period, providing an area of focus for controlling costs.[1] Medicare members have complex medical needs, and improvement in care coordination through managed care models, accountable care organizations, patient-centered medical homes, and value-based pricing has been shown to be effective in reducing health care costs.[2-7] Of particular focus is medication-related expenses, especially specialty drugs, because they represent a disproportionate (1:25) use to cost ratio.[8-10]

Specialty pharmacy creates a system with unique expertise and protocols for best handling and dispensing drugs for patients with specific chronic and/or rare diseases.[11-16] One specific model of specialty pharmacy, the health system specialty pharmacy (HSSP) model, adds the benefit of close coordination between providers and pharmacists to seamlessly provide comprehensive services for their patients by leveraging a common electronic medical record and health system.[17-19] Therefore, the HSSP has access to patient medical histories, lab results, and most recent visit notes. Often, a representative from the HSSP is physically present in the same environment as prescribing providers. Both access and embedded relationships allow the pharmacy to have a more comprehensive understanding of patient health.

There is a growing body of literature showing that HSSP is associated with improvement in clinical outcomes, including access to medication and medication adherence rates.[20-22] However, there is a lack of data on the model's effect on improving health care costs and utilization. A retrospective matched cohort study from a single institution found that the HSSP model was associated with a lower total medical expenditure among Medicare members of an accountable care organization; however, the results did not reach statistical significance.[23] Therefore, we leveraged a national database of Medicare members to investigate whether use of an HSSP is associated with decreased health care costs. An analysis of this scale to investigate this question integrating data from the entire United States has not yet been performed.

Methods

STUDY DESIGN

This exploratory treatment effectiveness study retrospectively analyzed medical and pharmacy claims for members using different specialty pharmacy care models. HSSPs studied were clients of Shields Health Solutions (SHS); the complete list of SHS-affiliated pharmacies is shown in Supplementary Table 1 (available in online article). SHS partners with health systems to implement HSSPs. As a secondary review of deidentified claims data, this study was exempt from institutional review board considerations and followed Health Insurance Portability and Accountability Act of 1996 (HIPAA) consistent standards. This study also followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline.

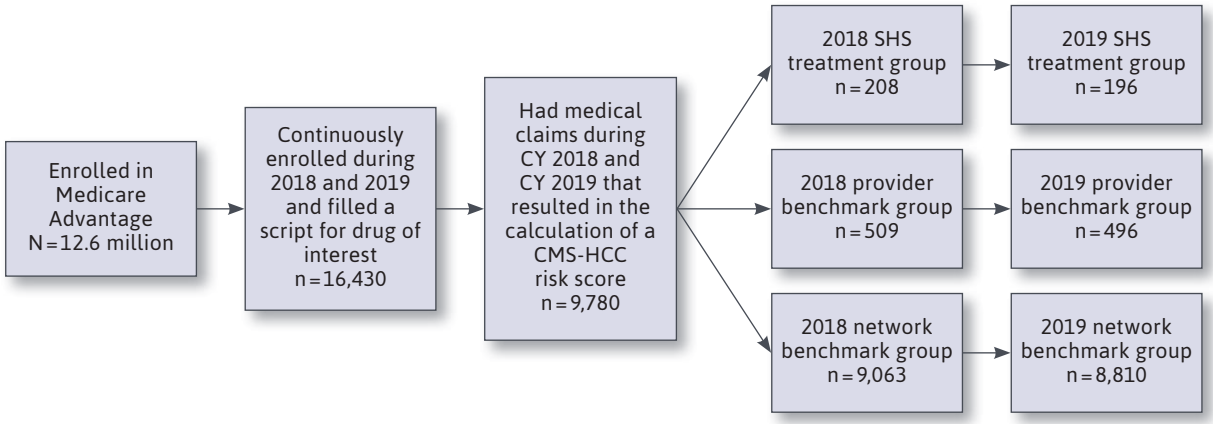
SETTING

This study includes members in US Medicare Advantage plans during 2018 and 2019. Optum Advisory Service's proprietary deidentified Normative Health Information database was the only source of data, which includes claims, membership, and provider data for more than 12.6 million Medicare Advantage members. Claims for members in 2018 (baseline year) were considered against claims in 2019 (follow-up year).

