

Pharmacist-Provided Telephonic Medication Therapy Management in an MAPD Plan

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The 2000 Institute of Medicine (IOM) report *To Err is Human: Building a Safer Health System* increased awareness of the prevalence of medication errors.¹ In response, Congress, through the Medicare Prescription Drug Improvement and Modernization Act (MMA) of 2003, directed the Centers for Medicare & Medicaid Services (CMS) to contract with the IOM to draft a national agenda to reduce medication errors. The IOM later recommended that clinicians have a patient-centered collaborative approach for medication management.²

Centers for Medicare & Medicaid Services incorporated this recommendation by requiring a medication therapy management program (MTMP) for Part D sponsors.³ The provision states that medication therapy management is a service for Medicare beneficiaries who have multiple chronic diseases, are taking multiple drugs covered under the MMA, and are likely to incur an annual cost set by the Department of Health & Human Services.⁴ MTMPs were intended to improve drug therapy for Medicare members through the provision of patient education and counseling, improved adherence to medication, and detection of adverse drug events and patterns of prescription drug overuse and underuse.³ In the final rulings on the Medicare Prescription Drug Improvement and Modernization Act, CMS stated that MTMPs “must evolve and become a cornerstone of the Medicare Prescription Drug Benefit.”⁵

Wide variation exists among Prescription Drug Plans (PDPs) and Medicare Advantage Prescription Drug (MAPD) plans in their implementation and management of MTMPs. In 2007, the IOM stated that “While the concept of medication therapy management is promising, there is as yet no clear view as to what services should be provided or will be cost-effective.”² Since the IOM statement, a small number of studies have emerged regarding economic outcomes of MTMPs, with few reports on pharmacist-provided telephonic MTMPs.^{6,7} A report from Health Alliance Plan in Michigan described the impact of a telephonic MTMP provided to MAPD members during 2006 and 2007.⁶ A retrospective analysis was used to compare cost savings for members who enrolled in the MTMP with cost savings for members who declined participation. Both groups had a statistically significant decrease in prescription and medical costs over the 2006 plan year; however, there

Objectives: To evaluate the impact of a pharmacist-provided telephonic medication therapy management program (MTMP) on drug, medical, and total expenditures in a Medicare Advantage Prescription Drug (MAPD) plan population from the perspective of the health plan sponsor.

Study Design: Prepost analysis with a matched control group.

Methods: The intervention group was composed of MTMP-eligible MAPD members who received a pharmacist-provided telephonic consultation during the first quarter of 2008. Propensity score matching was used to select a matched control group among the remaining pool of MTMP-eligible MAPD members who did not receive a pharmacist-provided telephonic or face-to-face MTMP consultation in 2008. All-cause healthcare spending was determined before and after an intervention period for the MTMP consultation and control groups. A difference-in-difference analysis was performed to assess the impact of MTMP consultation on all-cause healthcare spending.

Results: A total of 432 MTMP-eligible MAPD members who received an intervention were matched to a comparison group of 432 members. The MTMP consultation group and the comparison group had different unadjusted total expenditures after intervention. The MTMP consultation group had an average of \$3680 less per member in the postintervention period compared with the preintervention period, while the matched comparison group had an average of \$393 more in the postintervention period compared with the preintervention period. Results from difference-in-difference regression analyses suggest that MTMP consultation was associated with lower total expenditures after adjusting for other baseline covariates.

Conclusions: Pharmacist-provided telephonic MTMP consultations can lead to decreases in total all-cause healthcare expenditures.

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Take-Away Points

Although Part D sponsors are required to have a medication therapy management program (MTMP) in which services can be provided face-to-face or through telephonic consultations, few studies have evaluated the impact of a pharmacist-provided telephonic MTMP on clinical and financial outcomes.

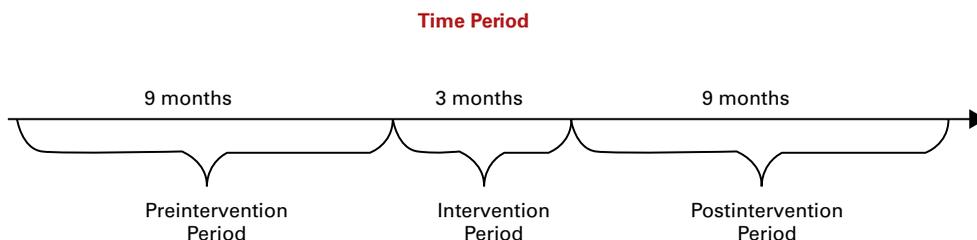
- A pharmacist-provided telephonic MTMP was associated with lower postintervention medical and total expenditures compared with a matched comparison group in a Medicare Advantage Prescription Drug plan population.
- This is an important finding for the Medicare program as the government and private insurers look for ways to optimize the value of the healthcare system.

was a significantly greater reduction in prescription costs for members who enrolled in the MTMP. The authors showed that prescription costs per member per month for the intervention group members decreased by 17.2% compared with a decrease of 7% for members who declined participation in the MTMP. Patient satisfaction with the MTMP was also very high, with 95% of respondents indicating that they found the program to be helpful.

