A Pharmacist Telephone Intervention to Identify Adherence Barriers and Improve Adherence Among Nonadherent Patients with Comorbid Hypertension and Diabetes in a Medicare Advantage Plan

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ABSTRACT

BACKGROUND: Patients with comorbid hypertension (HTN) and diabetes mellitus (DM) are at a high risk of developing macrovascular and microvascular complications of DM. Controlling high blood pressure can greatly reduce these complications. Angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin II receptor blockers (ARBs) are recommended for patients with both DM and HTN by the American Diabetes Association guidelines, and their benefit and efficacy in reducing macrovascular and microvascular complications of DM have been well documented. Poor adherence, however, remains a significant barrier to achieving full effectiveness and optimal outcomes.

OBJECTIVE: To examine the effect of a brief pharmacist telephone intervention in identifying adherence barriers and improving adherence to ACEI/ARB medications among nonadherent patients with comorbid HTN and DM who are enrolled in a Medicare Advantage plan.

METHODS: Cigna-HealthSpring's medical claims data was used to identify patients with HTN and DM diagnoses by using ICD-9-CM codes 401 and 250, and at least 2 fills for ACEIs or ARBs between January 2013 and October 2013. Patients who failed to refill their medication for more than 1 day and had a proportion of days covered (PDC) < 0.8 were considered nonadherent and were contacted by a pharmacist by phone to identify adherence barriers. Two outcome variables were evaluated: The first was adherence to ACEIs/ARBs, defined as PDC during the 6 months following the phone call intervention. The second outcome variable was a categorical outcome of discontinuation versus continuation. Discontinuation was defined as not using ACEIs/ARBs during the 6-month post-intervention period. Patients who disenrolled from the plan in 2014 or were switched to another medication commonly used for treating DM and HTN were excluded from further analysis. Descriptive statistics were conducted to assess the frequency distribution of sample demographic characteristics at baseline. Multiple linear regression was conducted to assess the intervention effect on adherence during the 6 months post-intervention using the first outcome of post-intervention PDC, adjusting for baseline PDC and other covariates. Logistic regression was performed to assess the association between medication discontinuation and other baseline characteristics using the second outcome of discontinuation. Other control variables in the models included demographics (age, sex, language), physician specialty (primary care vs. specialist), health plan (low-income subsidy vs. other), Centers for Medicare & Medicaid risk score, Charlson Comorbidity Index, and number of distinct medications.

RESULTS: In total, 186 hypertensive diabetic patients, nonadherent to ACEIs/ARBs (PDC < 0.8), were included in the study. Of the 186 patients, 87 received the pharmacist phone call intervention. Among these patients, forgetfulness (25.29%) and doctor issues, such as having difficulty scheduling appointments (16.79%), were the most commonly reported barriers. After excluding those who switched from ACEIs/ARBs to another medication, 157 patients were included in the logistic regression model. Of those, 131 had continued using ACEIs/ARBs and were included in the linear regression model. The mean ($\pm$ SD) post-intervention PDC for the intervention group was 0.58 ($\pm$ 0.26) and for the control group 0.29 ($\pm$ 0.17). Intervention was a significant predictor of better adherence in the linear regression model after adjusting all the other baseline covariates (β = 0.3182, 95% CI = 0.19-0.38, P < 0.001). Other covariates were not significantly associated with better adherence. In the logistic regression model (discontinuation: 26 [yes]/131 [no]) for predicting medication discontinuation, patients who received intervention were more likely to continue using ACEIs/ARBs (OR = 3.56, 95% CI = 1.06-11.86), and those with a higher comorbidity index were less likely to continue using them (OR = 0.72, 95% CI = 0.53-0.99).

CONCLUSIONS: The brief pharmacist telephone intervention resulted in significantly better PDCs during the 6 months following the intervention as well as lower discontinuation rates among a group of nonadherent patients with comorbid HTN and DM. The overall PDC rates in both the intervention and control groups were still lower than the recommended 80%. Improving adherence to clinically meaningful values may require more than a brief pharmacist phone call. Incorporating motivational interviewing techniques with follow-up calls to address adherence barriers may be more influential in forming sustainable behavioral change and enhancing medication adherence.

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What is already known about this subject

- Telephone interventions have been shown to improve adherence among patients with diabetes mellitus (DM).
- Studies suggest that intensified care, including intensified patient counseling, education, and training programs, from a pharmacist can improve medication adherence among patients with DM and hypertension (HTN).