PATIENTS

Members were considered eligible for this study based on the following criteria: (1) member must have had both medical and pharmacy insurance coverage from January 1, 2018, to December 31, 2019, and (2) member must have filled at

FIGURE 1 Study Population Inclusion



CMS-HCC = Centers for Medicare & Medicaid Services Hierarchical Condition Categories; CY = calendar year; SHS = Shields Health Solutions.

least 1 prescription for a specialty drug in selected disease states within the baseline year. The 6 drug disease states selected for inclusion in the analysis are as follows: oncology, transplant, cardiovascular, inflammatory, multiple sclerosis, and HIV. These drug disease state areas were addressed by the HSSP model during the period of interest. The specialty drugs included in the study were limited to self-administered drugs only. A brand-name specialty drug and its bio-equivalent generics were grouped together using a brand-name override. A complete list of specialty drugs and drug name overrides by selected disease state is specified in Supplementary Table 2 (available in online article).

EXPOSURE

Patient engagement with the HSSP model at sites listed in Supplementary Table 1 was defined by unique clinical engagements via embedded clinical pharmacists and enhanced patient medication on-boarding via clinic-embedded liaisons.[17] A patient whose provider participated in the HSSP model in-clinic received enhanced on-boarding, but a patient who did not fill with an HSSP pharmacy did not receive pharmacy care from the HSSP-embedded clinical pharmacist. Therefore, the effect of the HSSP care model was hypothesized to improve health care cost and utilization for patients filling prescriptions at pharmacies that follow the HSSP model and receiving care from a provider using the HSSP care model in-clinic. Patients with providers participating in the HSSP care model in-clinic only, but not using the HSSP pharmacy to fill prescriptions, were hypothesized to receive partial benefit. Patients not participating in the HSSP model in-clinic and not using an HSSP pharmacy at all had the least exposure to the HSSP model and were therefore hypothesized to benefit least.

Study population exposure was categorized into 1 treatment category and 2 benchmark categories: HSSP group, provider benchmark group, or network benchmark group. A member who filled at least 1 prescription for a specialty drug at an HSSP group-affiliated pharmacy and had a specialty provider participating in the HSSP group care model in-clinic was classified in the full treatment group (*HSSP group*). A member who had a provider participating in the HSSP care model in-clinic but did not use the HSSP pharmacy for any specialty fills was classified in the partial treatment *provider benchmark group*. Members were included in either the HSSP or the provider benchmark group if they first filled a medication of interest after the HSSP care model launch date only (HSSP group intervention partner launch dates are specified in Supplementary Table 1). A member with a provider not participating in the HSSP care model at all in-clinic and not using the HSSP pharmacy for any specialty fills was classified into the *network benchmark group*. The network benchmark group was further refined to match variation in health care cost due to geography, by only including members using pharmacies in the Northeast census region (see Supplementary Table 3 in online article), so as to match the majority of HSSP group and provider benchmark group members during the study period. Only members continuously enrolled were considered for the study population. Figure 1 describes the derivation of sample population for this study.

TABLE 1 Distribution of Member Characteristics Across the Intervention (HSSP) and Control (Provider Benchmark and Network Benchmark) Groups

Variable	HSSP		Provider		*P* value	Network		*P* value
Total member count	208		509		–	9,063		–
Total member months	2,366		5,909		–	102,978		–
Mean 2018 HCC risk score (SD)[a]	3.1051 (2.04)		1.9647 (1.82)		<0.001	1.7130 (1.63)		<0.001
Mean age (SD)	71.1 (10.0)		68.7 (9.8)		<0.01	68.2 (10.9)		<0.01
	n	%	n	%	*P* value	n	%	*P* value
Sex								
Female	98	47.1	255	50.1	0.39	4,511	49.8	0.42
Male	110	52.9	254	49.9		4,531	50.0	
Census division								
Northeast	112	53.8	328	64.4	<0.001	5,607	61.9	<0.001
Midwest	18	8.7	42	8.3		444	4.9	
South	19	9.1	60	11.8		1,342	14.8	
West	3	1.4	20	3.9		137	1.5	
Unknown[b]	56	26.9	59	11.6		1,534	16.9	
Disease state								
Oncology	129	62.0	190	37.3	<0.001	2,826	31.1	<0.001
Cardiovascular	11	5.3	4	0.8		552	6.1	
HIV	5	2.4	97	19.1		1,752	19.3	
Multiple sclerosis	3.4	7	41	8.1		907	10.0	
Inflammatory	22	10.6	85	16.7		2,121	23.4	
Transplant	35	16.8	97	19.1		990	10.9	
First Rx in 2018								
Quarter 1	102	49.0	399	78.4	<0.001	6,171	68.1	<0.001
Quarter 2	23	11.1	49	9.6		1,184	13.1	
Quarter 3	46	22.1	34	6.7		892	9.8	
Quarter 4	37	17.8	27	5.3		816	9.0	

[a]*Weighted by member months.*

[b]*Member census division could not be determined.*

HCC = Hierarchical Condition Categories; HSSP = health system specialty pharmacy; Rx = prescription.