Another recent study by Welch and colleagues from Kaiser Permanente Colorado showed the positive impact of a pharmacist-managed telephonic MTMP for MAPD members.⁷ Kaiser Permanente Colorado members who opted in to the pharmacist telephonic consultations were more likely to be hospitalized (adjusted odds ratio [OR] 1.4, 95% confidence interval [CI] 1.1-2.0) but were less likely to die (adjusted OR 0.5, 95% CI 0.3-0.9) than members who opted out of the MTMP. The Kaiser Permanente Colorado investigators found no difference in the rate of emergency department visits. They found that participants in the MTMP were more likely to have an increase in prescription expenditures compared with nonparticipants (adjusted OR 1.4, 95% CI 1.1-1.9).

The objective of this study was to estimate the impact of pharmacist-provided telephonic MTMP on drug expenditures, medical expenditures, and total expenditures in an MAPD population. Members receiving face-to-face MTMP from a pharmacist at a community pharmacy were not included in this analysis because the small sample size would not allow for a valid assessment of this intervention.

■ **Figure 1. Study Time Period**



METHODS

Intervention

Part D sponsors have the flexibility to choose how they implement an MTMP. In 2008, Humana's requirements for MTMP eligibility included (1) 2 or more chronic conditions; (2) 8 or more chronic, systemic Part D medications; and (3) anticipated Part D medication costs of more than \$4000 annually. Eligibility for the MTMP was assessed using prescription claims data stored in Humana's data warehouse, which were analyzed using the Humana MTMP eligibility application on a monthly basis to determine which Humana Medicare beneficiaries were eligible for MTMP services. At least 3 months of prescription claims data were captured and evaluated before a beneficiary was deemed eligible for MTMP services. Within the first quarter of a calendar year, the months from the preceding year were captured for the evaluation. Multiple chronic conditions were determined using a list of target medications to infer chronic conditions. The count of prescriptions was calculated as the number of unique Part D medications filled with at least a 15-day supply. Nonsystemic medications such as topical medications and nasal, otic, and ophthalmic agents were excluded. The anticipated annual cost for covered Part D drugs was determined based on the actual prescription cost (inclusive of Humana's payment and member payment) for those unique Part D drugs for which prescriptions were filled at the time of MTMP eligibility and the projected cost of Part D drugs for the remainder of the year. The projected annual costs were determined by calculating the average cost per day of the actual prescription costs and extrapolating those costs throughout the remainder of the year. For projected annual cost calculations, the cost was based on the most recent claim for the National Drug Code. For those members who had more than 3 months of claims data, the last claim must have been within the last 90 days to be counted as a drug that contributed to the projected annual costs. Members were deemed eligible for MTMP if they met all of the aforementioned criteria.

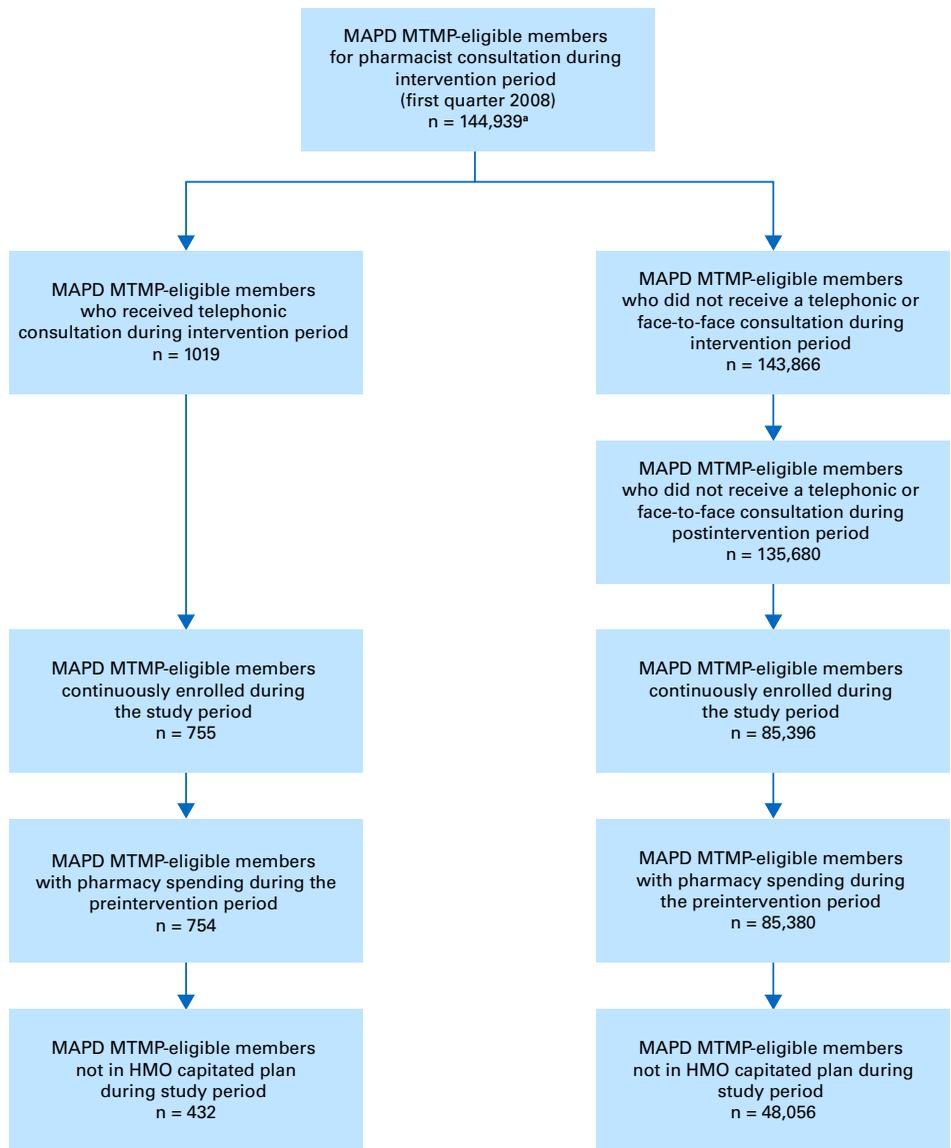
Humana utilized a combination of MTMP services such as Smart-SummaryRx mailings and pharmacist consultations. MTMP consultations included telephonic pharmacist consultations as well as face-to-face community pharmacist consultations.