What this study adds

- Among a group of nonadherent elderly patients with comorbid HTN and DM in a Medicare Advantage plan, a brief telephone intervention by a pharmacist resulted in significantly better proportion of days covered (PDC) rates and lower discontinuation of angiotensin-converting enzyme inhibitors/angiotensin II receptor blockers during the 6 months following the intervention.
- The overall PDC rates in the intervention and control groups were still lower than the recommended 80%. Improving adherence to clinically meaningful values may require more than a brief pharmacist phone call.
- This study found forgetfulness (25.29%) and doctor issues, such as having difficulty scheduling appointments (16.79%), were the most commonly reported barriers. Incorporating motivational interviewing techniques with follow-up calls to address these adherence barriers may be more influential in forming a sustainable behavioral change and enhancing medication adherence.

Medication adherence is the essential link between prescribing a medication and treatment success and is crucial in achieving maximum effectiveness for favorable outcomes of prescribed regimens.¹⁻³ Adherence is defined as the extent to which a patient takes medications as they are prescribed and recommended by a health care provider.³⁻⁵ Literature reports that 20%-50% of patients do not adhere to their prescribed regimens, and the problem is more prominent in older adults, with 40%-86% of elderly patients reported to be nonadherent,^{1,3,6} as they often use more medications, experience a higher number of illnesses, and are at risk of age-related cognitive decline.^{2,7}

In the United States, 33%-69% of all medication-related hospital admissions are attributable to poor medication adherence, at an annual cost of \$100 billion.^{3,5} With more than 32 million Americans receiving prescription drug benefits from Medicare (through Medicare Part D or Medicare Advantage),⁸ research aimed at identifying barriers to adherence in this population and developing impactful interventions is greatly needed.

Diabetes mellitus (DM) and hypertension (HTN) are independent risk factors for cardiovascular (CV) diseases and major public health issues in the United States.^{9,10} In 2050, an estimated 50 million Americans will have DM and 100 million will have HTN.⁹ The conditions frequently coexist, with 70%-80% of DM patients also having HTN.^{9,11} Known as the deadly duet, the combination significantly increases the risk of macrovascular (including diseases such as stroke, coronary artery disease, and peripheral arterial disease) and microvascular (diabetic nephropathy, neuropathy, and retinopathy) DM complications.¹⁰ Controlling high blood pressure (BP) can greatly reduce these complications, including the CV risk,¹⁰⁻¹⁴ which accounts for 50%-80% of diabetic fatalities.^{9,10,13,15,16}

American Diabetes Association guidelines^{10,17-19} recommend angiotensin-converting enzyme inhibitors (ACEIs)/angiotensin II receptor blockers (ARBs) in the hypertensive regimen for patients with both DM and HTN, and their benefit and efficacy in reducing macrovascular and microvascular complications of DM have been well documented.^{10,19-22} Poor adherence, however, remains a significant barrier to achieving full effectiveness, with reported nonadherence rates to antihypertensive therapy among DM patients of 20%-23%,^{16,23,24} and has been linked to uncontrolled BP^{13,16,24-26} and CV morbidity and mortality among DM patients with HTN.^{16,24,27-29}

Telephone interventions have been shown to improve care among DM patients,³⁰⁻³³ and intensified care such as intensified patient counseling, education, and training programs from a pharmacist have demonstrated benefits in improving adherence among patients with DM³⁴⁻³⁸ and HTN,³⁹⁻⁴³ as well as among older adults in general.⁴⁴

Pharmacist-led interventions have also been shown to improve BP control among patients with HTN and DM.^{45,46} Pharmacists have also been influential in improving CV risk factors among older adult patients in general⁴⁷ and DM patients in particular.⁴⁸

The objective of this research was to examine the effect of a brief pharmacist telephone intervention in identifying adherence barriers and improving adherence to ACEI/ARB medications among nonadherent patients with comorbid HTN and DM who are enrolled in a Medicare Advantage plan.

Methods

Study Design, Data Sources, and Population

A retrospective cohort study was conducted using Cigna-HealthSpring's medical claims database. The protocol was reviewed and approved by the relevant Committee for the Protection of Human Subjects at the University of Houston.

The study population consisted of continuously enrolled members of the Medicare prescription drug plan in Texas from January 2013 to June 2014.