OUTCOME

The primary outcome measure was total health care costs on a per-patient per-month (PMPM) basis. Total health care costs comprised total medical and pharmacy benefit claims. Secondary outcomes were selected utilization drivers and cost subcomponents of medical and pharmacy expenses. Total costs, subcomponent costs, and utilization drivers were calculated uniformly across groups. Cost were included if the date of service was between January 1, 2018, and December 31, 2019. A 3-month tail for claim payment was included as a cutoff point to ensure that all members had the same time frame whereby a claim may still be filed within a plan year.

BIAS ADJUSTMENT

To account for baseline differences in the member population (Table 1), the Medicare actuarial method of using CMS-HCC (Centers for Medicare & Medicaid Services Hierarchical Condition Categories) risk scores was used. Medicare Advantage uses CMS-HCC risk scores to predict future health care costs, set reimbursement rates, and calculate premiums. Medicare calculates CMS-HCC risk scores

TABLE 2 Health Care Utilization During Baseline and Follow-Up With CIs, With and Without CMS-HCC Risk Adjustment

Variable	Before risk adjustment						
2018	**HSSP**	**Provider**	**Network**	**HSSP comparison**			
Count	208	509	9,063				
Months	2,366	5,909	102,978				
Mean HCC	3.11	1.96	1.71				
				vs Provider		**vs Network**	
Visits per year	**Mean**	**Mean**	**Mean**	**Diff 95% CI**	***P* value**	**Diff 95% CI**	***P* value**
Inpatient	1.02	0.39	0.41	(–0.16-1.42)	0.12	(–0.14-1.37)	0.11
Hospital outpatient	20.32	11.27	10.42	(–1.63-19.73)	0.10	(0.14-19.67)	0.05
Emergency	0.71	0.57	0.64	(–0.47-0.74)	0.67	(–0.45-0.57)	0.82
Free-standing physician	46.41	32.37	30.53	(–1.79-29.87)	0.08	(1.78-30)	0.03
Rx per month							
Specialty	0.70	0.95	0.90	(–0.38-–0.12)	<0.01	(–0.32-–0.07)	<0.01
2019	**HSSP**	**Provider**	**Network**	**HSSP comparison**			
Count	196	496	8,810				
Months	2,144	5,699	99,743				
Mean HCC	2.87	1.94	1.74				
				vs Provider		**vs Network**	
Visits per year	**Mean**	**Mean**	**Mean**	**Diff 95% CI**	***P* value**	**Diff 95% CI**	***P* value**
Inpatient	0.73	0.45	0.47	(0.17-0.39)	<0.01	(0.16-0.36)	<0.01
Hospital outpatient	17.01	10.02	9.80	(4.52-9.61)	<0.01	(4.83-9.60)	<0.01
Emergency department	0.80	0.62	0.66	(0.06-0.31)	<0.01	(0.03-0.26)	0.01
Free-standing physician	37.30	30.90	29.70	(0.51-12.23)	0.03	(2.34-12.83)	<0.01
Rx per month							
Specialty	0.88	1.07	0.98	(–0.34-–0.03)	0.02	(–0.22-0.03)	0.15

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directly from demographic factors (age, sex, and Medicare and Medicaid dual eligibility), as well as diagnosis codes (derived from claims files from the previous year), to predict expenditures.[24] These actions adjust for differences in disease status, multidisease state interactions (comorbidities), and demographic factors between beneficiaries. Only members for which a valid CMS-HCC risk score could be calculated were included in this study (Figure 1).

CMS-HCC risk scores for all members and all groups were calculated using the 2018 CMS-HCC risk adjustment methodology. Risk scores were calculated first on a member level, before any group level calculations. CMS-HCC risk score-adjusted cost metrics were calculated on a PMPM basis by summing a member's total costs and dividing by member months and CMS-HCC risk score. Similarly, risk-adjusted utilization metrics were calculated by summing a member's units and dividing by member months and CMS-HCC risk score.

$$\text{CMS-HCC Adjusted Cost} = \text{Total Cost} \div (\text{Member Months} \times \text{CMS-HCC Risk Score})$$

$$\text{CMS-HCC Adjusted Utilization} = \text{Total Utilization} \div (\text{Member Months} \times \text{CMS-HCC Risk Score})$$

Because CMS-HCC risk score is calculated on an individual member basis normalized to 1 and directly multiplied by the base rate to calculate plan payment per member by Medicare,[25] Total Cost or Utilization divided by CMS-HCC in the denominator was used to represent a generalizable comparison for risk adjustment.