Pharmacist-Provided Telephonic MTMP in an MAPD Plan

The SmartSummaryRx operated on an opt-out basis and provided members access to personalized details of financial, health, and claims information. All MTMP-eligible beneficiaries were automatically enrolled in the program and received educational mailings unless they specifically stated their interest in opting out of the program. These mailings were designed to help Medicare members review past purchases and decisions while proactively planning for future decisions and behaviors. The SmartSummaryRx also notified beneficiaries of their eligibility for the MTMP consultations and were provided with contact information for the MTMP call center and instructions on how to enroll in these programs.

Like the SmartSummaryRx mailings, members were required to opt out of consultation services. The MTMP center handled inbound calls from eligible members who were interested in participating in the program. They also made outbound calls to invite members to participate in the MTMP. Since a large volume of outbound calls occurred each week, a priority score was assigned to each member such that members were placed at the top of the call list based on number of chronic conditions, number of unique Part D drugs, and the anticipated total cost for Part D-covered drugs. Members were offered the opportunity to participate in either a telephonic consultation with a Humana pharmacist or a face-to-face consultation with a community pharmacy if a participating MTMP provider was within the same zip code as the member. Members chose whether to participate in the face-to-face consultation, the telephonic consultation, or no consultation. In 2008, only 5% of MTMP consultations were provided through the 9000 community pharmacy MTMP providers for Humana.

■ **Figure 2. Member Selection Criteria**



MAPD indicates Medicare Advantage Prescription Drug; MTMP, medication therapy management program.
 *Included 54 members who received pharmacist-provided face-to-face MTMP.

Members who received a telephonic consultation from a pharmacist were provided with personalized guidance about their medications to optimize their medication regimen. During the consultation, the pharmacist conducted a comprehensive medication review by gathering a complete list of the member's medications including prescription medications, nonprescription medications, and herbal supplements. The pharmacist also obtained information on the member's drug allergies, medical conditions, and pertinent past medical history. As part of the comprehensive medication review, the pharmacist provided the member with education about his/her medication regimen including im-

■ **Table 1.** Member Characteristics Before and After Propensity Score Matching

N	Before Matching				After Matching	
	Full Comparison Group 48,056	Intervention Group 432	Standardized Difference	P ^a	Matched Comparison Group 432	Standardized Difference
Age, y mean (SD)	66.9 (11.5)	66.2 (11.1)	-6.10	.275	66.1 (12.1)	1.00
Female, %	61.40	60.60	-1.50	.759	61.30	-1.40
LIS, %	39.00	47.20	16.70	.001	44.20	6.00
Medicaid, %	21.60	26.90	12.20	.009	25.50	3.20
Urban, %	66.20	67.80	3.40	.671	66.20	3.50
White, %	85.60	85.00	-1.90	.557	83.60	3.80
Prescription count, mean (SD) ^b	61.0 (27.1)	60.3 (27.0)	-2.40	.505	59.4 (25.0)	3.50
RxRisk, mean (SD) ^b	5.8 (1.9)	5.8 (2.0)	2.20	.751	5.8 (1.9)	0.70
Hospitalization, % ^b	29.70	32.60	6.30	.189	30.60	4.50
Received MTMP intervention ^b	2.90	6.50	17.20	<.001	5.32	4.90
Received disease management ^b	23.20	29.40	14.00	.003	30.80	-3.00
Received disease management in 2008 ^c	21.20	35.60	32.50	<.001	35.20	1.00
Reached coverage gap 1st quarter 2008 ^c	10.50	20.60	28.20	<.001	18.30	5.90
Total medical costs, \$, mean (SD) ^b	10,476 (17,428)	13,183, (21,110)	14.00	<.001	11,935 (21,395)	5.90
Total drug costs, \$, mean (SD) ^b	3923 (3716)	5162 (4859)	28.60	<.001	5140 (5636)	0.40
Total costs, \$, mean (SD) ^b	14,399 (17,893)	18,346 (21,640)	19.90	<.001	17,075 (22,121)	5.80

LIS indicates low-income subsidy.