Data Files

Several computerized data files, including membership file, member summary file, institutional claims file, professional claims file, and pharmacy file, were used. Membership and member summary files include demographic, severity scores, and cost data for beneficiaries for each year. Institutional claims file include information on all inpatient claims. The files contain diagnostic information in the form of *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) codes, and procedure information in the form of Current Procedural Terminology codes. Professional claims contain information on all outpatient encounters. Pharmacy files contain Part D pharmacy data provided by a pharmacy benefits manager.

Inclusion Criteria. Patients who had a diagnosis of HTN and DM identified by ICD-9-CM codes 401 and 250 with at least 2 fills for ACEI or ARB therapy between January 2013 and October 2013 were included. Individual medications were identified and categorized as ACEIs/ARBs. Nonadherent patients between October 1, 2013, and December 31, 2013, were initially selected from the “failure to refill” report that is updated biweekly by the health plan to identify members of the plan who have failed to pick up their prescription medications for more than 1 day. Members also had to have a proportion of days covered (PDC) <80% for their ACEI/ARB medication before the intervention was included. The date of receiving the phone call intervention was defined as the index date, and the 6-month follow-up period was defined as the post-intervention period.

Intervention

A brief telephone intervention by a pharmacist was carried out among 87 patients randomly selected from the patients identified who were nonadherent to their ACEI/ARB medication between October 1, 2013, and December 31, 2013. Patients who were not contacted were in the comparator group. PDC is frequently used as a measure of patient adherence,⁴⁹ and 80% is the most commonly used cut-off point generally considered acceptable.^{5,24}

A pharmacist at the health plan contacted these patients by phone to identify potential adherence barriers. The pharmacist followed a standardized template in order to guide the conversation with the subject, provided appropriate education, and tried to address the patient concerns. The approved script was tailored to fit the subjects’ responses and included an introduction, an alert to the patients that their medication was past due for a refill, and targeted questions to identify barriers to medication adherence, which were to be followed up with individualized recommendations to deal with any issues identified (see Appendix for actual script). The discussion length varied by subject need and clinical judgment by the pharmacist, with most conversations lasting about 3-5 minutes. The pharmacist also contacted the patients’ physicians or pharmacies when possible to resolve the issues discussed with the patients. The barriers identified by the pharmacist during the phone call were documented.

Outcome Measures

The primary outcome was adherence to ACEIs and ARBs, defined as PDC during the 6 months following the implementation of the phone call intervention. Patients who disenrolled from the plan in 2014 or were switched to a diuretic or other medication were excluded from further analysis. PDC represents the proportion of days during the measurement period that are covered by prescription claims for ACEIs or ARBs. An index date defined as the intervention call date was identified.

The PDC during the 6 months following the index date was calculated by dividing the total number of days covered by ACEIs or ARBs by the total number of days in the measurement period (180 days).⁵⁰ If there was more than 1 prescription for an ACEI or ARB covering the same calendar day, the day was only counted once. If prescription fills for the same drug overlapped, the prescription start dates were adjusted to be the day after the previous fill had ended. Days supply that extended beyond the measurement period was truncated at 180 days. For the controls, an index date of October 1, 2013, was used, as it is the start date of the intervention. Baseline medication adherence was calculated as the PDC during the 6 months before the index date. Baseline and post-intervention PDC were calculated for the intervention and control groups, respectively.

Discontinuation was defined as not using any ACEIs/ARBs during the 6-month post-intervention period, excluding those who were switched to other drug classes used to treat DM and HTN. A switch was defined as using ACEIs/ARBs during the baseline period and using other drug classes to treat DM and HTN instead of ACEIs/ARBs, including calcium channel blockers, diuretics, beta-blockers, and alpha-blockers.

Statistical Analysis

Descriptive analyses were conducted to assess the frequency distribution of sample demographic characteristics at baseline. Student t-tests were conducted for continuous variables to assess the differences in mean values across the intervention and control groups. Chi-square tests were performed to assess the group difference for categorical variables across intervention and control groups. Bivariate analysis was conducted to assess the unadjusted association between the post-intervention PDC and each independent variable. Multiple linear regression was conducted to assess the intervention effect on adherence during the 6-month post-intervention period, adjusting for baseline PDC and other covariates. The outcome variable was the 6-month post-intervention PDC in the linear regression model. Logistic regression was performed to assess the association between medication discontinuation and other baseline characteristics. The outcome variable was categorized as discontinuation (yes/no) in the logistic model. Other control variables included demographics (age, sex, language), physician specialty (primary care vs. specialist), health plan (low-income subsidy vs. other), Centers for Medicare & Medicaid Services (CMS) risk score, Deyo’s Charlson Comorbidity Index (CCI),^{51,52} and number of distinct medications.