TABLE 2 Health Care Utilization During Baseline and Follow-Up With CIs, With and Without CMS-HCC Risk Adjustment *(continued)*

Variable	After risk adjustment						
2018	**HSSP**	**Provider**	**Network**	**HSSP comparison**			
Count	208	509	9,063				
Months	2,366	5,909	102,978				
Mean HCC	3.11	1.96	1.71				
				vs Provider		**vs Network**	
Visits per year	**Mean**	**Mean**	**Mean**	**Diff 95% CI**	***P* value**	**Diff 95% CI**	***P* value**
Inpatient	0.27	0.16	0.17	(–0.12-0.34)	0.33	(–0.09-0.29)	0.3
Hospital outpatient	10.80	9.37	9.53	(–7.67-10.51)	0.76	(–6.63-9.16)	0.75
Emergency	0.40	0.40	0.56	(–0.54-0.54)	0.99	(–0.62-0.3)	0.49
Free-standing physician	23.80	28.87	30.16	(–22.27-12.13)	0.56	(–18.88-6.16)	0.32
Rx per month							
Specialty	0.70	0.95	0.90	(–0.38-–0.12)	<0.01	(–0.32-–0.07)	<0.01
2019	**HSSP**	**Provider**	**Network**	**HSSP comparison**			
Count	196	496	8,810				
Months	2,144	5,699	99,743				
Mean HCC	2.87	1.94	1.74				
				vs Provider		**vs Network**	
Visits per year	**Mean**	**Mean**	**Mean**	**Diff 95% CI**	***P* value**	**Diff 95% CI**	***P* value**
Inpatient	0.23	0.16	0.17	(0.04-0.11)	<0.01	(0.03-0.09)	<0.01
Hospital outpatient	6.81	7.75	8.23	(–2.11-0.23)	0.12	(–2.39-–0.45)	<0.01
Emergency department	0.29	0.50	0.52	(–0.27-–0.15)	<0.01	(–0.27-–0.19)	<0.01
Free-standing physician	17.77	25.29	27.50	(–10.86-–4.19)	<0.01	(–12.29-–7.19)	<0.01
Rx per month							
Specialty	0.88	1.07	0.98	(–0.34-–0.03)	0.02	(–0.22-0.03)	0.15

CMS-HCC = Centers for Medicare & Medicaid Services Hierarchical Condition Categories; HSSP = health system specialty pharmacy; Rx = prescription.

STATISTICAL METHODS

Analysis was performed using chi-square tests for categorical data and 2-tailed t-tests for continuous data. For all t-tests, the variances were assumed to be unequal. *P* values less than 0.05 were considered as statistically significant (statistical significance level of $\alpha = 0.05$). Differences in mean primary and secondary outcomes were assessed separately between the HSSP group and the benchmarks groups. Means were assessed with and without adjustments for CMS-HCC risk scores using a t-distribution. SAS Enterprise Guide, version 7.1 (SAS Institute) was used to perform these functions.

Results

Of the analytic sample of 9,780 members used in this study, 208 (2.1%) belonged to the HSSP group, which accounted for 4,510 member months of data over the 2018-2019 study period. By comparison, the provider benchmark group comprised 509 members, which accounted for 11,608 member months, and the network benchmark group comprised 9,063 members representing 202,721 member months. Demographic characteristics of the members are described in Table 1. On average, members in the HSSP group had a higher CMS-HCC risk score in the baseline year compared with the benchmark groups ($P < 0.001$). Member age and sex were similar across different groups; however, notable

TABLE 3 Health Care Costs During Baseline and Follow-Up With CIs, With and Without CMS-HCC Risk Adjustment