^aComparison between the intervention group and the full comparison group (χ^2 tests for categorical variables, *t* tests or Wilcoxon rank sum tests for continuous variables).

^bMeasured in the preintervention period.

^cIncluded in propensity score matching to ensure the intervention group and comparison group were similar on these potential confounding factors.

portant monitoring parameters and information on safety issues such as side effects. The pharmacist conducted a drug interaction check on all of the member's medications and assessed adherence by reviewing claims history and utilizing an adherence screening tool. To optimize the member's medication regimen, the pharmacist identified medication-related problems such as drug interactions, lower-cost alternatives, improper dosages or frequencies, improper drug selections, untreated conditions, and adverse drug reactions, and provided education to the member on how to resolve these problems. At the end of a telephonic consultation, the pharmacist sent a synopsis of the consultation to the appropriate prescribing physician(s) as well as a letter to the beneficiary.

Data Sources and Selection of Participants

The preintervention period was from April to December 2007, and the postintervention period was from April to December 2008. The time period for this analysis is shown in **Figure 1**.

All MAPD MTMP-eligible members defined as having 2 or more chronic conditions, 8 or more chronic, systemic Part D medications, and anticipated Part D medication costs of more than \$4000 annually were identified. Member selection criteria are shown in **Figure 2**. Members who were continuously enrolled in an MAPD plan during the study period (April 1, 2007, through December 31, 2008) were included. Members were excluded if they resided in a long-term care facility, had zero net-paid drug expenditures in the preintervention period,

■ **Table 2.** Unadjusted Healthcare Expenditures^a

Type of Expenditure	Intervention Group (n = 432)				Matched Comparison Group (n = 432)				DD ^d
	Pre	Post	Change ^b	% Change ^c	Pre	Post	Change ^b	% Change ^c	
Medical	\$13,184	\$9225	(\$3959)	(30.0)	\$11,935	\$12,066	\$131	1.1	(\$4090)
Pharmacy	\$5162	\$5441	\$279	5.4	\$5140	\$5402	\$262	5.1	\$17
Total	\$18,346	\$14,667	(\$3680)	(20.1)	\$17,076	\$17,468	\$393	2.3	(\$4072)

DD indicates difference in difference.
^aActual spending 9 months before and after the intervention.
^bPostintervention spending minus preintervention spending.
^cPostintervention spending minus preintervention spending divided by preintervention spending: (post – pre)/pre.
^dChange for intervention group minus change for matched comparison group.

or were in an HMO capitated plan at any time during the study period. Of the 1.3 million MAPD members enrolled in 2008, 144,939 members were eligible for the MTMP during intervention period. The intervention group consisted of members who received a pharmacist-provided telephonic MTMP consultation during the first quarter of 2008. A total of 432 members in the intervention group and 48,056 members in the full comparison group met the selection criteria. Because baseline spending and other characteristics were significantly different between members who received MTMP consultation and those who were eligible but did not receive MTMP consultation (see **Table 1** and the Results section), a propensity score–matched control group of 432 members was selected among those who were eligible for MTMP during the first quarter of 2008 but did not receive a consultation during either the intervention period (first quarter of 2008) or the postintervention period (April to December 2008).

Variables

The dependent variable of this study was healthcare expenditures. Different types of expenditures were measured in this study. Medical and outpatient pharmacy expenditures, including both plan cost and member out-of-pocket cost, were derived from Humana's claims data for each member in both the preintervention and postintervention periods. The total expenditures were calculated by summing the outpatient pharmacy expenditure and the medical expenditure.

The primary independent variable was whether a member received a pharmacist-provided telephonic MTMP consultation. This variable was measured as a dichotomous variable with 1 for members in the intervention group and 0 for members in the matched control group.

Other covariates included demographic characteristics assessed at the start of the intervention period (eg, member age, sex, ethnicity, low-income subsidy status) as well as clinical and economic characteristics assessed during the preintervention period, which included comorbidities measured through RxRisk score, hospitalization, spending, participation in dis-

ease management programs, and participation in MTMP consultation. Time was included as a dichotomous covariate with 1 indicating the postintervention period and 0 indicating the preintervention period.