The CCI is constructed based on ICD-9-CM codes and assigns weights with a range of -1 to 6 for 19 major clinical conditions, depending on their adjusted relative risks.⁵¹⁻⁵³ The CMS risk score accounts for medication burden and disease severity and is calculated based on data taken from a large pool of beneficiaries to estimate the average predicted costs for each of the component factors (e.g., age, sex, low-income

A Pharmacist Telephone Intervention to Identify Adherence Barriers and Improve Adherence Among Nonadherent Patients with Comorbid Hypertension and Diabetes in a Medicare Advantage Plan

TABLE 1 Descriptive Statistics of the Baseline Sample Characteristics (N= 186)

	Total (N=186) Frequency (%)	Intervention Group (N=87) (%)	Control Group (N=99) (%)	P Value
Age (±SD)	70.91 (±9.22)	69.80 (±10.03)	71.87 (±8.39)	0.148
Sex				
Female	102 (54.84)	53 (51.96)	49 (48.04)	
Male	84 (45.16)	34 (40.48)	50 (59.52)	
Specialty group				
Special	74 (41.81)	37 (50.00)	37 (50.00)	0.482
Primary	103 (58.19)	57 (55.34)	46 (44.66)	
Language				0.107
English	156 (83.87)	77 (49.36)	79 (50.64)	
Spanish	30 (16.13)	10 (33.33)	20 (66.67)	
CCI (±SD)	0.62 (±1.51)	0.62 (±1.42)	0.62 (±1.60)	0.980
CMS risk score (±SD)	1.41 (±0.98)	1.53 (±1.08)	1.31 (±0.87)	0.119
Health plan				0.859
Low-income subsidy	100 (55.25)	47 (47.00)	53 (53.00)	
Other	81 (44.75)	37 (45.68)	44 (54.32)	
Number of distinct medications (±SD)	13.39 (±7.47)	13.21 (±7.88)	13.55 (±7.13)	0.759

Note: The frequency does not always sum up to the total due to missing value in some variables.

CCI= Charlson Comorbidity Index; CMS= Centers for Medicare & Medicaid Services; SD=standard deviation.

TABLE 2 Main Barriers Among Patients with Hypertension and Diabetes Receiving Phone Call Intervention (N= 87)

Main Barrier	Frequency	Percentage
Forgetfulness	22	25.29
Doctor	15	16.79
Adverse event	6	6.90
Cost and alternative source/insurance	5	5.75
Patient perception	5	5.75
Dose reduction	5	5.75
Pharmacy issue	3	3.45
Patient discontinued ^a	2	2.30
Denial	2	2.30
Lost medication	1	1.15
Interruption (admission)	1	1.15
Transportation	1	1.15
Unknown	19	21.84

^aDiscontinued for unspecified reason, without the supervision of physician.

status, individual disease groups). It consists of 189 disease classifications for use in risk adjusting of clinical outcomes in Medicare populations.^{54,55} The CCI and CMS risk score were included as continuous variables with a range of 0-8 and 0.26-5.13, respectively.

All statistical analyses were performed using SAS software package 9.3 (SAS Institute, Cary, NC) at a priori significance level of 0.05. Sample size estimation was conducted using GPower 3.1 statistical software (Informer Technologies, Walnut, CA). It was estimated that a total of 184 patients would be needed for a two-tail analysis using logistic regression at a 0.05 α -level and 0.20 β -level (80% power), and for a 1.7 odds ratio (OR), and approximately 185 patients would be needed for a multiple linear regression analysis with an effect size of 0.10.⁵⁶

Results

A total of 391 patients were identified as nonadherent to ACEIs/ARBs. Of those, 186 had diagnoses of HTN and DM and were included in the study. The descriptive baseline sample characteristics of those 186 patients are presented in Table 1.