Variable	Before risk adjustment						
2018	**HSSP**	**Provider**	**Network**	**HSSP comparison**			
Count	208	509	9,063				
Months	2,366	5,909	102,978				
Mean HCC	3.11	1.96	1.71				
				vs Provider		**vs Network**	
PMPM ($)	**Mean**	**Mean**	**Mean**	**Diff 95% CI**	***P* value**	**Diff 95% CI**	***P* value**
Inpatient	2,577	801	734	(–1,826-5,379)	0.33	(–1,660-5,346)	0.30
Hospital outpatient	8,941	3,802	3,149	(–5,397-15,676)	0.34	(–4,084-15,668)	0.25
Emergency department	48	44	47	(–61-71)	0.89	(–47-50)	0.95
Free-standing physician	4,682	3,104	2,880	(–2,240-5,396)	0.42	(–1,249-4,854)	0.25
Pharmacy Rx	4,787	4,333	3,916	(–2,002-2,910)	0.72	(–1,153-2,896)	0.40
Total health care	21,790	12,750	11,121	(–4,580-22,658)	0.19	(–1,806-23,143)	0.10
2019	**HSSP**	**Provider**	**Network**	**HSSP comparison**			
Count	196	496	8,810				
Months	2,144	5,699	99,743				
Mean HCC	2.87	1.94	1.74				
				vs Provider		**vs Network**	
PMPM ($)	**Mean**	**Mean**	**Mean**	**Diff 95% CI**	***P* value**	**Diff 95% CI**	***P* value**
Inpatient	905	605	643	(163-438)	<0.01	(135-390)	<0.01
Hospital outpatient	6,825	3,166	2,741	(2,663-4,654)	<0.01	(3,127-5,041)	<0.01
Emergency department	48	50	50	(–10-6)	0.56	(-9-4)	0.47
Free-standing physician	3,746	2,779	2,684	(388-1545)	<0.01	(534-1,589)	<0.01
Pharmacy Rx	4,399	4,114	3,601	(–429-999)	0.43	(177-1,418)	0.01
Total health care	16,860	11,497	10,162	(2,795-7,932)	<0.01	(4,328-9,068)	<0.01

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differences between the groups were present in geographical region and disease state. Differences existed between the HSSP group and benchmark groups for first prescription in 2018 ($P<0.001$), likely because of the rolling transition of members into the HSSP model throughout the baseline year.

Use of health care services is shown in Table 2. At baseline, members in the HSSP group had double the frequency of inpatient and hospital outpatient visits and had a free-standing physician visit more frequently. After adjusting for disease severity, demographics, and comorbid conditions of the members, using CMS-HCC risk scores, these differences were attenuated. In the follow-up year, the disparity in health care utilization reversed after adjustment such that the HSSP group had slightly less utilization in all visit categories compared with members in the benchmark groups.

Table 3 lists the health care costs incurred by members in this study based on their exposure status. Before adjusting for medical complexity, members in the HSSP group had 3-fold higher inpatient costs and at least twice as high hospital outpatient and total health care costs. Notably, the pharmacy prescription costs were also higher. However, after adjusting for the CMS-HCC risk scores, the magnitude of these differences decreased for inpatient and hospital outpatient costs and disappeared for pharmacy and total health care costs. In the follow-up year, after adjusting with CMS-HCC risk scores, members in the HSSP group had

TABLE 3 **Health Care Costs During Baseline and Follow-Up With CIs, With and Without CMS-HCC Risk Adjustment** *(continued)*

Variable	After risk adjustment						
2018	**HSSP**	**Provider**	**Network**	**HSSP comparison**			
Count	208	509	9,063				
Months	2,366	5,909	102,978				
Mean HCC	3.11	1.96	1.71				
				vs Provider		**vs Network**	
PMPM ($)	**Mean**	**Mean**	**Mean**	**Diff 95% CI**	***P* value**	**Diff 95% CI**	***P* value**
Inpatient	556	255	234	(–392-994)	0.40	(–335-978)	0.34
Hospital outpatient	2,718	2,286	2,170	(–3,052-3,915)	0.81	(–1,886-2,982)	0.66
Emergency department	21	25	35	(–38-30)	0.81	(–38-10)	0.66
Free-standing physician	1,843	2,014	2,218	(–2,046-1,705)	0.86	(–1,870-1,121)	0.6
Pharmacy Rx	4,136	3,814	4,639	(–4,226-4,869)	0.89	(–4,746-3,741)	0.82
Total health care	9,520	8,691	9,510	(–5,754-7,412)	0.81	(–5,453-5,475)	0.99
2019	**HSSP**	**Provider**	**Network**	**HSSP comparison**			
Count	196	496	8,810				
Months	2,144	5,699	99,743				
Mean HCC	2.87	1.94	1.74				
				vs Provider		**vs Network**	
PMPM ($)	**Mean**	**Mean**	**Mean**	**Diff 95% CI**	***P* value**	**Diff 95% CI**	***P* value**
Inpatient	266	181	208	(44-125)	<0.01	(21-96)	<0.01
Hospital outpatient	2,095	1,717	1,681	(48-708)	0.03	(119-710)	0.01
Emergency department	21	37	33	(–20-–12)	<0.01	(–15-–10)	<0.01
Free-standing physician	1,282	1,693	1,977	(–644-–178)	0.02	(–880-–511)	<0.01
Pharmacy Rx	3,087	3,723	4,018	(–1,179-–94)	0.02	(–1,371-–491)	<0.01
Total health care	7,060	7,683	8,152	(–1,820-575)	0.31	(–2,095-–89)	0.03