The RxRisk is an enhancement of the Chronic Disease Score that was originally developed by von Korff and colleagues.⁸ It is derived from drug claims data and thus can use data from a narrow window of claims rather than the broader window that is typically necessary for a medical claims–based comorbidity score such as the Charlson Comorbidity Score. The RxRisk has been rigorously tested and has demonstrated concordance with the Charlson-Deyo score.^{9,10} A recent evaluation of RxRisk by Farley and colleagues showed that the nonweighted RxRisk has better predictive validity for costs than the weighted version.¹¹ This nonweighted version provides a simple count of the RxRisk conditions for a member. The nonweighted version was used in this study to identify the number of unique disease categories per member in the 9-month preintervention period.

Statistical Analyses

Unadjusted medical, outpatient pharmacy, and total healthcare expenditures were calculated for each member for both the preintervention and postintervention periods. Because members were not randomly assigned to the intervention group and comparison group, there could be selection bias between these 2 groups. Propensity score matching was used to select a matched comparison group with comparable observed baseline covariates. Propensity score matching is a commonly used method to reduce selection bias in observational studies.^{12,13} A logistic regression model was created to calculate the propensity score for each member, wherein the dependent variable in the model was a dichotomous variable with 1 indicating the member received telephonic consultation (intervention group) and 0 indicating no telephonic consultation (the comparison group). The propensity score was the probability of a member receiving the telephonic consultation based upon the predictive variables. The predictive variables

■ **Table 3.** Difference-in-Difference Regression Analysis of MTMP Intervention Effect on Total Healthcare Expenditures (GEE Parameter Estimates)^a

Variable	Coefficient Estimate	SE	95% Confidence Limits	Z	Pr > z
Intercept	9.643	0.217	9.218, 10.068	44.440	<.0001
Time (post vs pre)	0.064	0.075	-0.083, 0.211	0.850	.393
MTMP intervention	0.089	0.079	-0.065, 0.243	1.130	.259
Time and MTMP intervention interaction	-0.275	0.100	-0.471, -0.079	-2.750	.006
Age	-0.007	0.003	-0.012, -0.003	-2.940	.003
Sex (female vs male)	-0.104	0.069	-0.239, 0.031	-1.510	.131
Race (black vs white)	-0.059	0.097	-0.249, 0.132	-0.600	.546
Race (other vs white)	-0.159	0.159	-0.471, 0.153	-1.000	.317
Urban (vs rural)	0.023	0.067	-0.108, 0.154	0.350	.727
RxRisk score	0.101	0.021	0.060, 0.142	4.850	<.0001
Medicaid	0.034	0.085	-0.134, 0.201	0.400	.691
LIS	-0.056	0.083	-0.219, 0.107	-0.670	.501
Received MTMP intervention in 2007	0.450	0.165	0.127, 0.773	2.730	.006

GEE indicates generalized estimating equations; GLM, generalized linear model; LIS, low-income subsidy; MTMP, medication therapy management program; Pr, probability.

^aGLM model with log link, gamma distribution, and GEE estimates.

included in the logistic regression model were member age, sex, race, urban or rural resident, RxRisk score, low-income subsidy status, Medicaid status, whether a member participated in disease management programs anytime during the study period, whether a member was MTMP eligible in 2007, whether a member received an MTMP intervention in 2007, whether a member reached the coverage gap in 2007, whether a member reached the coverage gap in the first quarter of 2008, preintervention hospitalization, preintervention drug expenditures, preintervention medical expenditures, and number of prescription fills a member had in the preintervention period.

The low-income subsidy status of the members during the first quarter of 2008 was verified through the Humana prescription claims and enrollment data. These members have a different copayment structure and typically have a different socioeconomic status than other members, so it was important to use this variable in the matching process. After the propensity score (the predicted probability from the logistic regression model) was calculated, 1 to 1 matching was carried out to identify matched comparison members based on the propensity score. A greedy matching algorithm was used to select the best match.¹⁴ After propensity score matching, the standardized difference method was used to assess the balance between the intervention group and the matched comparison group on preintervention covariates.¹⁵ A standardized difference of less than 10% has been recommended as supporting the assumption of balance between the intervention and the matched control group.¹⁶ There were 432

members in the intervention group and 432 members in the matched comparison group.

Difference-in-difference regression analyses were conducted among the intervention and matched comparison group members to assess the intervention impact on medical, outpatient pharmacy, and total expenditures.¹⁷ The difference-in-difference regression used a gamma function and modeled μ_{it} as

$$\mu_{it} = e^{\beta_0 + \beta_1 Tt + \beta_2 P_i + \beta_3 Tt P_i + \beta_4 X_i}$$

where μ_{it} represents mean (healthcare expenditures) for member *i* at time *t*; *Tt* represents time (0 for preintervention period, 1 for postintervention period); *P_i* indicates whether a member was in the MTMP intervention group (0 for comparison group, 1 for intervention group); *Tt P_i* is the interaction between time and MTMP intervention; and *X_i* represents a vector of member-level demographic characteristics and other covariates that could potentially impact healthcare expenditures. These include member age, sex, preintervention comorbidity, low-income subsidy status, urban or rural resident, and whether a member received an MTMP intervention during the year prior to the MTMP intervention. The time variable controlled for the ways in which time influenced all members in the analysis, independently of MTMP intervention. The MTMP intervention variable captured overall differences between participating and nonparticipating members. The interaction of these 2 variables captured the difference in change in healthcare