Of the 186 patients, 87 had received the pharmacist phone call intervention. The 87 patients receiving the call were randomly selected from the patients who were identified as nonadherent

during the intervention implementation period. Nonadherent patients who were not contacted (n = 99) were considered in the control group. Among these patients, forgetfulness (25.29%) and doctor issues, such as having difficulty scheduling appointments (16.79%), were the most commonly reported barriers, followed by fear of adverse events (AEs) (6.90%) and cost and alternative alternative source/insurance (5.75%). The frequency distribution of these adherence barriers is presented in Table 2. All the P values of chi-square test results were statistically insignificant ($P > 0.050$), which indicated that these barriers did not vary across patients' age, sex, language, income, and prescribers' specialty group. Chi-square analysis results are presented in Table 3.

All 186 patients were continuously enrolled in the health plan and had records in the database, so our attrition rate was 0. However, 29 patients had switched to other drug classes for treating DM and HTN. After excluding those who switched, 157 patients were included in the logistic regression model. Of those, 131 had continued using ACEIs/ARBs and 26 completely discontinued using ACEIs/ARBs, but they were not switched to another drug class. The baseline sample characteristics of those 157 patients are presented in Table 4.

The linear regression model included the 131 patients who had prescription refill records of ACEIs or ARBs during the 6-month post-intervention period; 66 were in the intervention group and 65 were in the control group. The baseline sample characteristics of those 131 patients are also presented in Table 4. The mean (± standard deviation [SD]) post-intervention PDC for the intervention group was 0.58 (±0.26) and for the control group 0.29 (±0.17).

TABLE 3 Chi-square Analyses of Group Differences Among Patients with Hypertension and Diabetes Receiving Phone Call Intervention (N=87)

	Main Barrier			P Value
	Forgetfulness	Other Issues (Cost/ Pharmacy Doctor/Patient Perception/ Denial)	Unknown (Reason Was Not Reported by Patients)	
Age				
35-65	5	13	2	0.302
> 65	17	33	17	
Sex				
Male	11	14	9	0.212
Female	11	32	10	
Specialty group				
Special	9	19	4	0.077
Primary	11	24	13	
Income				
Low	13	24	10	0.858
Other	9	22	9	
Language				
English	18	42	17	0.512
Spanish	4	4	2	

Intervention was a significant predictor of better adherence (higher PDC) in the linear regression model after adjusting for all the other baseline covariates ($\beta=0.3182$, $P<0.001$). However, the other covariates were not significantly associated with better adherence. In the logistic regression model for predicting medication discontinuation, intervention and comorbidity index were found to be significantly associated with medication discontinuation. Patients who received intervention were more likely to continue using ACEIs/ARBs (OR=3.56, 95% CI=1.06-11.86). Patients with a higher CCI were less likely to continue using ACEIs/ARBs (OR=0.72, 95% CI=0.53-0.99). The other covariates were not found to be significantly associated with medication discontinuation. The results of the logistic regression model and the linear regression model are presented in Table 5.

Discussion

The study examined the influence of a brief pharmacist telephone intervention on identifying adherence barriers as well as on adherence to ACEI/ARB medications among nonadherent patients with comorbid HTN and DM enrolled in a Medicare Advantage plan. In our study, we found the pharmacist telephone intervention resulted in significantly better PDCs during the 6 months following the intervention as well as lower discontinuation rates. Forgetfulness (25.29%) and doctor issues, such as having difficulty scheduling appointments (16.79%), were the most commonly reported barriers.

Pharmacists have the knowledge base and expertise needed to provide medication-related education⁵⁷ and are now assuming an important role in chronic illness management.^{35,58} By providing patient education, monitoring medication use, communicating with other health care professionals regarding the patient drug experience, and actively taking steps to prevent medication discontinuation and address compliance issues, pharmacists can be influential in improving adherence,^{7,35,59} as adherence is likely to be higher when patients understand their disease and treatment.⁶⁰

The brief telephone intervention resulted in identifying several adherence barriers among this high-risk population, even though the reason for nonadherence was not reported in approximately 20% of the 87 patients contacted. The most commonly reported barrier was forgetfulness in approximately a quarter of the 87 nonadherent patients. Forgetfulness has been previously reported as an adherence barrier among elderly patients,⁶¹ patients with poorly controlled DM,⁶² and underserved patients with DM in Texas.⁶³ It is also commonly reported by hypertensive patients.^{61,64} Encouraging patients to relate pill-taking to daily activity and to use pill boxes and organizers, as well as suggesting the use of automated refill reminder programs, could potentially help patients remember to take their medication and improve their adherence.