CMS-HCC=Centers for Medicare & Medicaid Services Hierarchical Condition Categories; HSSP=health system specialty pharmacy; PMPM=per patient per month; Rx=prescription.

a lower PMPM cost ($7,060, 95% CI=$3,025-$11,095) than the provider benchmark group ($7,683, 95% CI=$4,933-$10,432, P=0.31) and network benchmark group ($8,155, 95% CI=$7,371-$8,932, P=0.03). The breakdown of these costs reveals that lower pharmacy costs and free-standing physician visit costs in the follow-up year contributed to the overall difference reflected in the total health care costs.

Discussion

This retrospective cohort study identified an association between use of an HSSP and reduction in total health care costs and health care visits. We observed notable differences in health care utilization and costs, especially during the follow-up year after adjusting for CMS-HCC risk scores. Based on analysis of different components of health care and related costs, we noted that the overall trends were largely driven by decreased free-standing physician-related expenses and pharmacy costs. Notably, these differences were most pronounced between HSSP users and the network benchmark group. These findings represent the first multihealth system analysis of the effect of HSSPs and build on previous findings by our group based on a single institution, which revealed similar findings but did not reach statistical significance.[23]

Historically, specialty pharmacy care models have focused narrowly on reducing drug spend for members, rather than providing care coordinating interventions to improve total health care costs.[26] These findings suggest that the HSSP model may have a broader role to play in care coordination; however, specific interventions and associated outcomes could not be elucidated in this study. Nevertheless, these findings corroborate previous evidence that HSSP use was associated with reduced provider burden and streamlined specialty medication management.[27,28] Further, an investigation comparing physician satisfaction with HSSP vs external SP identified a meaningful difference in the average score of satisfaction with HSSP use.[29] The improvement in satisfaction was driven by lowering time to initiation of specialty drugs, a particularly important consideration in the care of these medically complex patients.

Our finding of observed health care expenditure improvement with the use of HSSP is particularly noteworthy, considering that HSSP use is associated with improved clinical outcomes.[20-22] It is possible that the reduced time to initiation or a streamlined process to sustain access to specialty pharmacy through increased care coordination is driving both of these findings. Specialty medications are emerging as essential tools within the arsenal of treatment options for complex or refractory disease. However, obtaining access to these medications requires a complicated process that includes prior authorization and often an appeal to a member's insurance company.[29] As part of that process, frequent physician visits may be required.

In addition, delay in initiation of the specialty medications may cause worsening of the disease or frustration among the patients, leading to additional health care utilization. Indeed, prolonged time to treatment initiation has been associated with adverse patient outcomes.[28,30-34] Taken together, these findings underscore the critical takeaway that use of HSSPs is a value-driven proposition for patients, managed care organizations, and payers.

LIMITATIONS

It is important to understand the findings of this study in the context of its limitations. To begin, a small proportion of Medicare Advantage members were eligible for inclusion in this study. A low number of patients filling a specialty medication of interest within a much larger member population was expected, given the low proportion of specialty pharmacy patients typically observed in populations (< 2%-5%).[35,36] However, specialty pharmacy patients as a whole have been shown to represent more than 50% of all pharmacy expense and more than 34% of total health care costs for plans.[26] Therefore, despite the relatively small number of members, our study represents the largest display of cost and utilization data available for a very impactful population on total health care costs for plans. Trends observed among groups with varying HSSP pharmacy exposure should be considered in the context of multifaceted care received by these patients beyond pharmacy.

A heavier balance of oncology patients observed in HSSP populations may involve cyclical therapeutics that could confound comparisons. In addition, self-selection of more oncology patients or more complex patients in general (by either providers or patients) into new or higher cost care models may introduce bias.

Statistical techniques such as matching or multivariable regression may adjust for confounding variables, but application of these many techniques obscure the generalizability of findings. CMS-HCC risk scores were used as a patient complexity balancing method in this study because Medicare uses CMS-HCC scores for forward-looking projections regarding benefit cost and design; however, it only controls for known confounders.

Finally, it is important to recognize that member access to the HSSP model is not universal and depends on certain key factors. The most prominent factors are insurance networks and limited distribution drug restrictions, which represents a future line of inquiry as consistent findings of health care cost savings emerge.