Table 4. Difference-in-Difference Regression Analysis of MTMP Intervention Effect on Medical Expenditures (GEE Parameter Estimates)^a

Variable	Coefficient Estimate	SE	95% Confidence Limits	Z	Pr > z
Intercept	8.845	0.325	8.209, 9.481	27.240	<.0001
Time (post vs pre)	0.084	0.104	-0.120, 0.287	0.810	.421
MTMP intervention	0.113	0.109	-0.101, 0.327	1.030	.302
Time and MTMP intervention interaction	-0.405	0.143	-0.686, -0.124	-2.830	.005
Age	-0.002	0.004	-0.009, 0.005	-0.520	.604
Sex (female vs male)	-0.154	0.094	-0.339, 0.031	-1.630	.103
Race (black vs white)	-0.062	0.122	-0.302, 0.178	-0.510	.611
Race (other vs white)	-0.261	0.217	-0.687, 0.165	-1.200	.229
Urban (vs rural)	0.022	0.093	-0.160, 0.204	0.240	.813
RxRisk	0.120	0.030	0.061, 0.180	3.970	<.0001
Medicaid	0.015	0.126	-0.231, 0.261	0.120	.904
LIS	-0.112	0.119	-0.345, 0.121	-0.940	.347
Received MTMP intervention in 2007	0.525	0.214	0.106, 0.945	2.450	.014

GEE indicates generalized estimating equations; GLM, generalized linear model; LIS, low-income subsidy; MTMP, medication therapy management program; Pr, probability.

^aGLM model with log link, gamma distribution, and GEE estimates.

expenditures between members in the MTMP intervention group and the comparison group. That is, β_3 estimated the net effect associated with MTMP intervention, after controlling for other covariates and the trend effect.

Since healthcare expenditures are known to have a skewed distribution, a generalized linear model with log link and gamma distribution was used in the difference-in-difference regression analysis.¹⁸ The method of generalized estimating equations (GEE) was used to account for repeated measurement of the same member. Exponentiated coefficients from GEE analysis were interpreted as rate ratios between groups.¹⁷ For example, a coefficient estimate of -0.1 would be exponentiated to 0.90, which represents a 10% decrease in healthcare expenditures in the MTMP intervention group during the postintervention period relative to the matched comparison group and the preintervention period. A ratio of 1 indicates no difference between groups.

Statistical significance was set at .05. Separate models were constructed for medical, outpatient pharmacy, and total healthcare expenditures. All statistical analyses were conducted using the SAS Enterprise Guide, version 4.1 (SAS Institute Inc, Cary, North Carolina).

RESULTS

Member Baseline Characteristics

The preintervention characteristics and expenditure pattern for the full comparison group, intervention group, and matched

comparison group are shown in **Table 1**. A total of 432 members received the pharmacist-provided telephonic consultation in the first quarter of 2008 and met all other inclusion criteria. The full comparison group consisted of 48,056 MTMP-eligible members who did not participate in a consultation during 2008. Although members were allowed to have a prior MTMP consultation, only 6.5% of members of the intervention group and 2.9% of members of the full comparison group had received any MTMP consultation during the preintervention period. However, 29.4% of the intervention group participated in disease management in 2007 compared with 23.2% in the full comparison group. Intervention group members had higher preintervention mean total expenditures than did the full comparison group: \$18,346 versus \$14,399, respectively ($P < .001$).

After matching, the intervention group and matched comparison group had similar preintervention expenditures and characteristics, with standard differences for all preintervention covariates less than 10% after matching. The unadjusted medical, pharmacy, and total expenditures for the intervention group and matched control group are presented in **Table 2**. Members in the MTMP intervention group had an average reduction in total all-cause healthcare expenditures of \$3680 (postintervention expenditure minus preintervention expenditure) over a 9-month period, while members in the matched comparison group had an average increase in total all-cause healthcare expenditures of \$393. The intervention group experienced a decrease in medical spending of \$3959, while the matched comparison group had a slight increase of \$130

■ **Table 5.** Difference-in-Difference Regression Analysis of MTMP Intervention Effect on Pharmacy Expenditures (GEE Parameter Estimates)^a

Parameter	Coefficient Estimate	SE	95% Confidence Limits	Z	Pr > z
Intercept	9.375	0.197	8.988, 9.762	47.490	<.0001
Time (post vs pre)	0.052	0.044	-0.034, 0.138	1.180	.237
MTMP intervention	0.010	0.067	-0.122, 0.141	0.140	.886
Time and MTMP intervention interaction	-0.010	0.048	-0.105, 0.085	-0.210	.834
Age	-0.019	0.003	-0.024, -0.015	-7.850	<.0001
Sex (female vs male)	0.036	0.071	-0.104, 0.176	0.500	.616
Race (black vs white)	-0.028	0.126	-0.275, 0.218	-0.230	.822
Race (other vs white)	0.028	0.151	-0.269, 0.324	0.180	.853
Urban (vs rural)	0.014	0.068	-0.119, 0.148	0.210	.834
RxRisk	0.057	0.017	0.024, 0.090	3.430	.001
Medicaid	0.059	0.074	-0.086, 0.204	0.800	.424
LIS	0.037	0.083	-0.126, 0.200	0.450	.654
Received MTMP intervention in 2007	0.244	0.148	-0.04, 0.534	1.650	.099