Approximately 15% of the patients contacted reported a doctor-related issue, and the pharmacist contacting the physician may help resolve some of these concerns. Other barriers previously reported include cost,⁶¹⁻⁶⁴ side effects,^{61,63} transportation issues,⁶³ and hospitalization.⁶³ Switching the patients to generic medications when possible and obtaining a 90-day supply may help with cost issues.

Using positive framing when discussing AEs in the context of medication beliefs (most of the patients will not get an AE) may address some of the patient concerns. A commonly reported side effect for patients on ACEIs is a troublesome cough, and switching to an ARB is recommended if that develops.^{18,65,66} Therefore, if a patient complains about a cough, the pharmacist can suggest the switch to an ARB and contact the physician to implement the switch and fill the medication. Suggesting mail delivery can be an option for patients with transportation issues.

Other barriers, such as the patient's perceptions about the disease and treatment, and patient denial of the need for treatment can be a window for the pharmacist to provide patient education and make a difference in the patient's adherence. Pharmacy issues reported should be immediately addressed when possible by the pharmacist contacting the patient's pharmacy. Examples of pharmacy issues identified in this project include the patient waiting for the prescription to be transferred or the patient not receiving the medication because a pharmacist suspects a potential interaction with another medication taken by the patient.

A Pharmacist Telephone Intervention to Identify Adherence Barriers and Improve Adherence Among Nonadherent Patients with Comorbid Hypertension and Diabetes in a Medicare Advantage Plan

TABLE 4 Descriptive Statistics of Patients Included in the Linear and Logistic Regression Models

	Linear Regression Model				Logistic Regression Model			
	Total (N = 131) (%)	Adherent PDC > 0.8 (N = 25) (%)	Nonadherent PDC < 0.8 (N = 106) (%)	P Value	Total (N = 157) (%)	Discontinued Yes (N = 26) (%)	Discontinued No (N = 131) (%)	P Value
Intervention				<0.001 ^a				0.141
Yes	66 (50.38)	24 (36.36)	42 (63.64)		75 (47.77)	9 (12.00)	66 (88.00)	
No	65 (49.62)	1 (1.54)	64 (98.46)		82 (52.23)	17 (20.73)	65 (79.27)	
Age (±SD)	71.42 (±9.46)	70.63 (±8.30)	71.59 (±9.74)	0.669	71.53 (±8.97)	72.13 (±5.92)	71.42 (±9.46)	0.640
Sex				0.436				0.798
Female	72 (54.96)	12 (16.67)	60 (83.33)		87 (55.41)	15 (17.24)	72 (82.76)	
Male	59 (45.04)	13 (22.03)	46 (77.97)		70 (44.59)	11 (15.71)	59 (84.29)	
Specialty group								
Special	53 (41.73)	12 (22.64)	41 (77.36)	0.361	53 (41.73)	9 (14.52)	53 (85.48)	0.699
Primary	74 (58.27)	12 (16.22)	62 (83.78)		74 (58.27)	15 (16.85)	74 (83.15)	
Language								
English	110 (83.97)	20 (18.18)	90 (81.82)	0.547	134 (85.35)	24 (17.91)	110 (82.09)	0.272
Spanish	21 (16.03)	5 (23.81)	16 (76.19)		23 (14.65)	2 (8.70)	21 (91.30)	
CCI (±SD)	0.41 (±1.21)	0.52 (±1.15)	0.39 (±1.23)	0.648	0.59 (±1.55)	1.46 (±2.53)	0.41 (±1.21)	0.050
CMS risk score (±SD)	1.31 (±0.93)	1.57 (±0.96)	1.25 (±0.92)	0.126	1.38 (±0.96)	1.72 (±1.06)	1.31 (±0.93)	0.051
Health plan								
Low-income subsidy	71 (54.62)	16 (22.54)	55 (77.46)	0.294	86 (55.84)	15 (17.44)	71 (82.56)	0.474
Other	59 (45.38)	9 (15.25)	50 (84.75)		68 (44.16)	9 (13.24)	59 (86.76)	
Number of distinct medications (±SD)	12.76 (±7.49)	13.24 (±6.64)	12.65 (±7.70)	0.725	13.00 (±7.60)	14.19 (±8.17)	12.76 (±7.49)	0.383
Baseline PDC mean (±SD)	0.67 (±0.15)	0.64 (±0.14)	0.68 (±0.15)	0.167	—	—	—	—

Note: The frequency does not always sum up to total due to missing value in some variables.

^aIndicates significant finding.