Conclusions

Our study is the first to examine the cost-saving effects of HSSPs on a multihealth system scale, as well as the first to examine the cost-saving effects of different levels of patient engagement with the HSSP model. As HSSPs become more widely available and used, the focus of research should shift to cost-effectiveness analysis and pseudo-randomized effectiveness study for specific disease states to inform health care practices and strategic decision making at an institutional level.

DISCLOSURES

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REFERENCES

1. Centers for Medicare & Medicaid Services. NHE fact sheet. Accessed April 3, 2021. https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NHE-Fact-Sheet

2. Centers for Medicare & Medicaid Services. Medicare Program; Medicare Shared Savings Program: Accountable Care Organizations. Proposed Rules. *Fed Regist.* 2011;76(67):19528. Accessed April 3, 2021. https://www.govinfo.gov/content/pkg/FR-2011-04-07/pdf/2011-7880.pdf

3. Wilks C, Krisle E, Westrich K, Lunner K, Muhlestein D, Dubois R. Optimization of medication use at accountable care organizations. *J Manag Care Spec Pharm.* 2017;23(10):1054-64. doi:10.18553/jmcp.2017.23.10.1054

4. Fishman P, Coe NB, White L, et al. Cost of dementia in Medicare managed care: a systematic literature review. *Am J Manag Care.* 2019;25(8):e247-e253.

5. Karnuta JM, Navarro SM, Haeberle HS, Billow DG, Krebs VE, Ramkumar PN. Bundled care for hip fractures: a machine-learning approach to an untenable patient-specific payment model. *J Orthop Trauma.* 2019;33(7):324-30. doi:10.1097/BOT.0000000000001454

6. Jackson GL, Powers BJ, Chatterjee R, et al. The patient-centered medical home: a systematic review. *Ann Intern Med.* 2013;158(3):169-78. doi:10.7326/0003-4819-158-3-201302050-00579

7. Amara S, Adamson RT, Lew I, Slonim A. Accountable care organizations: impact on pharmacy. *Hosp Pharm.* 2014;49(3):253-59. doi:10.1310/hpj4903-253

8. Hirsch BR, Balu S, Schulman KA. The impact of specialty pharmaceuticals as drivers of health care costs. *Health Aff (Millwood).* 2014;33(10):1714-20. doi:10.1377/hlthaff.2014.0558

9. Robinson JC, Howell S. Specialty pharmaceuticals: policy initiatives to improve assessment, pricing, prescription, and use. *Health Aff (Millwood).* 2014;33(10):1745-50. doi:10.1377/hlthaff.2014.0498

10. Robinson JC, Howell S, Pearson SD. Value-based pricing and patient access for specialty drugs. JAMA. 2018;319(21):2169-70. doi:10.1001/jama.2018.5367

11. National Association of Specialty Pharmacy. What is specialty pharmacy? 2016. Accessed April 3, 2021. https://naspnet.org/wp-content/uploads/2019/08/What-Is-Specialty-Pharmacy-090718.pdf

12. Schwartz RN, Eng KJ, Frieze DA, et al. NCCN Task Force report: specialty pharmacy. *J Natl Compr Canc Netw.* 2010;8(Suppl 4):S1-S12. doi:10.6004/jnccn.2010.0127

13. Miller RM, Happe LE, Meyer KL, Spear RJ. Approaches to the management of agents used for the treatment of multiple sclerosis: consensus statements from a panel of U.S. managed care pharmacists and physicians. *J Manag Care Pharm.* 2012;18(1):54-62. doi:10.18553/jmcp.2012.18.1.54

14. Stern D, Reissman D. Specialty pharmacy cost management strategies of private health care payers. *J Manag Care Pharm.* 2006;12(9):736-44. doi:10.18553/jmcp.2006.12.9.736

15. Ganguli A, Clewell J, Shillington AC. The impact of patient support programs on adherence, clinical, humanistic, and economic patient outcomes: a targeted systematic review. *Patient Prefer Adherence.* 2016;10:711-25. doi:10.2147/PPA.S101175

16. Gleason PP, Alexander GC, Starner CI, et al. Health plan utilization and costs of specialty drugs within 4 chronic conditions. *J Manag Care Pharm.* 2013;19(7):542-48. doi:10.18553/jmcp.2013.19.7.542

17. Joseph T, Hale GM, Eltaki SM, et al. Integration strategies of pharmacists in primary care-based accountable care organizations: a report from the accountable care organization research network, services, and education. *J Manag Care Spec Pharm.* 2017;23(5):541-48. doi:10.18553/jmcp.2017.23.5.541