GEE indicates generalized estimating equations; GLM, generalized linear model; LIS, low-income subsidy; MTMP, medication therapy management program; Pr, probability.
^aGLM model with log link, gamma distribution, and GEE estimates.

(-30% vs 1%). The drug expenditures increased for the intervention group at about the same rate as they did for the comparison group: \$279 versus \$262, respectively (5.4% vs 5.1%).

Difference-in-difference regression analysis (generalized linear model with GEE estimates) results are presented in **Table 3**, **Table 4**, and **Table 5**. In the total expenditure model (Table 3), the coefficient estimate of the interaction term of time and MTMP intervention was statistically significant (coefficient estimate -0.275, *P* = .006), which suggests that MTMP intervention was associated with net total healthcare expenditure savings after controlling for other covariates and the trend effect. As stated in the Methods section, exponentiated coefficients from these analyses were interpreted as rate ratios between groups. The coefficient of -0.275 was exponentiated to 0.76, which represents a 24% decrease in all-cause total healthcare costs in the MTMP intervention group during the postintervention period relative to the matched comparison group and the preintervention period. The coefficient estimate of the interaction term of time and MTMP intervention was also statistically significant in the medical expenditure model (coefficient estimate -0.405, *P* = .005) but not in the pharmacy expenditure model (coefficient estimate -0.010, *P* = .834), which suggests that the pharmacist-provided telephonic MTMP consultation was associated with savings in medical expenditures but not in pharmacy expenditures. Among the covariates, member comorbidity, measured through RxRisk score, was associated with higher

medical, pharmacy, and total expenditures; age was associated with lower pharmacy and total expenditures; and receiving MTMP intervention in the preintervention period was associated with higher medical and total expenditures.

DISCUSSION

The pharmacist-provided telephonic MTMP was associated with reduction in total expenditures in an MAPD plan. The intervention group experienced an average of \$3680 savings in all-cause total healthcare expenditures per participant over a 9-month period. MTMP intervention was associated with statistically significant cost savings even after adjusting for member demographic and clinical characteristics. This is an important finding for the Medicare program as the government and private insurers look for ways to optimize the value of the healthcare system. CMS estimates that just more than 10% of Medicare members have been MTMP eligible for years 2006 through 2009. With new guidelines for MTMPs benchmarked by CMS beginning in 2010, it is estimated that approximately 25% of Medicare members are MTMP eligible.^{19,20} If all MTMPs for MAPD members were able to achieve the savings found in this program, the savings could be significant. The results of the study indicate that ongoing MTMPs consisting of multiple consultations may be needed before reductions in all-cause total healthcare expenditures occur.

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Based upon our review of the published literature evaluating pharmacist-provided telephonic MTMP, the study used similar methodology by comparing those members who participated in MTMP with those who were eligible for services but declined participation.^{6,7} Prior studies from Health Alliance Plan and Kaiser Permanente Colorado have documented cost savings associated with pharmacist-provided telephonic MTMP. As noted previously, the Kaiser Permanente Colorado study found that MTMP was associated with an increase in drug expenditures while the Health Alliance Plan MTMP was associated with a decrease in drug expenditures. Although the Health Alliance Plan study estimated that drug costs increase as patients engage in MTMPs, our study estimated that drug expenditures increased at the same rate in the intervention and matched comparison groups (5.1% and 5.4%, respectively) over the study period. Increased drug costs reported in other studies may be due to better medication adherence as well as intensification of drug therapy. Prior to 2010, the broad criteria for MTMP eligibility and lack of established requirements and structure for enrolling, targeting, and providing interventions did not allow for evaluation of adherence in this study.

The estimated cost savings reported in this study were driven by a decrease in medical costs (over a 9-month period), whereby medical expenditures decreased by 30% in the intervention group compared with a slight increase of 1% for the matched comparison group. Similarly, the Health Alliance Plan study reported that both groups had a statistically significant decrease in medical costs over the 2006 plan year; however, there was not a statistically significant greater reduction in medical costs for those members who enrolled in the MTMP compared with those who declined enrollment. Although medical costs were not evaluated in the Kaiser Permanente Colorado study, those patients who opted in to the MTMP were more likely to be hospitalized than those who declined participation, which would have likely increased medical costs.