CCI = Charlson Comorbidity Index; CMS = Centers for Medicare & Medicaid Services; PDC = proportion of days covered; SD = standard deviation.

The findings also indicate that the brief telephone intervention resulted in significantly better PDCs during the 6 months following the intervention and lower discontinuation rates among the intervention group compared with the control group. The overall 6-month PDC following the intervention was still low (58%), given that 80% adherence is generally considered acceptable.^{5,24}

Improving adherence to a clinically meaningful value may require more than a short phone call, especially because we want the behavioral change of improved adherence to be sustained. The transtheoretical model (TTM) of behavioral change recognizes that changing behavior involves progression through several stages as described in the stage-based models of behavior change,⁶⁷⁻⁶⁹ and benefits of TTM-based interventions among DM patients at various stages of readiness have been demonstrated.⁷⁰

Literature demonstrates that motivational interviewing (MI) is a promising form of intervention to aid in chronic illness care and promote self-management behaviors such as medication adherence.⁷¹ MI is a patient-centered form of guiding to explore ambivalence as well as elicit and strengthen motivation to change^{72,73} and is well suited for delivery by phone.⁷¹

MI fosters behavior change by contrasting the current behavior (medication adherence) to a desired goal (self-care, improved quality of life) as well as promoting self-efficacy in a way that is supportive, collaborative, empathetic, and evocative.⁷¹ As patients may be at different stages of behavioral change or willingness to change, the counseling is based on the patients' readiness and behavioral stage to minimize resistance and maximize engagement,⁷¹ in combination with setting target goals and resolving problems to build the patients' confidence in their ability to change.⁷⁴ MI is a way to help patients recognize their problem and empower them to do something about it, using strategies that are more persuasive than coercive or argumentative.⁷⁵

Future studies incorporating MI techniques to address patient adherence barriers coupled with follow-up calls to guide the patients may be more influential in improving medication adherence among high-risk patients with combined HTN and DM. MI has been used to promote behavioral changes in drug addiction, alcohol abuse, weight loss, and smoking cessation.⁷⁵ It has been shown to improve self-care for DM patients^{73,76} and enhance medication adherence among patients with several chronic illnesses, including HTN,⁷⁷ asthma,⁷⁸ and human immunodeficiency virus.⁷⁹

A Pharmacist Telephone Intervention to Identify Adherence Barriers and Improve Adherence Among Nonadherent Patients with Comorbid Hypertension and Diabetes in a Medicare Advantage Plan

TABLE 5 Results of Linear Regression Model and Logistic Regression Models

	Logistic Regression Model		Linear Regression Model	
	OR (95% CI)	P Value	β Coefficient (95% CI)	P Value
Intercept	—	—	0.1142 (-0.29-0.54)	0.594
Intervention		0.038 ^a	0.3182 (0.19-0.38)	<0.001 ^a
Yes	3.56 (1.06-11.86)			
No	Reference			
Age	1.01 (0.94-1.08)	0.697	-0.0007 (-0.004-0.004)	0.748
Sex		0.420	-0.0117 (-0.10-0.07)	
Female	Reference			0.795
Male	1.60 (0.51-5.07)			
Specialty group		0.747	0.0859 (-0.02-0.15)	0.067
Special	0.82 (0.25-2.64)			
Primary	Reference			
Language		0.925	0.1108 (-0.02-0.23)	0.098
English	Reference			
Spanish	1.08 (0.21-5.72)			
CCI	0.72 (0.53-0.99)	0.044 ^a	0.0229 (-0.018-0.050)	0.248
CMS risk score	0.55 (0.30-1.01)	0.051	0.0089 (-0.05-0.06)	0.759
Health plan		0.226	-0.0072 (-0.105-0.080)	0.883
Low-income subsidy	Reference			
Other	2.07 (0.63-6.74)			
Number of distinct medications	1.07 (0.96-1.20)	0.184	0.0026 (-0.005-0.009)	0.513
Baseline PDC	—	—	0.1928 (-0.20-0.45)	0.251

^aIndicates significant finding.

CCI = Charlson Comorbidity Index; CI = confidence interval; CMS = Centers for Medicare & Medicaid Services; OR = odds ratio; PDC = proportion of days covered.