18. Zuckerman AD, Carver A, Cooper K, et al. An integrated health-system specialty pharmacy model for coordinating transitions of care: specialty medication challenges and specialty pharmacist opportunities. *Pharmacy.* 2019;7(4):163. doi:10.3390/pharmacy7040163

19. Colgan K, Beacher R. Importance of specialty pharmacy to your health system. *Am J Health Syst Pharm.* 2015;72(9):753-56. doi:10.2146/ajhp140796

20. Barnes E, Zhao J, Giumenta A, Johnson M. The effect of an integrated health system specialty pharmacy on HIV antiretroviral therapy adherence, viral suppression, and CD4 count in an outpatient infectious disease clinic. *J Manag Care Spec Pharm.* 2020;26(2):95-102. doi:10.18553/jmcp.2020.26.2.95

21. Shah NB, Mitchell RE, Proctor ST, et al. High rates of medication adherence in patients with pulmonary arterial hypertension: an integrated specialty pharmacy approach. *PLoS One.* 2019;14(6):e0217798. doi:10.1371/journal.pone.0217798

22. Reynolds VW, Chinn ME, Jolly JA, et al. Integrated specialty pharmacy yields high PCSK9 inhibitor access and initiation rates. *J Clin Lipidol.* 2019;13(2):254-64. doi:10.1016/j.jacl.2019.01.003

23. Soni A, Smith BS, Scornavacca T, et al. Association of use of an integrated specialty pharmacy with total medical expenditures among members of an accountable care organization. *JAMA Netw Open.* 2020;3(10):e2018772. doi:10.1001/jamanetworkopen.2020.18772

24. Pope GC, Kautter J, Ellis RP, et al. Risk adjustment of Medicare capitation payments using the CMS-HCC model. *Health Care Financ Rev.* 2004;25(4):119-41.

25. Medpac. Medicare Advantage Program Payment System. Accessed September 9, 2021. https://www.medpac.gov/wp-content/uploads/2021/11/medpac_payment_basics_21_ma_final_sec.pdf

26. Visante. Pharmacy benefit managers (PBMs): generating savings for plan sponsors and consumers. February 2016. Accessed April 9, 2021. https://www.pcmanet.org/wp-content/uploads/2016/08/visante-pbm-savings-feb-2016.pdf

27. Pulvermacher A, Nelson C. Benefits of developing a collaborative, outcomes-based specialty pharmacy program. *Am J Health Pharm.* 2016;73(11):839-43. doi:10.2146/ajhp150805

28. Bagwell A, Kelley T, Carver A, Lee JB, Newman B. Advancing patient care through specialty pharmacy services in an academic health system. *J Manag Care Spec Pharm.* 2017;23(8):815-20. doi:10.18553/jmcp.2017.23.8.815

29. Anguiano RH, Zuckerman AD, Hall E, et al. Comparison of provider satisfaction with specialty pharmacy services in integrated health-system and external practice models: a multisite survey. *Am J Health Syst Pharm.* 2021;78(11):962-71. doi:10.1093/ajhp/zxab079

30. Cocohoba J, Pohlman B, Tran JS, et al. Modeling specialty medicine access: understanding key health system processes and players. *J Am Pharm Assoc (2003).* 2019;59(1):43-50.e3. doi:10.1016/j.japh.2018.09.004

31. Geynisman DM, Meeker CR, Doyle JL, et al. Provider and patient burdens of obtaining oral anticancer medications. *Am J Manag Care.* 2018;24(4):e128-e133.

32. Niccolai JL, Roman DL, Julius JM, Nadour RW. Potential obstacles in the acquisition of oral anticancer medications. *J Oncol Pract.* 2017;13(1):e29-e36. doi:10.1200/JOP.2016.012302

33. O'Neil D, Accordino MK, Wright JD, et al. Delay in receipt of newly prescribed oral anticancer drugs [abstract]. *J Clin Oncol.* 2019;37(15 Suppl):6541. doi:10.1200/jco.2019.37.15_suppl.6541

34. Khorana AA, Tullio K, Elson P, et al. Increase in time to initiating cancer therapy and association with worsened survival in curative settings: a U.S. analysis of common solid tumors [abstract]. *J Clin Oncol.* 2017;35(15 Suppl):6557. doi:10.1200/jco.2017.35.15_suppl.6557

35. Evernorth Health. 2020 drug trend report. Accessed April 3, 2021. https://www.evernorth.com/drug-trend-report

36. Lotvin A. The evolution of specialty management. CVS Health Insights. January 10, 2017. Accessed June 21, 2021. https://payorsolutions.cvshealth.com/insights/the-evolution-of-specialty-management