Other studies have reported findings on the cost avoidance from face-to-face consultations by pharmacists. Barnett and colleagues reviewed 7 years of medication therapy management-related claims from a multistate network of community pharmacists.²¹ Based on the pharmacists' self-assessment of the impact of the medication therapy management consultation, they projected the cost avoidance from the medication therapy management services. They estimated the mean cost avoidance per claim at \$93.78. The "Ten City Challenge" sponsored by the American Pharmacists Association Foundation showed the impact of a community pharmacist program for diabetes patients.²² The authors compared the change in medical and drug expenditures for an intervention group with

a national estimate for medical cost inflation. The drug expenditures for patients in the intervention group increased by 35% more than the projected increase for a comparison group of diabetes patients. The medical expenditures for the same patients decreased by nearly 20% compared with the projected costs for comparisons. The total net paid by the employers for the patients receiving pharmacist consultation increased by 3.8% less than the net paid for the comparison group, even after factoring in the payments to the pharmacies. A similar pattern of cost shifting occurred in the Asheville Project, wherein community pharmacists provided consultations to diabetes patients in North Carolina.²³ The authors reported a trend toward higher drug expenditures, but lower medical expenditures in diabetes patients who participated in the program. Hirsch and colleagues reported on the 3-year results from a community pharmacy MTMP for Medi-Cal members with HIV/AIDS.²⁴ In each year, mean predicted medication costs for non-antiretroviral therapy were approximately 30% to 40% greater in the intervention group than in the nonintervention group (eg, 2007: \$10,815 [\$538] vs \$8190 [\$252], respectively; $P < .001$); however, predicted expenditures for inpatient services were significantly lower (eg, 2007: \$3083 [\$293] vs \$5186 [\$300], respectively; $P < .001$).

It is important to note that all members in this study (including those in the full comparison group) were mailed quarterly reports from Humana regarding their medication utilization and other benefit information (SmartSummaryRx). These reports provided beneficiaries with information about the MTMP and how they could participate in the program for free. Outbound telephone calls were also made to the members with the highest drug utilization to encourage participation in either the face-to-face community pharmacist program or the telephonic program with Humana pharmacists. Few members chose to enroll in either program. Thus, strategies to enhance participation in MTMPs may be an important factor in their future impact.

Limitations

First, the present study used a quasi-experimental design and propensity-score matching to reduce the selection bias that is inherent in observational studies. However, it is quite possible that unmeasured factors differed between the intervention and comparison groups. For example, we do not know whether the members who chose to participate in MTMP had greater motivation to change or were generally more amenable to adopting positive medication use behaviors than members in the comparison group (who either declined a consultation or could not be reached). Considering that participants were proactively contacted and either agreed to participate or called to receive an intervention, it

is likely that they were seeking help and were motivated to adopt changes. Additionally, a prioritization process was used to target members with the greatest number of chronic conditions, the greatest number of Part D drugs, and the highest total costs; those patients may have had the greatest potential for change. It is unknown whether these savings can be created and sustained when members with lower total costs are targeted. The intervention and comparison groups may also have differed in their mix of disease states, providers, or other variables.

Second, because the MTMP is designed to provide personalized consultations regardless of disease state or provider, a great deal of heterogeneity exists among the participants. The measurement of clinical outcomes is challenging in that no clinical end point (eg, glycosylated hemoglobin, blood pressure) is common to all participants. The only common factors across all participants are the utilization of multiple drugs covered through Part D for multiple diseases and projected annual drug spending in excess of \$4000.

The true long-term cost savings from a single MTMP intervention are not known. In this study, the cost savings were measured across a 9-month period. It is not known whether the differences in spending patterns between the intervention and comparison members persisted beyond the first 9 months after the intervention. Although the results of this study indicate a reduction in all-cause total expenditures of a pharmacist-provided telephonic MTMP, there is not yet a benchmark for MTMP cost savings or program costs across Medicare. The cost associated with providing MTMP services was not taken into account when determining the decrease in all-cause total expenditures between the intervention and matched comparison groups.

This study did not assess a face-to-face community pharmacy MTMP because the sample size for the Humana community pharmacy MTMP during the first quarter of 2008 (54 participants) was too small to provide a valid assessment of the program. Thus, the findings are limited only to the type of telephonic program described in this report. Telephonic programs provide a very efficient approach for reaching MTMP-eligible members, because a small number of pharmacists can contact many patients throughout the country. To further increase efficiency and effectiveness, targeting algorithms could be used to direct the pharmacists toward the patients most likely to benefit from a telephonic consultation. Current research at Humana is focused on identifying the subsets of members who are at highest risk for medication-related problems and those who have benefited the most from various forms of MTMPs. Evaluations of MTMPs provided by community pharmacies will also be done.

CONCLUSIONS

A pharmacist-provided telephonic MTMP among MTMP-eligible MAPD members who received a consultation in the first quarter of 2008 was associated with lower postintervention medical and total expenditures compared with the expenditures in a matched comparison group. Participation in MTMP was low among MTMP-eligible MAPD members. It is unclear how the 2010 CMS-mandated changes for MTMPs will affect participation in and expenditures for programs similar to this MTMP.

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