The associations between comorbidity and medication adherence have been variable in previous literature.^{53,80-82} In this study, CMS risk scores were not associated with ACEI/ARB discontinuation or PDC levels following the intervention. Patients with higher CCI scores were more likely to discontinue their ACEIs/ARBs, possibly due to increased regimen complexity with more comorbidities.⁸³

Limitations

Several limitations to this study can be described. Filling the prescription does not guarantee the patient took the medication, but prescription refill rates are a relatively accurate measure of overall adherence.^{2,5} We were unable to capture prescriptions that were filled from pharmacies outside the network or paid by cash. We were unable to ascertain if the ACEIs/ARBs were prescribed for HTN and DM or other medical conditions using the claims data. The patients had diagnosis records of both DM and HTN and had prescription fill records of ACEIs/ARBs, so we assumed these medications were prescribed for DM and HTN. We were also unable to identify whether patients had a primary diagnosis of DM and a secondary diagnosis of HTN or vice versa, which is another limitation of the claims database.

Other limitations include lack of comprehensive clinical data and information on potential confounders like race, side effects, low health literacy, and perceived health. Randomization in future studies can help overcome some of these limitations. We also could not account for use of samples or hospitalizations during a follow-up period.

Conclusions

This study demonstrated that the brief pharmacist telephone intervention resulted in significantly better PDCs during the 6 months following the intervention and lower discontinuation rates in a group of nonadherent patients with comorbid HTN and DM. The overall PDC rates in both the intervention and control groups were still lower than the recommended 80%. Improving adherence to clinically meaningful values may require more than a brief pharmacist phone call. Incorporating MI techniques with follow-up calls to address adherence barriers may be more influential in forming sustainable behavioral change and enhancing medication adherence.

While the cost of such adherence improvement programs may be somewhat high given the pharmacist time needed, significant savings can be reflected in less physician and emergency room visits and decreased hospitalization of high-risk patients. Such savings may prove cost-effective to health plans and the health care system as a whole.

A Pharmacist Telephone Intervention to Identify Adherence Barriers and Improve Adherence Among Nonadherent Patients with Comorbid Hypertension and Diabetes in a Medicare Advantage Plan

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DISCLOSURES

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Study design was created primarily by Abughosh and Fleming, with help from the rest of the authors. Abughosh, Serna, Henges, and Masilamani collected the data, with data interpretation performed by Wang, Essien, Chung, and Abughosh, assisted by Fleming. The manuscript was written by Abughosh, along with Wang and assisted by Serna, Fleming, and Essien. Abughosh and Wang took the lead in manuscript revision, with assistance from the other authors.

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A Pharmacist Telephone Intervention to Identify Adherence Barriers and Improve Adherence Among Nonadherent Patients with Comorbid Hypertension and Diabetes in a Medicare Advantage Plan

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A Pharmacist Telephone Intervention to Identify Adherence Barriers and Improve Adherence Among Nonadherent Patients with Comorbid Hypertension and Diabetes in a Medicare Advantage Plan

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A Pharmacist Telephone Intervention to Identify Adherence Barriers and Improve Adherence Among Nonadherent Patients with Comorbid Hypertension and Diabetes in a Medicare Advantage Plan

APPENDIX Medication Adherence Call (for Nonadherent Members)

Member Information

Name (last, first): _____ Date: _____

DOB: _____ Age: _____ Sex: M F

Part D STARS Adherence Measures

Nonadherent measures: DM HTN Statin

PDC of nonadherent measures: DM HTN Statin

Nonadherent measures:

Last fill date:

Days since last fill:

Hello, my name is <Your Name> and I am a pharmacist/pharmacy intern calling from Cigna-HealthSpring, your health insurance company. The specific medication(s) I am speaking about is/are: <medication name>.

The reason for this call is to see if there is anything I can assist you with in order to ensure that you receive this/these medication(s).

I am contacting you because I have taken a look at your pharmacy claims information and have noticed that you have not picked up certain medication(s). Please let me know what, if anything, has caused you difficulty in picking up this/these medication(s). Possible reasons could include:

Cost	Adverse effects (experienced or potential)	Transportation issues	Forgetfulness
Interruption (ex.: hospitalization, travel)	Receiving samples/receiving patient assistance	Does not feel medication is necessary	Out of refills
Reduction of dose (ex.: 2 pills → 1 pill)	No longer sees prescribing MD	Discontinuation by MD	

Other:

Thank you for addressing this issue with me. Based on your concerns, here are some recommendations I have for you in order to ensure that you are able to take your medications.

1) _____

2) _____

3) _____

Thank you for your time.